

IMPORTANCE OF DUGONG PROFILE IN UNDERSTANDING ITS CONSERVATION ALONG TANZANIA COAST

Adelaide E. Sallema¹ and Omar A. Amir²

¹National Museum of Tanzania, Dar es Salaam, Tanzania

²Ministry of Livestock and Fisheries, Zanzibar

Email: adelaide5mon@yahoo.co.uk

Abstract: A study to estimate abundance, distribution and evaluate magnitude of dugong threats and status in selected sites based on surveys was conducted between 2008 and 2009 during south-east and north-east monsoon periods respectively. Conservation initiatives were also assessed by involving local communities in monitoring activities. Findings show that 10 sightings of live dugongs were verified and localized in areas of Kilwa, Somanga, Rufiji and Mafia. Threats including entanglement in fishing gear, dynamite fishing, trawling, habitat destruction and pollution persist. The study recommends monitoring of dugongs and their habitats and future impact assessments for inshore marine and estuarine developments involving local communities for conservation of dugongs in Tanzania.

Keywords: Dugong, Monsoon, Conservation, Habitat Destruction, Conservation

Introduction

Despite their relatively extensive range (IUCN 2000) in 43 countries bordering the tropical, sub-tropical Indian and Western Pacific Oceans (IUCN, 1990) most dugong populations are small and near to extinction due to increasing anthropogenic pressures (IUCN 2000). The sea grasses are found in sheltered coastal waters less than 10 m in depth where dugongs are affected by anthropogenic impacts which may drive them away from food sources due to deterioration in quality of sea grasses. Dugongs were hunted for meat when they were abundant in the 1950s. Estimation of population size and distribution range of dugongs has sharply declined in the 1990s (Chandeet *et al.*, 1994; Marsh *et al.*, 2001), due to entanglement in fishing gear, excessive hunting, dynamite fishing, prawn trawling, habitat destruction and pollution (Cockcroft and Krohn 1994). Mortality rate from incidental killings persists and 1 dugong after 2 years can be found caught in gillnet in the 2000s. The earliest record on population status, occurrence and threats of dugongs was in 1930 where 3 dugongs were caught by local fishermen from Mafia Island (Dollman, 1933). Ray (1968) reported Rufiji and Kilwa as the last remaining refuges for dugongs. Recent studies (WWF EAME, 2004; Sallema, *et al.*, 2009) evidenced existence of dugongs between Kilwa – Rufiji – Mafia channel. Detailed information on animal profile is needed to understand its threats, status ecology and conservation initiatives.

Methodology

A non-random sampling was used to get 200 respondents in five selected sites, Kilwa, Somanga, Rufiji, Bagamoyo and Dar es Salaam. Respondents were interviewed over the period of four months from July 2008 to February 2009 covering the monsoon periods.

Analysis, Results and Discussion

Abundance and distribution of dugongs in selected sites

Number of respondents, age class, landing sites, number of respondents who reported occurrence of dugongs between the 1950s and 1970s and numbers of live dugongs and sightings since the 2000s are presented in Tables 1, 2 and 3. The abundance of dugongs based on monsoon periods is presented in Table 4 which is consistent with current responses from fishers on timing of sightings of dugongs. The high abundance of dugongs in the past can be attributed to the fact that the

proportion of dugong population to human pressure on marine resources was high so hunting dugongs did not show remarkable impacts on their stock. Population increase for the last half century has multiplied pressure on terrestrial and marine ecosystems. The sharp rise in 2000s can be to the fact that conservation efforts are increasing. Major remaining areas of dugongs reported are consistence with studies by (Sallemaet *al.*, 2009) that dugong distribution and abundance is reflected in specific areas characterized by calm seas with clear water and abundance of sea grass beds. Most dugong areas harbor *Halodule uninervis* which are preferred food for dugongs. This is consistence with study by Aragones, 1996 that selection for highly digestible *Halophila* and high nutrients *Halodule* means that dugongs maximize nutrient intake rather than bulk. Dugongs use specialized habitats for calving and mating (Anderson, 1981).

Table 1: Number of landing sites of respondents interviewed

Location	Number of landing sites	Sex		Age Classes		
		M	F	18-45	46-70	71+
Kilwa	4	43	7	13	28	9
Somanga	4	45	5	11	33	6
Rufiji	2	20	10	7	21	2
Bagamoyo	4	32	8	5	32	3
Dar es Salaam	2	25	5	8	19	3
Total	16	165	35	44	133	23

Source: Field Work January –December 2008/2009

Table 2: Locations, landing sites, number of respondents interviewed, number of dugong caught and sighted (1950s – 1970s) Shaded columns (12%, 7%) and (2000s) Unshaded columns (43.5%, 22.5%)

Location	Landing site	No. of Respondents	INTERVIEWS			
			1950s – 1970s		2000s	
			No. of respondents caught dugongs	No. of respondents sighted dugongs	No. of respondents caught dugongs	No. of respondents sighted dugongs
Kilwa	KilwaKivinje	11	2	0	5	2
	KilwaKisiwani	12	3	2	9	3
	Olelo	15	1	1	9	1
	KilwaMasoko	12	1	0	5	0
Somanga	Pwani	17	4	3	14	9
	Ngolwe	5	0	0	1	2
	MkokoMmoja	5	3	2	1	1
	Ndumbo	23	0	0	17	11
Rufiji	Mohoro	15	4	3	11	13
	Kisiju	15	0	0	11	1
B'moyo	Changuhela	10	2	1	0	0
	Nchipana	20	0	0	0	0
	Kitame	10	1	0	2	1
DSM	Magogoni	15	0	0	1	0
	Mjimwema	5	0	0	0	0
	Mbweni	10	3	2	1	0
TOTAL		200	24	14	87	45

