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Marine Mammals and Fisheries Interactions

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Introduction

The term marine mammal includes members of five different mammalian groups: Cetaceans (whales, dolphins, and porpoises), Pinnipeds (seals, sea lions and walruses), Sirenians (manatees, dugongs, and sea cows), Sea otters and Polar bear. Marine mammals are probably one of the best sentinel organisms in aquatic and coastal environments because many species have long life spans and have extensive fat stores that can serve as depots for anthropogenic toxins. Many marine mammals are at the top of the food chain, putting them at risk of accumulating high levels of contaminants in their tissues over their lifetime or assimilating biotoxins present in their prey. These toxic levels indicate not only the health of the marine mammals, but also the condition of the ecosystems. Marine mammals have also been used in navy. Navy trains these animals to perform tasks such as ship and harbour protection, mine detection and clearance, and equipment recovery. The Indian seas support a variety of marine mammals, which include baleen whales, toothed whale, dolphins, porpoise and dugong. Stranding and sighting records show that the Indian seas are a habitat for 26 species of cetaceans and one species of sirenian (sea cow). Of the 26 species of cetaceans six are Mysticeti (baleen whales) and the rest are Odontoceti, which includes Delphinidae, Physeteridae, Kogiidae, Ziphiidae, Phocoenidae and Platanistidae. Until the year 2003, knowledge of marine mammals of India was restricted to incidental catch of various species in fishing gear.

Conservation of Marine Mammal in India

Between 2003 and 2012, the Central Marine Fisheries Research Institute (CMFRI) undertook organized research work on marine mammals and conducted extensive visual sighting cruises on-board FORV *Sagar Sampada* in the Indian seas and contiguous seas to explore diversity, distribution and ecological characters of this mega fauna. Since the commissioning of FV *Silver Pompano*, this process had become more intense and elaborate. The total number of sightings in the Indian seas was estimated at 650, which comprised 8700 individuals, belonging to 18 species. All the 27 species of marine mammals in the Indian seas are protected under Wildlife (Protection) Act 1972. While the Act has significantly reduced intentional capture of marine mammals, incidental capture in fishing gears is a cause for concern. Stranding records can be used as an indirect means to monitor the status, distribution, seasonal abundance and fishery interaction of marine mammals. It has been documented that 380 stranding records are available in the Indian seas in the last 60 years (Vivekanandan and Jeyabaskaran, 2012). About 85% of the strands have been reported by researchers from CMFRI. Recurring stranding events are also reported frequently along the entire Indian coast. Conservation management action plans are important for maintaining and restore the distribution, abundance and diversity of marine mammals in the Indian EEZ. It is important to recognize that marine mammal conservation can take place only with the support and participation of fishermen. Conservation of marine mammals could be achieved by integrating the agenda into

fisheries regulatory mechanisms. There is a need to create awareness among fishermen and the public on the importance of mammals in the marine ecosystems, their status and threats, and the need for conservation.

Based on the collected information, the conservation status of Indian marine mammals was classified based on IUCN Red list criteria and the results are given in Table. 1.

