

**Template for Submission of Scientific Information  
to Describe Areas Meeting Scientific Criteria for  
Ecologically or Biologically Significant Marine Areas**

**Title/Name of the area:** Gulf of Mannar, Sri Lanka

**Presented by** (*names, affiliations, title, contact details*)

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**Abstract** (*in less than 150 words*)

Gulf of Mannar is a repository of over 3,600 species of plants and animals and the first biosphere reserve in the South-East Asian region. It is one of the most biologically diverse coastal regions in the planet earth. It is also among the largest remaining feeding grounds for the globally endangered species namely dugong. Five different species of endangered marine turtles, innumerable fish, mollusks and crustaceans are also found here. The Gulf of Mannar region supports a variety of habitats within the main ecosystems of coastal lagoons, sea grass beds and coral reefs. Due to the high productivity of the area, it is an important fishing ground both for India and Sri Lanka. The marine environment and the aquatic species in the GOM are subjected to a great threat at present mainly due to use of harmful fishing methods/gear and extensive use of marine resources. Thus it is paramount important for both countries to safeguard the ecological status and sensitivity of this system.

**Introduction**

*(To include: feature type(s) presented, geographic description, depth range, oceanography, general information data reported, availability of models)*

The Gulf of Mannar (GOM) is an ecologically important critical habitat shared by India and Sri Lanka. The biodiversity of the ecosystems in the Gulf of Mannar is very high and support economically important resources such as finfish, crustaceans, mollusks and marine plants. It is also the area of distribution of the endangered dugong and sea turtles. In the Sri Lankan side of GOM, scientific information on the coastal and marine environment is scanty at best and there are large information gaps as the area was out of bounds for scientific research due to the internal conflict that prevailed in Sri Lanka during the last three decades. The Palk Bay and the Gulf of Mannar covering an area of 10,500 sq. km are biologically rich and rated among the highly productive seas of the world. As shown by the satellite image (Fig. 1) it is a unique area with high biodiversity linking two large marine ecosystems namely the Gulf of Mannar and the Bay of Bengal.

The Indian part of the Gulf of Mannar has been declared as Marine Biosphere reserve in 1989. It is also recognized under UNESCO MAB Programme (Man and Biosphere) for their value in conservation and management of natural resources through scientific research and monitoring to support sustainable development of resources. In the Sri Lankan part of the Gulf, the Bar reef has been declared as a Marine Sanctuary, considering the necessity of preservation for sustainability of coastal fisheries. The Bar Reef Marine Sanctuary (BRMS) is

the largest of the Marine Protected Areas (MPAs) in Sri Lanka covering an area of 306 sq km, located west of the Kalpitiya Peninsula in the northwestern coastal waters and borders the Puttalam Lagoon. This is the only location in Sri Lanka that has many coastal ecosystems (coral reefs, mangroves, seagrass beds, coastal sand dunes / spits, and a large lagoon) in a single area. Direct movement of several species of fish between the coral reefs of Bar Reef and the Puttalam Lagoon have been identified. Some of the fish species are economically important, e.g. *Epinephelus malabaricus*, *Siganus lineatus* and *Lutjanus argentimaculatus*. The main purpose of declaring the BRMS was to protect the coral reefs, their biota and to safeguard abundant fish stocks. The large extent of the BRMS ensures that there is adequate space for spawning aggregations and for juveniles to move among various habitats that form the nursery grounds.

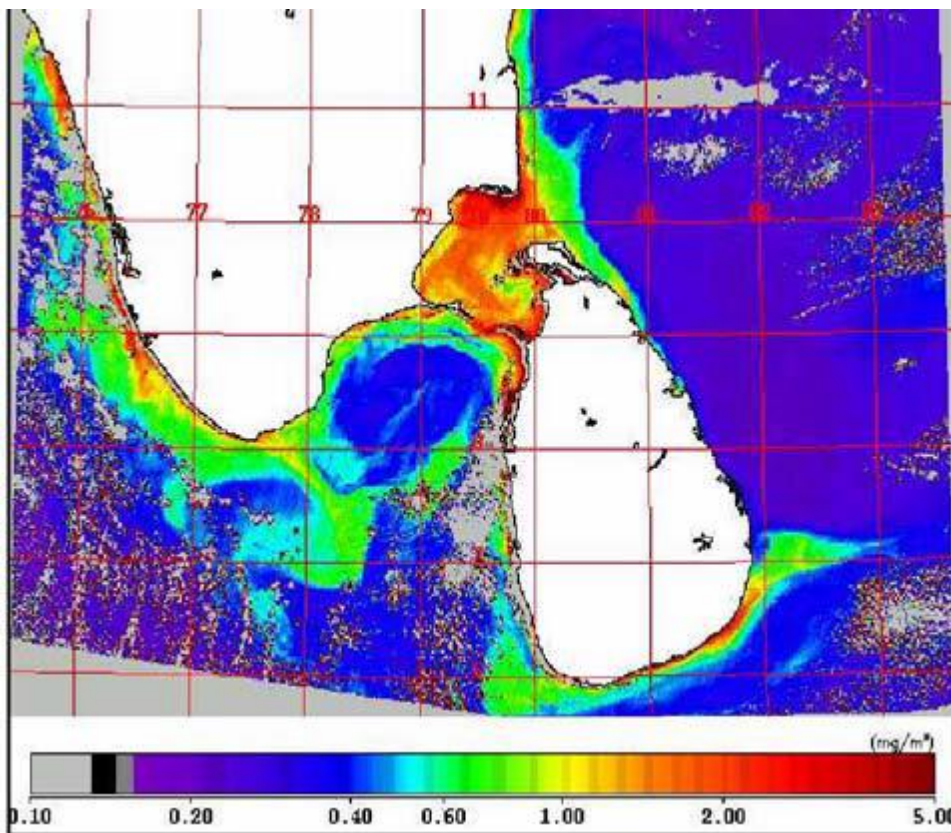


Fig. 1 **Satellite Image of the region**

#### **Location**

*(Indicate the geographic location of the area/feature. This should include a location map. It should state if the area is within or outside national jurisdiction, or straddling both.)*

Gulf of Mannar (Sri Lankan side) is situated on the northwest coast of Sri Lanka, between Mannar island to the north and Silawathurai reef and Silawathurai to the south. The Gulf of Mannar lies between Lat. 8°N and 9°N; Long. 78°E and 79°E i.e. North East of Sri Lanka and South East of India.

### **Feature description of the proposed area**

*(This should include information about the characteristics of the feature to be proposed, e.g. in terms of physical description (water column feature, benthic feature, or both), biological communities, role in ecosystem function, and then refer to the data/information that is available to support the proposal and whether models are available in the absence of data. This needs to be supported where possible with maps, models, reference to analysis, or the level of research in the area)*

### **Climate**

Gulf of Mannar is generally having tropical weather conditions throughout the year due to their geographical location. The wind over this area is predominantly northeasterly from December to February when the northeast monsoon is in effect over the island. Therefore the sea surface currents in open water also move northeasterly direction along these areas, which are being deflected to the right by the Coriolis force. During which slight to moderate (10 to 15 knots) with swell height about 1 to 2 m sea conditions are noticed due to the prevailing wind stream of northeastrelies. During intermonsoon periods (March to April and October to November) wind is generally calm (less than 10 knots) and no definite direction is noticed. During this period smooth sea condition is observed with the swell height about 0.5 meters. Somewhat fairly steady strong westerly winds (10 to 25 knots) are blown from May to September, when the southwest monsoon prevails over the island. During this period southwesterly currents are observed in open water, which are deflected to the right by the Coriolis force. Moderate to rough sea conditions are prevailed with swell height about 1.5 to 2.5 m during this period.

The annual average temperature over these areas is generally lies between 27 °C to 28 °C. The annual average atmospheric pressure over this area is about 1009 milli bars. Tropical Cyclones, which affected to Sri Lanka, usually crossed the Eastern and the Northern parts of Sri Lanka and passed through the Gulf of Mannar and the Palk Strait to Indian sub continent. With these events high surface winds (more than 60 knots) and very high sea conditions with the swell height about 9 to 14 meters are prevailed over these areas.

### **Hydrology**

The salinities of the Bay of Bengal are generally lower than the oceanic mean salinity (35 psu), while the salinities of the Arabian Sea is high up to 36.5 psu, which is due to high evaporation and hardly no freshwater input. The seasonal difference of sea surface salinity around the Island is about 2 psu. Seasonal salinity and temperature at Gulf of Mannar and east part of Palk strait are shown in Figs. 2a and b, respectively.

