

## REDISCOVERING THE DUGONG (*DUGONG DUGON*) IN MYANMAR AND CAPACITY BUILDING FOR RESEARCH AND CONSERVATION

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**ABSTRACT.** – The dugong (*Dugong dugon*) is the only extant species of the family Dugongidae in the order Sirenia. This herbivorous marine mammal inhabits the waters of some 37 countries in the Indo-Pacific region but is presently listed in the IUCN Red List of Threatened Species as being vulnerable to extinction throughout its range. Although the presence of the dugong in Myanmar waters has been locally known since historic times, recent global assessments and action plans on the species have not listed Myanmar as a country that supports a dugong population. While no systematic work on the dugong has ever been undertaken in Myanmar, recent knowledge has been scarce with the last documented report being from 1966. The present project aimed at developing local capacity for dugong surveys using interview survey techniques and carried out a preliminary assessment along a segment of the Rakhine coast of western Myanmar to initiate collection of qualitative data. This preliminary survey succeeded in documenting the continued presence of the dugong in Myanmar waters along with healthy seagrass beds. These survey results indicate that the dugong population in the waters off western Myanmar is less threatened by anthropogenic pressures than in many countries of the south and south-east Asian region where they are under constant threat due to direct hunting, accidental bycatch and habitat destruction. Therefore it is recommended that further surveys are undertaken in an extended area to provide a sound scientific basis for management of this population which has good long-term conservation potential.

**KEY WORDS.** – Dugong, *Dugong dugon*, Myanmar, Rakhine coast, occurrence, threats.

### INTRODUCTION

*Dugong dugon* (Müller, 1776) 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 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 is considered important because recent global assessments and action plans (Marsh et al., 2002) have not listed Myanmar as a country that still supports a population of this species. Historically however, the presence of the dugong in Myanmar waters has been known locally and documented as far back as the 1850's by Rev. S. Benjamin (Mason, 1882). Unfortunately there has been a large gap in knowledge about this species in Myanmar of recent times, with the last documented reports of dugong occurrence being in 1966 (Yin, 1967a, 1967b). While no systematic surveys have ever been undertaken, the lack of recent information possibly led to Myanmar being neglected in more recent global assessments of the species. Meanwhile, the dugong is totally protected in Myanmar waters under the Protection of Wildlife and Protected Areas Law where it has been listed in the "Completely Protected Animals" category since 1994 (State Law and Order Restoration Council of the Union of Myanmar, 1994).

After almost four decades the present project initiated gathering qualitative data using interviews, on dugong occurrence along the Rakhine coastline (Fig. 1) of western Myanmar in 2005/2006. This coastline was selected as the focal area for the initial survey as the last documented report from 1966 also originated from this area. Objectives of the project included investigating the continued presence of the dugong in the waters off the Rakhine coast while simultaneously building local human resource capacity through training of Burmese researchers in the interview methods through collaboration with a researcher from Sri Lanka where similar assessments had been undertaken recently (Ilangakoon et al., 2004). Interview surveys were chosen as the preferred methodology as it is a useful method that can be applied in developing countries such as Myanmar with limited resources for research on endangered species. Training of local researchers was therefore considered an important component of the project, in order to enable them to carry out similar assessments on the dugong in other parts of the Myanmar coastline in the future.

## MATERIALS AND METHODS

A semi-structured interview survey technique was adopted to collect qualitative data for this survey, based on a questionnaire already developed and used in the Gulf of Mannar, Sri Lanka and India (Ilangakoon et al., 2004). The questionnaire had a mixture of closed and open-ended questions while the interviews themselves were unstructured in order to encourage a free dialogue and elicit the maximum possible information. The questionnaire had several sections which focused on assessing historical and current local knowledge about the dugong among members of coastal communities, interactions between humans and dugongs including superstitions or beliefs regarding the dugong that prevail among these coastal communities, direct and indirect threats and conservation. In addition to individual interviews conducted, group discussions were also carried out to make the respondents more comfortable with the process and collect supplementary data at all field sites visited along the Rakhine coastline of western Myanmar in December 2005/January 2006. The questionnaire was translated into the local language and all interviews and discussions were conducted in the local language. 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 questionnaire and discussions were designed to elicit maximum data on local knowledge and beliefs regarding the dugong, interactions between dugongs and people, recent sightings and possible distribution, threats and protection.

