

**MONITORING, TAGGING AND CONSERVATION OF MARINE
TURTLES IN MOZAMBIQUE: ANNUAL REPORT 2015/16**

Compiled and Edited by:
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1 – Leatherback turtle hatchling in Inhambane (Photo: Jess Williams)

2 – Loggerhead turtle heading back to sea after nesting at the Ponta do Ouro Partial Marine Reserve (Photo: Marcos Pereira)

3 – Marine turtle carapace on top of a dune in Závora (Photo: Raquel Fernandes)

4 – Mature male loggerhead turtle found entangled in a gillnet and drowned off Praia da Rocha, Inhambane (Courtesy of Alexandra Patane and Ole Siegfried)

The opinions, positions and points of view expressed in this document, reflect only those of the authors and do not necessarily reflect those of governmental institutions, private sector or civil society which contributed to the elaboration of this report.

Maputo, June 2016

SUMMARY

The ninth annual report on monitoring, tagging and conservation of marine turtles in Mozambique presents the results of the 2015/16 nesting season, ongoing and published studies, as well as priorities for future research and a list of relevant events.

Monitoring took place from September 2015 to March 2016, in the southern part of the country, and from June 2015 to May 2016 in the northern part.

Tracks and nests of loggerhead (*Caretta caretta*) and leatherback (*Dermochelys coriacea*) turtles were recorded along the stretch of coastline between Ponta do Ouro and São Sebastião, and green turtles (*Chelonia mydas*) were reported at Vamizi island. Interestingly, not a single hawksbill turtle (*Eretmochelys imbricata*) was reported this season. Hawksbill turtles are rarely observed in Vamizi, with only one track found in the 2012-2013 nesting season. A total of 1868 tracks and 1005 nests were recorded during 2015-16 nesting season. The most abundant were loggerhead turtles (1600 tracks; 752 nests), followed by greens (215 tracks; 207 nests) and fewer leatherbacks (53 tracks; 46 nests).

The Ponta do Ouro Partial Marine Reserve (POMPR) was an important nesting area for loggerheads (98.6% and 99.7 % of all loggerhead tracks and nests reported) and leatherbacks (94.3% and 95.6% of all leatherback tracks and nests reported). Vamizi Island was the only monitoring area to report green turtles tracks.

As in the previous years, titanium flipper tagging only took place at the POPMR, with 83.8% of the total tagging undertaken in the Ponta Malongane-Ponta Dobela section. Fewer turtles (147 loggerheads and 7 leatherbacks) were recaptured and tagged when compared with the previous season (177 loggerheads and 3 leatherbacks) in the Malongane section of the coast.

In general, when compared with the previous seasons, 2015/16 had slightly less loggerhead and leatherback tracks and more green turtles tracks. The explanation is not clear and may simply be a result of monitoring effort or natural seasonal variation. The impacts of environmental changes and seasonal variation are not yet understood and future efforts should be made in this subject area. In addition to this, identifying and quantifying the extent of anthropogenic impacts (particularly fisheries-related mortality) to sea turtles in Mozambique is needed to inform conservation and management decisions.

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POPMPR marine turtle monitoring program:

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INTRODUCTION

Marine turtles are migratory species with global distribution. There are seven extant species of marine turtles globally that inhabit nearly all oceans and occupy broad geographical ranges (Wallace *et al.*, 2010).

Five species of marine turtles (green, hawksbills, leatherbacks, loggerheads and olive ridley) frequent the waters of the Western Indian Ocean and nest in Mozambique (Hughes, 1971; Louro *et al.*, 2006). Green turtles are the most common species, nesting in the northern part of Mozambique. There are occasional reports of hawksbills nesting in this area, however, these sightings in Vamizi seem to be decreasing (Garnier *et al.* 2012; Louro & Fernandes, 2013; Fernandes *et al.*, 2014; Fernandes *et al.*, 2015a). Loggerheads are the most common species nesting in southern Mozambique, followed by leatherbacks (Pereira *et al.*, 2014). A rare occurrence of a green turtle nesting in iSimangaliso Wetland Park on South Africa was recently recorded, which may result from climate change driven species range shift. More attention should be given to these events as they could indicate a possible expansion of the species nesting grounds (Lombard & Kyle, 2016).

Alarming estimates of marine turtle bycatch were revealed in Mellet (2015) from fisheries operating within the South West Indian Ocean (SWIO) region. From a bycatch dataset spanning between 2000 and 2011, the interaction (capture) and mortality rates from longline, purse seine, beach seine, prawn trawl and gillnet fisheries operating within the SWIO region were quantified. It was estimated that the industrial longline fishery caught $4\,129 \pm 1\,376$ turtles. y^{-1} , the purse seine fisheries captured $4\,388$ turtles. y^{-1} , and gillnet fisheries captured $40\,264$ turtles. y^{-1} . High interaction rates were also quantified in beach seines ($9\,171$ turtles. y^{-1}) and prawn trawler ($1089\text{--}2\,795$ turtles. y^{-1}) fisheries. The long line fishery is of special concern for two vulnerable species, the loggerhead and the leatherback turtles (Spotila *et al.* 2000; Mellet, 2015).

