



AFRICAN SEA TURTLE NEWSLETTER

Aerial photo of Fundação Maio Biodiversidade's (FMB) celebrations at the end of the nesting season on Maio Island, Cape Verde.

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BREAKING NEWS!

A Loggerhead Female Turtle from the Important Rookery of Cabo Verde Recaptured in Gabon

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The Cabo Verde Islands harbor the second largest nesting aggregation of the endangered loggerhead sea turtle in the Atlantic (Marco *et al.* 2011), and the only substantial rookery in West Africa (Marco *et al.* 2012).

Loggerheads have been reported to nest on all islands of Cabo Verde, including islets. Boa Vista Island accounts for approximately 85-90% of the nests laid in the country, followed by Sal, Maio and Santa Luzia (Marco *et al.* 2011). Nevertheless, poaching of nesting females and eggs for human consumption over the years has become an important threat for the survival of the Cabo Verde loggerhead population.

For this reason, nesting is monitored in almost every island of the archipelago, and generally includes night patrols, monitoring of nests, and measuring and tagging nesting females. External metal flipper tags allow easy identification of a turtle every time she is seen, without the need for special detectors to read internal PIT tags. This is especially useful when turtles are found washed up on shore or accidentally caught by a fishing boat, as is the case described in this article.

A loggerhead turtle, tagged with Inconel metal tags EES757 / EES758 on Sal Island, Cabo Verde, August 20, 2014 (and seen again on September 4, 2014) was captured by a fishing trawler on December 16, 2015 in southern Gabonese waters.

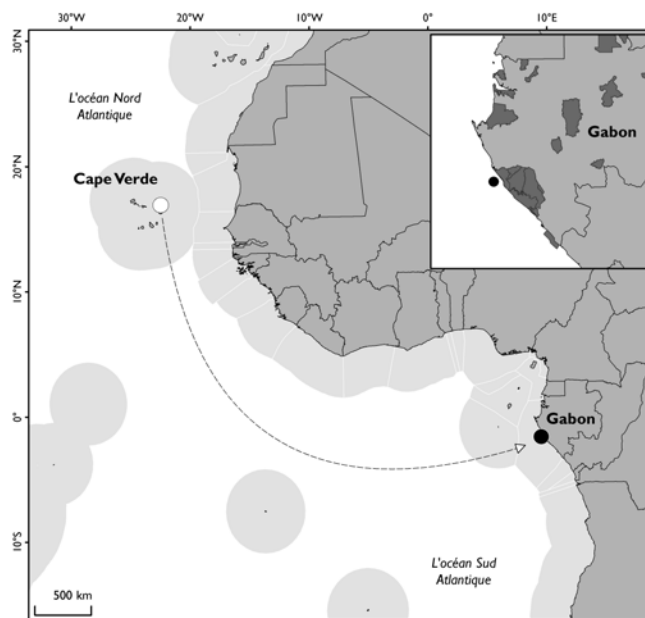


Figure 1. The loggerhead travelled over 4,000 km between the tagging location (Cabo Verde) and the recapture location (Gabon).

She was caught approximately 13 nautical miles offshore of Gabon's Loango National Park at a depth of around 38 m after travelling over 4,000 km in approximately 15 months (Fig. 1).

The turtle, called Bertiginosa by the field assistants who tagged her, was hauled onboard in a comatose state and received reanimation treatment by the onboard observer working for Gabon's government observer program (General Directorate of Fisheries and Aquaculture, and National Agency of Fisheries and Aquaculture) (Fig. 2). After 12 hours of observation she recovered sufficiently and was released back to sea. Interestingly, both at nesting and recapture, the turtle was recorded as exhibiting a full amputation of the posterior left flipper.



Figure 2. The loggerhead onboard a fishing trawler in southern Gabonese waters (Photo: Felicien Mavoungou Makanga).

This off-season migration by this turtle is a unique event, as there are no previous records of a Cabo Verde adult loggerhead turtle so far south.

Satellite tracking studies of nesting females from Cabo Verde and stable isotope analysis have shown post-nesting migrations to the coast between Mauritania and Sierra Leone during the non-reproductive period between nesting seasons (Hawkes *et al.* 2006; Eder *et al.* 2012; Pikesley *et al.* 2015). The presence of a Cabo Verde adult turtle so far south along the Atlantic coast of Africa is therefore unusual. It is possible that it may have accidentally drifted with currents or abnormal

weather patterns, or it may have been exploring feeding conditions in a new area for possible settlement during the non-reproductive periods. However, it is also possible that a small but predictable portion of the Cabo Verde population occupies foraging areas off the coast of Africa south of the Equator, between Gabon and Angola. Loggerheads are known to occur in these waters, but their rookeries of origin have yet to be identified.

Not enough is known about the migratory routes of adult loggerhead turtles in the Eastern Atlantic, and this finding suggests that the presence of loggerhead turtles in previously unknown areas is putting them at risk from fishery bycatch where their foraging grounds overlap with intensive industrial fisheries. Gabon's efforts to better understand and quantify the impact of its fisheries are laudable, and the use of both onboard observers and Turtle Excluder Devices remain high priorities on a national level.

Acknowledgements: We are grateful to the onboard observer Felicien Mavoungou Makanga who found, saved, and reported the turtle in Gabon; Peter Eliazar and the Archie Carr Center for Sea Turtle Research at the University of Florida, for providing the tags and facilitating the contacts; and Manjula Tiwari for offering the opportunity to publish the note in the African Sea Turtle Newsletter. We also thank Lucy A. Hawkes and Matthew J. Witt for interesting discussions on the post-nesting migrations of Atlantic loggerheads, and for the beautiful map. We acknowledge the support and authorisation of Georges Mba Asseko (Director General of the Agence Nationale des Pêches et de l'Aquaculture), Micheline Schummer Ghandji (Director General of the Direction Generale des Pêches et de l'Aquaculture), Pulcherie Mengue M'Adzaba (Director of Industrial Fisheries) and Michael J. Fay (Initiative Gabon Bleu, Agence Nationale des Parcs Nationaux) for Gabon's on-board observer program over the years, without which we would not be reporting this fascinating recapture.

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Community Involvement in the Monitoring of Marine Turtles in Guinea Bissau

Implication des communautés dans le suivi des tortues marines en Guinée Bissau

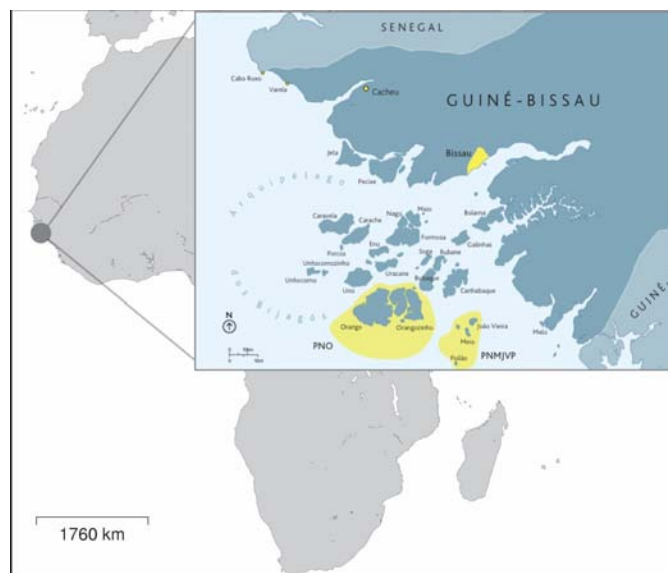
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Abstract: Sea turtle population monitoring activities are dependent on a strong complementary commitment towards raising awareness and integrating local communities in conservation. This is a challenge in Guinea-Bissau because of its great diversity of ethnic groups, whose rules, customs and belief, are related to sea turtles in so many different ways. Although sea turtles are not exploited for commercial purposes, they are still highly poached and used for traditional purposes. For example, within the Bijagos ethnic group sea turtles are very important for traditional ceremonies, for medicinal purposes, and for the use of eggshells to fertilize agricultural soil. But within the Felupes and the Balantas ethnic groups, sea turtles are considered sacred animals. Converting turtle poachers and fishermen into turtle patrollers and monitors is one of IBAP's (Institute for Biodiversity and Protected Areas) main goals and challenges. IBAP staff and turtle team members have become very active in enforcing turtle protection. Although poaching is still a reality, community participation and levels of awareness have increased considerably in the past 10 years, thanks to the engagement of the community members. (For more details, please contact the authors)

La Guinée Bissau se compose d'une mosaïque de plus de deux douzaines de communautés ethniques différentes, chacune avec ses propres règles, croyances et coutumes dans leurs relations avec les ressources naturelles, et dans ce cas particulier, dans leur rapport avec les tortues marines. Les groupes ethniques qui vivent dans la partie continentale du pays, parce qu'ils habitent loin des zones d'habitats marins et terrestres des tortues, n'ont pas un lien direct avec eux; et par conséquent leurs usages et leurs coutumes ne sont pas liés aux tortues marines et l'implication de ces communautés dans leur conservation est minime.

Dans le cas de la zone côtière continentale et de l'Archipel des Bijagos avec de vastes plages de ponte des tortues marines, les



Localisation de la zone côtière de la Guinée Bissau.

usages et coutumes des groupes ethniques majoritaires intègrent l'exploitation et des coutumes avec les tortues marines. Au nord du pays, dans la zone de Varela, les groupes ethniques majoritaires que sont les Felupes et les Balantes considèrent la tortue luth (*Dermochelys coriacea*) et la tortue verte (*Chelonia mydas*) comme des espèces sacrées; pour cette raison, ils ne se nourrissent pas de leurs viande, bien que la consommation des œufs de la tortue verte soit assez fréquente. Dans le sud, dans la région de Cacine à Melo, occupée par des Balantes, Tandas, Nalus et Soussous, ainsi que la grande majorité des pêcheurs étrangers originaires de Guinée et Sierra Leone, la consommation de la viande et des œufs de tortues marines est fréquente.

Dans l'Archipel des Bijagos, les populations de l'ethnie Bidjogo considèrent les tortues marines comme un don de Dieu; ils consomment leur viande et leurs œufs, et la carapace sert de récipient dans les travaux domestiques. Dans la société Bidjogo, les tortues marines ont une fonction sociale importante, en particulier pendant les cultes et dans la célébration des ancêtres; elles sont utilisées dans les cérémonies de reproduction, de «garandessa» (paiement de tribut en signe de respect), d'investiture du Régulo (rois traditionnels) et dans certains autres cas elles sont considérées comme un facteur de cohésion sociale pour la communauté, dans le renforcement des liens communautaires.

