

**CAPACITY BUILDING AND PRELIMINARY ASSESSMENT
ON DUGONG (*Dugong dugon*) OCCURRENCE OFF THE
RAKHINE COAST OF MYANMAR**



Tint Tun and A. D. Ilangakoon

**Report to
The Society for Marine Mammalogy**

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By

Mr. Tint Tun

Marine Biologist,
Wildlife Conservation Society (WCS),
MYANMAR

E-mail: cetaceanmm@mail4u.com.mm
tinttun@gmail.com

Ms. A. D. Ilangakoon

Member, Cetacean Specialist Group,
IUCN Species Survival Commission,
SRI LANKA

E-mail: anouki@zeynet.com
anouk.ilangakoon@gmail.com

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1. Introduction

The dugong (*Dugong dugon*) is presently the only extant species in the Family Dugongidae of the Order Sirenia. The documented geographical range of the species extends over the coastal waters of some 37 countries ranging from east Africa, through south and south-east Asia to Australia (Marsh *et.al.*, 2002). This herbivorous mammal, inhabiting the marine environment was once abundant in many parts of its range but numbers have declined and its area of occupancy has decreased in recent times due to exploitation and loss of habitat.

The dugong is therefore, currently listed in the IUCN (World Conservation Union) Red List of Threatened Species as being vulnerable to extinction throughout its global range. It is also listed in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which prohibits all trade in this species or any products derived from it.

Documenting the continued presence of the dugong in Myanmar waters was considered important at this stage because recent global assessments and action plans have not listed Myanmar as a country that still supports a population of this species in her waters (Marsh *et. al.*, 2002). Historically however the presence of the dugong in Myanmar waters has been known locally within the country and has been documented as far back as the 1850's by Rev. S Benjamin (Mason, 1882). Unfortunately there has been a large gap in the knowledge base about this species in the country of recent times, with the last documented report of dugong occurrence in Myanmar being in 1966 (Guardian, 1966; Yin, 1967). This lack of recent information is possibly the reason for the neglect of Myanmar in more recent global assessments of the species.

After a gap of almost four decades the present project initiated gathering of recent information on the dugong along the Rakhine coastline of western Myanmar. This coastline became the focus of the initial survey as the last documented report from 1966

also originated from this area. Although the occurrence of the dugong in Myanmar waters has been known locally and accidental bycatch of dugongs has been reported from Rakhine and Taninthayi no systematic studies on the species have ever been carried out.

The present project was undertaken to initiate preliminary investigations into the continued presence of the dugong in the waters off the Rakhine coast of western Myanmar. Simultaneously the project proposed to build local human resource capacity for future assessments on the dugong in other parts of the Myanmar coastline through collaboration with researchers from other Asian countries such as Sri Lanka where similar assessments have been undertaken recently (Ilangakoon *et.al.*, 2004). The results of this collaborative capacity building exercise and preliminary field survey are detailed in the following sections of this report.

2. Methodology

A semi-structured interview survey technique was developed for this initial survey based on a questionnaire already used in the Gulf of Mannar Sri Lanka and India by Ilangakoon *et. al.* in 2004. Both individual interviews and group discussions were carried out at the field sites visited along the Rakhine coastline. The questionnaire was translated into the local language and all interviews and discussions were conducted in the local language by researchers from Myanmar. The collaborating researcher from Sri Lanka participated only as an observer.

2.1 Survey Area

The Rakhine coastal zone is bounded by the Bay of Bengal in the west and it stretches 740 km from the Naff River in the north to Mawdin point in the south. The survey was conducted along an 82 km. stretch of coastline from Magyi zin village in the south to

Thegoni village a few kilometers north of Kyein ta li along the Rakhine coast (Figure 1). The fishing villages of Magyi zin, Gwa, Magyi ngu, Tain gyo, Kan tha yar, Sathwar, Long gyo and Thegone, Gwa and Kyein ta li towns were included within this survey area.

2.2 Survey Respondents

The majority of respondents to the questionnaire and participants at group discussions (Figure 2 & 3) at all sites were members of the fishing communities. Additionally in-depth discussions were also held with regional fisheries officials of the area (Figure 4) and other influential and knowledgeable persons within these communities (Figure 5).

2.3 Survey Team

The survey team (Table 1) consisted of local researchers who already had experience working on other marine mammals such as Cetaceans in the country (Figure 6). Within Myanmar the members of the survey team are affiliated to the Wildlife Conservation Society (WCS), the Department of Fisheries (DoF) and the University of Myeik. The collaborating researcher from Sri Lanka is a member of the Cetacean Specialist Group of IUCN and is affiliated to the Indian Ocean Marine Affairs Co-operation (IOMAC) through its Center for Research on Indian Ocean Marine Mammals (CRIOMM).