The survey team consisted of researchers from Myanmar who already had experience working on other marine mammals (Cetaceans) in the country, and the collaborating researcher from Sri Lanka. The survey was conducted along an 82 km. stretch of coastline including the townships of Gwa and Kyein ta li as well as the fishing villages of Magyi zin, Magyi ngu, Tain gyo, Kan tha yar, Satthwar, Long gyo and Thegone (Fig.

1). The survey area was selected based on earlier documented records of dugong occurrence and more recent anecdotal reports of accidental bycatch. Survey respondents were selected randomly by focusing on places where fishing communities were centered. The majority of respondents to the questionnaire and participants at group discussions at all sites were fishermen while the rest were also members of coastal fishing communities including fisheries officials and village elders. Additionally, in-depth discussions were also held with regional fisheries officials and other influential and knowledgeable persons within these communities.

We are confident that the responses were reliable as respondents related well to the interviewers being very relaxed in their presence and there were no instances when a respondent refused to answer any question. Some of the data obtained through interviews with fishermen were subsequently verified independently by fisheries officials who were interviewed separately adding to our conviction that the information obtained is reliable.

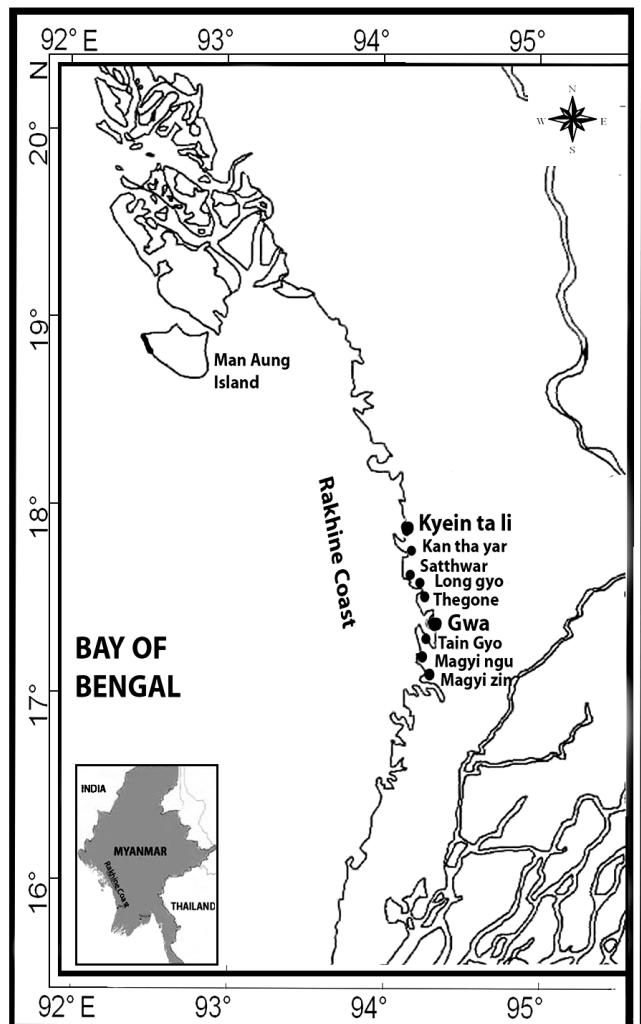


Fig. 1. The Rakhine Coast of Myanmar.

## RESULTS

An average of five individual interviews was administered among randomly selected members of the community at each of the selected fishing sites. At the townships of Gwa and Kyein ta li additional individual interviews were conducted with regional fisheries officials and other knowledgeable members of the community. Group discussions with communities included an average of 15–20 participants at each site where they were conducted. An additional group discussion was also held with fisheries officials at their regional office in Gwa where all six officials participated.