Une dynamique d'implication des communautés locales dans la conservation des tortues marines a été entreprise par l'IBAP (Institut de la Biodiversité et des Aires Protégées) avec l'appui de certaines institutions nationales de l'Etat et des ONG visant à protéger l'environnement, tels que l'UICN (Union Internationale pour la Conservation de la Nature), AD (ONG nationale Action pour le Développement), Tiniguena (ONG nationale pour le développement durable et la promotion du patrimoine culturel et naturel de la Guinée



Femmes Bidjogo utilisant des carapaces de tortues comme récipient (Photo: IBAP).

Bissau), et d'autres. Cette dynamique implique toute la communauté dans la protection des tortues marines, à commencer par les autorités traditionnelles, les Comités villageois et les sections villageoises, les jeunes, les enseignants, les associations locales, les riverains des zones de ponte et aussi les pêcheurs:

1. Les autorités traditionnelles (rois des villages et responsables religieux) de différentes localités, en particulier ceux de l'Archipel des Bijagós, sont impliqués à travers leur influence et leur pouvoir socio-culturel et religieux dans la protection des tortues marines, celle des plages de ponte avec diverses interdictions traditionnelles ("Mandjidura") dans les sites sacrés tels que les îles Poilão, Ancurai, et dans la restriction des captures et l'utilisation des ressources. Il existe de nombreux tabous pour lesquels se font des sacrifices de l'animal.

2. Les comités villageois et les sections villageoises sont impliqués dans la protection des tortues marines et ils utilisent leur influence politique dans les localités de leur juridiction.

3. Les jeunes de différentes îles et localités riveraines sont également impliqués dans la protection des tortues. Il existe des



Ceremonie traditionnelle de l'ethnie Bidjogo sur l'île de Canhabaque (Photo: J.F. Helio & N. Van Ingen)

"Jeunes collaborateurs des tortues marines" dans l'île de Canhabaque, ainsi que dans le complexe des îles Orango, à Unhocomo et Unhocomozinho, qui font le suivi des tortues marines et de leurs nids sur les plages de nidification et participent à des recherches portant sur les tortues marines et dans la sensibilisation de la population locale; fournissant des informations sur les pontes enregistrées et la consommation de viande de tortue ils organisent des réunions "Djumbai des tortues" dans les villages et participent à la sensibilisation radio (Radio Djan Djan) dans le domaine de la conservation des tortues marines et dans les cinémas-débats. De leur propre initiative, les jeunes de Varela ont créé des brigades de surveillance des tortues marines sur les plages de la région.

4. Les enseignants des communautés sont impliqués dans la sensibilisation de la population locale et des élèves dans les écoles; ils informent ce public sur les

menaces, la nécessité de réduire la capture des tortues et la collecte des œufs, ainsi que la conservation des sites de ponte. Des écoles EVAs (écoles où l'éducation environnementale occupe un rôle pédagogique central) ont été créées par l'ONG AD dans différentes localités avec des programmes d'éducation environnementale, pour susciter l'intérêt des plus jeunes dans l'acquisition de nouvelles connaissances permettant une meilleure conservation future des tortues marines avec l'aide des enseignants et des animateurs locaux.



Emergence de tortues vertes sur l'île de Poilão (Photo: J.F. Helio & N. Van Ingen).

Cette stratégie d'impliquer les communautés locales dans le suivi des tortues marines est pour l'IBAP une façon de transmettre des connaissances et des informations pertinentes qui contribueront au changement des mentalités des communautés locales et permettront de créer ainsi des synergies avec des mesures traditionnelles en faveur de la conservation des tortues marines.



Development Encroaches on the Southern Beaches of Bioko Island, Equatorial Guinea

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Bioko Island, Equatorial Guinea, is located in West/Central Africa in the Gulf of Guinea. The southern beaches of Bioko Island are important nesting sites for four of the five sea turtle species present in the Gulf of Guinea region (Tomás et al. 2010; Fitzgerald et al. 2011). On Bioko Island, there are five nesting beaches (totaling 19 km in length) on the southern part of the Island, which are all located in the Gran Caldera Southern Highlands Scientific Reserve (GCSH) (Fig. 1).

The GCSH makes up almost a third of Bioko Island (510 km²) and human settlement is concentrated on the northern edge of this protected area. Ureca, with fewer than 100 inhabitants, is the only village inside of GCSH and near the southern nesting beaches. Because of the difficulty to reach these remote areas, turtle and egg take on Bioko Island has been limited. Additionally, many villagers are employed by NGOs in conservation projects, which has served to further reduce both sea turtle poaching and egg take. Construction of a paved road from the city of Luba to the southern beaches (bisecting the protected area) was completed in November 2014. This road provides ease of access for the villagers of Ureca to the rest of the Island. However, it also facilitates access from the rest of the island to the GCSH and particularly the southern beaches, resulting in increased pressure on sea turtles and other wildlife.

In a recent publication we reported 43,860 leatherback (*Dermochelys coriacea*), 16,778 green turtle (*Chelonia mydas*), 1,731 olive ridley (*Lepidochelys olivacea*), and 85

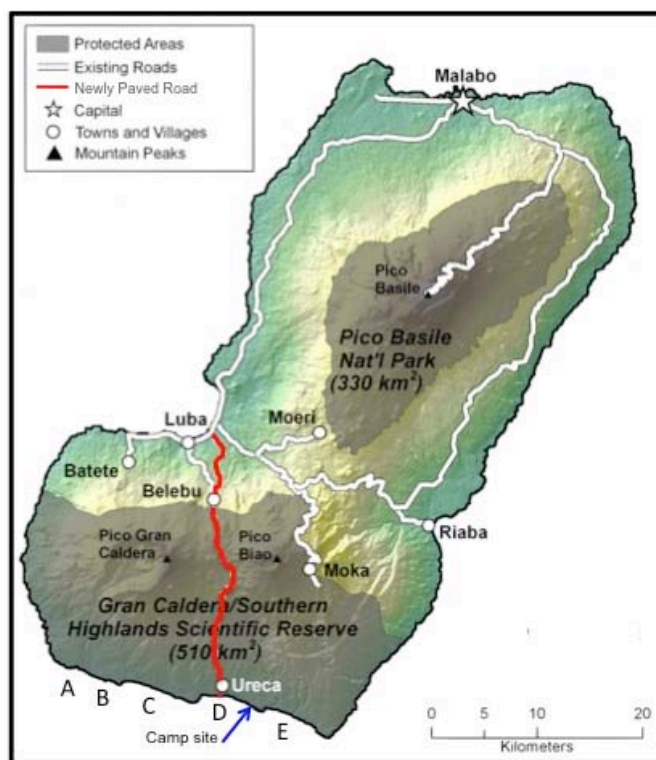


Figure 1. Map of Bioko Island, Equatorial Guinea. The five nesting beaches are labeled A – E on the map. The newly constructed and paved road is shown as a red line from Luba to Belebu and Ureca. Previously, there were no roads from Belebu to Ureca and the villagers and/or visitors hiked a full day through the forest to enter the village and/or the southern beaches.

hawksbill (*Eretmochelys imbricata*) encounters from 2000–2014 (Honarvar *et al.* in press). An encounter is the number of turtle tracks (including body pits, false crawls and abandoned nests) on the nesting beach. The number of green turtles seems to be stable and the number of olive ridleys is increasing. However, the total number of leatherback turtle encounters is decreasing on Bioko Island (Honarvar *et al.* in press). This decline

may be attributable to incidental catch of adult turtles by commercial and local artisanal fisheries in the Gulf of Guinea. However, the threat of adult sea turtle poaching on the nesting beaches has now greatly increased. During the 2007–2014 nesting seasons, three adult leatherback turtles were reported as having been poached on the southern beaches of Bioko Island. During the 2014 - 2015 season, 12 adult leatherbacks were reportedly taken illegally (Honarvar et al. 2016 in press). This does not include poaching of other species believed to be in higher demand, for which illegal capture data were not available.

During the 2015 – 2016 nesting season we concentrated our conservation efforts on beach D (Fig. 1), the nesting beach closest to the village of Ureca, where the road meets the beach. We established a seasonal camp on beach D (where the road comes in) in order to provide protection to all sea turtle species nesting in the area. Establishing a camp at this site is extremely important, not only to discourage poaching by local villagers, but also to discourage non-local poachers from entering the southern beaches via the newly completed road. The camp was staffed by a multinational group, which included students from Indiana University – Purdue University Fort Wayne (IPFW), students from the Universidad Nacional de Guinea Ecuatorial (UNGE), US volunteers, and Urecanos. Their participation focused on fostering international collaboration and enhancing in-country capability. This includes population monitoring (through tagging programs and other relevant data collecting techniques on beach D), which can eventually yield valuable information for national park administrators, the National Institute of Forestry Development and Protected Area Management (INDEFOR-AP), and Ministry of Fisheries and Environment for effective management decisions and protection of sea turtle populations on the southern beaches and Bioko Island as a whole.

While monitoring sea turtle nesting activities on beach D (October 10, 2015 – February 5,

2016) we also recorded the number of hunters and poachers present, the number of dead turtles seen, and the number of nests dug up by dogs. To date, we have encountered 87 hunters with shotguns, the majority of whom were seen towards the end of December (around Christmas and the New Year). Most, if not all, of the hunters were there specifically to hunt for other wildlife (such as monkeys, duikers, birds, and other small mammals), but would take sea turtles opportunistically. On two occasions, December 23 and 29, poachers were seen on the beach. They were clearly there to capture sea turtles. So far this season, we have recorded a total of six leatherback, four green, and two olive ridley turtles that were taken illegally from beach D (Fig. 2 & 3). The actual number of poached sea turtles may be higher than reported here, because most poachers discard the remains in the forest or dump them in the ocean. Most of the turtles (five leatherbacks and one green) were poached at the end of December, presumably slaughtered for Christmas and New Year celebrations.



Figure 2. Leatherback carapace found on December 29, 2015.

From October 10, 2015 to February 5, 2016, 454 tourists have visited beach D, with the highest numbers recorded during weekends and holidays. This is in contrast to the low number of tourists (10 – 20) who visited the beaches every nesting season before the presence of the Luba – Ureca road. In some

cases the tourists brought dogs with them, which dug up a total of four nests on beach D. Other problems with tourists included the use of bright lights, campfires on the beach, and trash left on the beach.



Figure 3. Green turtle carapace found on December 29, 2015.

The presence of the new road emphasizes the need for enforcement of the existing sea turtle and wildlife protection laws (Law 8/1988 regulating hunting of wildlife and Presidential Decree 183/87 regulating fishing). Establishing a checkpoint on the Luba-Ureca road can help to mitigate the increased access created by the road. Even if increased law enforcement presence and checkpoints could not be provided year round, focusing on major holidays and times of year when game

is traditionally consumed would provide significantly increased protection for the threatened and endangered species of Bioko Island.