Mozambican marine turtle monitoring programs were established at Inhaca Island in 1988, between Ponta Dabela to Ponta Malongane in 1994, at the Bazaruto Archipelago National Park in 2004, in São Sebastião in 2005, and in Vamizi and Rongui Islands in 2005 (Fernandes *et al.*, 2015b). These programs aim to collect information on number of nesting females, total nests and cases of mortalities to contribute to overall knowledge on conservation status of marine turtle

populations that are vulnerable to critically endangered species worldwide (IUCN, 2014; Table 1).

All marine turtle species are legally protected in Mozambique since 1965 through the *Diploma Legislativo* 2627 of 7 August. Recently, the Biodiversity Conservation Law (Law 16/2014 of 20 June), consolidated protection efforts by creating heavier fines as well as converting the threatening/killing of marine turtles from a simple administrative transgression to a criminal offence.

Table 1 Red list status of sea turtle species occurring in the Southwestern Indian Ocean (IUCN, 2014).

Species	Global Red List Status	Red List Status for WIO populations
Green turtles (<i>Chelonia mydas</i>)	Endangered (assessed in 2004; needs updated)	Not Available
Hawksbills turtles (<i>Eretmochelys imbricata</i>)	Critically endangered (assessed in 2008)	Not Available
Loggerheads turtles (<i>Caretta caretta</i>)	Vulnerable (assessed in 2015)	Near Threatened
Leatherbacks turtles (<i>Dermochelys coriacea</i>)	Vulnerable (assessed in 2013)	Critically endangered
Olive ridleys turtles (<i>Lepidochelys olivacea</i>)	Vulnerable (assessed in 2008)	Not Available

This report constitutes the ninth consecutive annual report on monitoring, tagging and conservation of marine turtles in Mozambique and presents the results of the 2015/16 nesting season, ongoing and published studies, as well as priorities for future research and a list of relevant events.

METHODOLOGY

Data collection was made through night patrols, by foot or by car, for nesting females and day patrols for hatchlings (Table 2). In the case of Vamizi Island, daily patrols were conducted early in the morning, to record and mark new nesting activities. Patrols in Závora and Tofo, Paindane were not made on a daily basis. Monitors from POPMR are subdivided in four sections, different from the previous seasons. Thus, to keep some consistency in the database, data were organized according to their geographical coordinates in the following sections: 1) Ponta do Ouro to Ponta Malongane; 2) Ponta Malongane to Ponta Dobela; 3) Ponta Dobela to Ponta Mucombo and 4) Ponta Mucombo to Santa Maria.

Data on eggs and hatchlings are only consistent for Vamizi, where the nests were individually marked. When logistically possible, the number of eggs and hatchlings were recorded to estimate hatching success. Leatherback and loggerhead females were only tagged with titanium tags at the Ponta do Ouro Partial Marine Reserve (POPMR). This was the first year that nests were individually marked in São Sebastião for easy location of each nest for further monitoring. However, it was not possible to determine hatching success rate or number of hatched eggs.

The total length of beach patrolled at the seven monitoring sites in the 2015/16 season was 127 km (~4.6% of the total coastline; Figure 1). In the southern part of the country, the nesting season lasted from 1 September 2015 to 31 March 2016, while in the north it ran from 1 June 2015 to 31 May 2016.

The authors recognized that this compilation, based on data extracted from the information made available by the different monitoring programmes, might contain gaps and thus it is recommended that readers proceed with caution in any further analyses that are made based on these data.

Table 2. Methods and monitoring period per survey area during the 2015/2016 season.

Area	Method	Number of monitors	Distance (km)	Period
Ponta do Ouro – Ponta Malongane	Patrol on foot	3	8	01 Sept 15 – 31 Mar 16
Ponta Malongane – Monte Mutondo	Patrol by car	9	32	01 Dec 15 – 12 Jan 16
	Patrol on foot			01 Sept 15 – 31 Mar 16
Monte Mutondo – Ponta Mucombo	Patrol on foot	14	30	01 Sept 15 – 31 Mar 16
Ponta Mucombo – Cabo de Santa Maria	Patrol on foot	20	20	01 Sept 15 – 31 Mar 16
Závora – Praia Manhame	Patrol on foot	1	10*	01 Oct 15 – 30 Apr 16
Tofo -Paidane	Patrol on foot	1	*	01 Oct 15 – 30 Apr 16
São Sebastião	Patrol on foot	6	25	15 Oct 15 – 15 Feb 16
Vamizi	Patrol on foot	4	12	01 June 15 – 31 May 16

*Occasional patrols



Figure 1 Marine turtle nesting beaches with data for the 2015/16 season (red circles).

MONITORING RESULTS

Tracks

Table 3. Marine turtle tracks per species and per monitoring area (Cc - *Caretta caretta*, Cm - *Chelonia mydas*, Dc - *Dermochelys coriacea*, Ei - *Eretmochelys imbricata* and, Lo - *Lepidochelys olivacea*).

