African Journal
of Sea Turtle Biology & Conservation

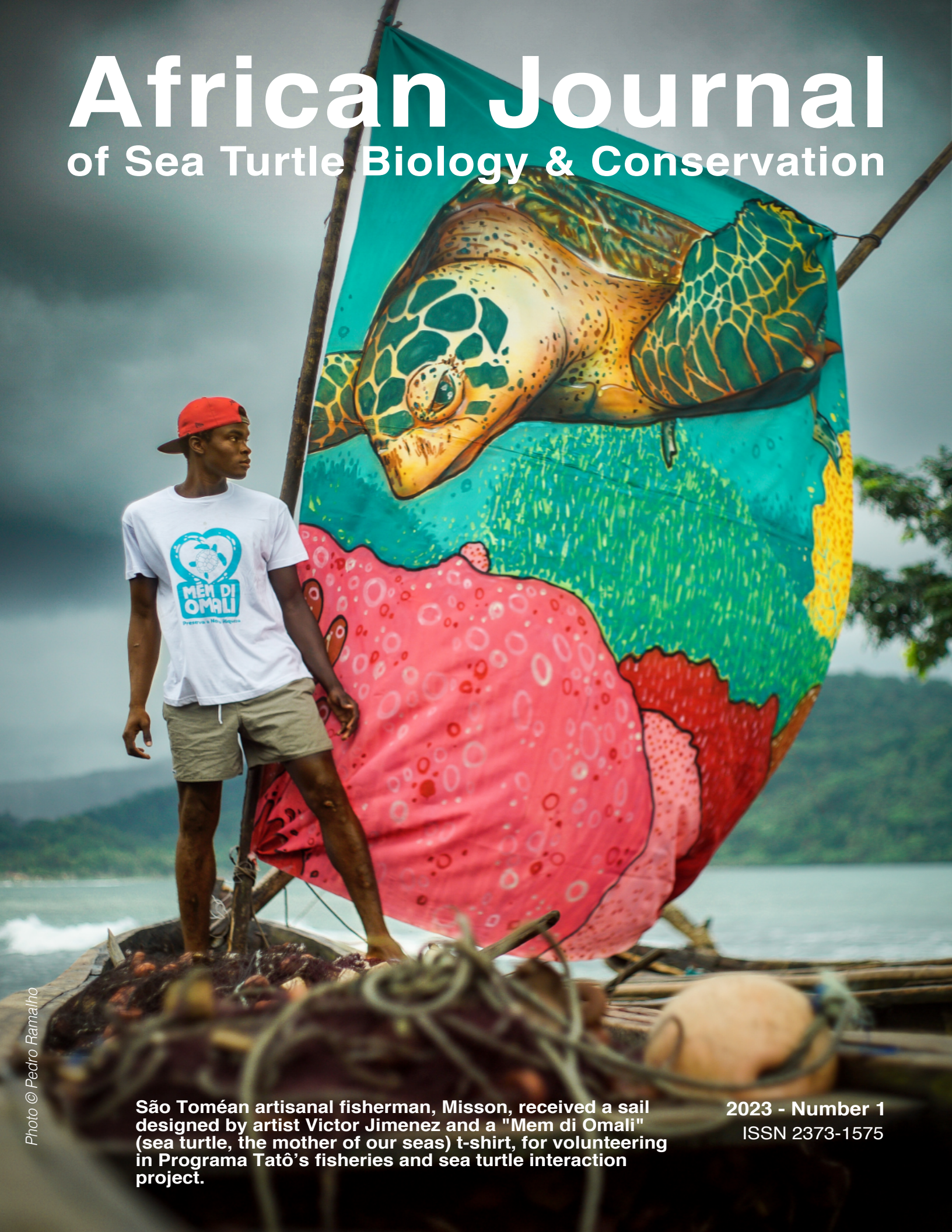

Photo © Pedro Ramalho

São Toméan artisanal fisherman, Misson, received a sail designed by artist Victor Jimenez and a "Mem di Omali" (sea turtle, the mother of our seas) t-shirt, for volunteering in Programa Tatô's fisheries and sea turtle interaction project.