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Teaming up with a Local Mobile Phone Service Provider in order to Spread Sea Turtle Conservation Messages

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Despite efforts made during the previous decade, sea turtles are still heavily exploited for human consumption in São Tomé and Príncipe. This has contributed to the decline in the critically endangered Eastern Atlantic Hawksbill, and has affected the populations of green (*Chelonia mydas*), loggerhead (*Caretta caretta*), olive ridley (*Lepidochelys olivacea*), and leatherback (*Dermochelys coriacea*) sea turtles (Hancock *et al.* in press). Program “Tatô” (local name given to the olive ridley sea turtle), started in 2003 by the local NGO Mar, Ambiente e Pesca Artesanal (MARAPA) and currently co-managed with the Portuguese NGO Associação para a Proteção, Pesquisa e Conservação de Tartarugas Marinhas nos Países Lusófonos (ATM), is the driving force for sea turtle research and conservation in the country. Ongoing activities include the seasonal deployment of local rangers to monitor and protect the key nesting beaches and to conduct awareness raising initiatives. In response to concerns raised by both NGOs, the government enacted a national sea turtle protection law in 2014 (Decree Law n°6/2014), criminalizing the capture and consumptive use of sea turtles in the archipelago (Lisboa 2015).

This challenged both NGOs to strengthen their conservation and research programs and

to develop an effective national outreach campaign. To achieve the latter goal, the leading national telecommunications company, Companhia Santomense de Telecomunicações (CST), was invited to help promote awareness for the preservation of sea turtles in São Tomé and Príncipe within the scope of its Corporate Social Responsibility program. Thus, an unprecedented partnership was established between the non-profits (ATM and MARAPA) and the private sector (CST), with the intent of reaching as large a number of community members as possible with conservation messages. Each week, from January 2015 (during the peak of the nesting season) to April 2015 (end of the nesting season), a text message was sent to all CST customers in the archipelago containing messages explaining (1) why sea turtles are endangered and emphasizing facts about their biology/ecology (2) priority actions that anyone can implement to reduce the human impact on sea turtle survival and (3) the potential importance of sea turtle-based ecotourism to the development of the local economy (Fig. 1). This awareness-raising tool proved to be a key component in the overall outreach strategy to promote sea turtle conservation and awareness as well as to involve the local population.



Figure 1: One of the several weekly text messages sent to all the population of São Tomé and Príncipe regarding the importance of sea turtle conservation. The message says, “Protect sea turtles and their nests. Our sea turtles are disappearing. They are part of our history and culture.” (Photo: B. Loloum)

Although sea turtle harvesting is still a reality, community participation and levels of awareness have appeared to increase considerably in the past year, thanks to the combination of extensive community outreach and educational activities and the engagement of the community members in sea turtle monitoring activities. During the following months, many community members expressed their approval and appreciation for the campaign during the program’s activities, and were eager to show their growing knowledge about sea turtles to the program’s staff. But most importantly, for the first time

since the start of the program, adult sea turtle mortality decreased significantly; from 2013 to 2015 we estimated a reduction of 72% in sea turtle mortality in the main nesting areas (210 reduced to 58 female sea turtles killed in each season, respectively).

Therefore, exploring the potential use of mass communication tools such as mobile phone services to increase the basic knowledge of sea turtle biology, understand key conservation issues, and promote sea turtles as a sustainable source for economic development may be a useful approach for developing a community mind-set for continued interest and engagement in sea turtle conservation. In our case, we show how positive results related to the preservation and sustainability of the marine environment can be achieved by complementing long-term *in-situ* conservation and protection actions with innovative outreach activities that are adapted to the local context and promote social inclusion of both the public and the private sectors.

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Participative Approach to Discuss Novel Law Implementation Strategies in São Tomé and Príncipe

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São Tomé and Príncipe are breeding grounds for four of the seven species of sea turtles in the world, with the females coming ashore between September and April of each year to nest on the beaches of the archipelago. São Tomé's beaches are frequented by olive ridley (*Lepidochelys olivacea*), green (*Chelonia mydas*) and leatherback (*Dermochelys coriacea*) turtles. In addition, there is a small but regionally significant hawksbill (*Eretmochelys imbricata*) nesting population (Loureiro *et al.* 2011; Monzón-Arguello *et al.* 2011; Wallace *et al.* 2011).

In a country where 61.7% of the population lives below the poverty line (World Bank 2009), sea turtle exploitation and trade in turtle derived products (meat, eggs and tortoiseshell) are traditional practices that represent a significant source of income for the local population (Graff 1996; Ferreira 2015). However, these traditional practices are also the cause of excessive mortality among both juvenile and adult animals (Hancock *et al.* in press a).

Recent growth in real Gross Domestic Product (GDP) of 4.9% was only achieved in 2014 because of strict policy measures under the Extended Credit Facility agreement with the International Monetary Fund (IMF) (2012-2015); the economy was primarily

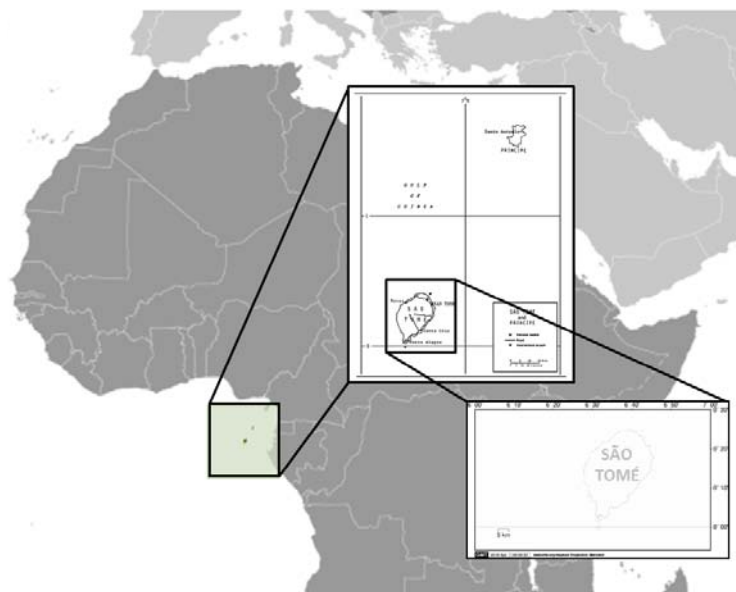


Figure 1: São Tomé Island (Democratic Republic of São Tomé and Príncipe, West Africa) (0°20'54.24" N, 6°44'11.40" E).

driven by the service (retail and tourism), construction, and agriculture sectors (Gama 2015). As a small insular country, São Tomé and Príncipe is exposed to rising sea levels, and its coastal areas are facing serious erosion problems because of excavation for construction materials (sand, bricks and clay, in particular), which has led to progressive loss and changes in sea turtle habitat (S. Vieira *pers. comm.*).

The Program "Tatô" ("Tatô" being the local name for olive ridleys) is dedicated to the

protection and conservation of sea turtle populations occurring in São Tomé Island (Fig. 1). The goals of the program are to promote conservation actions based on scientifically sound and reliable knowledge and to provide the government, public, and private stakeholders specific recommendations for the management and recovery of sea turtles occurring in the archipelago.

This program was started in 2003 by the local NGO MARAPA (Mar, Ambiente e Pesca Artesanal) and is currently co-managed with the Portuguese NGO ATM (Associação para a Proteção, Pesquisa e Conservação de Tartarugas Marinhas nos Países Lusófonos). Since its inception, one of its objectives has been to lobby the national government for the establishment of legislation that would provide some measure of protection for sea turtles in the archipelago.

The first draft of this legislation was submitted to the government for approval on January 2006 by a group of experts participating in the first International Workshop of Sea Turtle Experts in São Tomé and Príncipe (Ferreira *et al.* 2006).

In 2014, the first national legal framework to protect sea turtle populations was finally enacted (Decree-Law nº6/2014; Lisboa 2015). This new legislation declares a complete ban on the capture, possession, and sale of all sea turtle species and their derived products as well as disruption of nesting habitats; it also includes very high fines for offenders. The new legislation was welcomed with great expectations by the NGOs managing Program Tatô, but also with caution. New legislation is seldom enough to reduce threats to wildlife, and it is especially ineffective when: (1) authority of natural resources agencies is weak (Broad *et al.* 2003), (2) effective law enforcement measures are lacking (IUCN 2011), and (3) poor communication exists between the local population and the responsible environmental federal agencies. Other key limiting factors include the lack of a robust understanding of the socio-economic

context and decision-making processes affecting resource use, which is essential for assessing the feasibility of potential management strategies and implementation of effective interventions (Hancock *et al.* in press b).

In fact, during the 2014-2015 nesting season, which coincided with the first year of the new law, it was clear that law enforcement practices had been largely ineffective or even non-existent, as sea turtle meat and eggs were still sold openly in local markets. Most consumers were unaware of this legal change or were indifferent to it because of the lack of enforcement by the authorities. More importantly, adult female sea turtle mortality on the main nesting beaches continued to increase.

With this in mind, a National Workshop on Sea Turtle Law Enforcement Strategies, involving both the government and the public sector was organized at the National Library in the city of São Tomé on April 10, 2015. The goals of the workshop were to (1) assess the need for technical assistance and capacity building for national authorities, (2) identify ways to strengthen national sea turtle protection measures, and (3) discuss law enforcement strategies.

The National Workshop on Sea Turtle Law Enforcement Strategies: One of the key aims of the workshop was to ensure the participation of a diversity of stakeholders directly affected by the new law. This allowed for a participatory approach to identify the limitations in the implementation of the current law and to define specific courses of action that would result in effective methods. This ensured that all parties had an opportunity to express their opinions, share their experiences, and provide their own suggestions. Several key stakeholders attended the workshop, which was organized by ATM (Portuguese NGO Associação para a Proteção, Pesquisa e Conservação de Tartarugas Marinhas nos Países Lusófonos), MARAPA, and the National Environmental

Agency. The workshop also included members of the Central Government, the Ministry of Justice, as well as all the District Councils, Police Commanders, members of the National Environmental Agency, key representatives of the Fishermen and Resident's Associations from the communities where Program Tatô is operating, and local rangers.



Figure 2: The General Director of the Environment, Arlindo Carvalho, presided over the opening of the workshop. He welcomed the participants and the national media, and introduced the scope of the workshop (Photo: Victor Jiménez).

The workshop started with Program Tatô's Coordinator doing a presentation on the current conservation status of sea turtles in the country's national territory, including the implementation of the National Sea Turtle Protection Law (Decree-Law n. 6/2014), mortality reduction, as well as the challenges faced by the program's staff in charge of the beach protection activities (rangers).

