



**A brief report on the monitoring of marine turtles  
on the Sao Sebastiao peninsula, Mozambique,  
from November 2013 to March 2014.**

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**Success: evidence of the emergence and return of a nesting loggerhead turtle near  
Lighthouse, Sao Sebastiao peninsula, during the 2013 2014 nesting season**

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## **Introduction**

All marine turtles are regarded worldwide as threatened or endangered and the leatherback turtle, which is often seen in Sanctuary waters, is currently classified as critically endangered.

Marine turtles are generally seen as a charismatic and important component of tropical marine ecosystems and several species are routinely seen when snorkeling around Sanctuary. Many of the world's remaining important marine turtle breeding areas are on islands but one of the few mainland areas, where turtles used to breed in large numbers, was on the east coast of the African continent. Unfortunately there are now few places left on this shore where large numbers of turtles breed, mostly due to them being killed as they come out of the water to lay eggs and the poaching of turtle eggs. It is only in the extreme north of the South Africa coastline where this declining trend has been reversed following rigorous protection for over fifty years.

Up to five species of marine turtle are reported to have bred on the shores of Mozambique (Louro et al, 2006; Fernandez et al, 2014). In the past, however, information was scanty, often only colloquial and sometimes misleading. In recent years more attention has been paid to the situation and slowly better information and more accurate data have been obtained (Louro et al, 2012; Pereira et al, 2009; Videira et al, 2010). Efforts have been made to collate and organize the available historical data and combine this with current information (Louro et al, 2012; Pereira et al, 2009; & Videira et al 2010; Louro et al, 2012; Fernandez et al, 2014) and this is leading to a much better understanding of the status of marine turtles in Mozambique.

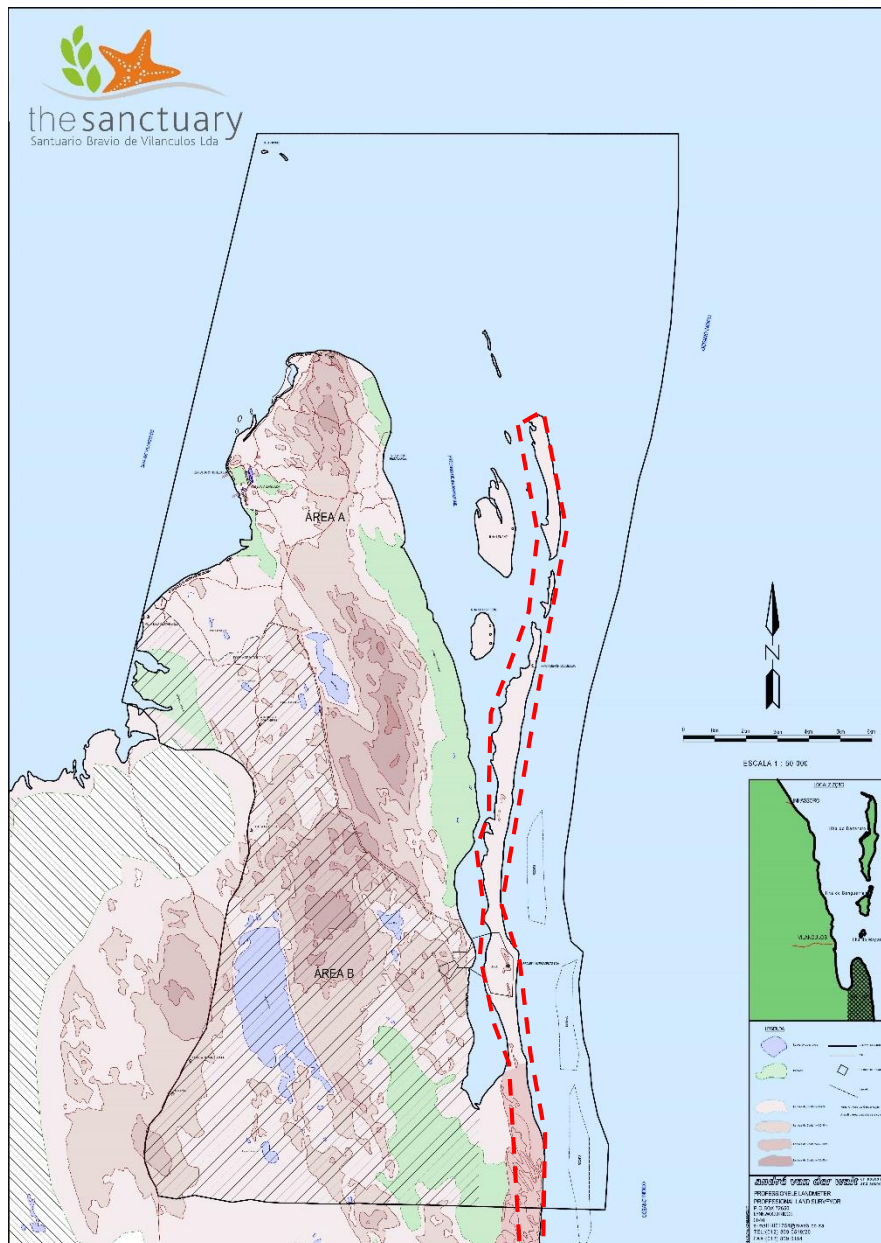
Various turtle monitoring schemes have been carried out in several localities in Mozambique in the past but methods of data collection and levels of accuracy and detail were dissimilar and often incompatible. This resulted in a confused situation where different schemes monitored the various aspects of turtle breeding in different ways, making simple collation or comparison of data difficult and sometimes misleading. In November 2010 a turtle Workshop was thus held in Maputo (Pereira & Videira, 2010) to address this situation and attempt to standardize methods of data collection. This resulted in a more consistent approach to turtle monitoring which makes the compilation of an annual National Mozambican Turtle Status Report more easy and meaningful.