Area	Cc	Cm	Dc	Ei	Lo	Total
Ponta do Ouro – Ponta Malongane	100		3			103
Ponta Malongane - Ponta Dobela	936		36			972
Ponta Dobela – Ponta Mucombo	385		2			387
Ponta Mucombo – Santa Maria	157		9			166
Závora–Praia Manhame*	2					2
Tofo-Paindane*			2			2
São Sebastião	20		1			21
Vamizi/Rongui		215				215
Total	1600	215	53	0	0	1868

*Occasional patrols

Tracks from loggerheads were first sighted on 22 September 2015, and the last track on 17 February 2016, at the POPMR. The São Sebastião Sanctuary also showed higher concentration of turtle activity during November and December, whereas in Závora only two loggerheads were observed, one on 15 November and the other on 23 December (Figure 4a). Leatherback first sightings were recorded on 17 October and the last track on 7 February at the POPMR. Mid December (11-21) was the peak for both species with an average of 35.6 (SD = 21.3) loggerhead turtles sighted per day and 0.9 (SD = 1.0) leatherbacks per day. In Tofo – Paindane, only two leatherback turtles were observed, both in November (3rd and 20th). Only one leatherback track was recorded in São Sebastião.

Green turtles have a yearlong nesting season in Vamizi. No clear peak was observed, but the following periods had higher average number of tracks per day: 1-10 March (1.40; SD = 1.51), 11-20 April (1.20; SD = 0.63) and 11-20 January (1.10; SD = 1.60).



Figure 2. A typical leatherback turtle track seen on São Sebastião Sanctuary. Photo taken by a monitor from the Chibo community in São Sebastião.

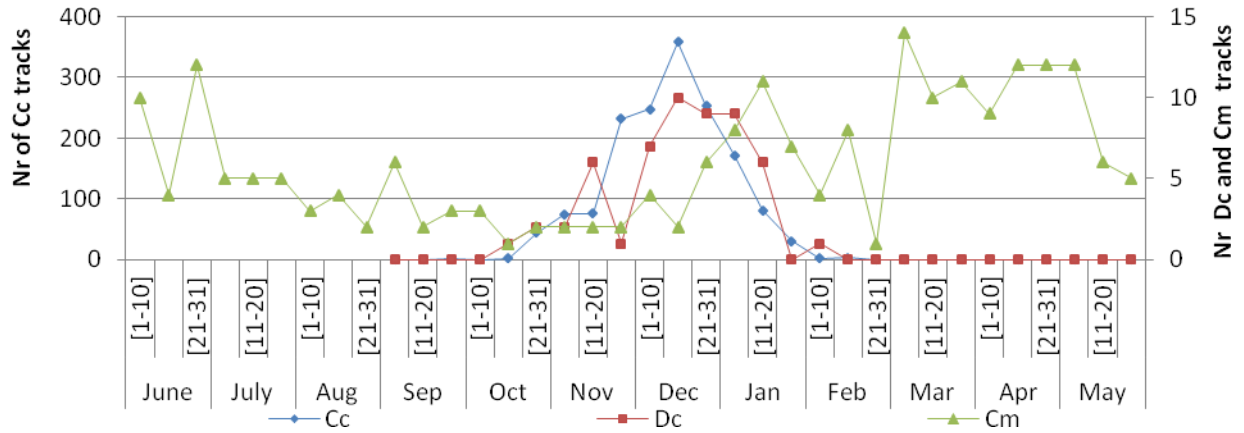


Figure 3. Total number of tracks per species binned into 10 day groups across the 2015/2016 season (Cc - *Caretta caretta* - left axis; Dc - *Dermochelys coriacea* and Cm – *Chelonia mydas* - right axis).

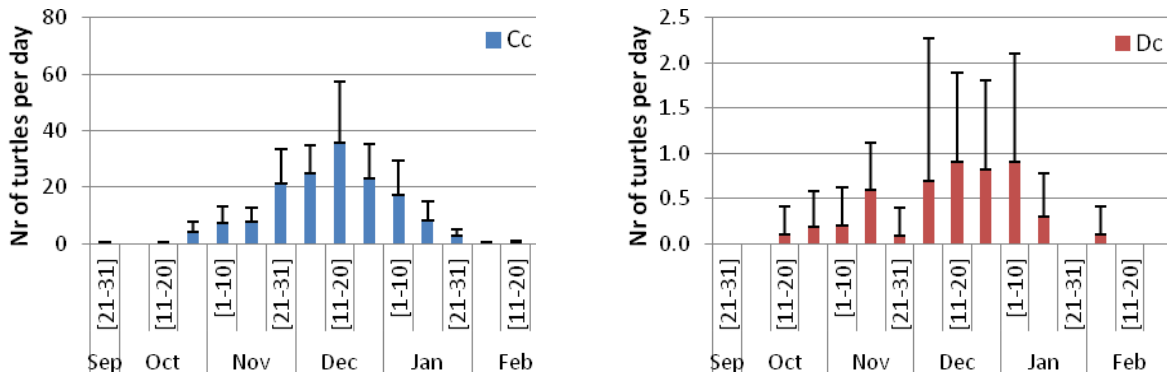


Figure 4. Number of tracks per day for each species binned into 10 day groups across the 2015/2016 season. Cc - *Caretta caretta*; Dc - *Dermochelys coriacea*. Bars = SD.