This presentation provided the basis for a brainstorming session, moderated by representatives of both NGOs, during which several focus groups of stakeholders were formed to discuss five topics related to the implementation of the new Decree-Law. The topics for each focus group were:

1. Regulations and Controls at sea
2. Regulations and Controls on land

3. Regulations and Controls at local markets (sea turtle products)
4. Regulations and Controls of hawksbill shell-craft trade
5. Sanctions as law enforcement mechanisms

Main results from the participatory discussion:

Based on their discussions, the focus groups proposed to designate either the governmental sector (the Internal Administration Ministry and the Environmental and Natural Resources Ministry were identified as the main governmental structures in charge of law implementation and enforcement) or the NGOs and assign them specific responsibilities and major recommendations for improved law enforcement (Table 1).

The major recommendations were presented to the audience at the end of the workshop. Furthermore, in early October 2015, a letter with the major recommendations and the meeting's summary was sent by mail to all current stakeholders' institutions. Several meetings with National Governmental Authorities, District Councils and the Police were organized between November 2015 and January 2016 in order to monitor the effectiveness of the recommendations that resulted from the workshop

Workshop outcomes: Although agencies responsible for law implementation and enforcement were identified during the meeting, along with their responsibilities, none of the recommendations drawn from each brainstorming session was implemented by the government agencies during the 2015/2016 sea turtle nesting season.

In order to cope with the increasing mortality at the nesting beaches, Program Tatô stretched its budget to include the training and employment of additional local rangers and the implementation (and financing) of weekly patrols by the local police on the main nesting beaches to prevent conflicts between poachers and rangers.

Although these measures led to a significant decrease in sea turtle mortality from 2014/2015 to 2015/2016 (reduction of 68% in sea turtle mortality – 154 reduced to 58 females killed in each season, respectively), it increased the operating costs of the program, and led to the burnout of the staff. In fact, the NGOs in charge of Program Tatô contributed the most towards law enforcement and beach protection in São Tomé and Príncipe.

Discussion: The lack of national authorities' involvement and political will are the main obstacles for sea turtle conservation in São Tomé Island. There is an urgent need to recognize the fundamental role of government institutions and promote their political, logistical and financial participation in order to sustain law enforcement measures on a long-term basis (Bräutigam and Eckert 2006).

According to a recent study carried out in the archipelago of Cape Verde, West Africa, the development of laws and regulations in Cape Verde seem to have not been an effective mechanism for reducing illegal trade in that country (Hancock et al. *in press b*). Despite limited legal protection of sea turtles since 1987, the government has had to reinforce the legal protection of sea turtles through successive new law decrees; most recently, in November 2015, the national environmental authorities approved a new decree to criminalize the intentional capture, detention or killing of sea turtles, as well as the purchase and sale of live and dead turtles and their by-products (Furtado 2015). This measure was taken in response to the increase in sea turtle mortality when the Cape Verde military stopped providing protection on the main nesting beaches in Boa Vista Island in 2014 (Fonseca 2014). However, active harvesters and traders continue with the illegal activity due to continuing demand from consumers, who are largely unaware that the consumption of sea turtle meat is illegal, and because the activity is still profitable in the absence of effective law enforcement

measures (Hancock et al. *in press b*). In this country, the ineffectiveness of law enforcement measures is mainly due to severe limitations in means and resources, both financial and human (Araújo 2008).

As long as harvesting and trade in sea turtles remain an important source of income, the impact can only be minimized if the value of protecting these resources outweighs the benefits forgone by conservation. Promoting the non-consumptive use of sea turtles such as the development of turtle-watching activities has been explored in many countries (e.g. Brazil, Costa Rica, and Indonesia) to improve infrastructure, promote economic development, and provide alternative sources of income and employment (Troeng and Drews 2004; Putra and Bailey 2007; TAMAR 2011), however, immediate or long-term benefits are not always clear or guaranteed (Hancock 2011).

Conclusion: Institutional barriers can be an important challenge to law implementation if decision-making and implementation processes are broadly distributed across a number of institutions (Nuno *et al.* 2014). We aimed to bring down these barriers by promoting a participatory and inclusive planning process for effective law enforcement in São Tomé and Príncipe and by including representatives not only from the governmental sector, but also from the public sector. A major limitation of this activity was the lack of a legally binding law enforcement strategy, and limited discussion on how a multi-agency and stakeholder law enforcement capacity could be developed.

We recommend that future discussions about the development of effective conservation actions consider social and economic data to gain a better understanding of the spatial, temporal and social aspects of the consumption of sea turtles.

Table 1: Major recommendations proposed during each brainstorming session.

SECTOR	DEPT.	STAKE-HOLDERS	FOCUS GRP	FORMAL RESPONSIBILITIES & NEXT-STEP ACTIONS	SPECIFIC RECOMENTATIONS
GOVERNMENTAL	INTERNAL/ADMINISTRATION MINISTRY	DISTRICT POLICE	2	Increase presence through beach patrols to deter sea turtle harvesting	<ul style="list-style-type: none"> Consider the temporary apprehension of offender's personal properties (e.g. fishing gear) as an alternative punishment Apply the punishment described in Art. 11 of the Decree-Law 6/2014 for reoccurring offenders Always contact representatives of the Tatô Program, in case of apprehension of live animals to facilitate the collection of biological data from the turtles, tagging (when applicable) and biometrics
			1, 2, 4	Conduct roadside traffic checks to identify and reduce illicit transport of sea turtles and by-products	
			1, 2, 3	Contact the District Council to proceed with the incineration of dead turtles, or any by-product apprehended	
			2, 3, 4	Identify and monitor sea turtle meat and tortoiseshell trading points and traders	
		DISTRICT COUNCILS	3, 4	Organize inspection teams for spot-checking the use of tortoiseshell (raw or processed) in artisanal handicraft workshops	
			1, 2, 3	Ensure the ethical disposal of sea turtle carcasses and by-products apprehended by police authorities	
			N/A	Collaborate with the NGOs in organizing and supporting awareness-raising activities	
	ENVIRONMENTAL AND NATURAL RESOURCES MINISTRY	NATIONAL ENV. AGENCY	N/A	Develop and implement a national awareness campaign in the national media and schools to increase knowledge and understanding of the social, economic and ecological importance of sea turtles for the sustainable development of São Tomé and Príncipe	<ul style="list-style-type: none"> When confiscating or suspending a selling license, provide a one-time loan to the identified traders to enable them to continue selling fish or other alternative products to turtle meat and eggs
			1, 2, 3, 4	Conduct a census to identify and quantify those dependent exclusively on sea turtle harvest and trade	
			5	Confiscate or suspend offender's market selling licenses	
			4	Update the census of active tortoiseshell crafters in the country	
			3, 4	Schedule a meeting with the active tortoiseshell crafters to discuss how to address the issue of this product's trade	
			5	Create a small department within the National Environmental Agency to assess and allocate fines resulting from the violation of the new law	
5			Contact the National General Prosecutor on legal issues related to the National Sea Turtle Protection Law		
NON-GOV	NGOs	1, 2	Develop protection and awareness actions		
		N/A	Generate information and recommendations for best practices, based on reliable scientific data		

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Lamu Archipelago, Kenya: A Pristine Sea Turtle Haven

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Lamu Archipelago in Kenya is located at the northernmost part of Kenya's coastline. It starts from the Tana River Delta in the south and stretches to the Kenya – Somalia border in the north (Fig. 1).

The archipelago comprises approximately 55 islands, which are mostly made up of fossilized sand dunes or raised beaches. Five islands are habitable – the world famous Lamu Island, and Manda, Pate, Ndau, and Kiwaiyu Islands. The coastal sections of the Doodri National Reserve on the Kenya mainland as well as the Kiunga Marine National Reserve (KMNR) also form part of the archipelago.

Beaches in Lamu are picturesque and isolated with clear blue waters that are calm or rough depending on the season. These provide ideal conditions for nesting and foraging sea turtles. Five species forage in the area: green turtle (*Chelonia mydas*), loggerhead (*Caretta caretta*), hawksbill (*Eretmochelys imbricata*), leatherback (*Dermochelys coriacea*) and olive ridley (*Lepidochelys olivacea*). Of these five, only green, hawksbill and olive ridley turtles are known to nest in Lamu.

The Lamu seascape records the highest number of sea turtle nests along the Kenyan coast. World Wide Fund for Nature (WWF),

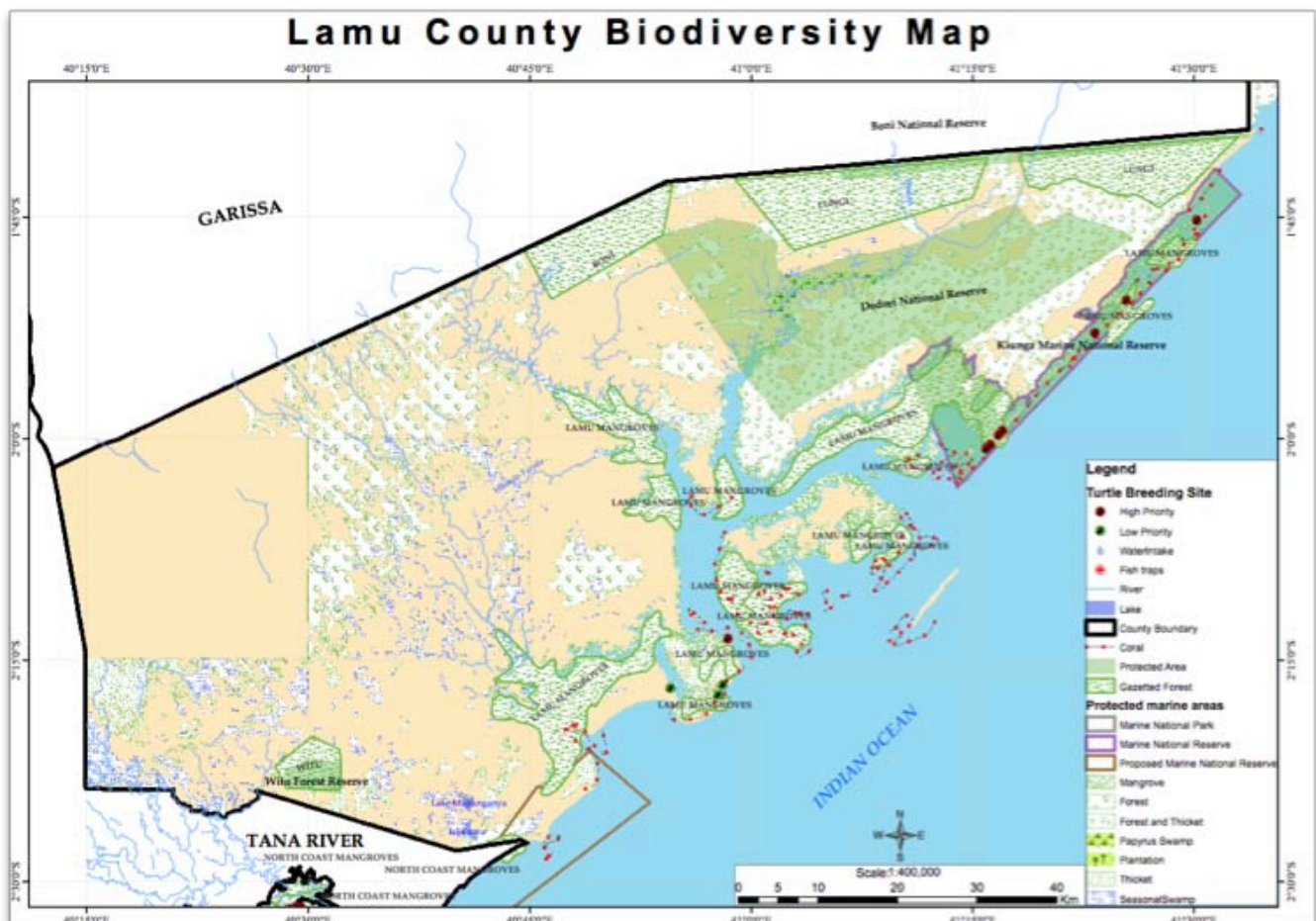


Figure 1: Map of Lamu County, Kenya.