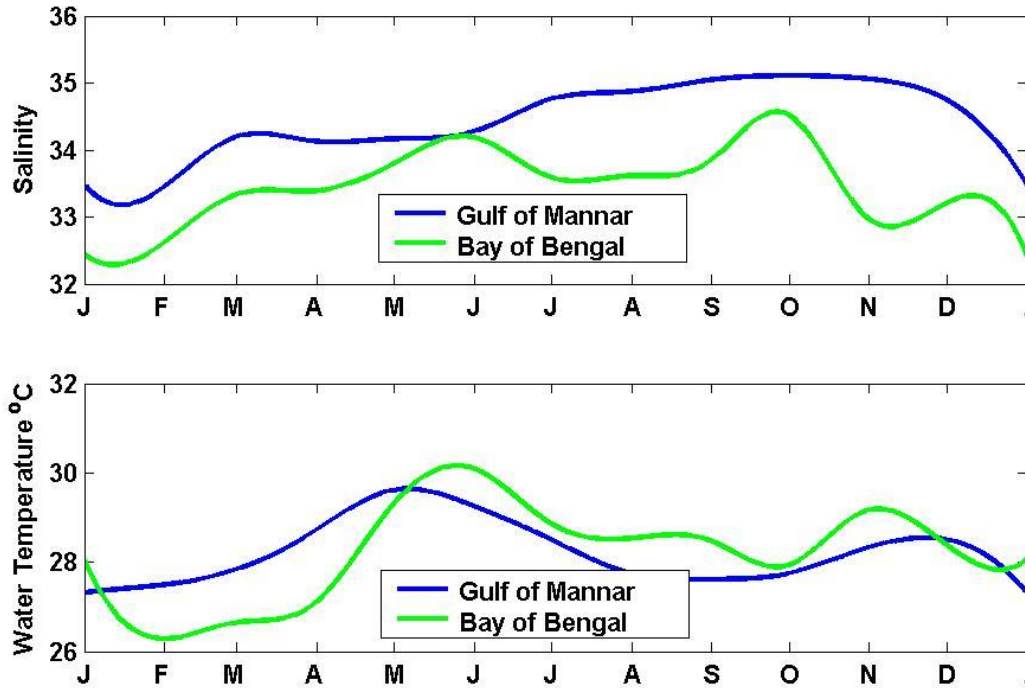


Fig. 2. Surface salinity and temperature variation in Gulf of Mannar and East Part of Palk Strait (Source: Wijeratne, 2004)

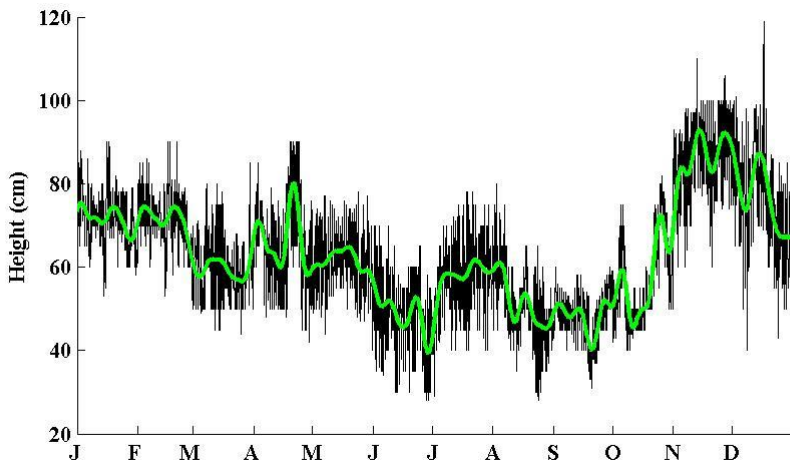


Fig. 3. Seasonal sea level variability at Karinager

Tide is mixed semi-diurnal and the average spring tidal range of the region is about 0.35 m. Remarkable feature is that the tidal phase is strongly varies, The seasonal sea level range is

about 0.40 m with maximum height in December-January and minimum in September-October (Fig. 3).

### **Circulation and flushing**

Circulation in Palk Strait and Palk Bay during SW monsoon is clockwise and it is reverses during NE monsoon. Adams Bridge restricts water exchange between Gulf of Mannar and Palk Pay, but strong currents exceeding  $1 \text{ ms}^{-1}$  appears at openings in between Adams Bridge Islands during both monsoons, however, there are no field data to compare the simulated currents. Flushing time of Palk Strait and Palk Bay area during NE monsoon is about 30 days and it exceeds more than 45 days during SW monsoon.

### **Sea grass**

Sea grasses are submerged marine angiosperms having adaptation to survive in the saline environment. There are several species of sea grasses occur in the Gulf of Mannar. Of these, *Thalassia*, *Halophila*, *Halodule*, *Enhalus* and *Cymodocea* are common. *Thalassia* and *Syringodium* are dominant in the areas of coral reefs whereas the others are distributed in muddy and fine sandy soils. Many species of crustaceans, molluscs, gastropods, sponges and fish inhabit the world of coral reef and sea grasses there. The sea grass communities are valuable habitats for commercially valuable aquatic species such as the shrimps.

### **Mangroves**

Mainland fringing and island fringing mangroves are the type of mangroves observed in Mannar (Table 1). Major mangroves areas bordering to the coast of Gulf of Mannar are found in the areas Achchankulam, Nrivillukulum, Vankalai and just north of the Mannar town (Kanankottiko).

**Table 1. :Mangrove and associated species encountered in the area**

<b>True mangrove species</b>
<i>Sonneratia casseolaria</i>
<i>Avicennia marina</i>
<i>Pemphis acidula</i>
<i>Rhizophora mucronnata</i>
<i>Lumnitzera racemosa</i>
<b>Associated species (in the scrub forest)</b>
<i>Prospis juliflora</i> ;
<i>Bengolensis spp;</i>
<i>Bengolensis spp;</i>
<i>Cassia auriculata;</i>
<i>Cactus spp;</i>
<i>Premna intergifolia</i>

## **Corals**

There are extensive coral reef ecosystems in the Gulf of Mannar in India and well as in Sri Lanka (Rajasuriya et al. 2002). In Sri Lanka, the largest coral reefs are found in the Gulf of Mannar from Kalpitiya Peninsula to Mannar Island (Rajasuriya & White 1995). There are four large coral reefs namely the Bar Reef on the west of the Kalpitiya Peninsula, Silavathurai, Arippu and Vankalai. These large coral reefs are mainly 'patch reefs' located offshore from 1-2 km to more than 10 km away from the coastline. All of these coral banks are in very shallow water up to about 5m depth and the deepest coral banks do not exceeding 15m. The dominant forms are branching, foliose and massive corals belonging to the genera of *Acropora*, *Montipora*, *Echinopora*, *Pocillopora* and *Porites* (Rajasuriya et al. 1998). However the overall species diversity of these reefs is very high with more than a 100 species of reef building corals recorded for the Bar Reef alone (Rajasuriya et al. 1998). The stony corals recorded from the southern Gulf of Mannar is shown in Table 2. The famous pearl banks of Sri Lanka are located to the west of the reef system from Silavathurai to Vankalai. In addition to large banks of patch reefs there are extensive sandstone/beachrock reef habitats, which support a variety of marine life, most of which are important economically.