For the last four years organized nesting turtle protection and monitoring has been carried out on the eastern shore of Sanctuary by the management team. This brief report serves to present the basic information collected in the Sao Sebastiao area by the Sanctuary during the 2013/2014 season, supported strongly by financial help from the Dugong Trust..

## **Methods**

The Sao Sebastiao peninsula is situated about five kilometers directly south of the southernmost island of the Bazaruto Archipelago and the Bazaruto Archipelago National Park (BANP). The region was proclaimed as a conservation area on 17 October 2000 under authorization number 4 of 2000 by the government of Mozambique. The reserve area, called Santuario Bravio de Vilanculos Lda, or The Sanctuary, has a management structure that actively carries out field management of land and marine areas.

Basic, but erratic, turtle monitoring and protection has been carried out for several years but in the earlier years data was scanty and supervision of the monitoring teams was challenging. In the last four years serious attempts have been made to improve both the protection and monitoring and this was further consolidated in the latest, 2013 to 2014, season. Most Sanctuary turtle breeding is thought to take place on the beaches of the eastern shore of the peninsula and the area monitored last season stretched from about five kilometres south of "Lighthouse" northwards for about 20 kilometers up the shore to the end of the sand spit ( Figure 1).



**Figure 1. The Sao Sebastiao peninsula showing, as a red area, the area patrolled during marine turtle monitoring in the 2013.2014 season.**

This last season six local residents were selected, trained, equipped and stationed with three placed at Nyati Beach Lodge and three at Lighthouse, to protect and monitor the study area during the peak period of turtle breeding. They were trained in turtle recognition and the basics of measuring (Photo 1) and then deployed to protect and monitor the nesting turtles from 9 October 2013 to 15 February 2014. This period was earlier than that of the previous season.