Kenya, has been working to protect marine turtles along the Lamu seascape for the past 20 years. Sea turtle conservation has been and continues to be a collaborative endeavor between WWF, Kenya Wildlife Service (KWS), and local coastal communities. Collaborative beach patrols are undertaken day and night all year round to record nesting females or tracks to determine whether a nest has been laid. If a female has nested, the team verifies the nest and marks the coordinates with a hand held GPS. If nests are found in areas that put the eggs at risk of predation or if the nests are laid below the high-water mark and are therefore likely to be submerged, they are moved to safer locations following an established protocol (Olendo *et al.* in press). Nests are monitored continuously throughout the incubation period. Efforts are made to reduce threats to hatchlings from land-based predators such as crabs, seagulls, foxes and hyenas.

An average of 119 nests is recorded annually, 98% of which are green turtle nests, 1.5% are hawksbills, and 0.5% are olive ridleys. It is estimated that approximately 35 turtles nest annually in the area. Approximately 81% of recorded nests hatch successfully (Olendo *et al.* in press). Failed nests are the result of

natural losses. The peak nesting season for all three species is April – September and during this time, patrol and surveillance efforts are doubled. Female turtles that emerge onto the beach are flipper tagged with an unique identification number. Patrols teams wait until nesting is complete to apply the tags to prevent disturbance during the nesting process. If the turtle already has a tag, the number is noted down and recorded in a tagging database.

Sea turtle flipper tagging has been carried out in Lamu since the year 2000, and a total of 187 nesting females have now been tagged. Nesting and tagging data are providing a better understanding of marine turtle population demographics and individual reproductive behavior, which in turn, are helping Kenya to plan conservation and management interventions more effectively.

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Surveys of Nesting Beaches in Lindi Region, Tanzania, Reveal Threats to Nesting and Foraging Green Turtle, *Chelonia mydas*, populations

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Current marine turtle conservation programmes cover approximately half of the Tanzanian coastline and include all known major nesting sites. However, Lindi Region (Kilwa and Lindi Districts) remains data deficient in terms of the current status of nesting populations (Muir 2005). The coastal waters of Lindi Region support extensive coral reef and seagrass habitats, but little is known about movement patterns and habitat use by marine turtles at other life history stages. Efforts to conserve and protect marine turtles and their habitats in Lindi Region have been hampered by these knowledge gaps.

In May 2015, Sea Sense NGO commenced a comprehensive survey programme to assess the status of nesting populations in Lindi Region.

Methods: A desk study was undertaken to identify the location of beach habitat in Lindi Region. Information was obtained from satellite imagery, technical reports, and existing knowledge of the area within the Sea Sense team. 13 locations were prioritised for nesting habitat surveys (Fig. 1). Surveys commenced in May 2015 during the peak nesting season and were repeated in July, August, and October 2015.

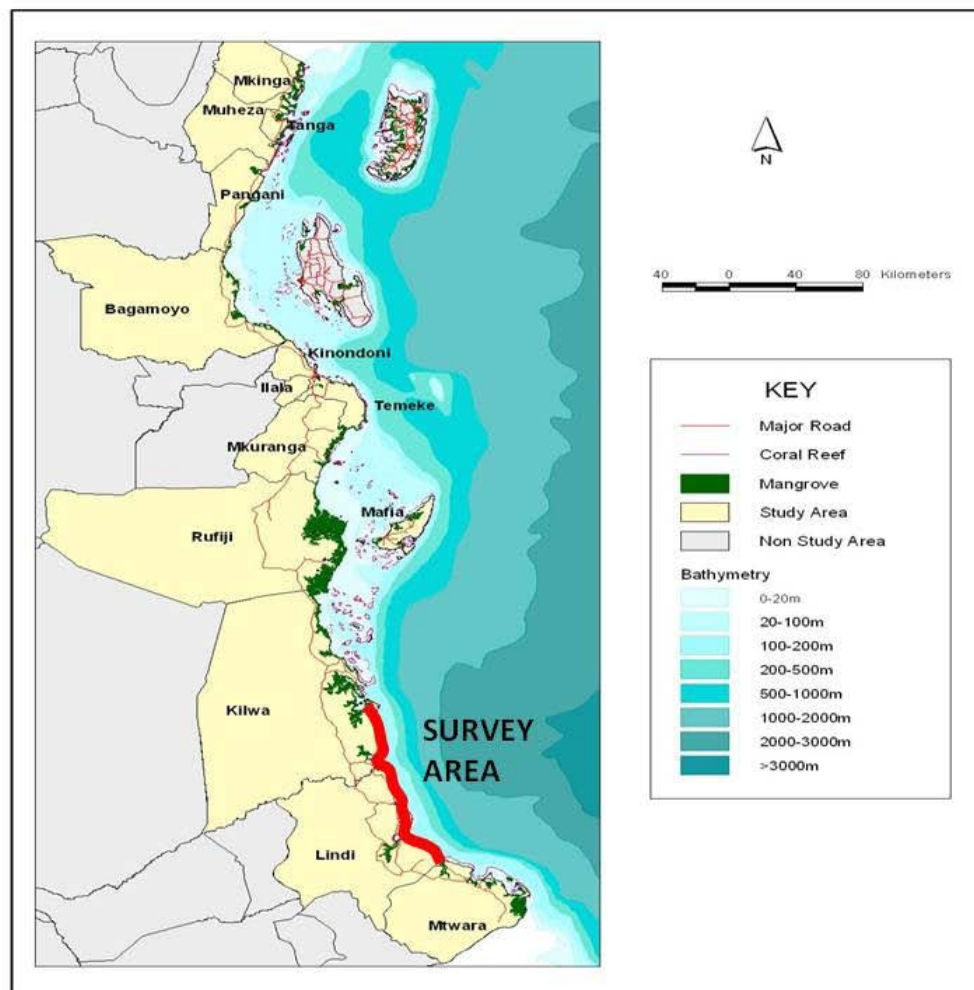


Figure 1. Survey area highlighted in red.

Four variables were selected to identify potential nesting areas: suitable substrate availability; beach slope and elevation; absence of physical obstacles impeding female access to the beach; and acceptable levels of human disturbance. Evidence of nesting activity was recorded i.e., the presence of crawls, nesting pits, and eggshells, and the evidence was characterized as fresh (less than a week old), recent (1-2 months old), or aged (more than two months old). A supporting team consisting of two citizens from each village accompanied Sea Sense during the beach surveys (Fig. 2).

Local knowledge of the occurrence and seasonality of nesting, threats from egg poaching, direct take of nesting females and fisheries interactions, and the extent of trade in turtle products (meat, eggs, oil) was accessed through informal discussions with supporting teams and citizens encountered during the surveys, and through formal meetings and Focus Group Discussions with fishers, village councillors, and village elders.



Figure 2. Survey team at Kera beach (Photo: Sea Sense).

Results: 11 of the survey sites were considered to provide suitable habitat for nesting green turtles (Fig. 3). Seven beaches showed evidence of recent (within the previous month) green turtle nesting activity. The density of nesting was low (average of 3 - 4 nesting pits per beach).



Figure 3. Measuring beach profiles (Photo: Sea Sense).

Community Focus Group Discussions revealed that poaching of eggs and females occurred at all nesting beaches, and it was reported that meat from one mature turtle sold for between 35 – 40 USD. The demand for turtle meat was high and as a result, the trade in turtle meat was considered to be an economically viable business. The impact of direct take of nesting females was evident, with all of the village councils reporting a significant decline in nesting activity over the past two to three decades.

Nets specifically designed to capture turtles, known locally as 'likembe,' were in use at all of the surveyed villages. During the four survey periods, 105 green turtle carapaces and one hawksbill carapace were observed at fish landing sites or discarded in vegetation close to villages (Fig. 4).



Figure 4. Discarded carapaces observed during beach surveys (Photo: Sea Sense).

97% of the green turtle carapaces belonged to the sub-adult or adult age class. At one site, 35 green turtle carapaces were observed with curved carapace lengths (CCLs) ranging from 63 – 101 cm (SD±10). Four international flipper tags originating from Madagascar (1), Mayotte (1) and Seychelles (2) were surrendered to the survey team by local fishers.

Most citizens who were interviewed or contributed to Focus Group Discussions knew that marine turtles were protected by national legislation, but did not know the reasons for their protection or the penalties associated with harming a marine turtle. Law enforcement efforts were largely absent, and therefore citizens did not fear apprehension for slaughtering and consuming turtles or poaching eggs.

The level of knowledge and understanding of marine turtle biology and conservation was low. Many citizens believed that turtles were fish and could therefore be subjected to the same type of exploitation. Conservation of marine turtles and their habitats was not considered to be of any relevance or importance amongst the communities surveyed.

Discussion: Green turtle nesting activity in Lindi Region has declined significantly over the past few decades due to the persistent take of nesting females and poaching of eggs. Data collected in 2015 indicates that Lindi Region does not currently support any significant green turtle rookeries.

In view of the fact that the trade in turtle meat is thriving in Lindi Region, it is likely that the discarded carapaces from mature turtles were foraging individuals originating from nesting sites elsewhere in the region. This conclusion is supported by the retrieval of four international flipper tags, which originated in Madagascar, Mayotte and Seychelles. High rates of reproductive success at green turtle nesting sites in Madagascar, Mayotte and Seychelles are likely to contribute to the

resilience of the green turtle population in the southwest Indian Ocean region, which is recognised as a distinct Regional Management Unit (Wallace *et al.* 2010). Therefore, persistent removal of sexually mature individuals from the population during their foraging phase may constitute a considerable threat to the longer-term stability of green turtle populations in the region.