Table 2. Stony corals recorded from the southern Gulf of Mannar

<b>Acroporidae</b>	<i>Turbinaria peltata</i>	<i>Lobophyllia</i> sp.
<i>Acropora aculeus</i>	<i>Turbinaria</i> sp.	<i>Cynarina lacrymalis</i>
<i>A. anthocercis</i>	<b>Faviidae</b>	<b>Merulinidae</b>
<i>A. cytherea</i>	<i>Favia favius</i>	<i>Hydnophora exesa</i>
<i>A. danai</i>	<i>F. maxima</i>	<i>H. microconos</i>
<i>A. divaricata</i>	<i>F. pallida</i>	<i>Hydnophora</i> sp.
<i>A. Formosa</i>	<i>F. veroni</i>	<b>Oculinidae</b>
<i>A. humilis</i>	<i>F. rotundata</i>	<i>Galaxea astreata</i>
<i>A. hyacinthus</i>	<i>F. speciosa</i>	<i>G. fascicularis</i>
<i>A. microphthalma</i>	<i>F. spp.</i>	<b>Pectinidae</b>
<i>A. millepora</i>	<i>Montastrea curta</i>	<i>Mycodinium elephantosus</i>
<i>A. nobilis</i>	<i>M. valenciennesi</i>	<i>Echinophyllia aspera</i>
<i>A. robusta</i>	<i>Diploastrea heliopora</i>	<i>E. sp.</i>
<i>A. secale</i>	<i>Plesiastrea versipora</i>	<b>Poritidae</b>
<i>A. solitaryensis</i>	<i>Goniastrea aspera</i>	<i>Porites</i> spp.
<i>A. valenciennesi</i>	<i>G. pectinata</i>	<i>Goniopora stokesi</i>
<i>A. yongei</i>	<i>G. retiformis</i>	<i>G. sp.</i>
<i>Montipora aequituberculata</i>	<i>Platygyra daedalea</i>	<i>Alveopora verrilliana</i>
<i>M. danae</i>	<i>P. lamellina</i>	<i>A. fenestrata</i>
<i>M. foliosa</i>	<i>P. pini</i>	<i>A. sp.</i>
<i>M. millepora</i>	<i>P. sinensis</i>	<b>Pocilloporidae</b>
<i>M. monasteriata</i>	<i>Leptoria phrygia</i>	<i>Pocillopora damicornis</i>
<i>M. undata</i>	<i>Leptastrea purpurea</i>	<i>P. eydouxii</i>
<i>M. verrucosa</i>	<i>L. transversa</i>	<i>P. verrucosa</i>
<i>Astreopora gracilis</i>	<i>Cyphastrea Chalcidicum</i>	<i>P. sp.</i>
<i>A. forbesi</i>	<i>C. seralia</i>	<i>Stylophora pistillata</i>
<b>Astrocoeniidae</b>	<i>Echinopora lamellosa</i>	<b>Siderastreidae</b>
<i>Stylocoeniella guentheri</i>	<i>Oulophyllia crispa</i>	<i>Coscinaraea columna</i>
<b>Agariciidae</b>	<b>Fungiidae</b>	<i>C. sp.</i>
<i>Pavona decussata</i>	<i>Cycloseris costulata</i>	<i>Pseudosiderastrea tayamai</i>
<i>P. maldivensis</i>	<i>C. cyclolites</i>	<b>Thamnasteriidae</b>
<i>P. minuta</i>	<i>C. patelliformis</i>	<i>Psammacora configua</i>
<i>P. varians</i>	<i>Diaseris distorta</i>	<b>Milleporidae</b>
<i>P. venosa</i>	<i>D. fragilis</i>	<i>Millepora exaesa</i>
<i>Gardineroseris planulata</i>	<i>Fungia (Danafungia) dan.</i>	<i>M. platyphyllia</i>
<i>Leptoseris explanata</i>	<i>F. (Ctenactis) echinata</i>	<i>M. sp.</i>
<i>L. mycetoseroides</i>	<i>F. (Verrilofungia) repanda</i>	<b>Stylasteridae</b>
<i>L. papyracea</i>	<i>F. (Pleuractis) scutaria</i>	<i>Distichopora violacea</i>
<i>Pachyseris rugosa</i>	<i>F. fungites</i>	
<i>P. speciosa</i>	<i>Podabacia crustacea</i>	
<b>Caryophyllidae</b>	<i>Polyphyllia talpina</i>	
<i>Paracyanthus</i> sp.	<i>Sandalolitha robusta</i>	
<i>Euphyllia</i> sp.	<i>Zoopilus echinatus</i>	

<i>E. ancora</i>	<b>Mussidae</b>	
<i>Catalaphyllia jardinei</i>	<i>Acanthastrea echinata</i>	
<i>Plerogyra sinuosa</i>	<i>Australomussa rouleyensis</i>	
<b>Dendrophylliidae</b>	<i>Symphyllia agaricia</i>	
<i>Heteropsammia cochlea</i>	<i>S. radians</i>	
<i>Tubastrea micrantha</i>	<i>S. cf. recta</i>	
<i>Tubastrea</i> sp.	<i>S. cf. valenciennesi</i>	
<i>Dendrophyllia</i> sp.	<i>Symphyllia</i> sp.	
(Source: Rajasuriya et al., 1998b)		

## **Coral reef habitats of Bar Reef**

Bar Reef includes coral and sandstone reef habitats. The coral habitats are situated between 3 and 8 km from the shore and are in shallower water than the sandstone/limestone reef habitats. The depth of the coral reef habitats vary from exposed shallow reef crests at low tide to about 10m. In the Bar Reef coral patches vary in extent from a few meters to hundreds of meters and are dominated by branching *Acropora* spp, and foliaceous *Echinopora lamellosa* corals (Rajasuriya, et al 1998). There are two major coral areas within the Bar Reef Marine Sanctuary. A shallow extensive coral area is located between 3 and 6 km from the shore. The deeper (10m) coral area is further offshore about 4km northwest of the shallow coral area. The western edge of both the shallow and the deep coral areas exhibit spur and groove reef formations where narrow patches of sand separate coral patches aligned in a northeast-southwest direction. Four coral reef habitats have been distinguished in the Bar Reef; these are the shallow reef flat (SRF), the shallow patch reef (SPR), the deep reef flat (DRF) and the *Porites* dome (POD) (Rajasuriya et al. 1998).

The shallow reef flats (SRF) are generally 100-200m across and were at an average depth of about 3m containing large monospecific stands of branching *Acropora* with smaller patches of *Echinopora lamellosa* and *Montipora* spp as well as areas of coral rubble and sand. The appearance of the SRF was typical of homogeneous *Acropora* dominated coral habitats. It had the highest live coral cover (~ 80%), but was relatively low in richness and diversity of coral genera. Three genera *Acropora* (*A. Formosa*, *A. nobilis*, *A. microphthalma*), *Montipora aequituberculata* and *Echinopora lamellosa* dominated the homogeneous coral banks. However the dominant of the three was *Acropora* spp. These large coral patches also contained small areas of *Pocillopora damicornis*, *P. verrucosa* and tabulate *Acropora* spp (*A. hyacinthus*, and *A. cytherea*).

The shallow patch reefs (SPR) are at a depth of 4m, they are smaller than the coral patches of SRF and are dominated by branching and tabulate *Acropora* spp. The SPR consisted of spur and groove coral banks. It had a slightly higher average number of coral genera at 2.5 per 50m line transect compared to the SRF (average < 2 coral genera). The SPR was also dominated by *Acropora*, whilst other genera (*Montipora*, *Favites*, *Favia*, *Pocillopora*, *Echinopora*, *Acanthastrea*, and *Porites*) represented an average of 1% from the total coral cover. In structural complexity it was similar to the SRF. However, the SPR had the highest substrate composition diversity among all the coral habitats of the Bar Reef.

The deep reef flat (DRF) had the single largest coral bank within the BRMS and is located further offshore at a depth of about 8m. It contained extensive areas of branching *Acropora* and substantial growth of tabulate *Acropora*. Its structural complexity was lower than the other habitats. The lowest number of coral genera was recorded from the DRF although its live coral cover was second highest in the Bar Reef. It also had 37% dead coral.

The *Porites* dome habitat (POD) was located in the northwestern edge of the DRF and was at an average depth of 10m. The highest structural complexity was recorded in this habitat, which was dominated by large *Porites* domes of about 5m in diameter. Patches of branching *Acropora* and substrate of sandstone/limestone were found among the *Porites* domes. Live coral cover was < 20% whilst the dead coral, substrate and coral rubble was higher than in the other habitats. On average there were 2 coral genera per 50 m line transect.

## **Sandstone reef habitats of Bar Reef**

Two distinct habitats, namely Structured Sandstone Reefs (SSR) and Flat Sandstone Reefs (FSR) were identified (Rajasuriya et al. 1998). The SSR occurred as discontinuous bands



parallel to the shoreline at an average depth of 19m. They form a network of long platforms, each 1- 2 km in length with a relief up to about 4m and with overhanging ledges with crevasses along the eastern and western margins. The average live coral cover was about 15% but the SSR supported the highest coral species diversity. The main coral genera were *Favia*, *Favites* and *Acropora* but also contained most of the coral genera found in other habitats. Large domes of *Diploastrea* (3m diameter), and colonies of *Platygyra* and encrusting *Montipora* were also present. Species of Fungiidae (*Cycloseris patelliformis*, *C. cyclolites*, *Fungia scutaria*, *F. fungites* and *Polyphyllia talpina*) were common and was more abundant than in any other habitat (Rajasuriya et al. 1998).