**Photograph 1. Sao Sebastiao monitors recording a loggerhead turtle.**

During the period of monitoring, the turtle monitors were issued with data sheets, measuring tapes and digital cameras. They were to walk their allocated areas nightly, identifying turtles and noting all turtles encountered and all turtle tracks seen. They were not required to tag turtles as this would necessitate extra supervision without which tagging could seriously delay or injure the turtles.

Various challenges again arose with supervision, as the monitoring took place in an area only approachable by boat, and some of the equipment was found to be unsuitable. Photographs were to be taken of all turtles and tracks but problems were encountered and some animals and tracks were not photographed. Despite the challenges some useful photos, measurements and records were obtained.

Towards the end of the season Monitors checked for hatching nests and, when it had been established that the nests had hatched successfully, they were dug up to investigate the hatching success rate (Photos 2 & 3).



**Photograph 2. A hatched loggerhead nest excavated by monitors the following morning to check on hatching success.**



**Photograph 3. A Sanctuary hatched loggerhead turtle heading for the ocean.**

### **Results.**

A total of 7 turtle tracks were encountered by the monitoring team during the survey period (Table 1), well below the 18 recorded last season. This is unusual as records from the monitoring in the far south of Mozambique show good numbers of loggerhead turtles this last season. In terms of where the turtles are emerging, each track is now recorded accurately using a hand held GPS and results are presented in Figures 2 & 3. The turtles emerged over the whole of the survey area but were concentrated in two regions, in the south around Lighthouse and in the north around Nyati Lodge (Tables 1 & 2 and figures 2 & 3). Usually only turtle tracks were found but, on two occasions last season, the turtles themselves were seen by the monitors.

**Table 1. Information on turtle breeding activity on Sanctuary during the 2013/2014 season including the date of sighting, locality recorded, if it was a turtle (T) or spoor (S) sighting, the measurement of its tracks (cm) and whether or not it nested (Y= nested, N = no nest)**

No.	Date	Zone	S or T	CM	Nest (Y/N)
1	14/11/2013	Lighthouse	S	67cm	Y
2	14/12/2013	Lighthouse	S	67cm	N
3	15/12/2013	Lighthouse	T & S	62cm	Y
4	16/12/2013	Pescada	S	88cm	N
5	25/12/2013	Nyati	S	59cm	Y
6	11/01/2014	Nyati	S	87cm	Y
7	04/02/2014	Nyati	T & S	955m	N

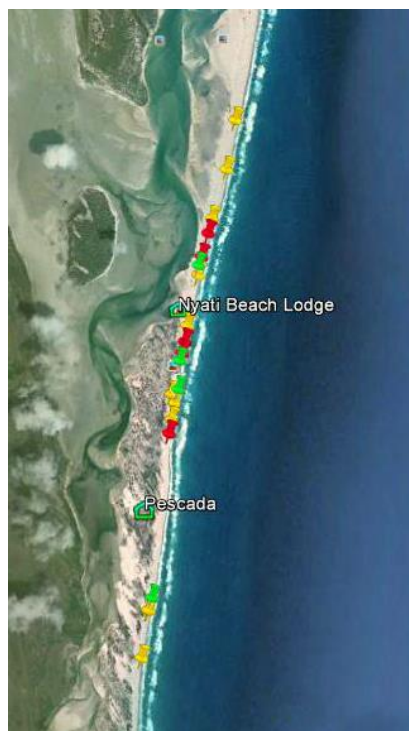
**Table 2. Information on turtle breeding activity on Sanctuary during the 2013 2014 season presenting the % emergence by month, total emergences and % by locality.**

Category	2011/2012	2012/2013	2013/2014
October	28.6	No monitoring	0
November	7.1	44.4	14.3
December	42.9	55.6	57.1
January	21.4	0	14.3
Feb & March	0	0	14.3
Total tracks/turtles	14	18	7
Nyati	35.7	50	42.8
Pescada	7.1	11.1	14.3
Lighthouse	57.1	38.9	42.8





