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Dugongs, *Dugong dugon* (Family: Sirenia) and Humans: the fisher's perspective

Ranil P. Nanayakkara[1, 2, 3], Ruvinda K. de Mel[1], Surendranie J. Cabral[1] & H.M.J.C.B Herath[1,4,5]

[1]*BEAR (Biodiversity Education And Research), Sri Lanka.*
[2]*Department of Zoology, University of Kelaniya, Kelaniya, Sri Lanka.*
[3]*IUCN Sirenia Specialist Group Regional member (Indian Ocean)*
[4]*Postgraduate Institute of Science (PGIS), University of Peradeniya, Peradeniya, Sri Lanka.*
[5]*Department of Biology and Ecology, Faculty of Medicine, South Asian Institute of technology and Medicine (SAITM), Malabe, Sri Lanka.*

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ABSTRACT

The dugong (*Dugong dugon*, Muller 1776) is a mammal considered Vulnerable globally and Endangered locally. In Sri Lanka, dugongs are found in calm shallow waters of the Northwest, North and east coast *viz*., from Kalpitiya to Jaffna with sporadic reports from the east coast. It is one of the least known mammals occurring in the Sri Lankan seas and there exists large gaps in the scientific knowledge of this animal. The fishermen of the north and east coasts of the island are the people who come into direct contact with these animals in their day to day lives Therefore, ethnobological studies in indigenous communities have been conducted regarding the knowledge, perceptions and beliefs of these individuals toward the dugongs are invaluable when assessing the threats faced by these animals and formulating conservation plans. A standardized questionnaire was used to collect data from fishermen inhabiting the north and east coasts of the island. The questions were structured to extract and assess the local knowledge on the biological and ecological aspects of the dugongs while simultaneously gathering details of the backgrounds of the fishermen.185 fishermen were interviewed. 100% of the interviewed fishermen said that their parents and grandparents had been fishermen themselves. 92.44% of the fishermen said they could correctly identify a dugong from a dolphin while 7.56% replied in the negative. 100% of the fishermen responded saying that they knew of seagrass beds and 100% again said that they are important. 100% said that they fish in seagrass areas as well. Furthermore, 100% knew of seagrass beds off the coasts of their villages. There is a correlation between the knowledge of the fishermen with the number of years of experience in fishing. This indigenous knowledge can be used to identify the threats and conserve the dugong population. In fact the fishing community can be used to conserve the endangered dugong population by positively changing their knowledge, attitudes and practices.

Keywords: *Dugong dugon,* fishermen, North and East coasts, Sri Lanka

INTRODUCTION

The dugong (*Dugong dugon*, Muller 1776) is a mammal considered Vulnerable globally and Endangered locally. It is a one of the least known mammals occurring in the Sri Lankan seas. Historically dugongs had a wide range occurring in 37 countries from East Africa to West coast of Australia; they specially inhabit shallow waters around islands, which promotes the growth of sea grasses. The dugongs have been an integral part of human mythology and beliefs (by possibly giving rise to the mermaid legend) similarly to the Amazon river dolphin (*Inia geoffrensis*) (Cravalho. 1999; Gravena et al., 2008). Though once widely distributed, it is now restricted to coastal waters of the Indian and Pacific Oceans (Marsh *et al*., 2001).The decline in the populations is largely due to over hunting for their meat, hide and oil (Marsh *et al*., 2001). A similar fate is shared by many other marine and aquatic animals such as Tucuxi Dolphin (*Sotalia fluviatilis)* (Alves & Rosa, 2008).

In Sri Lanka, dugongs are found in calm shallow waters of the Northwest, North and east coast *viz*., from Kalpitiya to Jaffna with sporadic reports from the east coast (Nanayakkara, 2011; Nanayakkara, 2013), however ongoing research has shown that dugongs have had a much wider distribution trend in Sri Lanka, which has stretched to the south of the island (Nanayakkara, 2013, Nanayakkara unpublished). From a local perspective the dugong has been associated with fisher and the local inhabitants in by gone years, as the dugong has always been looked at as a source of protein. Archaeological excavations has revealed that even the earliest man to inhabit this land, the helas and dugongs acknowledged each other's presence. The discovery of Microliths, mostly stone implements together with dugong bones, suggest that the so called aborigines of Sri Lanka, probably the Yaks, Nagas, Rakus and the Asuras were used to eating dugong meat, even prior to the advent of Prince Vijay in the sixth century B.C. (C. S. R. Nanayakkara, Per Comm.). further, the fisher and sailors have compared the dugong closely with women, due to its disposition and being a gentle creature the dugong has been referred to widely