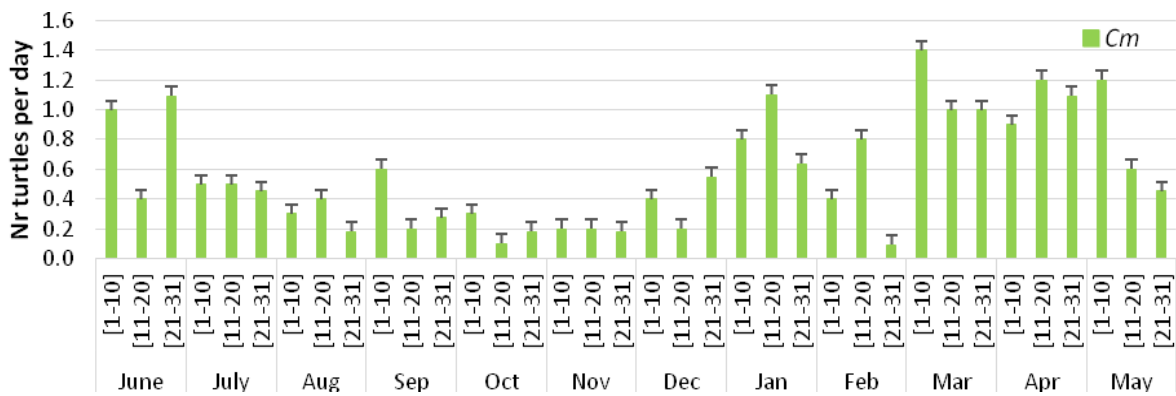


Figure 5. Number of tracks per day for the green turtle (*Chelonia mydas*) binned into 10 day groups across the 2015/2016 season. Bar = SD.

Nests

Table 4. Number of confirmed nests laid per species and per monitoring area (Cc - *Caretta caretta*, Cm - *Chelonia mydas*, Dc - *Dermochelys coriacea*, Ei - *Eretmochelys imbricata*, Lo - *Lepidochelys olivacea* and NI - not identified).

Area	Cc	Cm	Dc	Ei	Lo	NI	Total
Ponta do Ouro – Ponta Malongane	61		3				64
Ponta Malongane - Ponta Dobela	439		31				470
Ponta Dobela – Ponta Mucombo	172		1				173
Ponta Mucombo – Santa Maria	78		9				87
Závora–Praia Manhame*	2						2
Tofo–Paindane*			2				2
São Sebastião							0
Vamizi		207					207
Total	752	207	46	0	0	0	1005

*Occasional patrols

Table 5. Number of non-nesting emergences (NNE) and unconfirmed nests (UN) laid per species and monitoring area (Cc - *Caretta caretta*, Cm - *Chelonia mydas*, Dc - *Dermochelys coriacea*, Ei - *Eretmochelys imbricata*, Lo - *Lepidochelys olivacea* and NI - not identified).

Area	Cc		Cm		Dc		Ei		Lo		NI	Total
	NNE	UN	NNE	UN	NNE	UN	NNE	UN	NNE	UN		
Ponta do Ouro – Ponta Malongane	1	38										39
Ponta Malongane - Ponta Dobela	3	494			5							502
Ponta Dobela – Ponta Mucombo		213			1							214
Ponta Mucombo – Santa Maria		79										79
Závora–Praia Manhame*												0
Tofo–Paindane*												0
São Sebastião												0
PNA Bazaruto*												0
Vamizi			8	0								8
Total	4	824	8	0	6	0						842

The first emergence of a loggerhead turtle with successful nest was observed on the 18th of October and the last was reported on the 31st of January at POPMR.

The first emergence and successful nest of a leatherback turtle was reported later, on the 17th of October and the last occurred on the 19th of January at POPMR.

Table 6. Loggerhead turtle (*Caretta caretta*): number of nests laid per area.

Area	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Ponta do Ouro – Ponta Malongane		1	14	25	21		
Ponta Malongane - Ponta Dobela		2	71	285	81		
Ponta Dobela – Ponta Mucombo		11	54	81	26		
Ponta Mucombo – Santa Maria		4	24	26	24		
Tofo-Paindane*							
Závora–Praia Manhame*			1	1			
Total	0	18	164	418	152	0	0

*Occasional patrols

Table 7. Leatherback turtle (*Dermochelys coriacea*): number of nests laid per area.

Area	Oct	Nov	Dec	Jan	Feb	Mar
Ponta do Ouro – Ponta Malongane		2		1		
Ponta Malongane - Ponta Dobela		1	21	9		
Ponta Dobela – Ponta Mucombo		1				
Ponta Mucombo – Santa Maria Bilene	3	3	3			
Závora–Praia Manhame*						
Tofo-Paindame*		1	1			
Total	3	8	25	10	0	0

*Occasional patrols

Table 8. Green turtle (*Chelonia mydas*): number of nests laid per area

Area	Jun	Jul	Aug	Sep	Out	Nov	Dec	Jan	Feb	Mar	Apr	May
Vamizi	26	15	26	15	9	7	6	6	11	26	12	35
Total												

Table 9. Green turtle (*Chelonia mydas*): number of hatchlings and eggs per area.