Figure 2. Exact GPS localities of turtles emerging to lay on the east side of San Sebastian peninsula, Mozambique, during the 2011/2012 season (Red), 2012/13 season (Yellow) and 2013/14 season (Green)



(a)



(b)

Figure 3 a & b. Detail of exact GPS localities of turtles emerging to lay in the vicinity of Nyati Lodge (a) and Lighthouse (b) on the east side of San Sebastian peninsula during the 2011/2012 season (Red), 2012/13 season (Yellow) and 2013/14 season (Green)

The sizes of tracks measured in the last season (Table 1 & Figure 4) fell into one fairly “normal” looking distribution with one outlying measurement of well over one metre and only a leatherback turtle (*Dermochelys coriacea*) could have resulted in such a measurement. Most of the measurements fell into a category that corresponds to the dimensions of loggerhead turtles (*Caretta caretta*), and there are photographs of several of these animals (Photographs 1 & 3) that have been measured or seen in recent years.

In the previous two years measurements of turtles suggested three fairly distinct size classes and, although this year only two were evident, if all data so far are collated (Figure 5) there is a distinct suggestion of three size groups of turtles. Olive ridley turtles (*Lepidochelys olivacea*) are smaller than loggerheads and there have previously been unconfirmed reports of this species nesting on these beaches. It looks as if, yet again, we have confirmed the nesting of loggerhead turtles on Sanctuary and also obtained tantalizing, but unfortunately still circumstantial, suggestions of both leatherback and olive ridley turtles nesting on Sanctuary beaches.

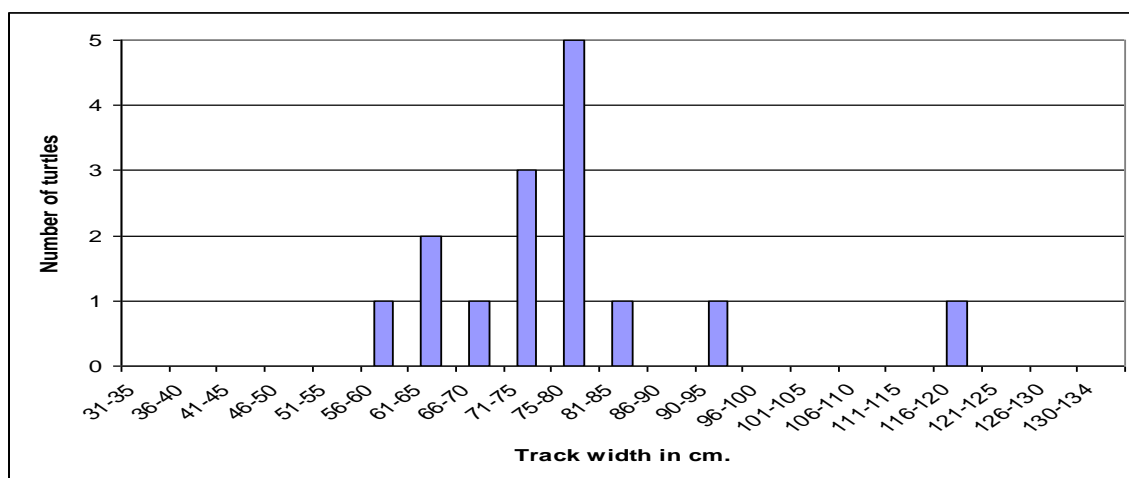


Figure 4. Length frequency analysis of turtle nesting tracks found during the 2013/2014 nesting season on the San Sebastian peninsula.