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A New Era: African Journal of Sea Turtle Biology and Conservation

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Welcome to the African Journal of Sea Turtle Biology and Conservation, the next-generation publication built on the foundations of the African Sea Turtle Newsletter (2014–2022).

In the spirit of the ancient African philosophy of Ubuntu, or “I am, because you are,” this journal is committed to connecting all those who impact the future of African sea turtles, by giving this broad diversity of stakeholders a voice and a platform. We accept a diversity of contributions that ranges from the biology of sea turtles to the complex geographical, cultural, social, economic, political, and spiritual aspects of sea turtle conservation and management in Africa.

I am honored to have a dedicated team of Regional Editors and a diverse Editorial Board. We will continue our tradition of accepting contributions in English, French, Spanish, and Portuguese, and we are taking up a new challenge of publishing contributions in Arabic!

We hope this bi-annual journal will be an inspirational and valuable resource, regardless of where you live and work.

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Observations from the First Ultrasonography Study on Loggerhead Sea Turtles, *Caretta caretta*, in Cabo Verde

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Sea turtles are characterized by a complex life cycle and long migratory routes, making it difficult to study certain aspects of their life history, such as reproduction, in the wild (Rostal *et al*., 1998). As a result, limited information is often available on their reproductive physiology, lifetime reproductive performance, and behaviour (Hamann *et al*. 2010). However, ovarian dynamics and follicular maturation, an essential process in the female reproductive cycle (Rostal *et al*. 1990) can be used to better understand sea turtle life history and improve conservation effort (Comizzoli and Holt 2019). Recently, the reproductive status of three nesting loggerhead sea turtles (*Caretta caretta*) was assessed using ultrasonography after their unsuccessful nesting attempts on the Spanish Mediterranean coast (Crespo-Picazo *et al*. 2019). Surprisingly, two of them had no eggs ready to be laid and had only mature follicles in the coelomic cavity even though all three had started to dig an egg chamber and gone through the motions of the natural nesting process. Prior to this observation, the possibility of nesting females emerging on the beach when they were not ready to lay eggs had not been considered (Crespo-Picazo *et al*. 2019). Therefore, false attempts were always associated with female choice, rather than with reproductive status.

Cabo Verde is home to one of the largest nesting loggerhead sea turtle populations in the world (Marco *et al*. 2015) and an ideal place to study natural behaviours. Specifically, the island of Boa Vista hosts 60-65% of the nesting activities in the archipelago. In this study, we evaluated the presence and significance of behaviours similar to those observed on Mediterranean beaches. Using ultrasonography (Rostal *et al*. 1998), we investigated the presence of eggs and the follicular stages in females that emerged on the beach, regardless of whether they initiated nesting behaviours. We focused on turtles nesting on the island of Boa Vista in July 2022. Data were collected on the major nesting beaches of the Natural Reserve, Ervatão, João Barrosa, and Boa Esperança (Fig. 1).