Table 1. Marine mammals of India & Conservation Status

No	Common Name	Species name	IUCN Status	India Status*
1.	Blue whale	*Balaenoptera musculus*(Linnaeus, 1758)	Endangered	Endangered
2.	Fin whale	*Balaenoptera physalus*(Linnaeus, 1758)	Endangered	Endangered
3.	Bryde's whale	*Balaenoptera edeni* Anderson, 1878	Data Deficient	Data Deficient
4.	Common Minke whale	*Balaenoptera acutorostrata* Lacépède, 1804	Least Concern	Data Deficient
5.	Humpback whale	*Megaptera novaeangliae* (Borowski, 1781)	Least Concern	Data Deficient
6.	Sperm whale	*Physeter macrocephalus* Linnaeus, 1758	Vulnerable	Vulnerable
7.	Pygmy sperm whale	*Kogia breviceps* (de Blainville, 1838)	Data Deficient	Data Deficient
8.	Dwarf sperm whale	*Kogia sima* (Owen, 1866)	Data Deficient	Data Deficient
9.	Cuvier's beaked whale	*Ziphius cavirostris* Cuvier, 1823	Least Concern	Data Deficient
10.	Indo-Pacific beaked whale	*Indopacetus pacificus* (Longman, 1926)	Data Deficient	Data Deficient
11.	Short-finned pilot whale	*Globicephala macrorhynchus* Gray, 1846	Data Deficient	Data Deficient
12.	Killer whale	*Orcinus orca* (Linnaeus, 1758)	Data Deficient	Data Deficient
13.	False killer whale	*Pseudorca crassidens* (Owen, 1846)	Data Deficient	Data Deficient
14.	Pygmy killer whale	*Feresa attenuate* Gray, 1874	Data Deficient	Data Deficient
15.	Melon-headed whale	*Peponocephala electra* (Gray, 1846)	Least Concern	Data Deficient
16.	Irrawady dolphin	*Orcaella brevirostris* (Gray, 1866)	Vulnerable	Vulnerable
17.	Indo-Pacific humpbacked dolphin	*Sousa plumbea* (Osbeck, 1765)	Near Threatened	Least Concern
18.	Rough-toothed dolphin	*Steno bredanensis* (Lesson, 1828)	Least Concern	Data Deficient
19.	Risso's dolphin	*Grampus griseus* (Cuvier, 1812)	Least Concern	Least Concern
20.	Bottlenose dolphin	*Tursiops aduncus* (Ehrenberg, 1833)	Data Deficient	Least Concern
21.	Pan tropical spotted dolphin	*Stenella attenuate* (Gray, 1846)	Least Concern	Data Deficient
22	Spinner dolphin	*Stenella longirostris* (Gray, 1828)	Data Deficient	Least Concern
23.	Striped dolphin	*Stenella coeruleoalba* (Meyen, 1833)	Least Concern	Data Deficient
24.	Long beaked common dolphin	*Delphinus capensis* Gray, 1828	Data Deficient	Least Concern
25	Finless porpoise	*Neophocaena phocaenoides* (Cuvier, 1829)	Vulnerable	Near Threatened
26	South Asian River dolphin	*Platanista gangetica* (Roxburgh, 1801)	Endangered	Endangered
27	Sea cow	*Dugong dugon* (Müller, 1776)	Vulnerable	Endangered

* Status assigned based on sighting surveys conducted by the CMFRI during the years 2003 - 2012 under the project "Studies on marine mammals of Indian EEZ and the contiguous seas" funded by CMLRE, Ministry of Earth Sciences, Government of India

Marine mammals – fisheries interaction

The marine mammal – fisheries interaction is a major cause for concern. Mechanized fishing was introduced on a commercial scale in India in the mid 1960s. Since then, the fisheries sector has grown rapidly. Marine fisheries census carried out by CMFRI in 2005 shows that there are 58,911 mechanized fishing craft along the Indian coast operating trawl net, gillnet, lines, dolnet and purseseines. The efficiency of fishing vessels has increased, resulting in longer sea endurance, extension of fishing to oceanic waters and the introduction of larger and efficient gear. The growing number and efficiency of mechanized boats have increased the chances of fishing gear – marine mammal encounters. Unfortunately the incidental kills of marine mammals have not been regularly monitored in India. However, it is natural to expect that the incidental kills of marine mammals, especially those of small cetaceans, would have increased with the proliferation of mechanized fishing fleet.

Bycatch of Marine mammals

Competition between cetaceans and fishermen for commercially important fishes is a major cause of concern for cetacean population. Extensive fishing by gillnet in mechanized boats has increased 'bycatch' and driven many species to vulnerable state.'Bycatch' refers to animals that become hooked, trapped, or entangled in fishing gear deployed with the intention of catching something else, i.e. the catching is inadvertent or accidental. The accidental entanglement in fishing gear that causes these marine mammals to become trapped underwater so they cannot reach the surface to breathe.In India, fishermen use the dolphin calf for consumption and adults are used as bait for hook and line fishery for sharks and tuna. The International Whaling Commission (IWC) estimated at least 3,08,000 dolphins and porpoises are killed in bycatch each year in the world's oceans. The World Conservation Union (IUCN) identified bycatch as one of the serious threats to the marine mammals.IWC estimated that >40,000 cetaceans are killed annually in Sri Lanka artisanal gillnet fisheries. Gillnets and purse seines operated from motorized boats caused the entire boycott. At the same time dolphin-fishery interactions cause a loss in revenue by damaging the gear and loss of captured fish.

The Marine Fishery data of the country is collected from all the maritime states through a well-defined stratified random sampling design. Marine mammals do not form a regular by-catch, hence there is no continuous data. However, staff of CMFRI stationed in various parts of the east and west coasts report on stranding and entanglement as and when such incidences occur**.** The FEMD/CMFRI has collated the information on marine mammals and the data pertaining to entanglement is given below.