The FSR lacked much structural complexity. This habitat was present seawards of the SSR and at a depth of about 22m. This habitat contains widely separated depressions (2-5m diameter) with small rocks and holes. Live coral cover was very low (< 5%) and consisted of small colonies (about 0.25m diameter) of massive and encrusting corals and several species of Fungiidae. The depth increases rapidly towards the west of the FSR habitats and reef habitats become rare below 35m. Thereafter within a short distance of about 200m the depth increases to more than 200m. This depth contour forms the western boundary of the BRMS (Rajasuriya et al. 1998).

The reefs in the Gulf of Mannar are richer and better developed than reefs in the Palk Bay, however, high levels of sedimentation, coral mining and destructive fishing methods continue to degrade the reefs along the Indian coast. (Venkataraman 2003). Almost all the reefs in the Gulf of Mannar region were affected by the coral bleaching event in 1998. Some are recovering but most of the shallow water corals remain degraded, but nevertheless is important as a habitat for recolonisation by corals, fish and other organisms (Wilkinson et al. 1999, Rajasuriya 2002).

### **Eco-sensitive habitats species**

The shallow sea area in the northern parts comprises islands, sand dunes, forest, beaches and nearshore environment, including a marine component with algal communities, sea grasses, coral reefs, pearl banks, salt marshes and mangroves. The nearshore ecosystems in the area are considered the most productive marine ecosystems, sustaining large number of species and they are eco-sensitive habitats. They found in tropical warm waters especially where sea surface temperatures are above 20°C. They are sensitive to thermal fluctuation, sedimentation, pollution and sunlight intensity. Their importance stems from the fact that they support a complex biological community. They bestow shelter to fish and invertebrates and also act as fish nurseries and breeding grounds.

### **Phytoplankton**

Phytoplankton density varied from  $0.34-9 \times 10^4$  individuals per litre. Diatoms dominated the phytoplankton population and mean abundance of this group in the area is 90% with a range of 73.6-100% followed by dinoflagellate which contributed to 0-16%. Most common dinoflagellate species was *Ceratium* sp. followed by *Procentrum* sp. and *Gymnodinium* sp. All the species found at locations six, eight and nine were only diatoms. Twenty seven (27) of phytoplankton genera belong to two groups was found in the area (Table 3). Diatoms were the most dominant phytoplankton group which comprise of 24 genera and most of them were centric diatoms. Most dominant diatom species were *Bacillaria* sp. followed by *Rhizosolenia* sp (Jayasiri, 2007).

**Table 3. List of Phytoplankton genera of the Mannar area (Jayasiri, 2007)**

<b>Phytoplankton group</b>	<b>Phytoplankton Genera</b>
<b>Bacillariophyceae (Diatoms)</b>	<i>Bacillaria</i> sp.
	<i>Rhizosolenia</i> sp.
	<i>Nitzschia</i> sp.
	<i>Pennate</i> sp.
	<i>Pleurosigma</i> sp.
	<i>Cerataulina</i> sp.
	<i>Coscinodiscus</i> sp.
	<i>Chaetoceros</i> sp.
	<i>Planktoniella</i> sp.
	<i>Fragilaria</i> sp.
	<i>Paralia</i> sp.
	<i>Skeletonema</i> sp.
	<i>Thalassionema</i> sp.
	<i>Leptocylindrica</i> sp.
	<i>Asterionella</i> sp.
	<i>Guinardia</i> sp.
	<i>Eucampia</i> sp.
	<i>Ditylum</i> sp.
	<i>Dictyocha</i> sp.
	<i>Melosira</i> sp.
<i>Bellerrochea</i> sp.	
<i>Biddulphia</i> sp.	
<i>Corethron</i> sp.	
<i>Bacteriastrum</i> sp.	
<b>Diniphyceae (Dinoflagellates)</b>	<i>Ceratium</i> sp.
	<i>Procentrum</i> sp.
	<i>Gymnodinium</i> sp.

## **Zooplankton**

Species belonging to fourteen groups of zooplankton were found from the area. Zooplankton density varies from 78-1005 individuals per litre (Jayasiri, 2007). The highest peak of 1005 individuals per litre was recorded at location fourteen and 70% of that was associated with bivalve larvae and eggs. The most dominant zooplankton group of the area is copepods and crustacean larvae (nauplius) followed by larval stages of bivalves and echinoderms. Mean percentages of copepods, bivalves and nauplius are 26.5%, 26.7% and 22.5% respectively. Other groups contributed to the zooplankton population in the area are euphausiid, mysids, cirripedia, fish, eggs and larval forms of echinoderms, chaetognaths, polychaetes and urochordates. Diversity of taxonomic groups of zooplankton is high at locations near Adam's bridge (Jayasiri, 2007).

## Fish and fishery resources in the Gulf of Mannar

Since Gulf of Mannar comprises of a variety of sensitive marine habitats like coral reefs, mangroves and sea grasses, it could be considered as one of the most productive ecosystems in Sri Lanka. Both finfish and shell fish species are rich in this area. This includes export oriented fishery resources largely taken from this ecosystem: spiny Lobster, sea cucumber, chank, shrimps and crabs etc. The finfish resources mainly comprises of small pelagic (clupeids, mackerels, anchovies and flying fish). Apart from that, barracudas (*Sphyreana* spp.), pony fish (*Leiognathus* spp.) and half beaks (Hemirhumphidae) are other abundant finfish resources. The denersal finfish resources mainly associated coral reefs are threadfin bream (Family: Nemipteridae), grouper(Family: Serranidae), snapper (Family: Lutjanidae), emperor (Family: Lethrinidae) etc. Further, large pelagic species like skipjack tuna, yellowfin tuna, bigeye tuna, kawakawa, frigate tuna and seer fish etc which are mostly abundant in offshore and oceanic areas but also occur in coastal waters are found in certain areas of the Gulf of Mannar.

**Table 4. Some important species found in the marine fishery in the Gulf of Mannar**

<b>Scientific Name</b>	<b>Common name</b>	<b>Local name</b>	<b>Commercial Importance</b> [Low, Moderate, High]	<b>Abundance</b> [Very rare, Rare, Average, Common]
<b>Family: Clupeidae</b>				
<i>Amblygaster sirm</i>	Spotted sardinella	Hurulla	Moderate	Common
<i>Amylgaster clupeoides</i>	Bleeker's smoothbelly sardinella	Galhurulla	Moderate	Average
<i>Nematalosa nasus</i>	Bloch's gizzard shad	Koiyya	Low	Common
<i>Hilsa kelee</i>	Kelee shad	Katugoi	Low	Common
<i>Sardinella gibbosa</i>	Goldstrip sardinella	Matta salaya	Moderate	Average
<i>Sardinella longiceps</i>	Indian oil sardine	Pesalaya, yaksalaya	Low	Common
<i>Sardinella albella</i>	White sardinella	Sudaya	Low	Common
<b>Family: Scomridae</b>				
<i>Rastrelliger kanagurta</i>	Indian mackerel	Kumbalawa	Moderate	Average
<i>Katsuwonus pelamis</i>	Skipjack tuna	Balaya	Moderate	Common
<i>Sarda orientalis</i>	Striped bonito	Thora balaya	Moderate	
<i>Auxis thazard</i>	Frigate tuna	Alagoduwa	Moderate	Average
<i>Auxis rochei</i>	Bullet tuna	Baita	Moderate	Common
<i>Euthynnus affinis</i>	Kawakawa	Atawalla	Moderate	Average
<i>Thunnus albacares</i>	Yellowfin tuna	Kelawalla	High	Common
<i>Thunnus obesus</i>	Bigeye tuna	Asgedi kelawalla	High	
<i>Acanthocybium solandri</i>	Wahoo	Sawara, Hera maha	High	Average