Despite low nesting numbers, Lindi Region may be of greater national and regional importance to green turtles than previously recognized. Lindi Region lies in close proximity to the Rufiji Delta – Mafia Island Seascape which has been declared a ‘Site of Importance to Marine Turtles’ through an initiative of the *Indian Ocean South East Asia (IOSEA) Marine Turtle Memorandum of Understanding*. Coastal and marine habitats in Lindi Region are likely to form part of the regional connectivity between marine turtle nesting sites, foraging grounds and migratory corridors provided by the Rufiji Delta – Mafia Island Seascape. However, these habitats are threatened by persistent dynamite fishing and a large industrial development (LNG plant) currently being planned adjacent to nesting beaches in Lindi. In-water surveys planned for 2016 and 2017 will investigate the relative importance of Lindi Region to foraging turtles.

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The Tradition of Take: Sea Turtle Consumption in Dovela, Mozambique

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Five species of sea turtle are found in Mozambican waters. All have been protected by national laws since 1965. Despite national protection, the illegal take of sea turtles is widespread and usually goes unpunished (Louro *et al.* 2006). Information on quantities and motives for take, cultural significance, and geographic hotspots are urgently needed to inform conservation and management actions.

Here we present information on the traditional take and use of sea turtles as revealed by semi-structured interviews with artisanal fishers from Dovela village, Inharrime, in southern Mozambique (Fig. 1).

The turtles of Dovela: Nesting along this coast occurs from November to February each year and is dominated by loggerhead turtles (*Caretta caretta*), although some leatherback (*Dermochelys coriacea*) nesting does occur. In this region and on the rest of the turtle nesting beaches of the Inhambane Province, nests are scarce. In the 2014/2015 nesting season, four nests were recorded (Fernandes *et al.* 2015). However, anecdotal reports from both fishers and expatriate residents in the area indicate that nesting effort was greater one to two decades ago. In addition to low nesting rates, most nests do not complete a full incubation period as they are frequently raided for their eggs.

Evidence (carapaces and bones) of illegal take can be detected along the provincial coast all year round, suggesting that illegal take is not restricted to emerging females or



Figure 1: Study site, Dovela village located in southern Mozambique.

their eggs. In light of a possible decrease in nesting turtle populations and a lack of quantitative historical data on nesting activity, we sought to document (a) traditional beliefs and values relating to sea turtles, (b) whether these cultural values are still held, and (c) whether they are a driver of illegal take. Information was gathered through interviews with 10 key people, all local fishers and residents of Dovela. The interviewees were

identified using the snowball sampling technique (Goodman 1961).



Photo: Sharron Basson

A typical coastal village, Dovela: Dovela is a small coastal village, located approximately 400 km north of the nation's capital, Maputo. From the main highway (EN1) it is a further 10 km along dirt tracks towards the ocean before the village is reached. The village is situated around an inland closed coastal lagoon system that runs parallel to the coast. Within the village there is a primary school and one small ecotourism lodge. The nearest town, Inharrime, is 20 km to the south, once back on the EN1. Throughout the Province, 50-70% of the population lives below the poverty line (Republic of Mozambique Ministry of Planning and Development 2010). Literacy levels reflect these statistics. In rural areas and amongst females, the rates are even higher. Although the national language is Portuguese, a local dialect M'Chope is more commonly spoken in the village.

The prevalence of take: All interviewed fishers were aware of or had partaken in the consumption of sea turtle meat or eggs. However, most (n= 7) also indicated that turtle take and consumption was never a regular activity (in past or present times). Interviewed fishers referred to take as a traditional

activity, which involved a ceremony before the meat could be cut up, divided between people, and then cooked and eaten. Some of the older interviewees had not consumed turtle meat since they were children, or since Portuguese colonial times (Mozambique declared independence in 1975). They also promptly declared that their children had never eaten turtle meat.



Photo: Jess Williams

Preferences for meat: A common theme was the fact that not everyone likes turtle meat. *"Traditionally, people here eat turtles and I don't know why that is because fish is much better and it does not smell like the turtle's meat does. I have no clue why it is a tradition to eat turtle!"* *"Our families eat rice and cassava leaves like everyone else. If we catch crayfish we sell it, as it has the best value. If we eat meat, we eat fish or mussels. Sometimes if I do not manage to catch a fish from the ocean, I will buy a fish caught from the lake."*

Decreasing trends: The interviewees noted decreasing trends regarding both the consumption of turtles and the decline in numbers of nesting females. *"Years ago people used to eat turtles, but at the same time, back then there were more turtles coming to nest, at least 20 per year and I would also say more species than we see today."*

For sale or consumption?: Several references were made to suggest that there is some cultural taboo against the sale of turtle meat. *“The turtle is a gift from God, we cannot sell it”. “Here, nobody sells the turtles, their meat has to be eaten, we can’t sell it. It’s like the mussels, you eat them, you don’t sell them.”*

The traditional ceremony: The interviewed fishers revealed several versions of a traditional ceremony relating to sea turtles and their harvest. One fisher recounted, *“My grandfather was the chief of the village so when someone caught a turtle, he had half of the animal.”* He explained that the head of the turtle had to go to the “regulo” (chief of the greater area) but half of the turtle was for the chief. A front flipper was allocated to the fisher who caught it, the other front flipper and a hind flipper were for the leader, and the rest was divided by the chief among those who had helped the catch. The leader had to walk to the beach each time a turtle was caught and before dividing the pieces of the turtle he conducted a small ceremony with a machete “patting” on the shell of the dead turtle and saying something like *“Welcome, our ancestors gave this to us. Others have given this to us to sustain us.”* He recalled that the “regulo” at that time did not eat the turtle because he did not like it, but he used to give it to the wise men, the senior members around him.

Thanking our ancestors and offering to the ocean: Another of the interviewed fishers told the story of how he knew of traditions regarding turtles because when he was growing up his father was the village chief. He described two parts to the traditional ceremony related to the hunting of turtles. When someone caught a turtle, this information had to be disclosed to the chief. The chief then conducted the first part of the ceremony before going to the beach to see the captured animal. The chief performed a small ceremony at home where he asked the ancestors to go with him to the beach to help guide him when he cut the

turtle. With this calling to the ancestors he performed a small prayer. Once at the beach, a small piece of the turtle meat, half the size of a hand, needed to be cut and grilled, and then a prayer was done. The prayer was to thank the ancestors for the gift of the turtle and to ask them to send more turtles. After this was completed, the piece of grilled meat was put at the tide line and left until the ocean took it away.



Photo: Sharon Basson.

Cutting up the catch: The turtle was cut with a special blade, similar to a machete. The plastron was cut open laterally into halves. Then the front and back flippers were cut off. The head, the heart and one of the rear flippers along with the meat around the rear flipper joint were transported to the “regulo.” The transporters were given ‘tontonte’ (local alcohol) or 50 MZN (US\$1) to deliver this to the “regulo.” A front flipper was given to the village chief and the other to the fisher who killed the turtle. The final hind flipper was shared with all the others who helped to cut up the turtle. The rest of the turtle, including anything that was left from its interior, was for the village. The meat was cooked up at the chief’s house and eaten with the people. In addition to the offering to the ocean, another piece of the meat was grilled and given to the grandchildren of the chief, (even if his children were adults at the time). It was important that the chief’s grandchildren ate the meat. *“For each and every turtle, the tradition was the same. My father, the chief,*

had to go to the beach each time a turtle was caught."

A garden offering: An alternative version of the ceremony was described again in two parts. First, the chief would send someone to the beach when the news had been received of a turtle being caught. The chief's assistant would open and 'peel' the turtle carcass. A wooden stick was specially cut and used to mount the turtle pieces and then it was carried back to the chief's house. The first piece of meat was grilled at the beach and given back to the sea in conjunction with some prayers to the members of their families who had died a long time ago. Once back at the chief's house, another piece of the meat was cut, grilled, and then mounted on the stick that was used to transport the turtle from the beach. This stick with the grilled meat was placed in a special area of the chief's garden, allocated as a prayer area. The offering was not allowed to be touched by anyone and it remained in the garden until it had rotted away.

A loss of tradition, a loss of turtles: Interviewed fishers remarked that the traditional ceremonies surrounding the hunting and consumption of turtles were no longer occurring. *"Catching a turtle was not so often, it was more than today but not so often. Today, there is no more tradition so there are less turtles coming to nest. Today, no one knows how to pray properly, the content has been forgotten."* Some of the interviewed fishers attributed the decline in numbers of nesting turtles to the lack of traditional values and ceremonies occurring. *"Today, there are still many turtles in the water but they don't get out of the sea because they are not called anymore. There is no more tradition to ask them to get out of the water. They are not called, so they don't get out, that's all!"*

While physical evidence of illegal take is widespread and can be found year-round, the interviewees indicated that the traditional take of turtles and ceremonies to accompany such activities are occurring less frequently.

Similarly, a loss of tradition surrounding turtle take has also been described in other parts of the Western Indian Ocean region (Frontier Madagascar 2003). Our interview responses show that while traditional values may have once been a driver for take, it is not likely to be the main motive for take in the present day in Dovelá village. However, Mozambique's coastline extends almost 2,700 km and has a rich cultural diversity. The prominence and specifics of traditions regarding turtles are likely to vary amongst the cultures of local people. Although our interviews indicated that the frequency of capture and consumption is low in Dovelá, these practices still occur in other places.

Traditional take and cultural significance are not commonly viewed as compatible values for achieving effective species conservation. More consideration of the cultural significance of turtle take is needed with regards to how to account for such traditional behaviours within western-value based species management frameworks. Reflecting on the limited conservation success (where effective protection has been restricted to the southern nesting beaches and near-shore waters of the Ponta Do Ouro Marine Partial Reserve) that has been accomplished in Mozambique, despite more than fifty years of marine turtle specific legislation, suggests that a new approach to marine turtle conservation and management in Mozambique may be required (Fernandes *et al.* 2015).

Given the clandestine and sensitive nature of discussing the hunting of sea turtles, we must acknowledge that these responses present part of the narrative of traditional turtle take, but perhaps not the whole story. Our results are likely to be limited by methodological constraints such as language barriers and interviewer effects, and the concern for the fishers' responses implicating them in a way that might force them into livelihood changes. However, this is the first time that traditional anecdotes regarding sea turtle take and use have been documented in Mozambique and we believe that this work will

help convey the significance of understanding and documenting the ethnography of an area before implementing conservation actions, given its likely influence in the success or failure of such efforts.