Fishing related mortality of cetaceans

All the marine mammals of the region are afforded protection under the Indian Wild Life Protection Act, 1972. Records on entanglement of marine mammals in fishing gears were collected and analysed for the period 1950 to 2015**.** It was observed that gill nets are responsible for 98.8% of the mortalities. Occasional reports on incidental catch / entanglement in trawl, purse seine, shore seine and long line has also been recorded. This became a problem from 1970s though the

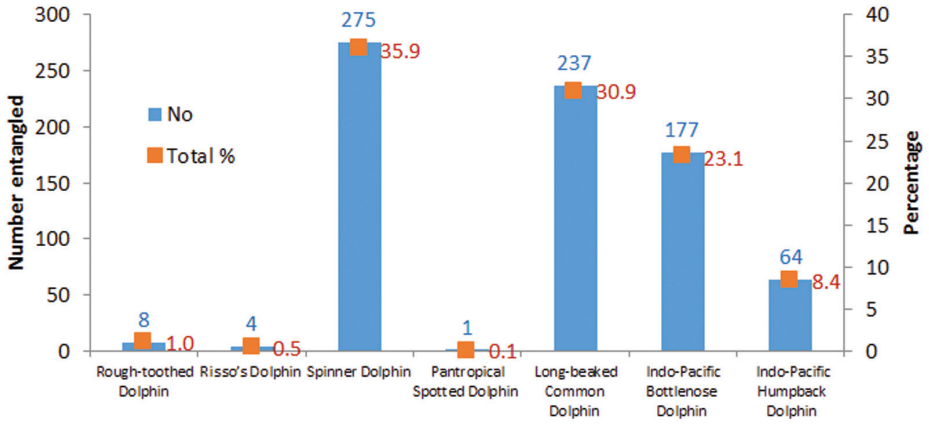
first report in 1953 was that of an incidental catch of porpoise in a dol net along Gujarat.The average entanglement of porpoises is less than 0.69 per year along the Indian coast and that of dolphins is about 11.7 per year. However, these are released back to the sea immediately since the fishermen are aware about the Act on the marine mammals. According to the survey conducted among fishermen dolphin population has increased and this has negatively affected their fishing activities. Damage to gear and financial loss to mend this is a problem cited by gill netters of South India.

Porpoises:

A total of 45 porpoises have been found to be caught by fishing nets along Karnataka (34nos), Kerala (9nos; from gill nets) and one each from Gujarat (dol net) and Tamil Nadu (gill net). Of the 34 nos. from Karnataka, 32 were from gill net and 2 from purse seines. Surveys conducted in Kerala and Karnataka indicate that the porpoises continue to get entangled in gill nets in Karnataka and though this creates problem for the fishermen whose nets get torn, they release them back to the sea most often.

Dolphins:

About 766 entanglements / incidental catch of dolphins in fishing gears has been reported from Karnataka, Kerala, Tamil Nadu and Andhra Pradesh. Seven species of dolphins, such as Spinner Dolphin (275nos), Long-beaked Common Dolphin (237 nos.), Indo-Pacific Bottlenose Dolphin (177 nos.), Indo-Pacific Humpback Dolphin (64nos.), Rough-toothed Dolphin (8 nos.), Risso's Dolphin (4 nos.) and Pantropical Spotted Dolphin (1 no) were reported in the fishing gear related mortality along the Indian coast (Fig 1). Spinner Dolphins were reported in all the four south Indian states while others were mostly caught along the Kerala –Tamil Nadu fishing gear operations. Highest fishing related mortality were reported from Kerala (526 nos.) followed by Tamil Nadu (231 nos.). In Karnataka fishing related mortality was low (2 nos); spinner dolphin and Indo Pacific humpback dolphin one each. Only one species has been reported from Andhra Pradesh Spinner dolphin (5 nos.) and from A& N islands, beaked common dolphin has been reported.



During this century, the number of dolphin species reported in fishing related mortality **reduced to four**; only species such as Risso's Dolphin, Spinner Dolphin, Indo Pacific humpback dolphin Pantropical spotted dolphin have been reported. Entanglement of porpoises has been reported from Karnataka and Gujarat during this century.

Conclusion

Competition between cetaceans and fishermen for commercially important fishes is a major cause of concern for cetacean population. Conservation management action plans are important for maintaining and restore the distribution, abundance and diversity of marine mammals in the Indian EEZ. The information gathered from the majority of strandings has not been sufficient to determine the cause of the stranding. As a way forward, we suggest that sighting data may be combined in the future with stranding data as a more comprehensive tool to understand ecological linkages. Understanding of marine mammals requires population dynamics study. Marine mammal sighting data is required to understand the causes of these changes e.g. abundance of food, predation, levels of harvest, habitat availability, and how they affect reproduction and survival of individuals in the population. It is important to recognize that marine mammal conservation can take place only with the support and participation of fishermen. Conservation of marine mammals could be achieved by integrating the agenda into fisheries regulatory mechanisms. There is a need to create awareness among fishermen and the public on the importance of mammals in the marine ecosystems, their status and threats, and the need for conservation.