Table 1. The Survey Team

Name	Designation/Affiliation
Mr. Tin Tun	Associate Marine Biologist, Wildlife Conservation Society
Mr. Mya Than Tun	Staff Officer, Department of Fisheries, Myanmar
Mrs. Nang Mya Han	Professor, Dept. of Marine Science, University of Myeik
Ms. Thidar Moe	Deputy Staff Officer, Department of Fisheries, Myanmar
Ms. Anouk Ilangakoon	Member, Cetacean Specialist Group of IUCN

3. Results

Discussions on survey methodology, adapting and translating the questionnaire, survey participants and logistical arrangements between collaborators from Myanmar and Sri Lanka began in October/November 2005. The initial field survey along the Rakhine coastline was conducted in December 2005.

3.1 Local knowledge on the biology and ecology of the dugong

The majority of respondents at all sites were aware that the dugong is a mammal and they were all aware that dugongs inhabit sea-grass habitats. One respondent at Kan tha yar reported opening the stomach of an accidentally caught dugong and finding the undigested remains of crustaceans such as small crabs and echinoderms. At a group discussion with fishermen at Long gyo village, south of Kan tha yar, several members of the fishing community reported seeing dugongs accidentally pick up holothurians (sea cucumber) while feeding in sea-grass beds and subsequently spitting them out again without ingesting them. Some also reported that dugongs inhabited deeper waters (of about 45 feet depth) during day time but came closer to shore at night to forage on sea-grass and bivalves. Therefore in contrast to current scientific knowledge on dugong feeding habits, there is an opinion among these fishermen that dugongs are not strictly vegetarian although they eat plant matter most of the time.

At all sites visited fishermen reported frequent sightings of small groups of dugongs, usually 2, but sometimes numbering upto 5-6 individuals, including calves. It was reported that dugongs are more frequently sighted during the transitional months between winter and summer along this coast. The respondents also observed however, that larger numbers and more frequent sightings of dugongs can be made around Man aung Island (Cheduba Island) situated to the north of the present study area. This information was

further substantiated by fisheries officers at Gwa who observed that they receive frequent reports of dugong occurrence and bycatch from the Island of Cheduba.

3.2 Stories, beliefs and myths in relation to the dugong

In contrast to neighbouring countries of the region like Thailand there were no specific superstitions, myths or religious beliefs in relation to the dugong among the fishing communities along the Rakhine coast of Myanmar. However several stories connected to dugongs interacting with fishermen engaged in their day-to-day activities were reported.

At a group discussion at Long gyo village, south of Kan tha yar, several fishermen explained that dugongs often come and bump their heads against the wooden rudder of artisanal fishing craft at Hmawyone which is located between Kyein ta li and Thandwe near Andrew Bay. At times they head so violently that the rudder is damaged and therefore the fishermen carry long bamboo poles to push the dugongs away from their boats in such instances.

At Gwa a fisherman who used to dive for sea cucumbers in the past reported that dugongs often display curiosity and follow divers up and down between the surface and the substrate. This behaviour makes the divers a little nervous because dugongs are large heavy creatures even though they display no aggression and never try to harm the divers.

A fisherman at Kan tha yar who had some old dugong bones (Figure 7) in his possession and some fishermen at Long gyo village reported that they had heard dugong bones can be used as a remedy for diarrhea in the form of powder or ground to a paste with water on a stone slab. However, the fisherman who had the bones added that although he had kept some bones from an accidentally caught animal he had never tried this remedy and therefore did not know if it was true.

3.3 Recent evidence of dugong occurrence

Frequent dugong sightings and some accidental bycatch was reported from all sites visited. At Gwa it was reported that dugongs are frequently seen throughout the fishing season but the fishermen were not aware if they are present during the monsoon (May to October) as they do not go out fishing during that time of the year. At Kan tha yar and Kyein te li dugong sightings were reported all year round with more frequent sightings during the winter season, especially in December and January. Fishermen at all sites were in agreement that dugong sightings are more frequent and larger numbers are present around Cheduba Island throughout the year. It was reported that spending one week at Cheduba Island would guarantee at least one dugong sighting and possibly more. The respondents explained that they can be seen even from land as there are extensive shallow sea-grass beds around this island which is inhabited by people engaged in fisheries activities.