### Local knowledge on dugong biology and ecology

The majority (>80%) of respondents at all sites visited were aware that the dugong is a mammal and all respondents knew that dugongs inhabit seagrass habitats. They were also aware that dugongs feed on marine vegetation, but some fishermen were of the opinion that they are not strictly vegetarian. This was based on undigested remains of crustaceans (small crabs) and echinoderms found in the stomach contents of a dugong accidentally killed in a fishing net at Kan tha yar. At a group discussion consisting of approximately 20 persons from the fishing community at Long gyo village, several fishermen observed that dugongs accidentally pick up holothurians while feeding in seagrass beds, but spit them out without ingesting them. Approximately 30% of the respondents also observed that dugongs move into deeper waters during the day and move closer to shore at night to feed on seagrass and bivalves.

At all sites visited, fishermen reported frequent sightings of small groups of dugongs. These groups usually consisted of two animals, but sometimes groups of five to six individuals, including calves, were sighted in the area. Even within these groups most often only one calf was sighted while some of the pairs sighted consisted of mother/calf pairs. It was reported that dugongs are more frequently sighted during the transitional months of February–March–April between winter and summer along this coast. The respondents also reported 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 (Fig. 1). This information was further substantiated by fisheries officers at Gwa who confirmed receiving frequent reports of dugong occurrence and bycatch from the Island of Man Aung.

### Interactions between humans and dugongs

At Long gyo village respondents comprising 45% of those interviewed observed that dugongs often bump their heads against the wooden rudder of anchored artisanal fishing craft. It was reported that this is not accidental and the dugongs sometimes butt so violently that the rudder is damaged. Therefore, fishermen using these artisanal craft carry long bamboo poles in order to push dugongs away from their boats without harming them in such instances. At Gwa, fishermen who dived for sea cucumbers in the past reported that dugongs often display curiosity and follow divers between the surface and the bottom. Although this behaviour makes the diver

nervous the dugongs apparently never display any aggressive behaviour or try to harm the divers.

There were no superstitious beliefs or legends related to the dugong among people in the coastal communities surveyed on the Rakhine coast. At Kan tha yar, a fisherman had in his possession some old dugong bones. Two other respondents at Long gyo reported having heard that powdered dugong bones could be used as a cure for abdominal disorders but none of them had ever tried this remedy and did not know if it was authentic.

### Recent occurrence of the dugong

The interviewers also attempted to gather evidence of recent dugong occurrence in the area and do a preliminary assessment of its range along this segment of coastline. Frequent dugong sightings and some accidental bycatch in fishing gear were reported from all sites visited. At Gwa in the southern portion of the study area, at least one dugong sighting was reported in all months during the fishing season but fishermen were not aware if they were present when the monsoon is prevalent from May to August. Further north at Kan tha yar and Kyein te li at least one dugong sighting was reported in all months throughout the year with more frequent sightings during the winter months of December and January. Fishermen at all sites reported larger numbers consisting of more groups numbering over five animals and more frequent sightings (at least one sighting per week) of dugongs around Man Aung Island to the north of the present study area. It was observed that dugongs could even be sighted from shore in this area due to the presence of extensive shallow seagrass beds around the island.

The most recent accidental bycatch of a dugong was reported by respondents at Kan tha yar where an adult had been killed in a skate net in August 2005. Another dugong had been killed in the same area in 2004 and fisheries officials at Gwa were in possession of photographs of this animal (Fig. 2). Bycatch of at least two animals was reported to have occurred within the past five years at all sites visited.



Fig. 2. A dugong accidentally killed in a fishing net, at Kan tha yar in 2004.

### Threats and protection

Direct hunting was not reported at the sites visited but some accidental dugong bycatch, particularly in set nets for skates and rays along the Rakhine coast was reported to take place. Animals that are accidentally killed are consumed locally, but there is no special significance or popularity in relation to dugong flesh among these communities as it is not considered to have any medicinal properties or considered to be a delicacy that is sought after. Prevalence of anthropogenic threats such as destructive fishing practices or coastal development and excessive pollution that would cause degradation of seagrass habitats were also not reported along this coastline. The only fishing gear used in the area by local fishermen that is harmful to dugongs are gill nets and set nets, while destructive fishing methods like explosives and pushnets are not used.

