

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

Title/Name of the area: Khorī Great Bank, Sindh Coast, Pakistan

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Abstract (*in less than 150 words*)

Khorī Great Bank is located along southeast coast of Sindh province. It extends from the coast to offshore waters covering an area of about 22,500 sq km having a maximum depth of about xxx m. The unique physical feature of the area is Indus Canyon, known as the Swatch. Khorī Great Bank is known to be rich in biodiversity including cetaceans, sharks, fish and invertebrates. In this area and adjacent territory of India, Russian whaling fleet has massacred in 1968 about 170 Arabian humpback whales (highest numbers in Indian Ocean) indicating the richness of the area. A number of species of cetaceans including rough-toothed dolphin and Longman's beaked whales have only been reported from the area. It is important fishing ground especially for large sharks whose population has dwindles in past 15 years. Considering high biodiversity and the potential threats it may face, the area requires international recognition as an EBSA.

Introduction

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

Khorī Great Bank is an important marine area located along Sindh coast, Pakistan and in the Exclusive Economic Zone of Pakistan. It includes area of continental shelf and slope area of the Northern Arabian Sea. It has a maximum depth of 1,800 m. The unique feature of the area is Indus River Canyon (known as the Swatch) forming a fissure in the continental shelf. The Indus River discharge in the area which bring lot of sediments to the Great Khorī Bank. The River also bring freshwater in the area which plays important role in its productivity. The past four decades the flow of freshwater and sediments through the river has substantially decreased resulting in changed oceanographic conditions of the area. The area is influenced by the repeated reversal of monsoon which causes deep convective mixing bringing nutrient rich water to the surface supporting high productivity. The area located within the territorial waters come under the jurisdiction of the Sindh Government whereas remaining area is located in the Exclusive Economic Zone of Pakistan and comes under the control of Federal Government.

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.)

Khorī Great Bank is located entirely within the jurisdiction of Islamic Republic of Pakistan.

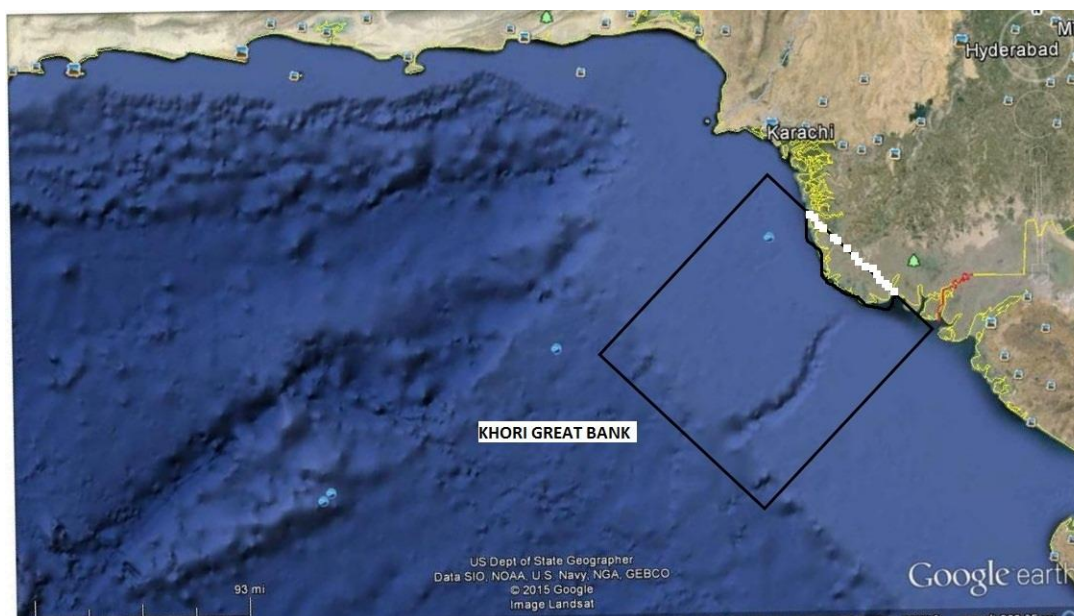


Fig. 1.Khori Great Bank (including the Swatch) along Pakistan coast.

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)

Great Khori Bank is influenced by the repeated reversal of monsoon which causes deep convective mixing especially during the north-east monsoon bringing nutrient rich water to the surface supporting high productivity in the Arabian Sea (Mara and Barber, 2005; Wiggert *et al.*, 2000). The wave action, for most part of year is intense especially during southwest monsoon (mid May to mid September), however, during rest of the period the sea conditions remain calm or with moderate wave action. During November and February the current in the area flows in anticlockwise direction whereas during remaining part of the year it is clockwise.