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Marine Turtle Strandings at Ponta do Ouro Partial Marine Reserve, Southern Mozambique

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Beaches at the Ponta do Ouro Partial Marine Reserve (POPMR) in southern Mozambique are widely recognized as important nesting grounds for loggerhead turtles (*Caretta caretta*) and leatherback turtles (*Dermochelys coriacea*) (Costa *et al.* 2007; Videira *et al.* 2008). The adjacent waters are also vital for marine turtles, serving as feeding grounds for green (*Chelonia mydas*) and hawksbill (*Eretmochelys imbricata*) turtles (Hughes 1971).

Since its proclamation in 2009, marine turtle monitoring and conservation efforts have increased at the POPMR, resulting in a new set of data on marine turtle strandings. This short communication presents preliminary data on marine turtle strandings along the POPMR's coastline and discusses potential causes.

Data were collected between 2007 and 2014 along the 86 km of coastline between Ponta do Ouro (26°51'32.22"S; 32°53'29.61"E) and Cabo de Santa Maria (26° 5'0.64"S; 32°57'39.06"E) (Fig. 1). Data were collected non-systematically by the Reserve's rangers as well as by community turtle monitors. Stranding data were also provided to Reserve rangers by local community members, tourism operators, and tourists. Whenever possible, stranding data included species identification, curved carapace length (CCL) and curved carapace width (CCW) measurements, evidence of anthropogenic and other fauna interactions, individual marks, tags, date and location.



Figure 1. Map of the Ponta do Ouro Partial Marine Reserve in southern Mozambique. The Reserve is part of the Ponta do Ouro - Kosi Bay Transfrontier Conservation Area (TFCA), the first marine TFCA in Africa.



Figure 2. Stranded juvenile green turtle being returned to sea by the POPMR warden (Photo: POPMR).

Table 1. Marine turtles found dead, stranded on the beach at the Ponta do Ouro Partial Marine Reserve.

Species	2007	2008	2009	2010	2011	2012	2013	2014	Total	Likely Causes
<i>C. caretta</i>	-	-	-	3	2	-	2	1	8	Shark injuries (n=2)
										Unidentified (n=6)
<i>C. mydas</i>	1	-	-	1	2	4	4	-	12	Shark injuries (n=1)
										Net entanglement (n=1)
										Boat strike (n=1)
										Unidentified (n=9)
<i>E. imbricata</i>	1	1	-	5	-	-	3	-	10	Unidentified (n=10)
<i>D. coriacea</i>	-	-	-	-	-	-	-	1	1	Dune stranding (n=1)
Total	2	1	-	9	4	4	6	1	31	

Table 2. Marine turtles found alive, stranded on the beach at the Ponta do Ouro Partial Marine Reserve.

Species	2007	2008	2009	2010	2011	2012	2013	2014	Total
<i>C. caretta</i>	-	-	-	-	-	-	-	-	-
<i>C. mydas</i>	-	-	-	2	2	1	2	1	8
<i>E. imbricata</i>	-	-	-	-	-	-	1	-	1
<i>D. coriacea</i>	-	-	-	-	-	-	-	-	-
Total	-	-	-	2	2	1	3	1	9

A total of 35 marine turtle strandings were recorded over a period of seven years (2007-2014) at the POPMR. Stranded turtles found dead accounted for 26 individuals (Table 1); the remaining individuals were found alive (Table 2). Green turtles were the most common stranded species (Fig. 2), followed by hawksbills. Strandings were due to injuries likely caused by sharks (n=3), boat strikes (n=1), entanglement in nets (n=1), and a fatal fall while traversing steep sand dunes (n=1). For the remaining stranded turtles it was not possible to determine the probable cause of

death or stranding. However, it could be attributed to thermal shock caused by sudden drops in sea temperature, which makes these species particularly vulnerable at the juvenile stage (G. Hughes *pers. comm.*).

Conservation efforts are clearly visible within the POPMR and as a result, the number of nesting females poached has substantially decreased (Pereira *et al.* 2014). However, marine turtles at sea still face significant human induced pressures (e.g. fishing, marine debris and pollution). The POPMR

needs to put in place a systematic stranding monitoring program including data collection on environmental parameters (e.g., water temperature and current patterns) to improve understanding of the possible causes of marine turtle strandings, and the development of protocols for necropsy analysis.

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Minutes of the Africa Regional Meeting, 36th Annual Symposium on Sea Turtle Biology and Conservation, Lima, Peru (1 March 2016)

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Thirty-eight people participated in the 2016 Africa Regional meeting, representing projects in more than 14 countries.



Country presentations:

São Tomé: In her presentation titled “Sea turtle Conservation on the Island of São Tomé,” Joana Hancock discussed the recent collaborative activities between the organizations MARAPA and ATM. One of the highlights of this talk was the addition of two recently discovered hawksbill and green turtle nesting areas (Praia Grande and Ilhéu das Rolas) to their ongoing monitoring efforts on the island.

Príncipe Island: Rita Patrício, a graduate student at the University of Exeter, presented “Sea Turtle Conservation at Príncipe Island.” Príncipe Trust Foundation has beach teams doing night patrols on 10 nesting beaches and day patrols in 4 other areas on the island. Since 15 November 2015, in collaboration with the coast guard, a marine team has been overseeing local fishing activities. The research activities include: measuring

incubation temperatures in the nests, genetic sampling, fibropapilloma monitoring, and tagging (MATAKI tags).

Cape Verde: Ana Liria Loza presented, “Update on Cabo Verde NATURA 2000 Sea Turtle Conservation Work in Boa Vista Island (Cape Verde).” Sea turtle conservation in Cape Verde started in 1998 on a 3-km beach on Boa Vista Island. Currently, sea turtle conservation and monitoring programs are taking place in almost all the Cape Verde islands. A major problem that the NGO is facing is the increasing number of sea turtles being poached. The poachers are quite aggressive and at times even take a sea turtle when NGO personnel are nearby. Some of the poachers appear not to be from the island, and sea turtle poaching is shifting from traditional consumption to trade for commercial purposes.

Adolfo Marco’s presentation, “New Research and Regulations on Touristic Turtle Watching on Turtle Behavior and Conservation in Cape Verde,” talked about the rapidly increasing economic development on Boa Vista’s coast and how the Government is looking for ways to make sea turtle watching a sustainable activity. A study on the effects of tourism on sea turtle nesting behavior is in preparation.

Nigeria: Marc Girondot presented, “Nigeria - Toward Projects for Marine Turtles,” gave an update on marine turtle projects in Nigeria. Three species of sea turtles (leatherbacks, greens and olive ridleys) have been observed nesting on the country’s beaches. There are currently no national programs for sea turtles in Nigeria, but plans are under way to set up a program in collaboration with the University of Lagos.

Ghana: Phil Allman presented, “Nine years of Sea Turtle Conservation and Research in Ghana—An Update of Activities.” The taboo about killing and consuming sea turtles gives them the protection that the government does not. In many local stories, sea turtles have guided lost fishermen back to shore. Hence, local people neither eat nor touch sea turtles. Unfortunately, sea turtles still get entangled in fishermen’s nets and drown. The use of LED lights in the nets appears to be an effective deterrent in Ghana.

Equatorial Guinea: Hector Barrios Garrido, a graduate student at James Cook University, spoke about “Indigenous People and Marine Turtle Conservation: Ndowe (Kombe & Benga) People—An African Approach.” His work was done in collaboration with the organization TOMAGE. Nine people from the Bengas and Ndowe clans were interviewed about marine turtles and conservation. There are different uses for sea turtles between the Bengas and Ndowe.

Shaya Honarvar spoke about the “Bioko Marine Turtle Program—Marine Turtle

Conservation through Research, Education and Outreach.” During the 2015 – 2016 nesting season, conservation efforts were concentrated on the nesting beach closest to the village of Ureca, where a recently completed road ends at the beach. Establishing a research camp at this site is extremely important, because it discourages poachers from entering the southern beaches via the new road. In addition to collecting data from live turtles, the following information was collected on the beach: number of hunters and poachers, number of other visitors, number of stranded turtles, and number of nests dug up by dogs. All data have been shared with stakeholders in an effort to protect and conserve marine turtles and their nesting beach.

Other regional presentations:

Joseph Fette, Section 609 Program Manager for the United States government, presented “Shrimp-turtle Law and Turtle Excluder Device Technology Transfer.” Currently only a handful of African countries use TEDs on their shrimp trawlers. He highly recommended expanding the TED program to other African countries.



To obtain certification, an official request needs to come from the pertinent foreign government to the U.S. Embassy, or to the Section 609 Program Manager in Washington D.C.

Alexandre Girard’s “FP (fibropapillomatosis) in Africa” gave a quick overview of available information about FP in three regions: West Africa, Central/South Africa, and Southeast Africa. FP in these regions is poorly documented and most reports are based on personal communication with local NGOs and researchers working in the area. Monitoring programs and protocols are needed to collect data and better understand FP rates and trends in Africa. In a second presentation, Alexandre Girard discussed the recent developments and activities of the RASTOMA network in Central Africa “RASTOMA: Central African Network for Sea Turtle Conservation Professionals.”

Jonathan Monsinjon, a graduate student at Université Paris-Sud is looking at the “Impact of Global Climate Change on Nesting Sites: A Potential Collaborative Project at the scale of Africa.” Jonathan Monsinjon presented some preliminary data and explained the type of data needed for this study, and how to collect them.

Adolfo Marco talked briefly about the new IUCN Red List assessment of the Northeast Atlantic loggerhead population.

Aliyah Pandolfi from Kashmir World Foundation talked about the pros and cons of using drones in monitoring sea turtle nesting activity.



About *en Haut!***Marion Broquère***(en Haut!; email: marion.broquere@gmail.com)*

The cover photo of this issue of the African Sea Turtle Newsletter was taken by the *en Haut!* team who visited Maio Island, Cape Verde, in October 2015 to work with the NGO Fundação Maio Biodiversidade on a photography project about climate change. Results from this visit can be found on our Facebook page: <https://www.facebook.com/Ile-de-Maio-Climat-la-tête-en-lair-les-pieds-sur-terre-133536700335586/?ref=bookmarks>

en Haut! develops innovative and effective processing tools for consultancy projects and for communicating land management issues, especially within the environmental arena. Their unique characteristic is to capture the West African landscape through aerial kite photography and to provide images for environmental and development-related analyses.

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INSTRUCTIONS FOR AUTHORS

The African Sea Turtle Newsletter (ASTN) is a free, bi-annual international electronic publication about the biology and conservation of sea turtles in Africa, and the stories of people who work with sea turtles on this vast and diverse continent and its offshore islands. This publication hopes to increase communication and collaborations among all those working with sea turtles in Africa –scientists, conservationists, policy-makers, project managers, community members, students, professors, everyone!— as well as share news with the international sea turtle community.

Contributions can range from original scientific papers and natural history observations to opinions, anecdotes, local myths, taboos, pharmacopeia, and legends, as well as field experiences, workshops, education and awareness activities, and announcements. We will accept and publish contributions in English, French, Spanish, and Portuguese so that everyone can express themselves in the language they most feel comfortable.