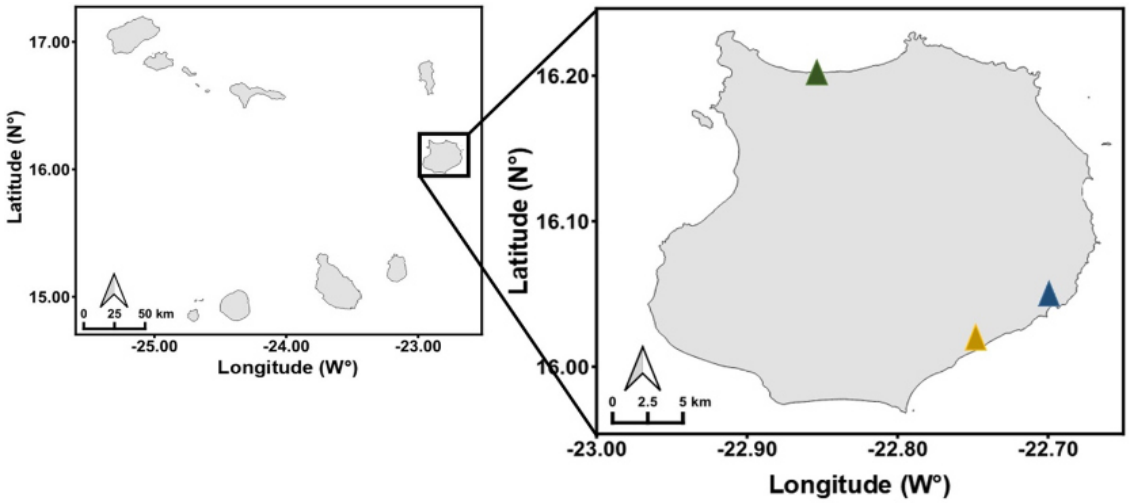

Figure 1. Map of Cabo Verde with the study area, Boa Vista Island and the sampled beaches, highlighted: Boa Esperança (green triangle), Ervatão (blue triangle) and João Barrosa (yellow triangle).

We scanned turtles at different nesting stages with a portable ultrasound machine (Vinno 5 Vet, Fujifilm Europe): (1) turtles for which egg laying had been confirmed (control individuals); (2) turtles that did not lay eggs, including turtles that attempted to nest but abandoned nesting or individuals that emerged on the beach, but were returning to the sea without attempting to dig. All females were monitored according to the standardized methodology established by "Projeto Tartaruga Boa Vista (PTBV) for Boa Vista Island. For instance, if the female did not already have a PIT tag, they were tagged. We also collected biometric data such as CCLmin (minimum curved carapace length), CCLnt (curved carapace length notch to tip), and CCW (curved carapace width). Lastly, we conducted an external examination for the presence of anomalies/injuries and epibionts. A total of 49 turtles were scanned (Figs. 2–3): eight turtles that laid eggs and 41 turtles that did not. Ten of them made at least one nesting attempt. Turtles that nested were examined after the egg laying process, and no presence of eggs with eggshells was detected, as would be expected after egg laying; the presence of clusters of vitellogenic follicles was observed at different stages of development. Among the non-nesting turtles, 39 had clearly identifiable eggs with the eggshell. In addition, the presence of vitellogenic follicles of different sizes and pre-ovulatory follicles were observed, as also described in the females that nested. Interestingly, in the remaining two non-nesting turtles, no eggs were detected, despite a deep ultrasound examination of the coelomic cavity. These two turtles had vitellogenic follicles of different sizes and pre-ovulatory follicles.

The reasons why a female may emerge on the beach and display nesting behaviour when she has no eggs ready to lay are unknown. Given that this behaviour has now been observed in two independent nesting aggregations, we propose several non-mutually exclusive hypotheses:

1. Rare aberrant behaviour that deviates from what is normally observed in a population.
2. Exploratory behavior: Individuals undertake an exploratory emergence on the beach before a successful nesting emergence.
3. Inexperience: young animals during their first nesting season.
4. Reproductive disorders / female reproductive pathology.
5. Hormonally induced behavior, previously undetected.