<i>Scomberomorus commerson</i>	Narrowbarred Spanish mackerel	Ahin Thora	High	Average
<i>Scomberomorus lineolatus</i>	Streaked seerfish	Anjilawa	Moderate	Common
<i>Scomberomorus guttatus</i>	Indo- Pacific king mackerel		Moderate	Average
<b>Family: Carangidae</b>				
<i>Decapterus russelli</i>	Indian scad	Linna	Moderate	
<i>Selar crumenophthalmus</i>	Bigeye scad	Asgedi bolla	Moderate	Average
<i>Scomberoides commersonianus</i>	Talang queenfish	Kattawa	Moderate	Common
<i>Carangoides sp.</i>	Trevally	Parawa	High	Common
<i>Caranx sp.</i>				
<i>Parastromateus niger</i>	Black pomfret	Kalu Vavvalaya	Low	Common
<b>Family: Lethrinidae</b>				
<i>Lethrinus harak</i>	Thumbprint emperors	Meevatiya	Moderate	Common
<i>Lethrinus nebulosus</i>	Spangled emperor		Moderate	Average
<b>Family: Lutjanidae</b>				
<i>Lutjanus fulviflamma</i>	Blackspot snapper	Ranna	Moderate	Common
<i>Lutjanus decussatus</i>	Cheekred snapper		Moderate	Average
<i>Lutjanus kasmira</i>	Common bluestripe snapper	Irri ranna	Moderate	Average
<i>Lutjanus madras</i>	Indian snapper		Moderate	Average
<i>Lutjanus quinquelineatus</i>	Fivelined snapper		Moderate	Average
<b>Family: Serranidae</b>				
<i>Cephalopholis argus</i>	Peacock hind	Kossa	Moderate	Average
<i>Cephalopolis formosa</i>	Blue lined grouper		Moderate	Average
<i>Epinephelus longispinis</i>	Longspine grouper		Moderate	Average
<i>Epinephalus malabaricus</i>	Malabar grouper		Moderate	Average
<b>Family: Scaridae</b>				
<i>Scarus rubroviolaceus</i>	Ember parrot fish	Gireva	Moderate	Average
<i>Scarus sordidus</i>	Daisy parrotfish		Moderate	Average
<b>Family: Caesionidae</b>				
<i>Caesio sp.</i>	Fusilier		Moderate	Average
<i>Gymnocaesio sp.</i>				Average
<i>Pterocaesio sp.</i>				Average
<b>Family: Haemulidae</b>				
<i>Plectorhinchus ceylonensis</i>	Sweetlips	Boraluwa	Low	Average
<i>Plectorhinchus lineatus</i>			Low	Average
<i>Pomadasy sp.</i>	Grunts		Low	Average
<b>Family: Coryphaenidae</b>				
<i>Coryphaena hippurus</i>	Dolphinfishes	Wanna	Moderate	Common
<b>Family: Cynoglossidae</b>				
<i>Cynoglossus sp.</i>	Tongue soles	Patha madiya	Low	Common
<i>Symphurus sp.</i>				

<b>Family: Exocoetidae</b>				
<i>Cheilopogon sp.</i>	Flyingfish	Piyamassa	Low	Average
<i>Cypselurus sp.</i>				
<i>Exocoetus sp.</i>				
<b>Family: Leiognathidae</b>				
<i>Gaza mniuta</i>	Toothpony	Mas karalla	Moderate	Common
<i>Leiognathus sp.</i>	Ponyfish	Karalla	Low	Common
<b>Family: Siganidae</b>				
<i>Siganus lineatus</i>	Goldlined spinefoot	Orawa	Low	Average
<i>Siganus javus</i>	Streaked spinefoot			Average
<b>Family: Engraulididae</b>				
<i>Stolephorus indicus</i>	Indian Anchovy	Handalla	Moderate	Average
<i>Encrasicholoina heteroloba</i>	Shorthead Anchovy	Rahu halmassa	Low	Common
<i>Thryssa sp.</i>		Lagga	Low	Common
<b>Family: Teraponidae</b>				
<i>Terapon sp.</i>	Terapon	Iribataya, Gonga, Keeli	Low	Common
<i>Terapon sp.</i>	Terapon	Iribataya, Gonga, Keeli	Low	Common
<b>Family: Congridae</b>				
<i>Conger sp.</i>	Conger	Anjalaya	Moderate	Average
<b>Family: Squalidae</b>				
<i>Centroporus uyata</i>	Little gulper shark		Moderate	Average
<i>Centroporus granulosus</i>	Gulper shark		Moderate	Average
<b>Family; Lamnidae</b>				
<i>Isurus oxyrinchus</i>	Shortfin mako		Moderate	
<i>Isurus pauca</i>	Long fin mako		Moderate	
<b>Family: Alopidae</b>				
<i>Alopias sp.</i>	Thresher shark		Moderate	
<b>Family: Carcharhinidae</b>				
<i>Carcharhinus melanopterus</i>	Blacktip reef shark		Moderate	Average
<i>Carcharhinus falciformis</i>	Silky shark		Moderate	
<i>Carcharhinus longimanus</i>	Oceanic whitetip shark		High	
<i>Carcharhinus amblyrhynchoides</i>	Grey reef shark		Moderate	
<b>Family: Sphyrnidae</b>				
<i>Sphyrna sp.</i>	Hammerhead shark			
<i>Eusphyra blochii</i>	Winghead shark		Low	
<b>Family: Dasitidae</b>				

<i>Dasyatis sp.</i>	Sting ray		Low	Common
<i>Himantura sp.</i>				
<i>Pastinachus sephen</i>	Cowtail stingray		Low	Average
<b>Family: Myliobatidae</b>				
<i>Aetobatus sp.</i>	Eagle ray		Moderate	Average
<i>Aetomylaeus sp</i>			Moderate	Average
<i>Rhinoptera sp.</i>	Cownose ray		Moderate	Rare
<b>Family: Turbinellidae</b>				
<i>Turbinella pyrum</i>	Chank	Hakbella	High	Average
<b>Family: Holothuriidae</b>				
<i>Holothuria fuscogilva</i>	White teatfish	Prima attaya	High	Average
<i>Holothuria nobilis</i>	Black teatfish	Polonga attaya	High	Average
<i>Holothuria scabra</i>	Sandfish	Jaffnaattaya	High	Average
<i>Holothuria atra</i>	Lollyfish	Nari attaya	Moderate	Average
<i>Stichopus chloronotus</i>	Greenfish	Dhambala attaya	Moderate	Average
<i>Thelenota anax</i>	Amberfish	Puna attaya	Moderate	Average
<i>Thelenota ananas</i>	Prickly redfish	Annasi attaya	Moderate	Average
<b>Family: Penaidae</b>				
<i>Penaeus indicus</i>	Indian white shrimps	Kiri Issa	High	Common
<i>Penaeus merguensis</i>	Banana prawn		High	Rare
<i>Penaeus monodon</i>	Giant tiger prawn	Karawndu Issa	High	Average
<i>Penaeus semisulcatus</i>	Green tiger prawn	Kurutu Issa	High	Common
<i>Metapenaeus affinis</i>	Jinga shrimps		Moderate	Average
<i>Metapenaeus elegance</i>	Fine shrimps		Moderate	Average
<i>Metapenaeus dobsoni</i>	Kadal shrimps	Mal issa	Moderate	Average
<i>Metapenaeus moyebi</i>	Moyebi shrimps		Moderate	Average
<b>Family: Palinuridae</b>				
<i>Panulirus ornatus</i>	Ornate spiny lobster	Divi issa(Pokirissa)	High	Rare
<i>Panulirus sewelli</i>	Arabian Whip lobster		High	Rare
<b>Family: Portunidae</b>				
<i>Portunus pelagicus</i>	Blue swimming crab	Nil Kakuluwa	High	Common
<i>Portunus sanguinolentus</i>	Bloodspotted crab	Kakuluwa		Common
<i>Scylla serrata</i>	Indo-pacific swamp crab	Mada kakuluwa		Common
<b>Family: Sepidae</b>				
<i>Sepia acculeata</i>	Needle Cuttlefish	Dalla	High	Average
<i>Sepia pharaonis</i>	Pharaoh cuttlefish			
<b>Family: Octopodidae</b>				
<i>Octopus sp.</i>	Octopus	Buwalla	Moderate	Average

Source: Haputhantri et al. (2014)

## Holothurians

A recent survey conducted in pearl banks enabled to collect specimens belongs to 10 species from the area. *Holothuria atra* is one of the most common species in the pearl banks. It is always found fully exposed on sandy bottom.