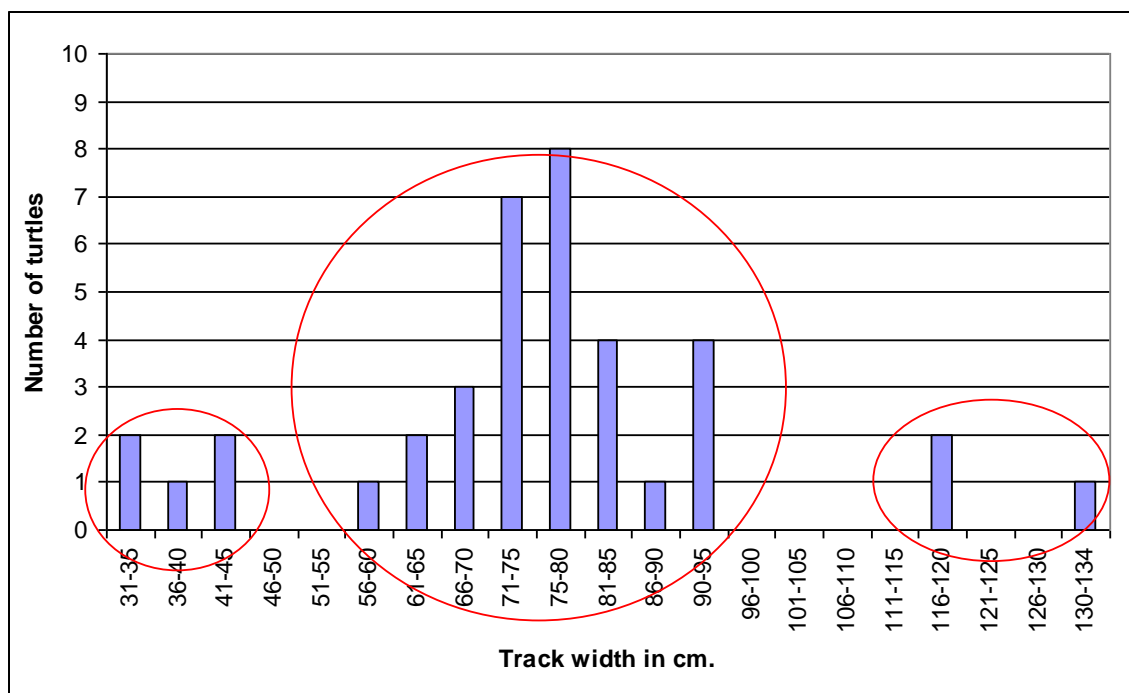


Figure 5. Collated length frequency analysis of turtle nesting tracks found during the 2010/2011, 2011/2012, 2012/2013 and 2013/2014 nesting seasons on the San Sebastian peninsula showing three apparent size groupings (38 turtle tracks in total).

Since the previous season no reports were received of turtles being killed but during the previous year Sanctuary management was called in twice when lodge owners or visitors came across turtles killed by fishermen outside Sanctuary waters. In both instances the turtles and nets were seized and the matters reported to the Mozambican government as well as traditional Authorities. Turtles will be caught incidentally in gill and seine nets and inevitably some will die in the process. It is clear, however, that although everyone knows that they should not kill turtles, if no one is watching, many people will still make use of the turtles or even target them. However, there have been fewer incidents with local communities neighbouring the Sanctuary and it appears that far away communities opportunistically target these animals. This could be as a result of community education and employment by the Sanctuary.

Other interesting turtle information collected during the past year has shown that there is real potential for Sanctuary to play an important role in regional and international marine turtle conservation.

Bangwe Island has been zoned as a "Marine Turtle Sanctuary" but very little recent evidence of turtles breeding had been found and it was assumed that there was too much disturbance for them to breed successfully on the island. In April 2013, however, a Sanctuary lodge owner found what he thought were possibly turtle egg shells washed out from the sand on Bangwe. He photographed them (Photograph 4) and sent them in for identification. The eggs were confirmed as marine turtle, most probably loggerhead, and they appear to have hatched. There is thus confirmation that at least one turtle bred successfully on Bangwe in the 2012/2013 season. Sanctuary management now monitors the situation closely but no evidence of breeding activity was recorded this year. Bearing in mind that the management of BANP erected hundreds of poles at the high water mark that could have negatively influenced turtle movement.