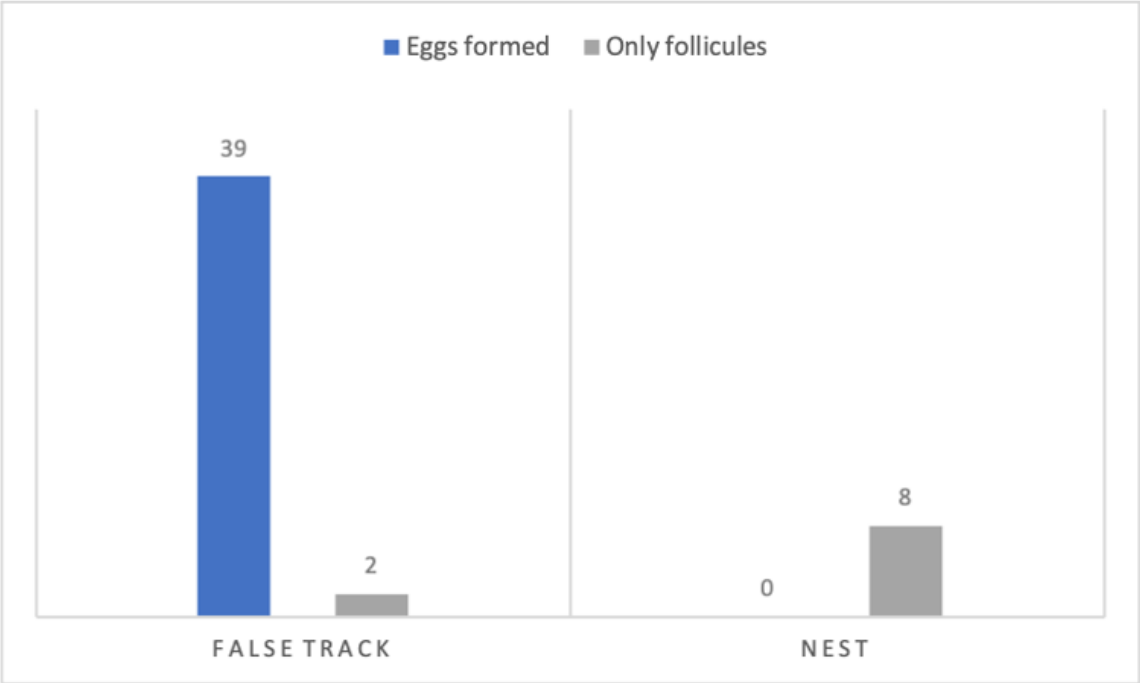

Figure 2. Results from the scanned turtles.

Our limited understanding of these unusual behaviours shows that there are still undescribed behaviours that may have important implications for our current knowledge of the biology and reproductive physiology of sea turtles. These behaviours may impact our understanding of colonization processes (Carreras *et al.* 2018) or the evolutionary strategy. Knowing the prevalence of these unusual behaviors, such as the one described in this study, in different populations (well-established nesting populations versus new colonizing populations) as well as within the same population (females that have just matured versus older females; females with greater or lesser site fidelity, etc...) can help understand the biological importance of these behaviours.

Miller *et al*. (2003) note that of all the sea turtle species, the loggerhead makes the most attempts before actually nesting, and this finding could explain some of these attempts. On the other hand, these behaviours must carry energy costs and increased exposure to predators, while also potentially increasing nest survival if one of the advantages is to select the best incubation area. In the future, the analysis of reproductive hormones such as testosterone, estradiol, progesterone, follicular stimulating hormone (FSH), luteinizing hormone (LH), and vitellogenin from the blood samples collected will provide interesting insights. Additionally, tracking the movements and habitat use of these turtles before nesting will be of interest to better understand this unusual behavior.

