

Appendix

Template for Submission of Scientific Information

to Describe Ecologically or Biologically Significant Marine Areas

Note: Please DO NOT embed tables, graphs, figures, photos, or other artwork within the text manuscript, but please send these as separate files. Captions for figures should be included at the end of the text file, however.

Title/Name of the area:Coastal waters around Sri Lanka

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Abstract (*in less than 150 words*)

Sri Lankan coastal waters and beaches are proposed as an area meeting EBSA criteria by considering its regional importance for nesting endangered and critically endangered species of turtles – the green turtle, leatherback turtle and hawksbill turtle. Additionally the area holds very fragile sensitive coastal ecosystems – coral reefs, sea grass beds, mangroves, mud flats, sand dunes, salt marshes and large number of river mouth openings. Globally endangered marine mammals such as *Balaenoptera musculus* and *Dagong dugon* are recorded from Sri Lankan coastal waters.

At present the entire area provides substantial amount of fin fish types, sharks, rays, shrimp, spiny lobsters, slipper lobsters, conch shells, sea cucumbers and reef fishes.

Introduction

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

Sri Lanka is a continental island and the continental shelf of many parts are rich and high in biological diversity. The northern part particularly the Palk Bay, Sri Lankan side of Gulf of Mannar (IUCN, 2011) and Pedro Bank area predominantly muddy or muddy-sandy bottom with very high biological diversity. The continental shelf is wider in northern and north western areas and narrow on the east coast. Area from Kalpitiya to Colombo has several biologically rich sea bottom areas – Chilaw, Negombo and Hendala. In the South, Hambantota bank is high in biological diversity. The Great and Little basses area of the Hambantota Bank is declared as a Marine protected area considering its high biological and ecological importance. The climate is affected by the country's insularity to the equator, in the Indian Ocean. The rains are determined by the monsoons – the south west and north east. During monsoonal months, humid winds blocked by the central mountains produce heavy rain to the coastal areas. Large number of rivers (103) discharges water to the 1600 km long coastline making the continental shelf rich in nutrients. Forty lagoons (40) and forty five estuaries (45) situated along the coast line provide required habitats for large number of aquatic animals who migrate between lagoon and sea. The seas around Sri Lanka are micro-tidal and are predominantly semidiurnal. The large scale oceanic currents related to regional oceanic circulation which dominate waters beyond the continental shelf are controlled by winds and temperature differences, and their general pattern changes seasonally. Off the east coast, currents are strongest during the north eastern monsoon, when they show an easterly trend; while off the west coast they are strongest during the south west monsoon, and exhibit a westerly trend (De Bruin et al., 1994).

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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. It should also state if the area is wholly or partly in an area that is subject to a submission to the Commission on the Limits of the Continental Shelf)

Sri Lanka is located in the Indian Ocean, South East of India, between 5° 55' and 9° 51' N latitude, and 79° 41' and 81° 53' E longitude. Boundaries of the area considered are located within the national jurisdiction of Sri Lanka. The area considered is mostly within the limits of the continental shelf of Sri Lanka.

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)

At present, the resources on the continental shelf is heavily harvested by Sri Lankan fishers. The resources are also increasingly being investigated by the scientific community. The shelf around northern and north-western part of the island is broad and the shelf ends more abruptly in the south and east of the island. Within the shelf area, averaging 22km and estimated to cover about 30,000 sq. km., the mean water depth is about 75m, but the submarine elevations drop abruptly to 900m within 3km and 1800m within about 15km of the shelf edge. Beyond this area is a steep descent of over 5500m bringing it to the general bottom level of the Indian Ocean (Madduma Bandara, 1989). The depth of the thermocline varies with the monsoons reaching 100-125 m on the west coast during the northeast monsoon and 40-60 m during the southwest monsoon period. On the east coast, south of Pedro Bank, the depth of the thermocline is at 50-70 m from the end of southwest monsoon to the start of the northeast monsoon, and 20-40 m at the start of the southwest monsoon (Maldeniya, 1997).