Because of unique physiographic and oceanographic features, Khori Great Bank is known to be highly rich in biological productivity and diversified marine fauna. The area is known to be an important fishing ground because of increased productivity at higher trophic level. The area is known to be rich in large sharks. An important bottom-set gillnet and longline fisheries used to exist in the area which because of overfishing collapsed in late nineties. Fisheries of large sharks has never recovered since then. It is believed that it has resulted in a trophic cascade which is evident from increased catches of a forage fish i.e. Indian mackerel. Despite decrease in the catches of sharks in the area, Khori Great Bank is still an important fishing ground for both pelagic and demersal fish. However, the separate data for the area is not available.

The area is uniquely known to be rich in cetaceans and about 19 species of cetaceans including baleen Whales, toothed whales, whales and porpoises are known from the area. Some species including rough toothed dolphin (*Steno bredanensis*) and striped dolphin (*Stenella coeruleoalba*) which are known area along Pakistan coast from where these species were recorded (Kiani *et al.*, 2013). Recently Longman's beaked whale (*Indopacetus pacificus*) has also been reported from the area. The diversity of abundance of cetaceans in the area can be judged from the fact that between 8 and 14 November 1966 Russian Whaling ship has killed 164 Arabian humpback whales from this and

adjacent Indian coast (Mikhalev, 1997, 2000). During this hunting spree they noted that 45.9% of females pregnant and over 50% of animals with full or half-full stomachs containing sardines and pelagic shrimps. Arabian humpback whale (*Megaptera novaeangliae indica* Gervais, 1883) considered to be world most vulnerable and non-migratory whale subspecies population having a restrictive distribution in the northern Arabian Sea. Similarly the area is also considered to be a hot spot for blue whales (*Balaenoptera musculus*). Elsewhere in the world, blue whales are known to associate with submarine canyons, for example the Monterey Canyon off California (Croll *et al.*, 2000) and the Perth Canyon off Western Australia (Rennie *et al.*, 2009). Soviet whaling fleet also have hunted blue whale from the area. Gore *et al.*, (2012), suggested that Soviet whaling may have seriously depleted, perhaps even extirpated, this small component of the northern Indian Ocean blue whale population

Aside from the diversified cetacean and elasmobranch fauna, Khorī Great Bank is known to have rich fisheries resources, however, there seems to be no specific study dealing with resources of the area. However, Fanning *et al.* (2011), Abildgaard, *et al.* (1986) and Ahmad *et al.* (1988) have included status of fish stocks in Pakistani waters including in the Khorī Great Bank. There no specific studies on the bird fauna of the area is available, however, Khorī Great Bank is located in the offshore Indus Delta which is a Ramsar site. Bird fauna of Indus delta has been covered under a number of studies including Hasan (1994, 1996), Ghalib *et al.*, (2009) and Khan (2006). Birds found in offshore waters of the area are covered by Moazzam and Ziaullah (2001).

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?)

Khorī Great Bank habitat is affected by reduction in the flow of the River Indus because of water diversion and construction of large reservoirs (dams and barrages) as a result freshwater and sediments inflow has been declined. Because of lack of baseline data, it seems difficult to determine the impact of reduced flow of water and sediment on the biota of the area. Because of uncontrolled fishing activities, fisheries resources have also declined. Fisheries of large sharks have already been stopped because of decreased in catches. Although Khorī Great Bank is considered to be important fishing ground for pelagic and demersal fisheries still, fishermen report noticeable decrease in the catches. There is no major anthropogenic activities in the area, however, discharge of agriculture wastes and other pollutants which are discharged through flow of Indus water might have been accumulated in biota but there is no studies area available.

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 informat ion	Low	Medi um	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				X

	geomorphological or oceanographic features.				
<i>Explanation for ranking</i> (unique, rare, endemic, populations or communities). River Indus Canyon (the Swatch) is one of the unique feature of the area. Information pertaining to Indus Swatch is highly limited but the area is rich is a unique habitat known to be rich in fisheries resources and high biodiversity. A number of cetaceans including rough toothed dolphin (<i>Steno bredanensis</i>), striped dolphin (<i>Stenella coeruleoalba</i>) and Longman's beaked whale (<i>Indopacetus pacificus</i>) are known from area. The area is also known for breeding and feeding ground for Arabian humpback whale (<i>Megaptera novaeangliae indica</i>) which is considered to be world most vulnerable and non-migratory whale population.					
Special importance for life-history stages of species	Areas that are required for a population to survive and thrive.				X
<i>Explanation for ranking</i> The area is also known for breeding and feeding ground for Arabian humpback whale (<i>Megaptera novaeangliae indica</i>) which is considered to be world most vulnerable and non-migratory whale population. Although Russian whaling fleet has massacred the population of Arabian humpback whale resulting in dwindling of their stocks (Fig. 2). It is believed that population of Arabian humpback whale has not recovered since then but still Khori Great Bank is considered to be an important feeding and breeding area for this species.					
Importance for threatened, endangered or declining species and/or habitats	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> Diversified cetacean and elasmobranch fauna found in the Khori Great Bank indicates uniqueness of the habitat which needs to be protected, additionally Indus Swatch is unique habitat which is among the least studied canyon of the world and a unique habitat.					
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
<i>Explanation for ranking</i> There is substantial evidence available which indicates that the population of cetaceans especially Arabian humpback whale and blue whale has been exterminated by Soviet whaling fleet in 1960's indicating fragility of the area. High diversity of cetaceans exists in the area which needs to be protected. Also uniqueness of Indus canyon warrants giving priority to this area for inclusion in the ecologically and biologically significant areas.					
Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.			X	
<i>Explanation for ranking</i> Presence of large population of cetaceans and sharks in the area indicate that high biologically productivity but the phenomena is not well understood. Population of cetaceans are reported from the area. Data for stock assessment of large sharks and fish species is scanty, however, recent studies indicates that highest catfish population is known from the area (Fanning <i>et al.</i>, 2011).					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.			X	
<i>Explanation for ranking</i> Khori Great Bank has diversified habitats including sandy shores along the estuary of the River Indus, shelf area, canyon and continental slope. It also has a part of the deep oceanic abyssal area. The pelagic environment of the area is also known for high productivity.					