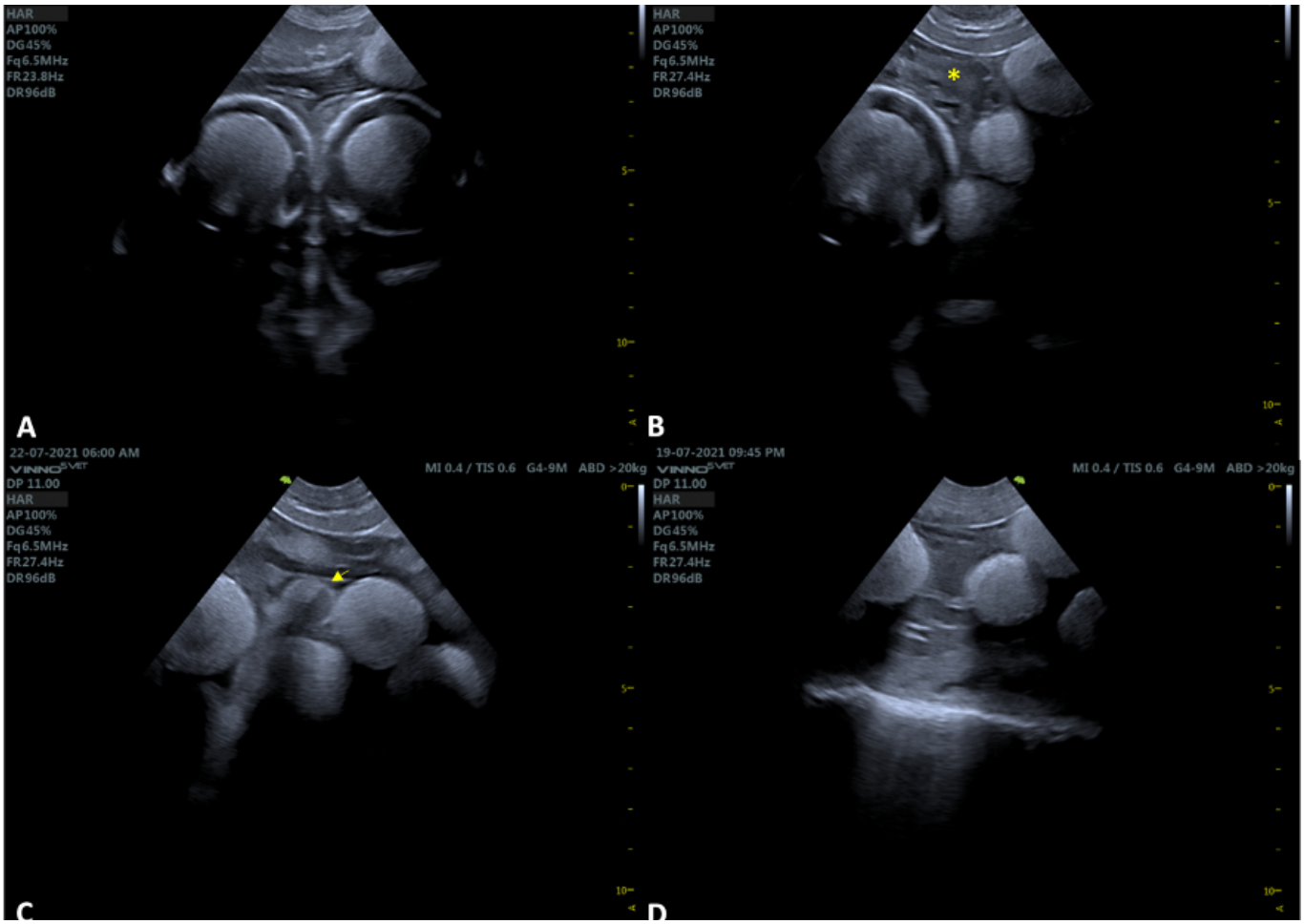

Figure 3. Ultrasound images of the coelomic cavity of nesting loggerhead turtles.
A: Developed eggs in the oviduct with clear differentiation between layers: external shell, albumin, and yolk; B: Developed egg, ovarian tissue (asterisk), and vitellogenic follicles; C: Recent ovulation, shown by the ovulatory band (triangle) present in the central follicle surrounded by large pre-ovulatory follicles; D: Large pre-ovulatory follicles and ovarian tissue (bottom white line represents the dorsal limit associated with the lungs).

Acknowledgements: We thank all the staff and volunteers from the local NGOs (Cabo Verde Natura 2000, BIOS CV, and Fundação Tartaruga) for all the support and tireless work to protect sea turtles, and Fundación Oceanogràfic Valencia for their technical support. We specially thank Jesús Martínez and Fujifilm Vet España for their technical support. We also recognize the support of Stuart Negus (PhD student at the University of Queen Mary) for the maps created in Rstudio. We thank the people of Boa Vista who facilitated the monitoring activities. We also thank the local authorities of Boa Vista and the national environmental authorities of Cabo Verde. This study was supported by MAVA – “Projecto Tartaruga Boa Vista”.