Continental shelf area of Sri Lanka supports variety of fishes, mammals, reptiles and invertebrates. Coastal habitats comprise an extensive system of estuaries and lagoons (158017 ha); mangroves (120500 ha); salt marshes (23819 ha); sand dunes (7606 ha); beaches (11788 ha); coastal marshy wetlands (9754 ha) and other water bodies eg. mud flats and back waters (18839 ha) (Anon. 1999). According to Anon (2007), mangrove zones, mud flats and salt marshes have reduced to an area of only 71000 ha. Muddy bottom areas in shrimp beds provide protective habitats for large number of different aquatic animals. Forty one species have been recorded as by-catch types in shrimp trawling operations indicating high biological diversity of shrimp grounds (Jayakody and Costa, 1987).

Proposed area is affected by two monsoonal winds and associated water current patterns. Some scientific information is now available to prove that coastal upwelling is taking place on the south coast of Sri Lanka during the south west monsoonal months. Occurrence of Blue whales, sperm whales, fin whales, humpback whales, dolphins, dugongs, whale sharks and five species of turtles is reported from the proposed area (Pernetta, 1993). According to Jayakody (2009), except two species, all other species of spiny lobsters of the Genus *Panulirus* living in the Indian Ocean are present in the proposed area and are subjected to heavy exploitation.

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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?)

Fishing is the most important economic activity in the proposed area. As coastal areas are thickly populated proposed area is heavily affected by land based influences. Therefore the chance of disruption of the sensitive ecosystems by common sources such as reef degradation, sedimentation, and overfishing is high. Lagoons and estuaries are important for the existence of many coastal and marine species and major threats to those ecosystems are identified as – sedimentation, land based pollution, destructive fishing, unauthorized land reclamation and over fishing (Jayakody and Maldeniya, 2003). Illegal fishing is also taking place in certain parts of the proposed area. Certain long lived species such as spiny lobsters living in coastal waters already show declining catch rates.

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 candidate EBSA may qualify on the basis of one or more of the criteria, and that the boundaries 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)			
		Don't Know	Low	Some	High
Uniqueness or rarity	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

Explanation for ranking

*The waters surrounding the island constitute of some unique sensitive ecosystems – Coral reefs, sea grass beds, mangrove vegetation, sand dunes and mud flats supporting very high biodiversity. Sri Lankan part of the Gulf of Mannar and Palk Bay in the north , Hambantota bank in south and Bar reef area in north-western part of the country are rich in demersal types having diverse oceanographic environments. Continental slope is rich in deep water lobsters – *Peurules swelli* and recorded occasionally the deep water lobster- *Paribacus antarcticus*. There are twelve globally threatened marine sharks, skates and rays inhabiting the proposed area and they are- *Anoxypristis cuspidate* (knifetooth sawfish); *Pristis microdon*(largetooth sawfish); *Pristis zijsron* (narrowsnout saw fish); *Rhina ancylostoma* (bowmouth guitarfish);*Rhincobatus granulatus* (sharpnose guitarfish); *Aetomylaeus maculates* (mottled eagle ray); *Aetomylaeus nichofii*(banded eagle ray); *Taeniura meyeni* (blak-bloched stingray); *Rhinoptera javanica* (flapnose ray); *Carcharhinus longimanus* (oceanic whitetip shark); *Rhincodon tyus* (whale shark) and *Stegostoma fasciatum* (leopard shark). There are four globally threatened bony fish types living in the proposed area and they are – *Cheilinus undulates*(Giant wrasse); *Thunnus obesus* (bigeye tuna);*