**Photograph 4. Hatched marine turtle eggs collected last season on Bangwe Island by a lodge owner.**

The same lodge owner subsequently found a turtle that seemed to be semi resident around the jetty in front of his Lodge on the western side of the peninsula, and has been identified by Dr. George Hughes as a rare and endangered hawksbill turtle ( Photograph 5).





**Photograph 5. A hawksbill turtle at the artificial reef near the jetty in front of Lodge Site 7.**

Leatherback turtles, which are currently listed internationally as “critically endangered”, are routinely seen in the ocean between Lighthouse and Nyati Lodge and last year Sanctuary’s Turtle Monitors photographed a green turtle in the same area. It thus seems that at least four species of marine turtle are to be found in Sanctuary waters where, due to Sanctuary management activity, they receive some degree of protection.

### **Discussion**

Monitoring of marine turtles on Sanctuary has recorded some important achievements to date. It has shown that:

- marine turtles nest on Sanctuary beaches each year
- many of the nests are hatching successfully
- current protection seems adequate to prevent turtle poaching on the beach & nest robbing
- Sanctuary is capable of running the monitoring scheme despite logistical challenges
- marine turtle monitoring/protection is benefiting the community through Monitor wages
- marine turtles are still under severe pressure from netters
- at least four species of marine turtle are to be found in Sanctuary waters
- natural predation does not seem to be a major factor in hatching success at present

The presence of monitors along the study area during peak nesting time appears to have prevented the killing of any turtles on the monitored beaches and at least reduced the number of nests being dug up. It is thought that in the fairly recent past almost all the nests in the study area were being dug up and quite a few turtles were probably being killed.

Due to this project there is now an area of significant size, outside the far south of Mozambique, where at least one and possibly two or even three species of marine turtle are monitored and given a substantial degree of protection. It is unknown how many turtles may be trying to nest north and south of the monitored area but it would appear that this is not just an area where turtles occasionally try and lay but possibly a relic or even core area for turtle breeding in the region.

It has also become apparent that the marine area east and north of the turtle monitoring zone contains numbers of leatherback turtles for much of the year. This may be associated with a localised “upwelling” where nutrients from deeper waters are brought to the surface by water movement. This, in turn, results in increased plankton densities and jellyfish numbers that can attract and sustain numbers of large animals that feed on these concentrations. Whale sharks, which are mostly plankton feeders, are reported to be present in this area in good numbers throughout the year and the jellyfish are a prime food for leatherback turtles.

Green turtles are probably the most common turtle species seen by divers in this area and in 2012 one was found on the beach by Sanctuary Turtle Monitors (Photo 6). It is not clear what this animal was doing as it was immature, and thus not breeding, and it was during the day and turtles very rarely come onto the shore in daylight unless they are seriously injured. This animal seemed healthy and was returned to the water.



**Photo 6. An immature green turtle encountered and measured on the beach by Sanctuary Monitors in 2012.**

Turtle nesting in this area is seen by the managers of Sanctuary as an important aspect of conservation and their management of the region. The core area monitored is fairly remote with few local residents nearby and little disturbance. It is probable that in the past the area was severely impacted by people killing turtles and digging up nests. Almost every old homestead in the area has pieces of turtle carapace in their middens. Changed conditions and improved management of the area, however, could well result in a fairly extensive area where turtles would be relatively safe to nest and where nests would be less likely to be destroyed or raided.

It has also become clear that, from time to time, people from outside the area come in to fish in the turtle nesting area by means of netting and this could easily impact adult turtles. It would appear that many fishers, if they thought no one was watching, would still kill and eat turtles.

Sadly, in the very recent past, the Mozambican coast has been the scene of large scale killing of marine turtles with several thousand estimated to have been killed annually in recent years. The killing appears to be declining in some areas but still takes place (Photos 7 & 8). Much of the killing is attributed to offshore long line fishing boats but shore fishers are still a source of high turtle mortality.