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Marine Turtle Nesting and Bycatch Monitoring Data 2012-2022, Little Bassa Nesting Beach, Liberia

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Liberia's 570 km coastline is predominantly undeveloped and consists of sandy beaches, rocks, mangrove swamps, lowland forests, and make-shift small fishing villages. The country also has a population of approximately 4.5 million people who live especially in urban areas. In the rural parts of the country, people living near the coast, rely mainly on fishing, hunting, and farming for food and income generation.

Leatherbacks (*Dermochelys coriacea*), olive ridleys (*Lepidochelys olivacea*), green turtles (*Chelonia mydas*), and hawksbills (*Eretmochelys imbricata*) have all been recorded nesting along the coast of Liberia (Fretey 2001). Although loggerheads (*Caretta caretta*) are found in Liberia's territorial waters, there is no clear evidence that this species nests on Liberian beaches. Liberia's marine turtles have been categorized as Vulnerable (leatherbacks, olive ridleys, and loggerheads), Endangered (green turtles), and Critically Endangered (Hawksbills) on the IUCN Red List.

Liberia's environmental law includes protection for marine turtles, but due to capacity gaps, little or nothing is done by the responsible government agencies to establish conservation programs. To date, only a fraction (40 km) of the entire 570 km coastline is being monitored for marine turtles by two NGOs: Sea Turtle Watch and Save My Future (SAMFU) Foundation. Sadly, over 90% of the nests, live-stranded turtles, and females encountered, especially on beaches without any monitoring activities, are killed by the community people living near the coast (SAMFU Foundation 2000).

The Little Bassa nesting site is in southwest Grand Bassa County (Fig. 1). The beach stretches 22 km from the mouth of the Farmington River near Marshall towards Little Bassa Town. The area consists of small fishing villages including Little Bassa, Samuel Brown, Sand Farm, Duo, Bassa Point, Wesseh Town, Gbagaye Town, and Beyon's Town.

Since 2012, the community-based marine turtle protection and monitoring program has been carried out by Sea Turtle Watch in partnership with the communities that are located near the beaches. Due to our community outreach, educational activities, and engagement of community members in marine turtle monitoring, the community's participation and level of awareness have increased in recent years.