Table 4. Holothurian species that Professor Herdman collected from Palk Bay and Gulf of Mannar

Genus	Species	Depth (Fathoms)
Synapta	<i>Synapta</i> sp.	2-8
Cucumaria	<i>Cucumaria tricolor</i> , Sluiter <i>Cucumaria turbinata</i> (Hutton) <i>Cucumaria imbricata</i> (Semper) <i>Cucumaria conjungens</i> , Semper	28 6-9 22
Thyone	<i>Thyone fusus</i> , var. <i>papuensis</i> , Théel	6-9
Phyllophorus	<i>Phyllophorus cebuensis</i> (Semper)	8-9
Colochirus	<i>Colochirus quadrangularis</i> , Lesson <i>Colochirus quadrangularis</i> , var. <i>mollis</i> <i>Colochirus doliolum</i> (Pallas) <i>Colochirus</i> sp.	8-9 8-19
Havelockia	<b>Havelockia herdmani</b>	4-40
Holothuria	<i>Holothuria kurti</i> , Ludwig <i>Holothuria monacaria</i> (Lesson) <i>Holothuria tenuissima</i> <i>Holothuria atra</i> , Jäger <b>Holothuria gallensis</b>	4-40 4-40 7 Reef Reef
Stichopus	<i>Stichopus chloronotus</i> , Brandt <i>Stichopus chloronotus</i> , var. <i>fuscus</i> <i>Stichopus variegates</i> , Semper	5-6 9-26 11-24

## Squid and cuttlefish, shrimp, lobster and crab

A number of shrimp and lobster species are reported from these areas. Shrimp species reported are mainly penaeid shrimp and most of them are commercially important. Among them *Penaeus indicus*, *P. merguensis* and *P. semisulcatus* are the most important. Number of *Metapenaeus* and *Metapenaeopsis* species are also found in the area. Lobsters are found only

in the coastal waters while shrimp are found both in coastal and lagoon/estuaries. There are number of spiny lobster and slipper lobster species have been reported from reef areas with sand bottom but the most common spiny lobster species found in the area are *Panulirus ornatus*. *Puerulus sewelli* is a deep-sea spiny lobster species usually beyond 150 –300 m depths and slipper lobster is *Parribacus antarcticus*. Three species of commercially important crabs are in the area: *Portunus pelagicus* (Blue Swimming Crab), *Portunus sanguinolentus* (swimming crab) and *Scylla serrata* (lagoon crab) (De Bruin et al., 1997).

### **Chanks and bivalves**

Chanks are found on sandy or muddy sandy areas in the pearl Banks and Palk Bay. The most common and economically important species is *Turbinella pyrum* (De Bruin et al., 1994).

A large number of edible bivalves are ocured in the lagoons and estuaries in the GOM area. These are the edible oyster (*Crassosstre madrasensis*), mussel (*Madiolus auriculatus*), cockles (*Gafrarium tumidum* and *Andara antiquata*) and clams (*Marcia opima* and *M. biantina*). The window-pane oyster (*Placuna placenta*) is a non-edible bivalve common in lagoon and estuaries in the area (Dayaratne et al., 1997)



## Reef and reef associated fish

**Table 5. Reef and reef associated fish species recorded from the southern Gulf of Mannar**

<b>Acanthuridae</b>	<i>Hemitaurichthys zoster</i>	<i>S. xenochous</i>
<i>Acanthurus bariene</i>	<i>Heniochus acuminatus</i>	<b>Pomacanthidae</b>
<i>A. blochii</i>	<i>H. monoceros</i>	<i>Apolemichthys xanthurus</i>
<i>A. dussumieri</i>	<i>H. pleurotaenia</i>	<i>Centropyge multispinis</i>
<i>A. leucosternon</i>	<i>H. singularis</i>	<i>Pomacanthus annularis</i>
<i>A. lineatus</i>	<b>Ephippidae</b>	<i>P. imperator</i>
<i>A. mata</i>	<i>Platax spp.</i>	<i>P. semicirculatus</i>
<i>A. tristis</i>	<b>Haemulidae</b>	<b>Pomacentridae</b>
<i>A. triostegus</i>	<i>Plectrorhinchus sp.1</i>	<i>Abudefduf vaigiensis</i>
<i>A. xanthopterus</i>	<i>P. sp.2</i>	<i>Amphiprion spp.</i>
<i>Ctenochaetus binotatus</i>	<i>P. obscurum</i>	<i>Chromis viridis</i>
<i>C. striatus</i>	<i>P. vittatus</i>	<i>Dascyllus aruanus</i>
<i>A. strigosus</i>	<i>P. schotaf</i>	<i>D. trimaculatus</i>
<i>Naso annulatus</i>	<b>Kyphosidae</b>	<i>Plectroglyphidodon dickii</i>
<i>N. breuirostris</i>	<i>Kyphosus spp.</i>	<i>P. lacrymatus</i>
<i>N. hexacanthus</i>	<b>Labridae</b>	<i>Pomacentrus chrysurus</i>
<i>N. lituratus</i>	<i>Anampses lineatus</i>	<i>P. similis</i>
<i>N. unicornis</i>	<i>Bodianus spp.</i>	<i>Stegastes spp.</i>
<i>N. vlamingii</i>	<i>Cheilinus spp.</i>	<b>Scaridae</b>
<i>Zebrasoma scopas</i>	<i>C. undulatus</i>	<i>Chlorurus sp.</i>
<i>Z. desjardini</i>	<i>Coris spp.</i>	<i>Cetoscarus bicolor</i>
<b>Balistidae</b>	<i>Epibulus insidiator</i>	<i>Scarus atrihunula</i>
<i>Balistapus undulatus</i>	<i>Gomphosus caeruleus</i>	<i>S. frenatus</i>
<i>Balistidae spp.</i>	<i>Halichoeres centriquadrus</i>	<i>S. niger</i>
<i>Balistoides conspicillum</i>	<i>H. marginatus</i>	<i>S. scaber</i>
<i>B. viridescens</i>	<i>H. leucoxanthus</i>	<i>S. sordidus</i>
<i>Odonus niger</i>	<i>Hemigymnus fasciatus</i>	<b>Serranidae</b>
<b>Caesionidae</b>	<i>H. melapterus</i>	<i>Aethaloperca rogaa</i>
<i>Caesio caeruleaurea</i>	<i>Labrichthys unilineatus</i>	<i>Cephalopis argus</i>
<i>C. curing</i>	<i>Labroides dimidiatus</i>	<i>C. miniata</i>
<i>Pterocaesio marri</i>	<i>Thalassoma hardwicke</i>	<i>C. sonnerati</i>
<i>P. tile</i>	<i>T. janseni</i>	<i>Epinephelus caeruleopunctatus</i>
<b>Chaetodontidae</b>	<i>T. lunare</i>	<i>E. fasciatus</i>
<i>Chaetodon auriga</i>	<b>Lethrinidae</b>	<i>E. fuscoguttatus</i>

<i>C. collare</i>	<i>Lethrinus harak</i>	<i>E. hexagonatus</i>
<i>C. decussatus</i>	<i>L. nebulosus</i>	<i>E. longispinis</i>
<i>C. falcula</i>	<i>L. sp.</i>	<i>E. merra</i>
<i>C. gardineri</i>	<i>Monotaxis grandoculis</i>	<i>E. tukula</i>
<i>C. guttatissimus</i>	<b>Lutjanidae</b>	<i>E. undulosus</i>
<i>C. kleinii</i>	<i>Lutjanus bohar</i>	<i>Pseudanthias spp.</i>
<i>C. lineolatus</i>	<i>L. decussatus</i>	<i>Plectropomus laevis</i>
<i>C. lunula</i>	<i>L. fulviflamma</i>	<i>P. maculatus</i>
<i>C. melannotus</i>	<i>L. gibbus</i>	<i>Variola louti</i>
<i>C. octofasciatus</i>	<i>L. quinquelineatus</i>	<b>Siganidae</b>
<i>C. plebeius</i>	<i>L. spp.</i>	<i>Siganus sp.</i>
<i>C. rafflesi</i>	<i>Macolor niger</i>	<i>S. stellatus</i>
<i>C. triangulum</i>	<b>Muraenidae</b>	<i>S. jarus</i>
<i>C. trifascialis</i>	<i>Gymnothorax spp.</i>	<i>S. lineatus</i>
<i>C. trifasciatus</i>	<b>Nemipteridae</b>	<b>Sphyrænidae</b>
<i>C. unimaculatus</i>	<i>Scolopsis bimaculatus</i>	<i>Sphyræna spp.</i>
<i>Forcipiger longirostris</i>	<i>S. vosmeri</i>	
(Source: Ohman et al., 1997)		

### Marine mammals

There are 28 species of whales and dolphins reported from Sri Lankan waters (Leatherwood et al., 1986). Among them 10 were reported from the north-western seas including Gulf area of the island. However, records made over the years are far from complete. There are several species, which have so far been recorded from single specimens. As for whales, they may be seen occasionally far offshore but dolphins can be seen very shallow sea areas, especially spinner dolphins. Sometimes humpback dolphins and bottlenose dolphins can be seen in the Puttalam Lagoon even south of Kalpitiya. It is believed that dolphins recorded in this area are resident pods and whales too believed that possibly resident in this part of the Indian Ocean.