Number	Nests*	Eggs Laid	Unhatched Eggs	Hatchlings	Dead Hatchlings
Vamizi	116	12623	110	319	124

* Number of nests with data on eggs and/or hatchlings

Table 10. Number of nests destroyed by natural and anthropogenic causes per area

Area	Cc	Dc	Cc	Total	Anthropogenic causes
Závora–Praia Manhame	2	-		2	One poached within 12 hours after the nesting activity, the other showed no signs of hatching.
Tofo-Paindane	-	2		2	One poached within 12 hours after the nesting activity, the other showed no signs of hatching.
Vamizi			24	24	Inundation/erosion
Total	2	2	24	28	



Figure 6. A) Green turtle nesting in Vamizi Island (Photo: Joana Trindade) and B) Loggerhead laying eggs at Ponta do Ouro Partial Marine Reserve (Photo: Marcos Pereira).

Mortality and Strandings

Table 11. Reported marine turtle mortality and anthropogenic threats (AT) per area (Cc - *Caretta caretta*, Cm - *Chelonia mydas*, Dc - *Dermochelys coriacea*, Ei - *Eretmochelys imbricata*, Lo - *Lepidochelys olivacea* and NI – not identified); CCL curved carapace length.

Area	Species/Causes	Total obser.	Anth. threats	Mortality
Ponta do Ouro border - Ponta Malongane	Female Cc with 98 cm (CCL) Death by natural causes (12 November 2015 ; Lat: - 26.8481400000; Long: 32.8946800000)	1	-	1
Ponta Dobela - Ponta Mucombo	Female Cc with 111 cm (CCL) Death by natural causes (22 September 2015; Lat: -26.3071700000; Long 32.9319800000).	1	-	1
Závora	Carapace in sand dunes near a hat with gillnets from artisanal fisheries (21/02/2016; Figure 7A)	1	1	1
Inhassoro	Cm captured by artisanal gillnet released (22/09/2015; Figures 14A-B)	1	1	-
Estoril - Beira	CC found dead on shore (29/05/2016; Figure 7B)	1	NI	1
Barra	Cm- whole carcass washed up on beach, suspected drowning in gill net. Fishers quickly found carcass on beach and chopped it up and distributed the meat (Figure9A).	1	1	1
Praia Manhame	Cm- carcass washed up already decomposing.	1	NI	1
Tofo	Mature male Cc found drowned in a gillnet at Praia de Rocha headland (Figure 8A-B). A juvenile Ei washed up dead, already decomposing (Figure 9B).	2	1	2
Island Rock (near Legogo)	Two mature loggerhead turtles, caught by two different groups of fishers, both groups are fishing using long lines to target sharks. (24/5/2016; Figures 11A-B)	2	2	2
Ilha do Fogo	Seven live turtles were found in the hands of a group of fishermen. The turtles were found hidden under dry branches, ready to be killed. The poachers would have then smoked the meat and sell it in Angoche or Larde. The leader of the poachers was apprehended and taken to Moma for questioning and conviction (Wordpress, 15/09/2015).	7	7	-
Vamizi	Ei – mature female, carcass found on the beach, head and front flippers missing (Figure 10A-B) Cm – adult female, carcass found on the rocks at the beach after laying	2	NI	2
Total		20	13	13



Figure 7. A) Carapace in sand dunes near a hat in Závora (Photo: Raquel Fernandes) and B) Loggerhead turtle washed on shore in Estoril-Beira (Photo: Eduardo Videira).



Figure 8. Mature male loggerhead turtle found entangled and drowned in bottom of gillnet set off Praia de Rocha headland, Inhambane. A) Carcass was released in attempts to save the animal however asphyxiation had already occurred before it was detected. B) The carcass was brought ashore and was handed over to local authorities (left photo: Courtesy of Alexandra Patane and Ole Siegfried; right photo: Jessica Williams).



Figure 9. A) Green turtle carcass reported at Barra Beach, Inhambane. Carcass was reported to wash ashore complete, however it was quickly detected by local fishermen, cut and distributed amongst themselves for consumption. Cause of death is theorised as drowning in gillnet and then the carcass was cut out of net and it washed ashore, however the carcass was not able to be examined before fishers cut and distributed the animal (Courtesy of Sharon Basson); and B) Juvenile hawksbill turtle carcass washed up in Praia do Tofinho, Inhambane (Photo: Jessica Williams).



Figure 10. Adult female hawksbill turtle carcass washed up at Vamizi Island (Photos: Joana Trindade).