**Photo 7. A mature turtle killed in a large mesh gillnet strung from Bangwe Island, on the Mozambican coast, in 2012. A visitor reported the incident and Sanctuary management responded.**



**Photo 8. A mature loggerhead turtle killed in a monofilament gillnet strung from the sand spit on the east of Vilanculos Sanctuary in 2012. A Sanctuary owner reported the incident and Sanctuary Management again responded.**

In the last few years Sanctuary has sent a strong message to all local fishers that the killing of turtles will not be tolerated and management will take firm action against any turtle killing. Fishers are now fully aware that, at least in Sanctuary waters, the killing of a turtle could have serious consequences for them. There have been no reports of the killing of turtles in the last year suggesting some measure of success on this important issue.

**Possibility of extending the turtle monitoring/protection area.**

With the new relationship with Singita there is a strong will to enlarge the area under Sanctuary management that could result in more than fifty kilometres of shoreline being patrolled and protected. This would greatly enhance the importance of our turtle monitoring and protection and establish a substantial refuge for turtles in central Mozambique. Discussions will be held before next season to establish if it will be possible to extend the current area covered.

It is clear that without active and visible policing or at least management presence local fishers will be severely tempted to kill any turtles they catch. It is thus important that Sanctuary improve and increase its management capacity and presence up and down the eastern shore. Extending patrols southwards from Lighthouse (Photo 9) will be investigated this year and also more vigilance right up the sand spit and in places like Bangwe Island.



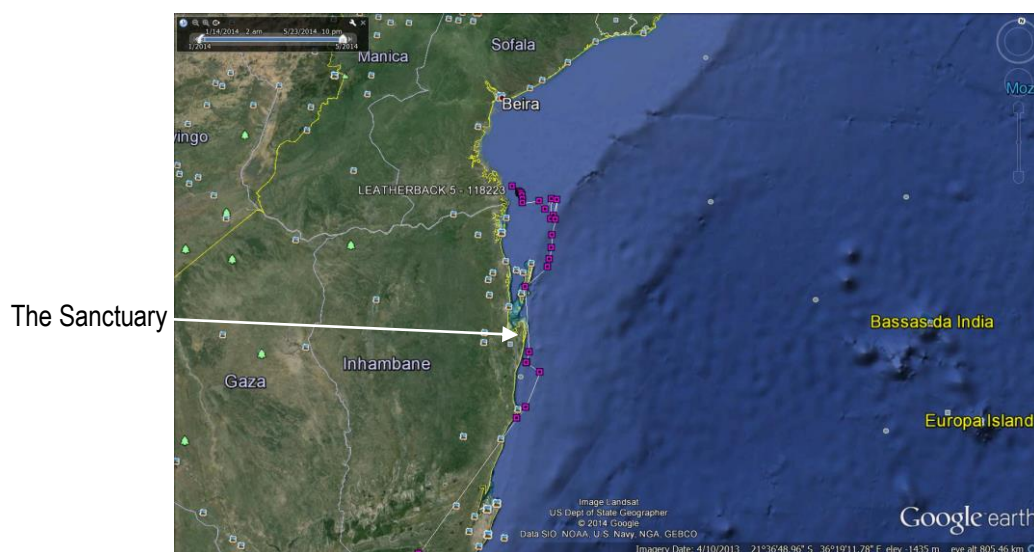
**Photo 9. Sanctuary management patrol with a loggerhead turtle.**

**National turtle cooperation and networking.** Sanctuary has been and will continue to work closely with other Mozambican government and NGO turtle interests. A Sanctuary representative attends the annual Mozambican Government pre-season turtle monitoring meeting in Ponta d'Oro and also the one in South Africa.