**Table 6: Whales and dolphins sighted or stranded in the Sri Lankan waters of the Gulf of Mannar**

Species	Location
Minke whale	Thalawila, Arialai- Jaffna, Off Puttalam
Fin whale	Lagoon
Sperm whale	Off Mannar
Humpback whale	Off Mannar
Fals Killer whale	Off Mannar
Spinner dolphin	Kytes
Rhissos dolphin	Off Mannar
Common dolphin	Off Mannar
Striped dolphin	Off Mannar
Bottlenose dolphin	Off Kalpitiya
Spotted dolphin	Off Puttalam Lagoon
Indo-Pacific Hump-Backed dolphin	Off Puttalam Lagoon

### Endangered, Threatened and Protected (ETP) species

In addition to marine resources important in fisheries, Gulf provides shelter for a number of endangered, threatened and protected (ETP) species (Table 7).

**Table 7: Endanger, threatened and protected (ETP) marine species found in the Gulf of Mannar**

<b>Scientific Name</b>	<b>Common name</b>	<b>Abundance</b> [Very rare, Rare, Average, Common]
<b>Family: Cheloniidae</b>		
<i>Chelonia mydas</i>	Green turtle	Rare
<i>Lepidochelis olivacea</i>	Olive ridley turtle	Average
<i>Stenella longirostris</i>	Spinner dolphin	Common
<i>Eretmochelys imbricata</i>	Hawksbill turtle	Rare
<i>Caretta caretta</i>	Loggerhead turtle	Rare
<b>Family: Dermochelyidae</b>		
<i>Dermochelys coriacea</i>	Leatherback turtle	Rare
<b>Family: Alopiidae</b>		
<i>Alopias sp</i>	Thresher shark	Rare
<b>Family: Dugonidae</b>		
<i>Dugong dugong</i>	Dugong	Very rare
<b>Family: Kogiidae</b>		
<i>Kogia sima</i>	Dwarf sperm whale	Rare
<i>Kogia breviceps</i>	Pigmy Sperm whale	
<b>Family: Delphinidae</b>		
<i>Peponocephala electra</i>	Melonhead Whale	Rare
<i>Feresa attenuata</i>	Pigmy killer whale	Rare
<i>Delphinus delphis</i>	Short beak common dolphin	Average
<i>Stenella coeruleoalba</i>	Striped dolphin	Rare
<i>Sousa chinensis</i>	Indo-Pacific Hump-Backed dolphin	Rare

Source: Haputhantri et al. (2014)

The Dugong has probably never been common in Gulf of Mannar and Palk Bay, and fairly scarce further north, though it had been observed in a few instances in the Gulf of Mannar over the past years. Dugong was formerly fairly plentiful in the Gulf of Mannar where it was sufficiently plentiful to be worth hunting. Shipping may create hazards for dugongs. They may be killed or injured when struck by any part of a vessel and may also be scared away from their feeding areas by vessel traffic.

### Sea turtles

Sea turtle is the other threatens species reported from northern shallow seas of the country. Though all five species are reported from northern seas, Olive Ridley (*Lepidochelys olivacea*) is common while Green turtle (*Chelonia mydas*), Loggerhead (*Caretta caretta*) and Leatherback (*Dermochelys coiacea*) are occasionally recorded from north -western and northern coastal areas. Important foraging sites and migratory routes of the turtles are located in the Gulf of Mannar. The Gulf of Mannar is known to be an important foraging site and a migratory route of the Olive Ridley population inhabiting the South Asian marine region (Kapurusinghe and Cooray, 2002).

### Feature condition and future outlook of the proposed area

(Description of the current condition of the area – is this static, declining, improving, what are the particular vulnerabilities? Any planned research/programmes/investigations?)

The marine environment and the aquatic species in the GOM are subjected to a great threat at present mainly due to use of harmful fishing methods/gear and extensive use of marine resources. Destructive fishing gear and methods are widely used for resource exploitation and law enforcement was found to be weak.

**Table 8: Some fishing gear/ method use in Gulf of Mannar, their seasonality and target species**

<b>Gear</b>	<b>Whether gear is less harmful/ harmful/Very harmful/ Illegal</b>	<b>Whether gear is used in Mannar/ Puttalam district</b>	<b>Seasonality</b>	<b>Target sp</b>
Drift gillnet Large mesh, Offshore	Harmful	Mannar, Puttalam		<i>Thunnus albacares</i> , <i>Katsuwonus pelamis</i> , <i>Scomberomorus commerson</i>
Drift gillnet Large mesh, coastal	Harmful	Mannar, Puttalam		<i>Thunnus albacares</i> , <i>Katsuwonus pelamis</i> , <i>Scomberomorus commerson</i>
Drift gillnet Large mesh, coastal for shovel nose shark (Ula del)	Less harmful	Mannar, Puttalam		<i>Scomberoides Selar crumenophthalmus</i>
Small mesh gillnet for anchovy	Harmful	Puttalam, Mannar		<i>Stolephorus sp.</i> <i>Thryssa sp.</i>
Small mesh gillnet for sardines and herrings	Harmful	Puttalam, Mannar		<i>Amblygaster sirm</i> , <i>Sardinella sp.</i> , <i>Nematolosa nasus</i> , <i>Hilsa kelee</i>
Surrounding gillnet for sardines(Surukku dhel)	Very harmful	Puttalam, Mannar		<i>Amblygaster sirm</i> , <i>Sardinella sp.</i> , <i>Nematolosa nasus</i> , <i>Hilsa kelee</i>
Gillnet for flying fish	Harmful	Puttalam, Mannar	October-April	<i>Cheilopogon sp.</i> <i>Cypselurus sp.</i> <i>Exocoetus sp.</i>
Drift gillnet for Indian mackerel	Harmful	Puttalam, Mannar		<i>Rastrelliger kanagurta</i>
Drift gillnet for Queenfish	Harmful	Puttalam, Mannar		<i>Scomberoides sp.</i>
Trammel net	Illegal	Puttalam, Mannar		Shrimps, Lobsters & small fish
Surrounding nets- Laila valai	Very harmful	Puttalam, Mannar		Carangidae sp,
Beach seine nets	Harmful	Puttalam, Mannar	October-April	<i>Stolephorus sp.</i> <i>Gaza minuta</i> , <i>Leiognathus sp.</i> <i>Sardinella sp.</i> <i>Carangidae sp.</i>
Tuna Long line	Less harmful	Puttalam,		<i>Thunnus albacares</i> , <i>Katsuwonus pelamis</i> , <i>Scomberomorus commerson</i> <i>Carcharhinus sp.</i>
Trolling lines with artificial bait (Sura	Less harmful	Puttalam, Mannar		<i>Katsuwonus pelamis</i> , <i>Thunnus albacares</i>

pannaya)				
Cast net	Less harmful	Puttalam, Mannar		<i>Penaeus sp.</i> , <i>Metapenaeus sp.</i>
Traditional trawl- Large		Puttalam, Mannar		<i>Penaeus sp.</i> , <i>Metapenaeus sp.</i> <i>Leiognathus sp.</i> <i>Arius sp.</i>
Bottom set net for skates	More harmful	Puttalam, Mannar	October- April	<i>Dasyatididae sp.</i> , <i>Myliobatidae sp.</i>
Bottom set net for lobster	More harmful	Puttalam, Mannar	October- April	<i>Panulirus sp.</i>
Bottom set net for demersal fish	More harmful	Puttalam, Mannar		<i>Lethrinus sp.</i> , <i>Lutjanus sp</i> <i>Epinephelus sp.</i>
Large mesh bottom set net for shark	More harmful	Puttalam, Mannar		<i>Carcharhinus sp.</i> <i>Isurus sp.</i> <i>Sphyrna sp.</i>
Bottom longline for demersal fish	More harmful	Puttalam, Mannar		<i>Lethrinus sp.</i> , <i>Lutjanus sp</i> <i>Epinephelus sp.</i>
Bottom longline for spiny shark/ Gulper shark	Harmful	Puttalam	October- April	<i>Centrophorus sp.</i>

**Source:** Haputhantri et al. (2014)

IUCN Sri Lanka initiated a project with IUCN India in 2013 with the aim of assessing the living resources in the Gulf of Mannar (Assessment of key species and habitats for enhancing awareness and for conservation policy formulation) and this project was funded by MFF. This regional initiative aimed to address threats to marine and coastal biodiversity in the Gulf of Mannar, which stem from a lack of awareness and inadequate policies.