Source: Field Work January –December 2008/2009

Table 3: Areas with Dugongs

Location	Areas With Dugongs	No. of dugongs Sighted
Kilwa	Olelo	1
Somanga	Likotonazi	1
	Utigiti	1
	KichinjaMbuzi	1
	Pombwe	1
Rufiji	Kisiju	1
	Mohoro Bay	1
TOTAL		7

Source: Field Work January –December 2008/2009

**Table 4: Fishers' observations of dugong sightings by months / period:
Unshaded columns = NE monsoon (88%); Horizontal patterns = SE monsoon (22%); Vertical patterns = inter-tropical monsoon periods (88%)**

Months/periods	88%					22%				88%			88%	
	Jan.	Feb.	Mar.	Apr.	May	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	March to May	October to November
Dugong areas														
Olelo														
Likotonazi														
Utigiti														
KichinjaMbuzi														
Pombwe														
Kisiju														
Mohoro Bay														

Source: Field Work January –December 2008/2009

Magnitude of dugong threats and status

Dugongs are still caught incidentally in gillnets (Table 5). Non-selective trawlers kill dugongs and destruct their habitats. Prawn trawling and dynamite fishing destroy dugong habitats in Rufijidelta, Jaja and Mchungu

Table 5: Number of Dugongs Killed Incidentally and Intentionally January 2000 – May 2009 and % Killed out of 30 dugongs caught

Location	Station	No. Killed Incidentally	% Killed	No. Killed intentionally	% Killed	Total no. of dugongs killed	Total % Killed
Kilwa	Olelo	1	3.33	1	3.33	2	6.66
Somanga	Litokonazi	1	3.33	0	0	1	3.33
	Utigiti	3	10	2	6.7	5	16.7
	KichinjaMbuzi	1	3.33	1	3.33	2	6.66
	Pombwe	3	10	1	3.33	4	13.3
Rufiji	Mohoro Bay	3	10	0	0	3	10
TOTAL		11	36.66	5	16.66	16	53.3

Source: Field Work January –December 2008/2009

Involvement of local communities in conservation initiatives of Dugong

Eight Five fishers were imparted with knowledge of dugong conservation in three sites through workshops conducted between July 2008 and May 2009.

Dugong Profile

Eight Two (82%) of respondents had better understanding on dugong. They reported dental formula of dugong similar to that of herbivores which is consistence to the study by Dollman, 1933 that the first pair of incisors and cheek teeth is shed when animal is growing. The better understanding on dugong profile can be attributed to respondents have been fishing for many years so had knowledge of the area and dugong. This is consistence to previous studies (WWF EAME, 2004; Sallemat *et al.*, 2009) suggesting that previous studies are reliable.

Conclusion

The continued protection of mangroves and other vegetation on the land adjacent to sea grasses could prevent overloading of sediments which can kill sea grasses. It is recommended to resurvey the area during northeast monsoon period for possibility of having more sightings and comparison if dugong sightings will be seen.

Acknowledgements

I am grateful to Western Indian Ocean Marine Science Association (WIOMSA) for financial support and fishers and Field Assistants for their hospitality and technical support.

References

1. Anderson, P. K. 1981. The behaviour of the dugong (*Dugong dugon*) in relation to conservation and management. *Bulletin of Marine Science* 31: 640 – 647.
2. Aragonés, L. V. 1996. Dugongs and green turtles: grazers in the tropical sea grass ecosystem. PhD thesis. James Cook University of North Queensland, Townsville, Australia.
3. Chande, A. I., Mtoka, G. F and Mhitu, H.A. 1994. Marine mammals and fisheries Interactions in Tanzania. UNEP
4. Cockcroft, V. G and Krohn, R. 1994. Passive gear fisheries of the South Western Indian and South Eastern Atlantic Oceans: an assessment of their possible impact on cetaceans. Report of the International Whaling Commission. Issue 15: 317 – 328.
5. Dollman, G. 1933. Dugongs from Mafia Island and a manatee from Nigeria. *Natural History Magazine*. No. 28, Vol. IV: 117 – 125.
6. ICUN (The World Conservation Union) 2000. The 2000 ICUN Red List of Threatened Animals. ICUN, Gland, Switzerland.
7. ICUN (The World Conservation Union) 1990. The 1990 ICUN Red List of Threatened Animals. ICUN, Gland, Switzerland.
8. Marsh, H., G. De'ath, N. Gribble and Lane, B. 2001. Shark control records hind cast serious decline in dugong numbers off the urban coast of Queensland. Final report to the Great Barrier Reef Marine Park Authority, Townsville, Australia.
9. Ray, C.1968. Marine Parks for Tanzania, results of a survey of the coast of Tanzania. The Conservation Foundation, New York Zoological Society.
10. Sallemat, A. E., Mapunda, M. & Lilombero, M. 2009. A Study of Myths, Legends and Scientific Facts of Dugong in Selected Areas of Tanzanian Coast. Markad Printers 30pp.
11. WWFEAME. 2004. Towards a Western Indian Ocean Dugong Conservation Strategy: The status of Dugongs in the Western Indian Ocean Region and Priority Conservation Actions. Dar es Salaam, Tanzania: WWF. 68pp.