*Corresponding Author's E-mail: ranil_n@hotmail.com

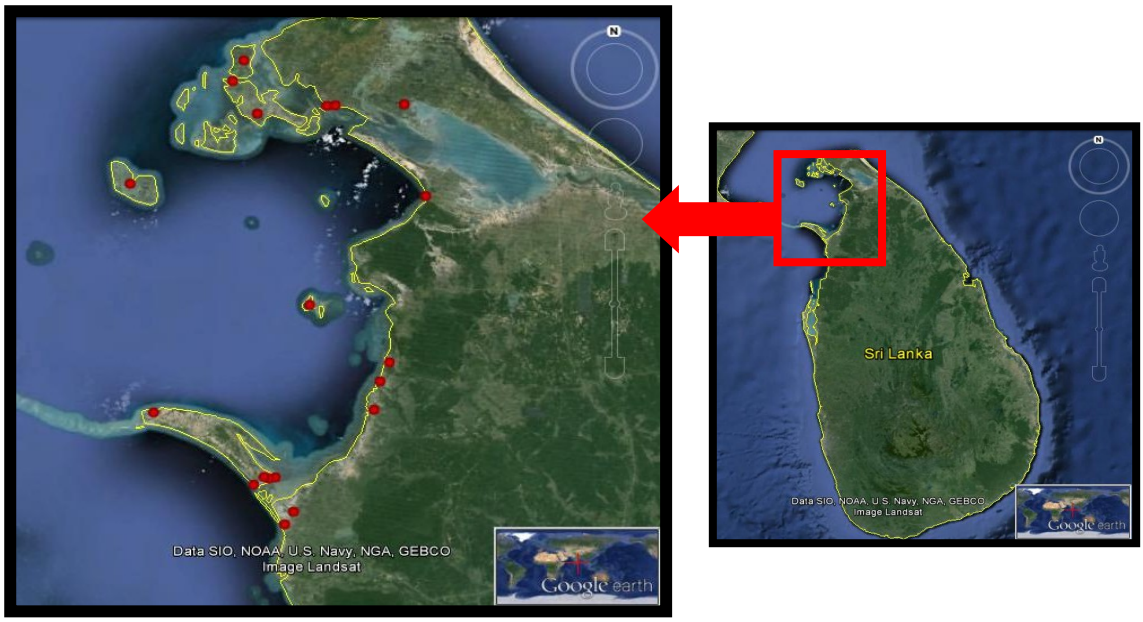

Figure 1. Sampling sites

in the poetic world often in comparison to a women. The dugongs habitual demonstration of strong maternal affection, has given rise to the fable of the mermaid and thus that earliest invention of mythical physiology may be traced to the Arab seamen and Greeks, who had watched the movements of the dugong in the waters of Mannar (Nanayakkara and Nanayakkara, unpublished). Strangely the dugong has survived over exploitation up until now; a result of men's desire, taste for dugong meat has put this creature at jeopardy.

Due to the lack of comprehensive research carried out in order to evaluate the ecology and threats faced by the dugong, there exists large gaps in the scientific knowledge of this animal in Sri Lanka. However, the fishermen of the north and east coasts of the island are the people who come into direct contact with these animals in their day to day lives. Thus, the knowledge, perceptions and beliefs of these individuals toward the dugongs are invaluable when assessing the threats faced by these animals and formulating conservation plans. Thus in this paper we discuss the backgrounds of the fishermen and their knowledge about the dugongs and how these can be changed accordingly and utilized in the efforts to conserve the dugong.