**International turtle cooperation and networking.** In 2012 Sanctuary was approached by a group of American turtle researchers, of good standing, who were interested in carrying out telemetry on leatherback turtles in the Bazaruto region. They had discovered, through telemetry, that leatherback turtles seemed to aggregate offshore in the area east and north of Sanctuary. While females probably nested elsewhere it looked as if males stayed in this region all year and they were drawing up a funded proposal to catch free swimming leatherback males and attach telemetry equipment to them. Sanctuary assisted them with information and offered the possibility of using Sanctuary as a base. The researchers are currently completing a proposal for possible submission to Sanctuary.

Ezemvelo KZN Wildlife, who run the South African turtle monitoring programme, have been attaching satellite telemetry equipment to leatherback turtles for some years and initial information suggested that they drift in ocean currents, well offshore, between breeding seasons. This last season, however, several of the female leatherback turtles tagged hugged the shoreline and headed directly north into Mozambican waters. Most have become semi resident close inshore and one (Figure 6) swam past Sanctuary and is currently slightly north of Sanctuary waters.

It had previously been thought that these turtles were ocean migrants but it now seems as if the inshore environment around Sanctuary could be important to this species even if it does not often currently nest here.



**Figure 6. Records of the position of a satellite tagged leatherback turtle tagged in South Africa, during May 2014 (The Sanctuary's location marked with a white arrow)**

### **Future monitoring**

The managers of The Sanctuary propose to upgrade turtle monitoring again this coming season and confirm it as an annual activity. This next season the target period for monitoring will be a little earlier, as it appears that most turtle emergences take place before the end of December. Suitable cameras will be given to Monitors and more attention will be given to training them in taking photographs. Each animal seen will be photographed, for positive identification, and all tracks will be counted, measured, photographed and localities recorded.



## **Funding**

We have been extremely fortunate in the last few years in that the Dugong Trust has covered most of the operating costs for turtle monitoring and protection. We have not yet secured funds for next season but will be applying again to the Dugong Trust, as well as other potential donors, to cover costs for this exciting and important project.

## **Concluding remarks**

It appears that the shores on the east of Sanctuary are suitable for several marine turtle species to breed and that at least a few individuals do so each year. Numbers breeding have probably declined markedly in the last few decades due to disturbance, killings and nest robbing by man. If Sanctuary management can remove, or at least reduce, some of these factors it seems likely that numbers of breeding turtles will increase. This happened in South Africa although it proved to be a very long, but successful, process.

The present monitoring showed that several turtle nests hatched successfully (Photo 9) this season and, if present plans can be implemented, the future of marine turtles on Sanctuary could be very bright.



**Photo 9. Freshly hatched Loggerhead turtles heading for the ocean.**

At the moment, successful and protected turtle breeding in Mozambique is mostly restricted to the far south and to loggerhead and leatherback turtles. If Sanctuary can provide protection to significant numbers of breeding turtles it could result in a central Mozambican loggerhead turtle breeding refuge. It also appears possible that at least one other species of turtle might find a relatively safe breeding area on the mainland of Africa.

The identification, protection and monitoring of a substantial new marine turtle breeding area on the mainland of Africa would be a significant achievement in worldwide marine turtle conservation. It will also be a valuable conservation and tourism asset to Sanctuary and contribute towards the conservation of these charismatic and endangered species.

Turtles have proved to be an extremely lucrative drawcard for tourism in many parts of the world where they generate substantial revenue and create employment for local people. While current Sanctuary monitoring is fairly modest and numbers of turtles are not great there is excellent potential for increasing the area of protection and turtle numbers monitored may well increase markedly.

The monitoring and protection carried out by Sanctuary is and will be closely integrated with the overall Mozambican efforts to conserve and protect these magnificent and threatened creatures.



**Acknowledgements: Thanks are due to:**

1. The **Dugong Trust** for essential financial support for the monitoring and protection programme
2. **Sanctuary Owners** and visitors for reporting turtle incidents to Management
3. **Community members** employed by Sanctuary to carry out the programme
4. **Community leaders** for support with the turtle killing incidents
5. **Dr. George Hughes** for general support, insights and help with identifying turtles.

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