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<p><i>Epinephelus lanceolatus</i>(brindle bass) and <i>Hippocampus spinosissimus</i>(hedgehog seahorse). There are five globally threatened turtle species occurring in the proposed area and they are- <i>Dermochelys coriacea</i>(leatherback turtle); <i>Eretmochelys imbricate</i>(hawkskill turtle); <i>Caretta caretta</i>(loggerhead turtle); <i>Chelonia mydas</i> (Green turtle) and <i>Lepidochelys olivacea</i> (olive ridley turtle).There are five globally threatened marine mammals recorded in and around the proposed area and they are- Dugong, Hump whale, Blue whale, sperm whale and common rorqual.</p>					
<p>Special importance for life-history stages of species</p>	<p>Areas that are required for a population to survive and thrive.</p>				<p>X</p>
<p><i>Explanation for ranking</i></p> <p><i>Having the most important coral reefs, sea grass beds, mangrove fringed lagoons & estuaries, coastal waters of Sri Lanka is an important habitat, nursery and reproduction area for multiple marine species eg: Penaeid shrimps; spiny lobsters; slipper lobsters; snappers; crabs; conch & sea cucumbers. It also provides protective habitats for nesting sea turtles. Dolphins and Whales are frequently recorded from this area. Gulf of Mannar (Sri Lankan side) provides the biological connectivity between Sri Lanka and India which may influence marine organisms abundance & diversity. Six species of spiny lobsters live in this area and the lime stone and sand stone reef areas in coastal Sri Lanka provide the substratum for juvenile settlement.</i></p>					
<p>Importance for threatened, endangered or declining species and/or habitats</p>	<p>Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.</p>				<p>X</p>
<p><i>Explanation for ranking</i></p> <p><i>Coral reef habitats and species in Sri Lankan coastal waters are under increasing threat due to land based pollution, sedimentation and destructive fishing.</i></p> <p><i>Southern and North –Western coastal areas are prominent nesting areas for six species of marine turtles. Some of these sandy beaches are in dander due to pollution and encroachment. Turtle egg collection adversely affect on their sustainability. Coastal waters up to 30 m depth range is a breeding area for spiny & slipper lobsters. Lime stone and sand stone shallow reef areas act as the base for lobster juvenile settlement areas now fast declining due to the use of bottom set nets.</i></p>					

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Vulnerability, fragility, sensitivity, or slow recovery	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
<p><i>Explanation for ranking</i></p> <p><i>The area contains a relatively high proportion of sensitive habitats, biotopes and species that are functionally fragile. Coral reefs, sea grass beds, and mangrove ecosystems are more resilient in terms of environmental parameters, but they too are slowly recovered from natural events such as storms & tsunami.</i></p> <p><i>Coral bleaching has happened in the past due to the increase of the temperature of sea water, vulnerability of these ecosystems happens mainly as an impact of high population density of coastal areas and also due to the use of harmful fishing gear types. Demersal spiny lobsters populations are considered extremely vulnerable as such species are generally long-lived, slow growing and slow to mature.</i></p>					
Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.			X	
<p><i>Explanation for ranking</i></p> <p><i>Sri Lankan continental shelf is narrow averaging up to 22 km except North-west and Northern banks where Sri Lankan continental shelf continue with the Indian continental shelf in the Gulf of Mannar & Palk Bay area. 103 rivers (some are small) discharge nutrients to the sea and continental shelf is highly productive. 40 lagoons and 45 estuaries situated along the coast line also help to increase the productivity in the coastal area. The most conspicuous features is the seasonal reversal of the current with the two monsoons – North Eastern and South western.</i></p> <p><i>Although primary productivity in the surrounding open ocean area is generally low, specific coastal ecosystems such as coral reefs, river mouths, estuary mouths and sea grass beds provide productive areas along the coast line.</i></p>					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.				X
<p><i>Explanation for ranking</i></p> <p><i>Coastal seas around Sri Lanka is characterized by productive ecosystems that support a plethora of species such as coral fishes; mangroves associated animals; fauna living among sea grasses; animals using lagoon and sea to complete their life cycle stages etc. resulting the high rating in biological diversity. It is further strengthened by the migratory animals such as Tunas, Cetaceans, Sea turtles and Sharks.</i></p>					

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<p>Examples are given below: <i>Marine Turtles</i> : 05 species(CZMP, 2003) <i>Marine mammals</i> : 38species <i>Marine fishes</i> : 1800 species <i>Corals</i> : 180 species(MOFE,1999) <i>Coral reef fishes</i> : 900-1000 (CZMP, 2003) <i>Lobsters</i> : 11 species (spiny, slipper & mud) <i>Mangroves</i> : 25 true mangrove species <i>Sea grasses</i> : (species types not yet fully studied- 12 species already recorded)</p>					
Naturalness	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		
<p><i>Explanation for ranking</i></p> <p>Seas around Sri Lanka have been heavily fished. Continental shelf floor areas are poorly harvested as the fishers do not have required technology to harvest demersal resources living in those areas.</p>					

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	Some	High
<i>Add relevant criteria</i>					
<i>Explanation for ranking</i>					