METHODS

A standardized questionnaire developed by CMS and UNEP was used to collect data from among representative sample of near-shore fisherman and villagers inhabiting Mannar Island near Adam's Bridge, Northward along the mainland coast to Jaffna and the off shore island adjunct to the mainland viz., Mannar, Vankalai, Mundampiddy, Thevanpiddy, Illupaikadavai, Kattalampiddy, Iranaitivu, Pallimunai, Panankaddukddu, Shathipuram, South bar, Thalvupadu, Thalaimannar, Moondampiddy, Pallikuda , Gurunagar, Urgavathurai/ Kytes, Neduntive/Delft, Pasaiyur, Valikamam (west), Thalaiyady, Velanai, Chavakachcheri, Karainagar (Figure 1). These areas were chosen, as it is the last foothold of the dugong in Sri Lankan waters and they still supports large extents of seagrass meadows. Interviews were conducted with seven - eight randomly picked individuals from each site were asked specific questions according to the questionnaire prepared for this purpose. The questionnaire was translated into the local language (Tamil, as the majority of fisher in the stipulated areas speaks only Tamil) and all interviews and discussions were conducted in the local language by a team who had prior experience in questionnaire surveys on marine fauna and flora. The interviews and discussions were conducted in an informal atmosphere in locations familiar to the respondents in order that they did not feel threatened in anyway. The questions were structured to extract and assess the local knowledge on the biological and ecological aspects of the dugong while simultaneously gathering details of the backgrounds of the fishermen.

185 fishermen (n=185) from these villages were interviewed using the questionnaire survey. All respondents were males, fishermen by profession and varied between 29-54 years in age.

RESULTS

Background of the fishermen

100% of the interviewed fishermen said that their parents and the grandparents had been fishermen themselves. While 98.92% of them claimed that fishing was their 'main activity', 95.14% said that it was their only activity while 4.86% said that they had other sources of income as well. The percentage of fishermen according to the number of years of experience they have as fishermen are depicted in Figure 2.

Knowledge on the biology of the dugong

92.44% of the interviewed fishermen could identify a dugong correctly. The answers provided when asked how long they thought a dugong would live ranged from

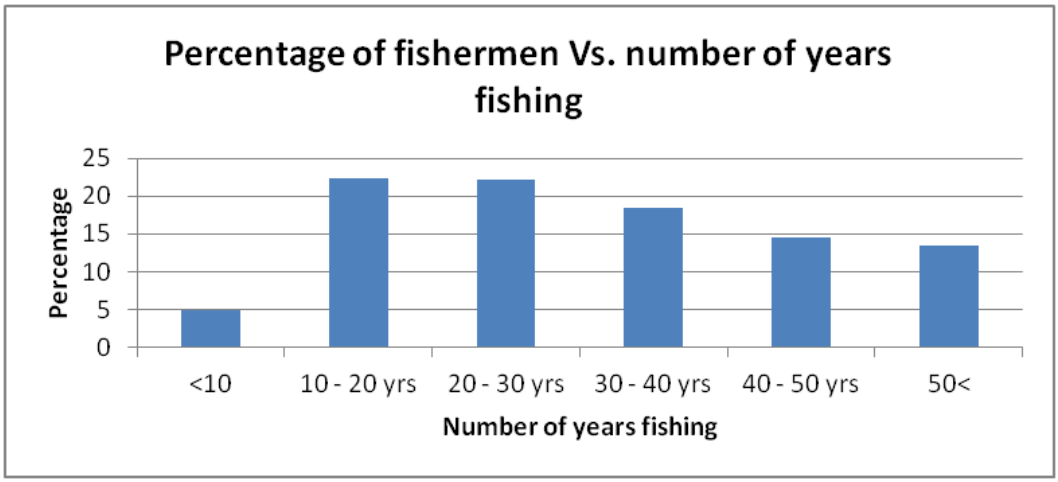

Figure 2. Number of years of experience as fishermen

25 years to 100 years with 73.91% of the answers being 50 ± 10 years (Table 1).

Table 1. Knowledge on the biology of the Dugong

Question	Yes (%)	No (%)
Correctly identify a dugong?	92.44	7.56
Know how long a dugong could live?	`49.2	50.81

Table 2. Knowledge of ecological aspects of dugongs and the threats they face

Question	Yes (%)	No (%)
Do you know of seagrass beds?	100	0
Are seagrass beds important?	100	0
Know of seagrass beds off the coast of your village?	100	0

100% of the interviewed fishermen knew about the seagrass beds and knew they are important. (Table 02). However while 51.89% said the importance of seagrass beds were directly linked with dugongs (as grazing grounds) 48.11% didn't relate it to dugongs but said it was for reasons such as, being reproductive grounds for fish and prawn culture, as primary producers etc.

When asked about the status of dugong populations 92.98% said that they believe the dugong population is decreasing while 7.56% said that they didn't have an idea as to how the trend was. The reasons that were given for the decline of the dugongs are depicted in Figure 3.