The most recent dugong bycatch was reported at Kan tha yar where a large animal had been accidentally killed in a net laid for skates as recently as August 2005. Fisheries officers at Gwa were able to provide photographs (Figure 8) of a young dugong that had been accidentally killed at Kan tha yar in 2004. Bycatch of at least a few animals was reported from all sites within the past five years.

3.4 Possible range of distribution along the Rakhine coastline

Based on the information obtained through this initial survey it appears that the dugong still has a continuous range of distribution from around Magyi zin, Bwa mi and Nga yoke kaung in the southern part of the study area, to Kyein ta li in the north. This stretch of coastline along Myanmar's Rakhine coast is approximately 80 km. in extent (Figure 9). Although this was the area actually covered by the present survey the data gathered indicates that dugong distribution along this coastline extends much further north, at least as far as Cheduba Island, where dugong sightings and bycatch is reported to be common.

Therefore it is now of importance to extend the survey north of Kyein ta li, at least to Cheduba Island and further north if possible, to ascertain the northern extremity of the dugongs range in Myanmar coastal waters.

The present information indicates that dugongs are not rare anywhere along the coastal belt that was surveyed and larger concentrations of the species are to be found further north around Cheduba island. All fishermen interviewed reported seeing dugongs in groups of 5-6 animals and also reported the presence of calves indicating that there is a viable breeding population of the species along this segment of coastline in Myanmar. These positive results from the present survey not only makes it possible to authenticate the fact that the Rakhine coastal waters off western Myanmar still supports a dugong population but also that it appears to be a healthy breeding population of the species. Further investigations will possibly indicate that the range of the species extends both north and south of the present study area and more extended surveys should therefore be considered a priority.

3.5 Threats and use

In contrast to most countries in Asia where the dugong still occurs, direct threats to the dugong along the Rakhine coast of Myanmar appear to be minimal. It is reported that about a decade ago some dugongs were accidentally caught in beach seine fisheries. Usually only young dugongs were caught in these nets as the nets are manufactured with locally available fibre threads and larger dugongs can tear these nets apart and escape. Presently however fishermen engage in deep sea fishing and beach seine fishing has not been practiced in the area for many years. Accidental bycatch in set nets used mainly for skates and rays does however still occur sometimes along this coastline. Opportunistic killing of dugongs with hand harpoons was reported only from the Taungup area.

Animals that are accidentally killed are used for local consumption here but the flesh of the dugong is not considered to be of any special significance or importance unlike in

other Asian countries such as Sri Lanka and India where direct hunting occurs because it is considered a delicacy (Ilangakoon, *et. al.*, 2004). At the same time unlike in neighbouring countries such as Thailand (Hines *et. al.*, 2005) there is no prevalence of strong superstitious or medicinal values in relation to dugong body parts, teeth or tears in Myanmar. All these factors contribute to the absence of demand driven direct hunting of dugongs along the Rakhine coastline of western Myanmar.

Likewise the sea-grass beds along this coastline are still in pristine condition (Soe-Tun *et.al.*, 2001) and they are not under any undue stress due to human induced factors such as destructive practices or pollution as in many parts of the world-wide range of the dugong today. The sea-grass habitat off the Rakhine coastline is therefore well preserved and faces no immediate threats.

3.6 Legislation in relation to the dugong

The State Law and Order Restoration Council of the Union of Myanmar enacted The State Law and Order Restoration Council Law No. 6/94, titled “The Protection of Wildlife and Protected Areas Law” on 8th June, 1994. The objectives of this Law are as follows:

- a) to implement the policy of protecting wildlife of the State;
- b) to implement the policy of conserving the protected areas of the State;
- c) to carry out in accordance with International Conventions agreed by the State in respect of the protection of wild species of both flora and fauna and representative ecosystems occurring in the country;
- d) to protect endangered species of wild flora and fauna and their habitats;
- e) to contribute for the development of research on natural resources;
- f) to establish zoological and botanical gardens for the protection of flora and fauna.

In accordance with Chapter V, Article 15(a) of the Protection of Wildlife and Protected Areas Law, the Forest Department of the Ministry of Forestry, Union of Myanmar issued

Notification No.583/94, dated 26 October 1994 under which, the Dugong was listed in the “Completely Protected Animals” category. Therefore, since 1994 the dugong is a species that is totally protected by law in Myanmar.