There is an ongoing project conduct by NARA in the Bar Reef Marine Centaury. The objectives of the study conduct by NARA using the funds received from the Bay of Bengal Large Marine Ecosystem (BOBLME) project are

- Contributing for measuring the effectiveness of the Marine Protected Area (MPA) and associated habitats at Kalpitiya, through developing evaluation techniques using biophysical, socio economic indicators and results will be used for better management of the Bar reef.
- Implementation of Education, awareness and training programmes targeting mainly school children, but also for the local communities including CBOs on ecosystem values, importance of habitats, best practices in tourism as well as conservation for the sustainable utilization of the resource for the benefit of future generations.
- Provision of data for the adoptive management of MPA.

#### **Assessment of the area against CBD EBSA Criteria**

*(Discuss the area in relation to each of the CBD criteria and relate the best available science. Note that a proposed area for EBSA description may qualify on the basis of one or more of the criteria, and*

that the polygons of the EBSA need not be defined with exact precision. And modeling may be used to estimate the presence of EBSA attributes. Please note where there are significant information gaps)

CBD EBSA Criteria (Annex I to decision IX/20)	Description (Annex I to decision IX/20)	Ranking of criterion relevance (please mark one column with an X)			
		No information	Low	Medium	High
<b>Uniqueness or rarity</b>	Area contains either (i) unique (“the only one of its kind”), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.				X
<i>Explanation for ranking</i>					
<b>Special importance for life-history stages of species</b>	Areas that are required for a population to survive and thrive.				X
<i>Explanation for ranking</i>					
<b>Importance for threatened, endangered or declining species and/or habitats</b>	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.				X
<i>Explanation for ranking</i>					
<b>Vulnerability, fragility, sensitivity, or slow recovery</b>	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.				X
<i>Explanation for ranking</i>					
<b>Biological productivity</b>	Area containing species, populations or communities with comparatively higher natural biological productivity.				X
<i>Explanation for ranking</i>					
<b>Biological diversity</b>	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.				X
<i>Explanation for ranking</i>					
<b>Naturalness</b>	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.			X	
<i>Explanation for ranking</i>					

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**Sharing experiences and information applying other criteria (Optional)**

Other Criteria	Description	Ranking of criterion relevance (please mark one column with an X)			
		Don't Know	Low	Medium	High
<i>Add relevant criteria</i>					
<i>Explanation for ranking</i>					

**References**

*(e.g. relevant documents and publications, including URL where available; relevant data sets, including where these are located; information pertaining to relevant audio/visual material, video, models, etc.)*

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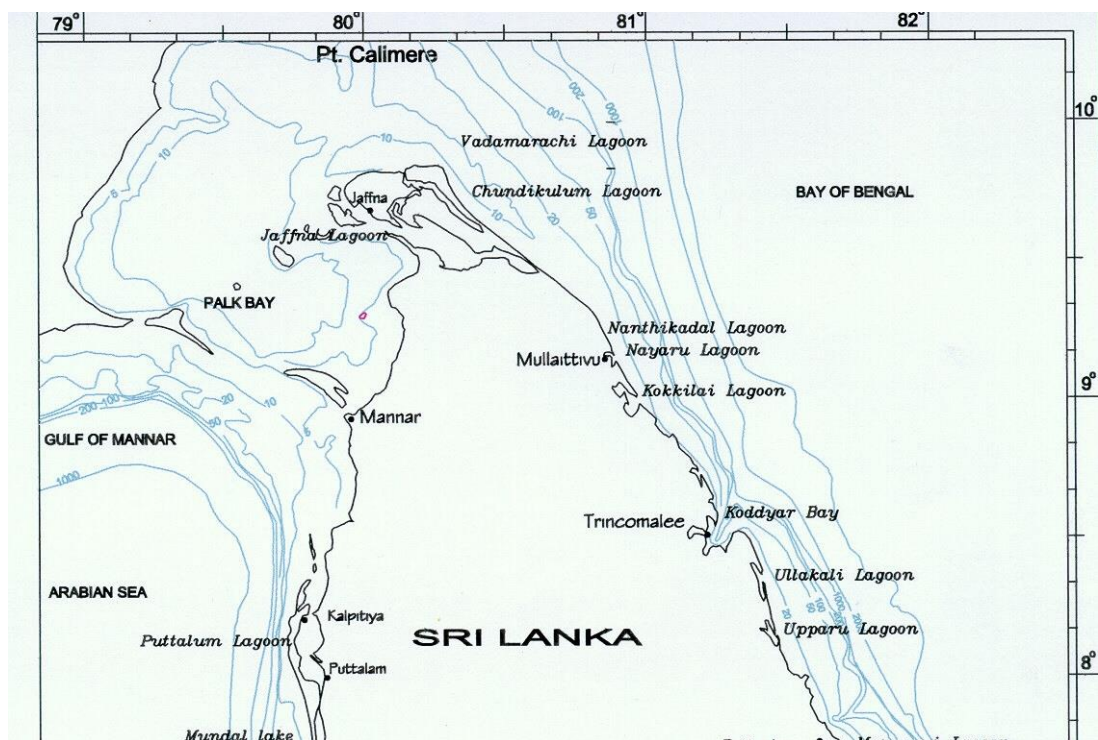
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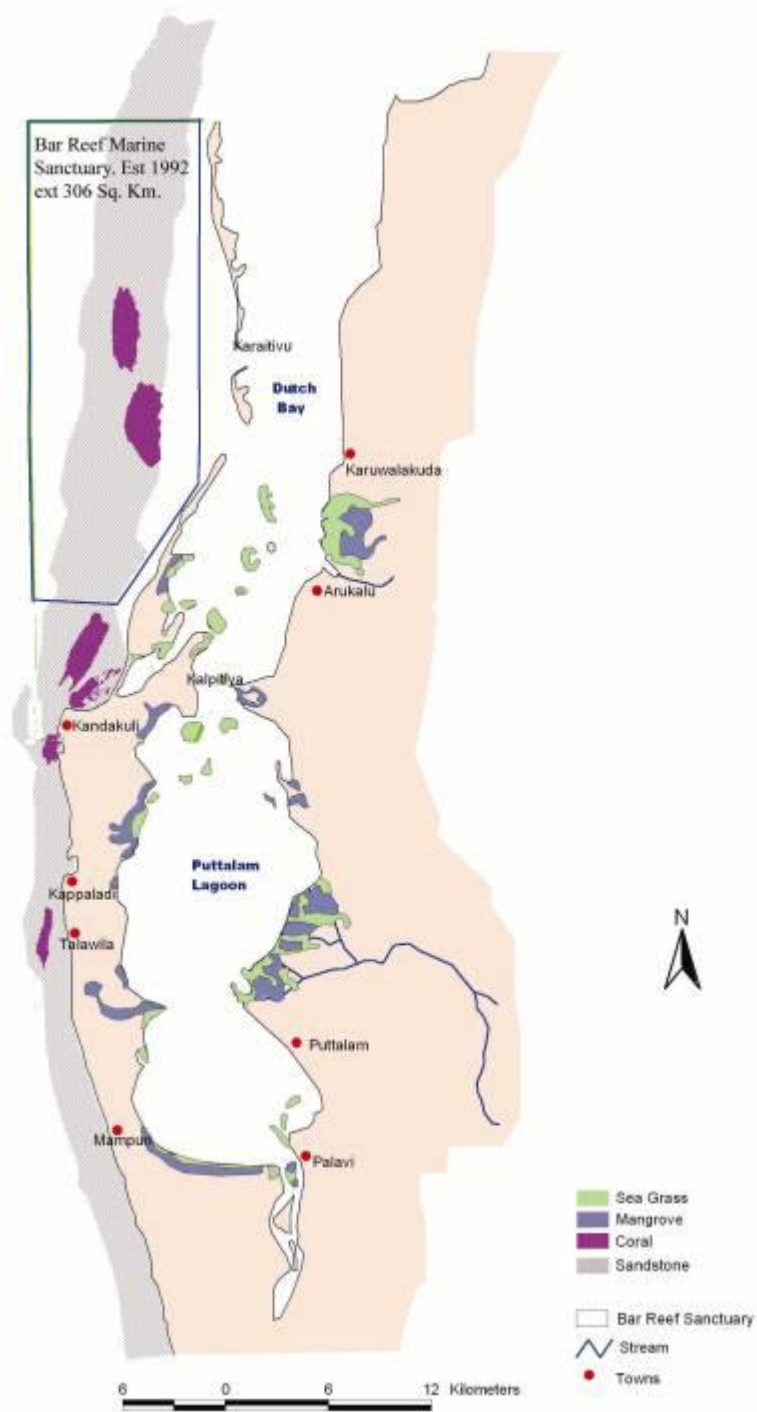
## Maps and Figures

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Map showing Bar reef