Correlations of interest observed in the results

61.54% of the interviewees who claimed they didn't know how long a dugong lives have less than 10 years of fishing experience. The interviewees who claimed to not know the status of Dugong populations were again mainly compromised of fishermen with less than 10 years fishing experience (61.53%). 50% of the fishermen who claimed to not know the difference between a dugong and a doplhin had less than 10 years of fishing experience.

DISCUSSION

The results show that the interviewed fishermen were all 3rd generation fishermen with fishing being the main source of income for almost all of them. This clearly implies that these fishermen would've had interactions or atleast heard of others in their community observing/ hunting dugongs.

While almost all the fishermen said they knew how to identify a dugong, almost half of them said they did not know for how long it lived. The provided answers for its longevity were within a large spectrum. However the answers all showed that the fishermen did know that the dugong was a long lived mammal.

The fishermen knew of seagrass beds and said they carried out their fishing activity in the vicinity of the seagrass beds located near their villages. However, though they knew that seagrass beds were important, only half of them knew their importance with regard to dugongs. Dugongs mainly feed on seagrass (Preen & Marsh, 1995) and seagrass beds are of prime importance to the survival of the dugongs. There seems to be a considerable gap in the knowledge of the fishermen regarding certain important biological aspects of the dugongs.

It is clear that over 90% of the fishermen believed that dugong numbers were decreasing. This seems to be the case through the range of the animal (Marsh *et al*., 2001) and the main reason the fishermen thought

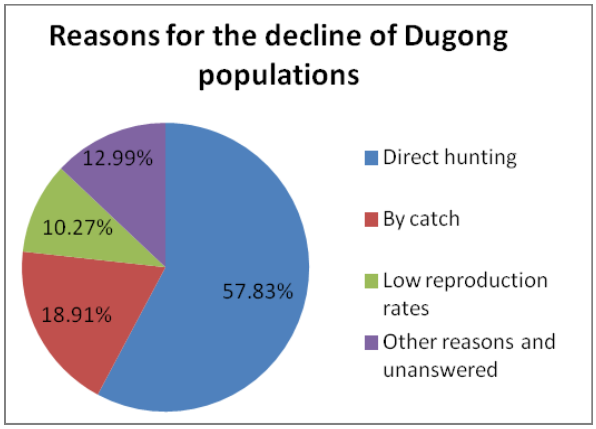

Fig. 3. Reasons for the decline of Dugong population.

was causing this was the intentional hunting of dugongs. This fact has been brought to light by previous authors as well (Ilangakoon, 2012). This does call for attention as the dugong has been legally protected since 1970 (Phillips, 1984). A fifth of our respondents thought that bycatch was the main cause of Dugong mortality and this reflects findings by Ilangakoon (2011) and Karunaratne *et al*. (2011). Surprisingly, not much said about mortality caused by blast fishing but such capture methods are definitely being used (Nanayakkara, 2013). When the question of this method came up the fishers we spoke to were sanguine about its effects but fisher communities from Puttalam have expressed concern at the resultant habitat destruction.

However it is important to note that the fishermen interviewed here did not see destruction of habitat as a serious threat to the dugong population of the area whereas the fishermen from the Puttalam area did (Karunaratne *et al.*, 2011). This again shows that the fishermen of the communities in question have not yet grasped the importance of sea grass beds in relation to dugongs. Superstitions concerning dugongs were not prevalent in Sri Lanka, a fortunate contrast to other parts of the world where Dugong body parts had medicinal significance leading to hunting to collect such items (Hines *et al*., 2005).

Another fact revealed through this survey was that the fishermen with less fishing experience had larger gaps in knowledge as opposed to the elders of the community. The younger fishermen (with less experience) were unable to correctly identify dugongs and didn't know of their population trends. Nor did they have any idea as to the longevity of the dugongs.

When reviewing the results of the study it is apparent that there are important issues that need addressing. Firstly the existence of large knowledge gaps regarding the biology of the Dugong need to be addressed. Another very important point that needs attention is to educate the fishermen regarding the importance of seagrass beds with regard to the dugong. Community meetings and workshops could be an effective method of conveying these points of interests to the fishing communities. When conducting workshops it would be prudent to recruit the more experienced fishermen as they seem to have a comparatively better understanding of the biology and threats faced by the dugongs. A strong rapport with the legal authorities should be promoted as direct hunting of dugongs is evidently still quite abundant. Thus the strong enforcement of laws is of paramount importance.

Incorporating these recommendations could prove effective when devising conservation action plans for the Dugong which in our opinion is of paramount importance.

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