3.7 Secondary information on other marine mammals

In the course of this survey on the dugong it was also possible to obtain information on the occurrence of other marine mammals of the Order Cetacea along the Rakhine coastline. All the skeletal parts of a 45-50 foot whale that had stranded approximately five kilometers north of Kyein ta li in July 2005 were discovered during the survey (Figure 10). Given the size of the skeleton and the shape of the skull it appeared to be of a fin whale (*Balaenoptera physalus*). Presently this skeleton is displayed for the public at the Fish Garden in Kandawgyi Park in Yangon (Figure 11). Fishermen at all sites also described encountering large whales exceeding 60 feet in length in deeper waters near the edge of the continental shelf. These are also possibly fin whales as the species seems to be common in the area. This is further substantiated by the fact that the skeleton of a 72 foot fin whale that stranded on the Rakhine coast in 1987 is presently displayed in the Natural History Display of the Yangon Zoological Gardens (Figure 12).

Additionally fishermen taking part in the dugong questionnaire survey when shown photographs of whales and dolphins in a guide book (Reeves *et. al.*, 2002) identified several species as ones they see often in the area. At Kan tha yar and Gwa fishermen identified the species *Sousa chinensis*, *Stenella attenuate* and *Tursiops spp.* as those that they are familiar with. At Kan tha yar several fishermen at a group discussion described a small whale not much bigger than their boats that is encountered in shallow waters and when shown pictures identified it to be *Balaenoptera acutorostrata*. At Kyein ta li one fisherman identified *Globicephala macrorhynchus* as a species he has seen in the area in addition to *S. chinensis*, *S. attenuate* and *Tursiops spp.* This is of interest as *G. macrorhynchus* is listed as one of three species of small cetaceans to occur in Myanmar

waters in a book titled “Wild Mammals of Myanmar” published in the 1960’s (Yin, 1967), although more recent surveys have not recorded the species.

4. Discussion

Although no systematic surveys have been carried out on the dugong in Myanmar and its occurrence has not been documented during the past four decades, the species appears not only to exist in these waters but to be quite common unlike in many other parts of its earlier range in south and south-east Asia. From all information gathered through the survey, the dugongs here seem to be a part of a healthy breeding population. Likewise, the Rakhine coastline within the present survey area and northwards to the islands off the coast still support good sea-grass habitat that is under no stress from human induced factors.

Some studies have been done on these sea-grass habitats that are essential for the survival of the dugong along the Myanmar coastline (Soe-Tun *et.al.*, 2001). A total of nine species have been recorded with eight of them occurring on the Rakhine coastline. The species include *Cymodocea rotundata*, *C. serrulata*, *Halodule pinifolia*, *H. uninervis*, *Syringodium isoetifolium*, *Enhalus acoroides*, *Halophila beccarii*, *H. decipiens* and *H. ovalis*. Meanwhile, the family Hydrocharitaceae represents the most dominant genera in both Rakhine and Taninthayi coasts and the family Cymodoceaceae occurs mainly on the Rakhine coastline. Presently, these sea-grass meadows along the coastal areas of Myanmar are in pristine, climax condition. Of the species found in the area *Halophila ovalis* is known to be a species preferred by dugongs (www.hans-rothauscher.de/dugong/sasia_e.htm).

It is also apparent that off Myanmar’s Rakhine coastline the dugong is not faced with serious direct hunting pressures or habitat fragmentation, degradation and destruction. This is in sharp contrast to many parts of the dugong’s worldwide range, especially in

Asia, where they are generally hunted as food or for their body parts, bones and teeth which are used for medicinal purposes and are valued on the basis of superstitious beliefs. The two factors of deliberate hunting and habitat destruction have played a major role in the vulnerable status of the dugong in many countries of the region. The absence of both these adverse factors in Myanmar makes the future survival prospects of the dugong population here much brighter than in many parts of its Asian range. The fact that the dugong and its habitat are still safe in Myanmar waters indicates that the dugong population here is probably healthier and more likely to survive in the long-term than in neighbouring parts of its range. In the light of these positive factors it can be speculated that Myanmar is possibly one of the very few countries in south and south-east Asia that not only supports a healthy dugong population but also one that faces no direct threats in the form of hunting, pollution, destructive fishing practices that destroy habitat or any other human induced factors that could adversely affect its long-term survival.