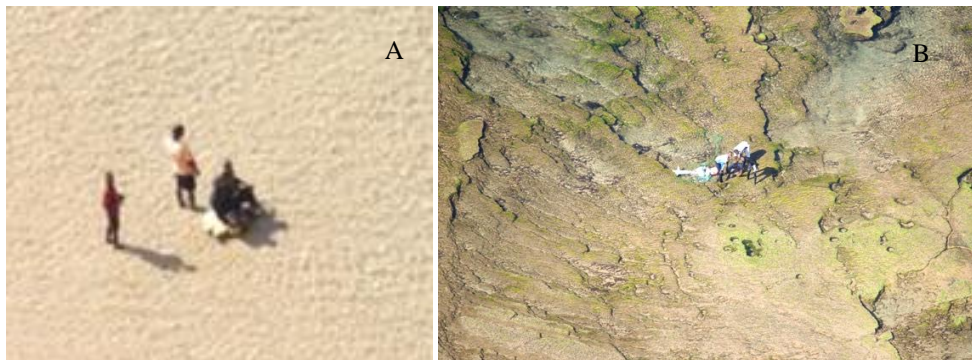


Figure 11. Aerial photos of two different groups of fishers that were using long lines to target sharks and caught two loggerhead turtles at Island Rock. The photo on the right shows that they caught a shark at the same time (Photo courtesy of Josh Axford, Marine Megafauna Foundation).

Table 12. Reported marine turtle strandings per area (Cc - *Caretta caretta*, Cm - *Chelonia mydas*, Dc - *Dermochelys coriacea*, Ei - *Eretmochelys imbricata*, Lo - *Lepidochelys olivacea* and NI – not identified).

Area	Species/Causes	Total	Causes
Tofo	Mature male Cm stranded alive with buoyancy problems and two badly infected eyes. This turtle was released offshore.	1	NI
Tofo	A juvenile post hatchling Ei – sick and weak, released offshore but no buoyancy control (Figure 2)	1	NI
Total		2	-



Figure 12. Juvenile hawksbill turtle stranded on Praia do Tofinho, animal was very weak but no external injuries. Rehabilitated over night and released offshore the next day (Photo: Jessica Williams).

Tagging and Recaptures

A total of 147 loggerhead turtles and seven leatherback turtles were tagged. A total of 115 loggerhead and six leatherback turtles were recaptured for the first time during the 2015-16 nesting season at the POPMR (see annex I).

Table 13. Number of marine turtles tagged during the 2015/2016 season at the Ponta do Ouro Partial Marine Reserve according to species.

Area	<i>C. caretta</i>	<i>D. coriacea</i>
Ponta do Ouro - Malongane	7	
Malongane - Dobela	122	7
Dobela - Mucombo	11	
Mucombo - Sta Maria	7	
Total	147	7

Table 14. Number of marine turtles first recaptured at the Ponta do Ouro Partial Marine Reserve (see annex I) presented per species.

Area	<i>C. caretta</i>	<i>D. coriacea</i>
Ponta do Ouro - Malongane	4	-
Malongane - Dobela	103	5
Dobela - Mucombo	8	-
Mucombo - Sta Maria	5	-
Total	120	5

RESEARCH UPDATE

Recent Publications

- Fernandes, R. S., M. A. M. Pereira, M. G. Soares & C. M. M. Louro (2016). Spatio-temporal nesting distribution of the loggerhead turtle (*Caretta caretta*) at the Ponta do Ouro Partial Marine Reserve, Mozambique. Submitted to *Testudo*.
- Louro, C. M. M., P. M. B. Gonçalves, M. A. M. Pereira & R. S. Fernandes (2016). Marine turtle strandings at Ponta do Ouro Partial Marine Reserve, Southern Mozambique. *African Sea Turtle Newsletter*, **5**: 32-34.
- Williams J. L., S. J. Pierce, M. M. P. B. Fuentes & M. Hamann (2016). The tradition of take: sea turtle consumption in Dovela, Mozambique. *African Sea Turtle Newsletter*, **5**: 27- 31.

Conference presentations

- Trindade, J. (2016). A look back at 12 years of green turtle nesting monitoring in Vamizi Island, Mozambique. Oral Presentation at the 36th Annual International Sea Turtle Symposium, Peru.
- Williams, J. L, S. J. Pierce, M. Hamann & M. M. B. P Fuentes (2016). Insights into illegal harvest of marine turtles in East Africa. Oral Presentation at the 36th Annual International Sea Turtle Symposium, Peru.
- Williams, J. L. (2016). Starting from scutes: Forming Mozambique's baseline with photo-ID and citizen science. 1st annual photo-identification workshop. 36th Annual International Sea Turtle Symposium, Peru.
- Williams, J. L, S. J. Pierce, M. Hamann & M. M. B. P Fuentes (2016). Using experts' opinions to fill the gaps: A case study of the conservation context in Mozambique. Poster Presentation at the 36th Annual International Sea Turtle Symposium, Peru.

On-going studies

- Photo-identification project in collaboration with TORSOOI and Kelonia.