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Submissions are welcome in English, French, Spanish, and Portuguese to represent the four major languages on the continent.

All submissions will be reviewed for content and formatting. A contact address should be given for all authors together with an email address for correspondence during the review process.

Text

To ensure a fast review, we ask that all submissions be in electronic form as a MS Word file (or text file) attached to an email. If email is not available, authors should contact the Editors to seek alternative arrangements. If internet or computer facilities are not available, a hard copy of the article can be sent to the Editors by mail or fax.

Scientific names should be italicized (e.g. *Dermochelys coriacea*) and given their full Latin name only in the first appearance.

Citations within the text should be listed in chronological and then alphabetical order (Fretey 2001; Formia *et al.* 2003; Tiwari and Dutton 2006). Please note the format of each type of reference (single, multiple, or two authors) within the text.

The literature cited should include only references cited in the text. Please use the following formats:

An article in a journal:

Weir, C.R., T. Ron, M. Morais, and A.D.C. Duarte. 2007. Nesting and pelagic distribution of marine turtles in Angola, West Africa, 2000–2006: Occurrence, threats and conservation implications. *Oryx* 41: 224–231.

A book:

Fretey, J. 2001. Biogeography and conservation of marine turtles of the Atlantic Coast of Africa. CMS Technical Series No. 6. UNEP/CMS Secretariat, Bonn, Germany. 429 pp.

A chapter or article in an edited volume:

Brongersma, L.D. 1982. Marine turtles of the Eastern Atlantic ocean. Pp. 407-416. *In:* K.A. Bjorndal (Ed.) *Biology and Conservation of Sea Turtles*. Smithsonian Institution Press, Washington DC. 583 pp.

Tables/Figures/Illustrations

All figures should be stored as separate files: Excel, .tif or .jpeg format. Please contact the Editors if you do not have access to scanning or other necessary electronic facilities. Tables and figures should be given in Arabic numerals. High resolution images may be requested after acceptance—final files should have a minimum resolution of 1200 px or >250 dpi.

INSTRUCTIONS POUR LES AUTEURS

Le bulletin d'information, African Sea Turtle Newsletter (ASTN) est une publication électronique internationale gratuite et biannuelle qui traite de la biologie et de la conservation des tortues marines en Afrique, de même que des expériences de personnes qui travaillent sur elles dans ce continent si vaste et diversifié, avec ses îles côtières. Cette publication vise à encourager la communication et la collaboration entre tous ceux qui travaillent sur les tortues marines en Afrique—les scientifiques, les écologistes, les politiciens, les directeurs de projets, les membres de communautés diverses, les étudiants, les professeurs, tous! Aussi vise-t-elle à disséminer les nouveautés entre les membres de la communauté internationale qui travaille sur ces espèces.

Nous acceptons des contributions diverses y compris des articles scientifiques, des observations dans la nature, des opinions, des anecdotes, des mythes locaux, des informations d'utilisation dans les pharmacopées, des légendes, des expériences personnelles de terrain, des ateliers, des activités pédagogiques et des annonces d'événements. Nous accepterons et publierons des contributions en anglais, français, espagnol et portugais pour que tous puissent s'exprimer dans la langue dans laquelle ils sont plus à l'aise.

LES CONTRIBUTIONS

Nous vous invitons à suivre les instructions pour les auteurs et d'envoyer vos contributions au Rédacteur Régional approprié :

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Toute contribution devra s'adresser aux rédacteurs régionaux et non pas aux membres du conseil éditorial.

Nous acceptons les contributions en anglais, français, espagnol et portugais pour représenter les quatre langues principales du continent.

Nous réviserons le contenu de même que le format de toute contribution. Chaque contribution devra fournir une adresse d'expéditeur pour chaque auteur de même qu'une adresse de courrier électronique qu'on pourra utiliser pendant la révision de la contribution.

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Les noms scientifiques doivent être écrits en lettre cursives/italiques (e.g. *Dermochelys coriacea*) et porter le nom latin du genre complet seulement dans sa première apparence dans le texte.

Les notifications dans le texte doivent se faire d'abord dans l'ordre chronologique et après alphabétique (Fretey 2001; Formia *et al.* 2003; Tiwari and Dutton 2006). Nous vous prions de noter le format de chaque style de notification (auteur unique, deux auteurs ou auteurs multiples) dans le texte.

Votre bibliographie devra comprendre seulement la littérature citée dans votre texte, selon les formats suivants:

Un article dans un journal académique:

Weir, C.R., T. Ron, M. Morais, and A.D.C. Duarte. 2007. Nesting and pelagic distribution of marine turtles in Angola, West Africa, 2000–2006: Occurrence, threats and conservation implications. *Oryx* 41: 224–231.

Un livre:

Fretey, J. 2001. Biogeography and conservation of marine turtles of the Atlantic Coast of Africa. CMS Technical Series No. 6. UNEP/CMS Secretariat, Bonn, Germany. 429 pp.

Un chapitre ou un article dans un volume édité:

Brongersma, L.D. 1982. Marine turtles of the Eastern Atlantic ocean. Pp. 407-416. *In*: K.A. Bjorndal (Ed.) *Biology and Conservation of Sea Turtles*. Smithsonian Institution Press, Washington DC. 583 pp.

Tables/Chiffres/Illustrations

Toute illustration devra être sauvegardée et présentée dans des fichiers séparés: format Excel, .tif ou .jpeg. Nous vous prions de communiquer avec les rédacteurs si vous n'avez pas un appareil disponible pour copier et sauvegarder électroniquement les images. Les tables et les chiffres devront être écrits en nombres arabes. Nous pourrions vous demander de nous envoyer des images haute résolution même après que votre contribution ait été acceptée—les dossiers définitifs devraient avoir une résolution minimum de 1,200 px ou >250 dpi.

INSTRUÇÕES AOS AUTORES

O Boletim African Sea Turtle Newsletter (ASTN) é uma publicação electrónica internacional bianual, gratuita, sobre a biologia e conservação das tartarugas marinhas em África e das histórias de pessoas que com elas trabalham neste vasto e diversificado continente e suas ilhas. Esta publicação pretende aumentar a comunicação e colaboração entre todos aqueles que trabalham com tartarugas marinhas em África - cientistas, conservacionistas, políticos, gestores de projectos, membros das comunidades, alunos, professores, todos! – assim como compartilhar notícias com a comunidade internacional do ramo.

As contribuições podem variar desde artigos científicos originais e observações sobre história natural a opiniões, histórias, mitos locais, tabus, farmacopeia e lendas, bem como experiências de campo, oficinas, atividades de educação e sensibilização e anúncios. Iremos aceitar e publicar contribuições em Inglês, Francês, Espanhol e Português para que todos se possam expressar na língua em que mais se sentem confortáveis.

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As citações no texto devem ser listadas em ordem cronológica e, em seguida, ordem alfabética (Fretey 2001; Formia *et al* 2003; Tiwari and Dutton, 2006). Por favor tenha em atenção o formato de cada tipo de referência (simples, múltipla, ou dois autores) dentro do texto.

A literatura citada deve incluir apenas as referências citadas no texto. Por favor, utilize os seguintes formatos:

Um artigo numa revista científica:

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Um livro:

Fretey, J. 2001. Biogeography and conservation of marine turtles of the Atlantic Coast of Africa. CMS Technical Series No. 6. UNEP/CMS Secretariat, Bonn, Germany. 429 pp.

Um capítulo ou artigo num volume editado:

Brongersma, L.D. 1982. Marine turtles of the Eastern Atlantic ocean. Pp. 407-416. *In*: K.A. Bjorndal (Ed.) *Biology and Conservation of Sea Turtles*. Smithsonian Institution Press, Washington DC. 583 pp.

Tabelas / Figuras / Ilustrações

Todas as figuras devem ser armazenadas como arquivos separados: Excel, formatos .tif ou .jpeg. Por favor, contacte os Editores caso não tenha acesso a digitalização ou outros meios electrónicos necessários. As tabelas e figuras devem ser dadas em algarismos arábicos. Imagens em alta resolução poderão ser solicitadas após a aceitação. Os ficheiros finais devem ter uma resolução mínima de 1200 px ou > 250 dpi.

INSTRUCCIONES PARA LOS AUTORES

El boletín, African Sea Turtle Newsletter (ASTN) es una publicación electrónica internacional gratis y bianual que apunta a divulgar novedades sobre biología y conservación de tortugas marinas en África, en base a experiencias de los investigadores que trabajan con estos reptiles en dicho continente, sus islas y su litoral tan vasto y diverso.

Esta publicación aspira a fomentar la comunicación y la colaboración entre todos que trabajan con las tortugas marinas en África (científicos, conservacionistas, personas políticas, gerentes de proyectos, miembros de comunidades locales, estudiantes, profesores, todos!) Además de compartir las novedades que surjan entre los miembros de la comunidad internacional que trabajan con estas especies.

Se aceptan contribuciones al boletín desde artículos científicos hasta observaciones sobre el mundo natural, opiniones, anécdotas, mitos locales, farmacopea, leyendas, experiencias personales en el “campo”, talleres, actividades pedagógicas y anuncios de varios eventos. Se publicarán contribuciones en inglés, francés, español y portugués para que todos puedan expresarse en la lengua más conveniente.

LOS ENVIOS

Por favor siga las instrucciones para los autores y haga su envío al Redactor Regional apropiado:

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Los nombres científicos se deben escribir en letra bastardilla/cursiva (e.g. *Dermochelys coriacea*) y llevar el nombre latino completo sólo la primera vez que se usa en el texto.

Las citas dentro del texto se deben alistar primero en orden cronológico y luego alfabéticamente (e.g. Fretey 2001; Formia *et al.* 2003; Tiwari and Dutton 2006). Favor de notar el formato de cada tipo de notificación (autor único, dos autores o autores múltiples) dentro del texto.

La bibliografía debe incluir sólo la literatura citada dentro del texto, de la siguiente forma:

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Weir, C.R., T. Ron, M. Morais, and A.D.C. Duarte. 2007. Nesting and pelagic distribution of marine turtles in Angola, West Africa, 2000–2006: Occurrence, threats and conservation implications. *Oryx* 41: 224–231.

Libro:

Fretey, J. 2001. Biogeography and conservation of marine turtles of the Atlantic Coast of Africa. CMS Technical Series No. 6. UNEP/CMS Secretariat, Bonn, Germany. 429 pp.

Capítulo o artículo en un volumen redactado:

Brongersma, L.D. 1982. Marine turtles of the Eastern Atlantic ocean. Pp. 407-416. *In:* K.A. Bjorndal (Ed.) *Biology and Conservation of Sea Turtles*. Smithsonian Institution Press, Washington DC. 583 pp.

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