Although these preliminary results based on surveying a small section of Myanmar's western coastline appear very positive and confirm the continued presence of the species in these waters they also lead to a host of other questions. At present no information or data is available on the total extent of the dugong's range of occurrence and distribution, the extent of available habitat, size of the population, seasonal movement patterns and extent as well as effects of accidental bycatch in Myanmar waters. Therefore this preliminary survey has only been able to show that Myanmar waters still have dugongs in them and that more research on the species is both urgent and important. The study should now be extended northwards of the present study area along the Rakhine coast. Likewise it is important to do a similar study on the south-west coast adjacent to the Mergui Archipelago off Myanmar as old documented records of dugongs occurring in that area already exist (Rev. S. Benjamin, 1853). More recently dugong bycatch has been reported on islands in close proximity to the city of Myeik (pers. comm. Nang Mya Han) on this south-west coast.

Meanwhile secondary information on the occurrence of other marine mammals obtained during the course of this survey indicates that the waters off the Rakhine coastline have

an abundance of cetaceans both large and small and the area may support high species diversity. Compared to other areas off Myanmar, the continental shelf off the Rakhine coast is narrow, having an average width of approximately 30-40 nm. and widening to about 60 nm. off the northern part. Hydrographic conditions along this coastline are influenced by the monsoons that prevail between May and October. The fact that the area is adjacent to the narrowest part of Myanmar's continental shelf also supports the possibility of high species richness. Likewise, many large whale strandings have also been reported along the Rakhine coastline both in the past and in recent times. The narrow continental shelf also ensures that even near-shore fishermen report encountering large whales during fishing activities. These factors warrant further investigation of the area in relation to all marine mammals including the dugong and cetaceans.

5. Conclusions and Recommendations

Based on the results of the present survey it can be concluded without any doubt that dugongs still inhabit the waters off the Rakhine coastline of western Myanmar. The coast also supports good sea-grass habitat that is under no stress from human induced factors. It can also be concluded that the status of the dugong on the Rakhine coast is presently secure due to minimal direct hunting pressures, low rates of accidental bycatch and no habitat degradation or fragmentation. As a result of these factors the dugongs along the Rakhine coastline still appear to be a part of a healthy breeding population. Therefore, the future survival prospects of the dugong population in Myanmar waters looks much brighter than in many parts of the species remaining range in Asia.

The results of this preliminary investigation, which was limited in its scope, are extremely positive for the dugong and its conservation in Myanmar. Based on these results several important future research and conservation needs have become apparent. Therefore future directions for work on the dugong in Myanmar are outlined through the following recommendations:

- It is recommended that dugong surveys should be extended to the north of the present study area along the Rakhine coastline with special attention to the area around Cheduba Island as a matter of priority.
- It is also strongly recommended that a training programme is organized for officers of the Department of Fisheries stationed along Myanmar's Rakhine and Tanintharyi coastlines in order to familiarize them with information collection on dugong occurrence and bycatch and to better equip them to collect data in a systematic and effective manner.
- After fisheries officers have received the necessary training it is suggested that a dugong bycatch monitoring and information network is initiated along the coastline in order to assess the extent of the accidental bycatch. This information will also assist in determining the range of occurrence and distribution of the species in Myanmar waters.
- Based on the discovery of old records and recent information on the occurrence of the dugong in the Mergui area off south-west Myanmar it is recommended that dugong surveys are initiated in this area as well.
- Once further baseline information is available it is strongly recommended that aerial surveys are conducted off the Rakhine coast to obtain direct, quantifiable data on dugong occurrence, distribution and population parameters in this area in the future.
- A public awareness and education programme is recommended along the Rakhine coastal belt, in order to sensitize the public and get public participation in future dugong conservation plans.
- Development of an overall action plan for conservation of the dugong in Myanmar is recommended.

6. Acknowledgements

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Figure 1 Map showing study area and survey sites



Figure 2 Individual interviews being conducted at field sites on the Rakhine coast



Figure 3 Group discussions in progress at survey sites



Figure 4. Discussion with Gwa township Fisheries Officer at his office.



Figure 5. Interview with knowledgeable persons at coastal villages.



Figure 6. Survey team at Kan tha yar beach



Figure 7. Dugong rind and bones at Kan tha yar



Figure 8 A dugong accidentally killed in a fishing net at Kan tha yar in 2004



Figure 9. Map showing places of dugong occurrence off Rakhine coast, Myanmar.



Figure 10. Skeletal parts of a whale stranded at Thegone village near Kyein ta li in July 2005.



Figure 11. Skeletal parts of a whale stranded near Kyein ta li in July 2005 presently displayed at the Fish Garden in Kandawgyi Park in Yangon.



Figure 12. Fin whale (*Balaenoptera physalus*) skeleton from a 1987 stranding at Andrew's Bay in Rakhine State, displayed at Yangon Zoological Gardens.