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
<i>Explanation for ranking</i> There is almost no human activity except commercial fishing in the Khori Great Bank area. There is a very small population living in the vicinity of the area, therefore, there are almost no anthropogenic impact noticeable in the area. Need not to point out that diversion of Indus River and construction of dams and barrages have serious bearings on the habitat and ecosystem of the area.					

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
Add relevant criteria					
<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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Maps and Figures

Fig. 1. Map of Khor Great Bank

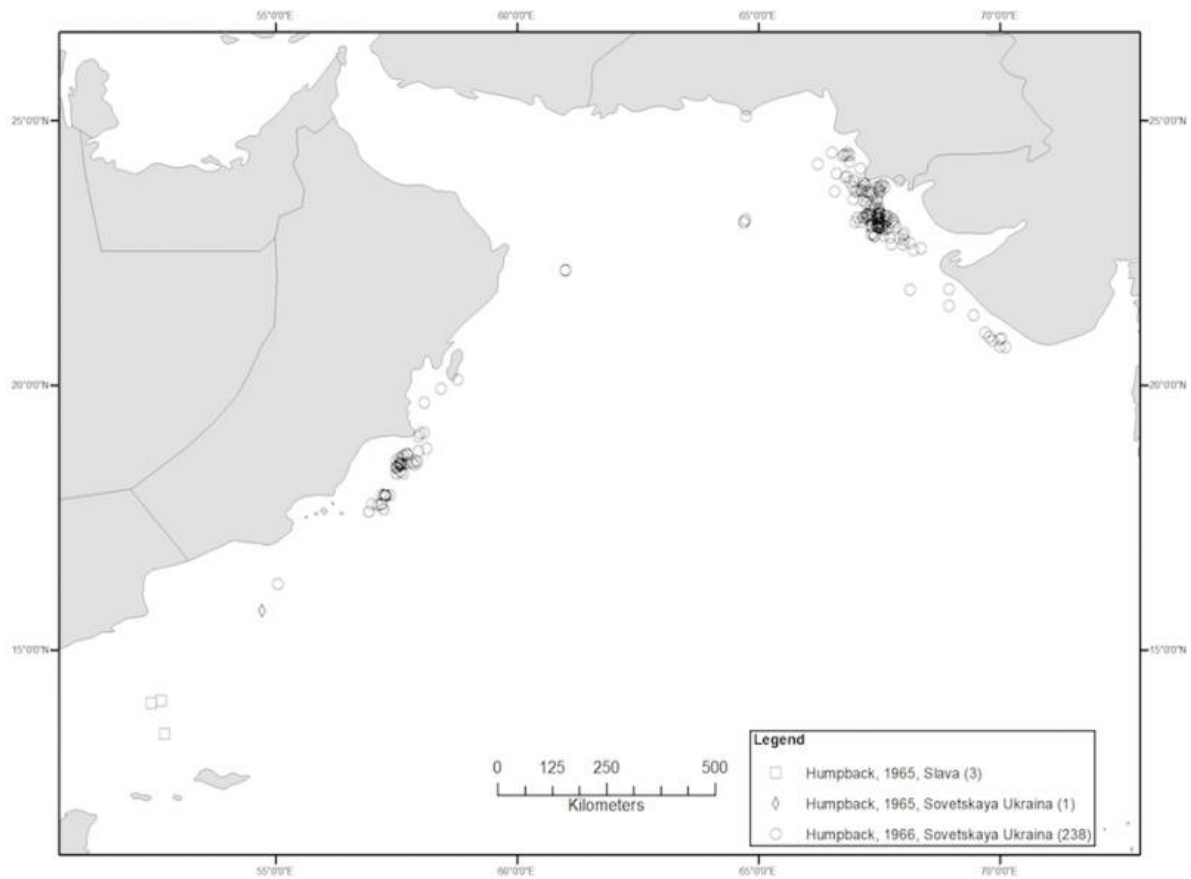


Fig. 2. Humpback Whale Catch Records '65 – '66 (IWC Source Data)

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