Priority future research

- Comprehensive survey to quantify illegal takes and genetic analysis which regional management units (RMU's) are being impacted from illegal take in Mozambique.
- Analysis of the relationship of emergences with confirmed nests per total emergences, and successful hatching.
- Climate change and vulnerable areas: monitoring nest temperature, sea level rise and coastal erosion.
- Quantifying poaching threats to marine turtle populations.
- Expanding scope of Photo ID library for Mozambique which will allow greater insight into coastal habitat use, site preferences and animal movements along the coast.
- Genetic studies for other marine turtle species populations (eg. leatherback, hawksbill and green turtles) found in Mozambique. A special interest is to conduct genetic analysis on albino green turtles hatchlings samples collected in Vamizi.
- Use of the modelling software MARK to study loggerhead population size and dynamics based on tagging and recapture data.
- Satellite tagging of green and hawksbill turtles to study their migratory routes in northern Mozambique.
- Use acoustic monitoring to study residency time and spatial ecology of hawksbill turtle, in the waters around Vamizi Island.

ENVIRONMENTAL EDUCATION AND AWARENESS

- Xiluva event at Escola Portuguesa de Moçambique in Maputo with the participation of 95 girls from Escola Primária Completa Unidade 19, Escola Primária Completa “A Luta Continua”, Escola Primária Completa do Alto Maé, Núcleo da Associação Académica de Maputo, Núcleo do Grupo Desportivo de Maputo, Bela Rosa (Bairro Maxaquene), Núcleo do Xipamanine and Núcleo da Mafalala (7 Abril 2016, Figures 13 A,B);

- 2nd Annual eco-camp at Dunes de Dovela in Inharrime with the participation of 18 students from Lycée Gustave Eiffel Ecole Française de Maputo (16-20 May 2016).

- During the release of a green turtle captured by artisanal gillnet the association *Solidariedade Internacional a Moçambique* provided awareness talks to fishers and children about marine turtles conservation (22 September 2015; Figure 14).

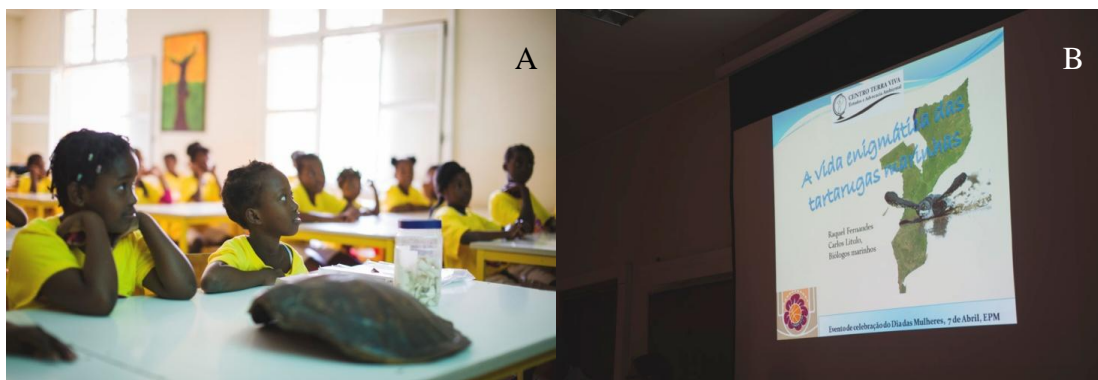


Figure 13. Environmental education about marine turtles at Escola Portuguesa de Moçambique.



Figure 14. Green turtle released at Inhassoro (Courtesy of Manecas Paulino Massuanguanhe, Solidariedade Internacional a Moçambique).

REFERENCES

- Fernandes, R. S., J. Williams, C. M. M. Louro & M. A. M. Pereira (2014). Monitoring, tagging and conservation of marine turtles in Mozambique: annual report 2013/14. 6 pp. Maputo, CTV.
- Fernandes, R. S., J. Williams, J. Trindade & M. A. M. Pereira (2015a). Monitoring, tagging and conservation of marine turtles in Mozambique: annual report 2014/15. 21 pp. Maputo, CTV
- Fernandes, R. S., J. Williams, J. Trindade & M. A. M. Pereira (2015b). Marine turtles in Mozambique: results from the 2014/15 nesting season." *African Sea Turtle Newsletter* 4: 35-37.
- Garnier, J., N. Hill, A. Guissamulo, I. Silva, M. Witt & B. J. Godley (2012). Status and community-based conservation of marine turtles in the northern Querimbas Islands (Mozambique). *Fauna and Flora International*, **46**: 359-367.
- Hughes, G. R. (1971) Preliminary report on the sea turtles and dugongs of Mozambique. *Veterinária de Moçambique*, **4**: 43-84.
- IUCN, 2014: IUCN Red List of Threatened Species. Version 2014.1. www.iucnredlist.org. Downloaded on 5 November 2014.
- Lombard, P. & S. Kyle (2016). Acompanhamento de tartarugas marinhas e conservação no Sul de Moçambique. 11 pp.
- Louro, C. M. M. & R. Fernandes (2012). Monitoring, tagging and conservation of marine turtles in Mozambique: Annual report 2012/13. Maputo, CTV.
- Louro, C. M. M., M. A. M. Pereira & A. C. D. Costa (2006). Relatório sobre o estado de conservação das tartarugas marinhas em Moçambique. 42 pp. Xai-Xai, CDS-ZC/MICOA.
- Mellet, B. (2015). Ecological risk assessment of fisheries on sea turtles in the South Western Indian Ocean. 217 pp. MSc thesis. Port Elizabeth, Nelson Mandela Metropolitan University.
- Pereira, M. A. M., R. S. Fernandes, E. J. S. Videira, C. M. M. Louro & P. M. B. Gonçalves (2014). Celebrating 20 years of marine turtle tagging and monitoring in southern Mozambique. *African Sea Turtle Newsletter*, **2**: 31-33.
- Wallace, B. P. *et al.* (2010). Regional Management Units for Marine Turtles: A novel framework for prioritizing conservation and research across multiple scales. *PLoS ONE*, **5** (12): e15465.