Dugong strandings and bycatch are not always reported to authorities because the mechanisms for such reporting are not developed. Despite its legally protected status in Myanmar, there is a lack of awareness regarding the dugong's conservation status among both the coastal communities and the authorities.

### DISCUSSION

The people we interviewed in coastal fishing communities along the Rakhine coastline are familiar with the dugong in these waters. They displayed basic knowledge about the biology, ecological needs and habits of the dugong. Their observations of dugong stomach contents and their belief regarding the species not being strictly vegetarian is however interesting as it is contrary to current scientific knowledge on dugong feeding habits (Marsh et. al.,). However, researchers working in other parts of the dugongs range have mentioned dugongs inadvertently or deliberately ingesting invertebrates and algae along with seagrass (Anderson, 1989; Preen, 1995) in prior instances.

Observations regarding interaction between live dugongs and people engaged in fishery activities in dugong habitat were also of interest. Further investigation regarding the reasons for interactions with anchored boats is warranted as this behaviour has not been reported before. Another significant factor was that all reported interactions between fishermen and dugongs in the area were non-aggressive. Unlike in many parts of the dugongs Asian range they are not deliberately killed or persecuted (Marsh et al., 2002; Ilangakoon et al., 2004; Hines et al., 2005) even when they cause damage to boats on this coast of Myanmar.

The absence of any superstitious beliefs about the dugong among these communities in Myanmar is unusual and in contrast to neighbouring countries where dugong body parts are used for purposes other than food due to superstitious beliefs (Hines et al, 2005). These traditional beliefs, practices and values create a demand driven market for dugong parts in many Southeast Asian countries (Marsh et al, 2002) but

the present results indicate that this is not prevalent in this region of Myanmar.

Based on recent sightings and bycatch of dugongs off this coastline reported during the survey, there remains no doubt that dugongs still inhabit the waters off the Rakhine coast of western Myanmar. Although preliminary indications are that there could be continuous distribution of the species along the 82 km stretch of coastline surveyed, this cannot be definitely stated at present and further work in the area is needed to substantiate such an assumption. Reports of more extensive dugong habitat and occurrence to the north of the present study area, also indicates that their range may extend much further north. This is in agreement with earlier documentation from this coastline (Mason, 1882; Yin, 1967a, 1967b). Frequent sightings indicate that dugongs may still be present in visible numbers in the waters off this coastal belt. Likewise, sightings of groups including calves indicates that this population is still breeding. Although the present conclusions are based on qualitative data the indications are that the waters off western Myanmar still supports a dugong population that is potentially viable in the long-term.

In contrast to most other countries in Asia where the dugong still occurs, direct threats to dugongs along the Rakhine coast are minimal. In south Asian countries like India and Sri Lanka they continue to be hunted for their flesh (Ilangakoon et al., 2004) which is considered a delicacy, despite legal bans. Likewise, in Southeast Asian countries like neighbouring Thailand, dugongs are used for profit when their flesh is sold as food and body parts are used for medicinal purposes and superstitious beliefs (Hines et al., 2005). According to Marsh et al., (2002: 10) dugongs are culturally significant throughout their range and there is wide-spread indigenous use of dugong parts. Although dugongs that are accidentally killed in fishing gear are locally consumed along the Rakhine coast of Myanmar, they have little financial value being normally shared among villagers. There is no special significance attached to dugong flesh and/or body parts and there is no demand driven market and therefore no incentive for deliberate hunting.

Likewise, unlike in many parts of the dugongs remaining range throughout Asia, habitat destruction is not a major threat along the Rakhine coast where the seagrass habitat is well preserved and still in pristine condition (Soe-Tun et al., 2001). Intensive coastal development in the form of tourism infrastructure, industrial development and shipping activity has not taken place along this coast of Myanmar which is still quite remote, difficult to reach and underdeveloped due to these reasons. Destructive fishing practices that destroy seagrass habitats are also not prevalent in the area. This again is in contrast to most other south and Southeast Asian countries where dugong habitat is being destroyed due to coastal development, agricultural runoff and destructive fishery practices (Marsh et al., 2002).