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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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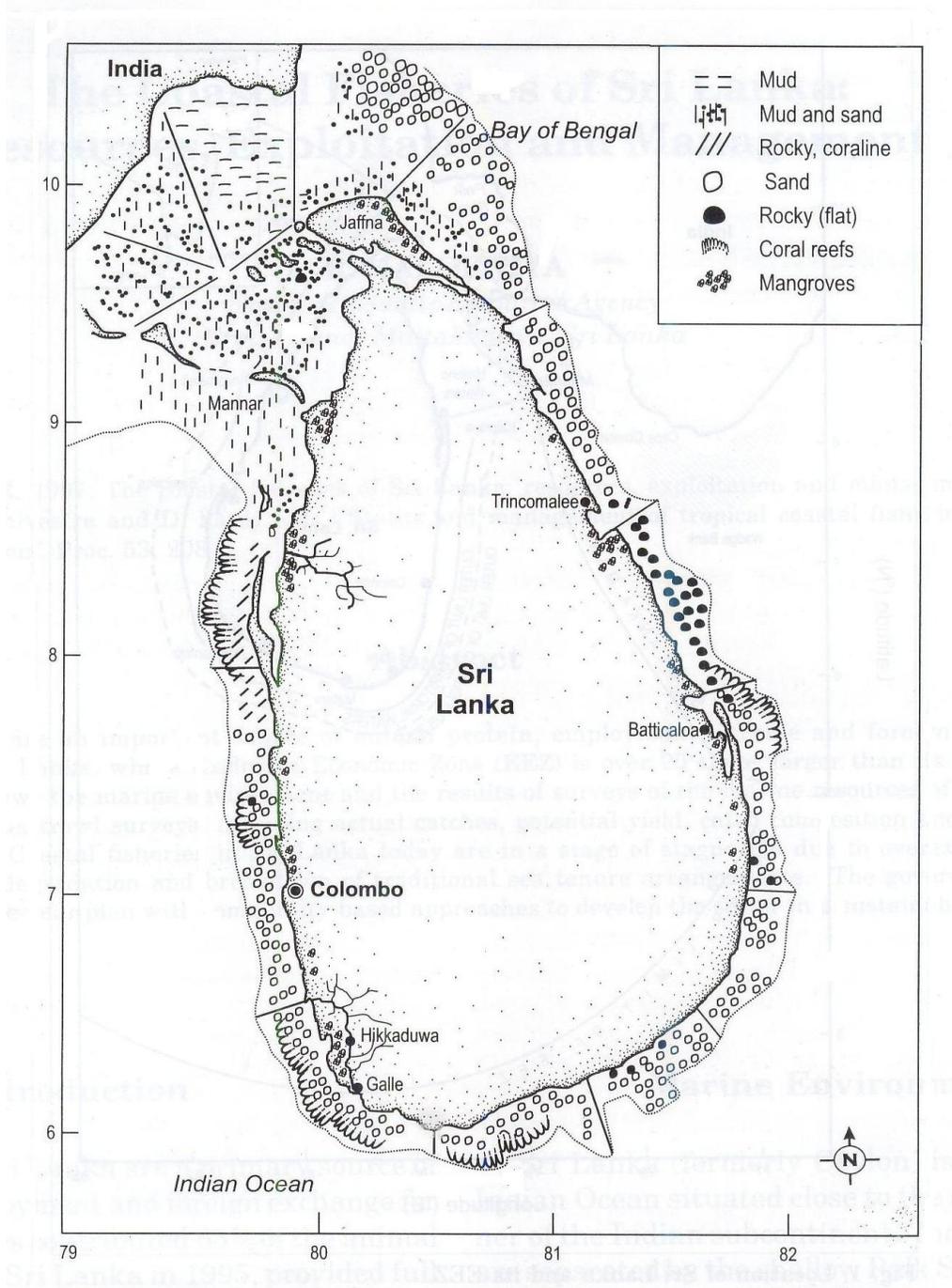
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Pernetta, J.C. (1993) *Marine Protected Area Needs in the South Asian Seas Region. Volume 5: Sri Lanka.* A Marine Conservation and Development Report. IUCN , Gland, Switzerland. vii+67pp.

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Maps and Figures



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