ANNEX 1 Remigration intervals for the recaptured turtles

Annex 1.1 Remigration intervals for the recaptured leatherback turtles during the season 2015/16 at the POPMR.

Tag	2013-2014	2014-2015	2015-2016	Total observations	Nr of nesting seasons
ZA0630R/0634A			2	2	1
ZA0131A/MZ565			2	2	1
MZ1889			2	2	1
MZ1885			1	1	1
MZ1980			1	1	1
MZ1979			1	1	1
MZ1887			1	1	1
MZ2038			1	1	1
MZ1750	2		1	3	2
MZ1886			1	1	1
MZ1940			1	1	1
MZ207/MZ2040			1	1	1

Annex 1.2 Remigration intervals for the recaptured loggerhead turtles during the season 2015/16 at the POPMR.

Tag	2003-2004	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	Total Observation	Number of nesting seasons
LL637							1			2		1	4	3
MO945												3	3	1
MO945/MZ1414												1	1	1
MZ101							3					1	4	2
MZ101							1					1	2	2
MZ108								3		8		2	13	3
MZ109								2				1	3	2
MZ109								1				1	2	2
MZ110								1				1	2	2
MZ113								1				1	2	2
MZ122											3	1	4	2
MZ124										1		1	2	2
MZ127												1	1	1
MZ128									2			1	3	2
MZ134							1					2	3	2
MZ135										2		2	4	2
MZ136										2		1	3	2
MZ137										2		1	3	2
MZ137										2		1	3	2
MZ138										2		1	3	2
MZ139												2	2	1
MZ140												1	1	1
MZ141												2	2	1
MZ144												3	3	1
MZ145												1	1	1

MZ150				1			2	3	2
MZ153				1			2	3	2
MZ155				1	2	4	1	8	4
MZ156				1			1	2	2
MZ158				1			1	2	2
MZ162					2		1	3	2
MZ164					6		2	8	2
MZ165					8		3	11	2
MZ171					1		1	2	2
MZ173					4		4	8	2
MZ174					4		3	7	2
MZ177							2	2	1
MZ178							2	2	1
MZ179							1	1	1
MZ180					1		1	2	2
MZ183							1	1	1
MZ184							1	1	1
MZ184							1	1	1
MZ185							2	2	1
MZ187							4	4	1
MZ188							3	3	1
MZ189							2	2	1
MZ192							1	1	1
MZ193							1	1	1
MZ194							4	4	1
MZ195							3	3	1
MZ1956/MZ1787							1	1	1
MZ195							3	3	1
MZ196							2	2	1
MZ197							2	2	1
MZ198							1	1	1
MZ199							1	1	1
MZ199							2	2	1
MZ200							2	2	1
MZ201							4	4	1
MZ202							2	2	1
MZ203							2	2	1
MZ203							2	2	1
MZ204							1	1	1
MZ205							2	2	1
MZ212							2	2	1
MZ213							1	1	1
MZ239					2	1	1	4	3
MZ251					1		1	3	3
MZ434						1	1	2	2
MZ501					2		1	3	2
MZ519					1		1	9	3
MZ537							1	1	1
MZ542					2		1	3	2
MZ707						1	2	3	2
MZ748						2	1	3	2
MZ757					1	2	1	4	3
MZ761					1		1	2	2
MZ774					1		1	2	2
PP091	1				1		1	3	3

PP096/ZATT011				1	1	1
PP146				2	2	1
PP559	1	1		1	3	3
PPO96				1	1	1
ZA020				1	1	1
ZA0203A/ZA0048A				1	1	1
ZA027				1	1	1
ZA033				2	2	1
ZA0332A/ZA0001A				1	1	1
ZA059				1	1	1
ZA066				2	2	1
ZA069				1	1	1
ZA0746A/0294A				1	1	1
ZA077				1	1	1
ZA559				1	1	1
ZABB3				1	1	1
ZACC8				1	1	1
ZAOO021A				1	1	1
ZAR27				1	1	1
ZARR2	1	1		2	4	3
ZASS1				1	1	1
ZASS143/MZ298				2	2	1
ZASS7				1	1	1
ZASS9			1 1	3	5	3
ZATT0				2	2	1
ZATT5				1	1	1
ZAVV1				1	1	1
ZAVV4				2	2	1
ZAVV7				1	1	1
ZAXX3				1	1	1
ZAXX819/ZAXX828				1	1	1



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