In conclusion, the dugong is still present in the waters off the Rakhine coast of western Myanmar and this population appears to be less threatened by anthropogenic pressures than

in many countries of the south and Southeast Asian region where they are under constant threat due to direct hunting, accidental bycatch and habitat destruction. The more secure status of this population of dugongs is a result of minimal direct hunting pressures, low rates of accidental bycatch and no habitat degradation or fragmentation.

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 positive results of this preliminary investigation, which was limited in its scope, augers well for the dugong and its long-term conservation in Myanmar.

Based on the present results several important future research and conservation needs have become apparent. We recommend that dugong surveys should be extended along the Rakhine coastline with special attention to the area around Man Aung Island as a matter of priority. The present methodology can continue to be adopted in future surveys as it is easy to administer in remote areas, enables rapid data collection and is a cost effective method that is useful given the limited resources available for research on endangered species in developing countries like Myanmar. It is also suggested that a dugong bycatch monitoring and information network is initiated along the coastline in order to quantify the extent of the accidental bycatch. This should ideally be done in conjunction with further local capacity building to better equip local fisheries sector personnel to collect systematic data in order to determine the range of occurrence and distribution of the species in Myanmar waters. The generation of further qualitative baseline information would facilitate more systematic surveys to gather direct, quantifiable data on dugong occurrence, distribution and population parameters in the future. In addition to these research priorities we suggest that a public awareness and education programme is initiated to sensitize the public and get public participation in future dugong conservation plans in coastal areas. Awareness creation will also help disseminate information about the dugong, its continued presence in Myanmar waters and its worldwide threatened status not only in coastal areas but throughout the country. It would also draw the attention of the international research and conservation community to this rediscovered dugong population in Myanmar waters and assist in obtaining the necessary resources to ensure its long-term survival.

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#### LITERATURE CITED

Anderson, P. K., 1989. Deliberate foraging on macro-invertebrates by dugongs. *National Geographic Research*, **5**: 4-6.

Hines, E., K. Adulyanukosol, D. Dufuss & P. Dearden, 2005. Community perspectives and conservation needs for dugongs (Dugong dugon) along the Andaman coast of Thailand., *Environmental Management*, **36**(5): 654-664.

Ilangakoon, A. D., D. Sutaria, R. Raghavan & E. Hines, 2004. *Interview Survey on Dugong (Dugong dugon) Distribution, Abundance and Conservation in the Gulf of Mannar Area, Sri Lanka and India*, Final Report to Sirenian International, Unpublished Report, Sirenian International, USA. 48 pp.

Marsh, H., 2002. *Dugong Status Report and Action Plan for countries and territories*. United Nations Environment Programme, UNEP/DEWA/RS.02-1.

Mason, F., 1882. *Burma, People and Productions. Notes on the Fauna, Flora and Minerals of Tenasserim, Pegu and Burma*. Stephen Austin & Sons, Hertford, UK.

Preen, A., 1995. Diet of dugongs: are they omnivores? *Journal of Mammalogy*, **76**: 163-171.

Soe-Tun, U., U. San-Tha-Tun, D. Mu-Mu-Aye, D. Ni-Ni-Win, D. Lei-Lei-Win & M. Ohno, 2001. Notes on sea grasses along Myanmar coastal regions. *Bulletin of Marine Science and Fisheries*, **21**: 13-22.

State Law and Order Restoration Council of the Union of Myanmar, 1994. The State Law and Order Council Law No.6/94, The Protection of Wildlife and Protected Areas Law. Union of Myanmar.

Yin, U. T., 1967a. *Wild Animals of Burma*. Rangoon Gazette Ltd. Rangoon, Burma. Pp. 144-145.

Yin, U. T., 1967b. *Wild Mammals of Myanmar*. Yangon, Myanmar. Pp. 153-154.