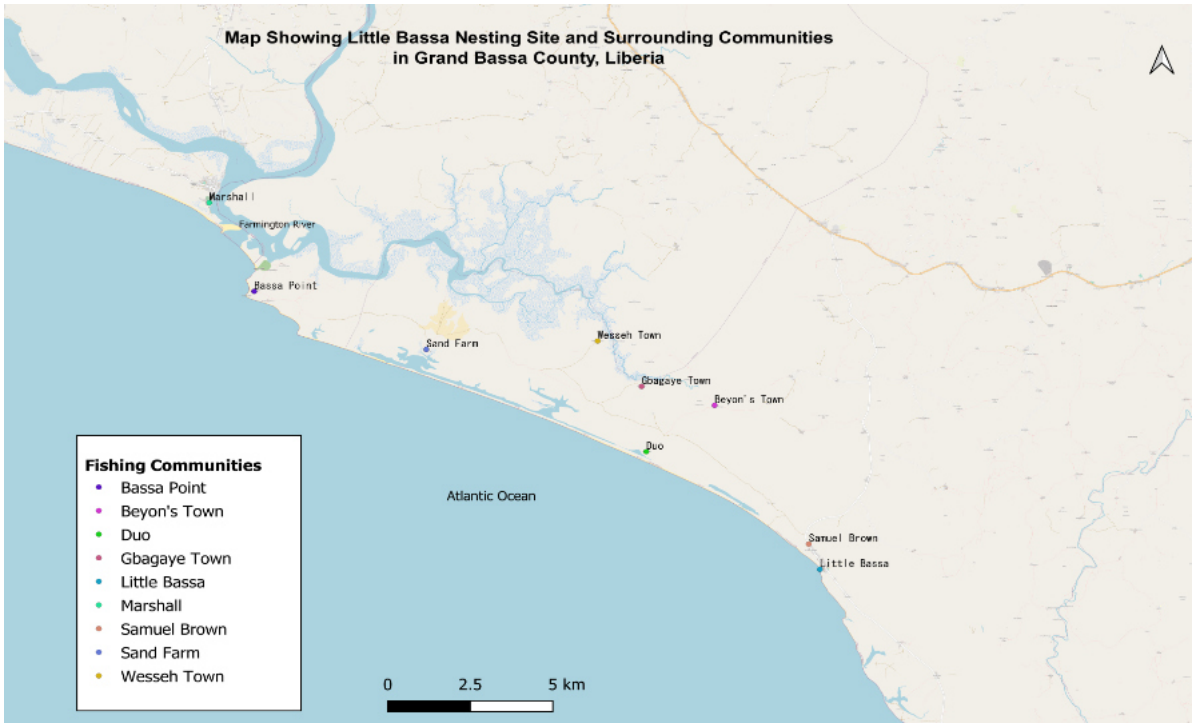

Figure 1. Map of Little Bassa nesting site and the surrounding communities.

Here, we present nesting and bycatch data collected between 1 October 2012 and 30 September 2022 at the Little Bassa nesting site.

Activities	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Beach patrols	x	x	x	x	x	x				x	x	x
Bycatch monitoring	x	x	x								x	x

Methods: In 2009, surveys were conducted at the site between September and December. We interviewed villagers to assess the level of community awareness, threats, nesting, and bycatch frequencies. In 2012, the targeted communities granted Sea Turtle Watch access to the beach, and they selected local members to work with the marine turtle conservation program. These community members were all poachers and hunters who were trained to identify, track, mark, and protect marine turtle nests and females occurring on the beach.

Each day, the trained community monitors patrolled the beach to locate and collect data on new tracks, nests, and females. Nesting takes place between October and June each year. Usually, the peak of the nesting season is between November and March each year. The table above shows the months when beach patrols and bycatch monitoring activities were carried out:

Data were collected on data sheets, where the name of the species, date, time nested, and the location of the nest (either below the high tide line, just below vegetation, or within vegetation) were recorded. Usually, the beach patrols were from midnight to 2 am and then 4 am/6 am to 8 am, and to a lesser extent during midday. In the afternoons, data were collected on hatched nests and any hatchlings left behind in hatched nests were released. Each patrol team monitored up to 7 km each day, especially during the peak of the nesting season. New nests were marked with numbered stakes. The monitors were responsible for protecting the nests until they hatched and for excavating the nests to determine hatching success. Excavation of nests is still a work in progress because not all community patrollers have the skills to carry out the process correctly.

Community monitors were also posted at fish landing points to inspect canoes and small mechanized boats for turtle bycatch. Bycatch was recorded in cooperation with the fishermen who brought ashore turtles caught in their nets for the project's staff to record.

Results: Leatherbacks, green turtles, and olive ridleys have been recorded at the Little Bassa nesting site; loggerhead nests have not been reported, but 2 loggerheads were reported as bycatch and were released alive at the nesting beach (Table 1). We recorded a total of 1,122 hatched nests at Little Bassa between October 2012 and September 2022. The total number of bycaught turtles released was 74. Approximately 133 nests were destroyed by erosion and/or high tide flooding between October 2012 and September 2022. There was no major report of poaching at the site.

Discussion: The high concentration of leatherback nesting occurred at Duo and Sand Farm beaches, whereas a high frequency of green turtle nesting occurs on Bassa Point Beach. Olive ridleys are the most common species and they nest along the entire beach.

In 2005, Liberia signed the Memorandum of Understanding (MoU) concerning Conservation Measures for Marine Turtles on the Atlantic Coast of Africa (https://www.cms.int/en/legalinstrument/atlantic-turtles-mou). As a party to this MoU, Liberia agreed to adopt measures for the conservation of marine turtles and appropriate protection for the species at all stages of their life cycle. Liberia has listed all marine turtles as endangered species and marine turtles are protected by Liberian Environmental law and regulations that ban the taking, possession, and killing of marine turtles and their eggs. Despite the law and regulations, unsustainable harvesting of turtle eggs including the regular slaughter of nesting females and turtle bycatch is the major threat to their survival. In most cases, marine turtles are being hunted and killed for meat and many of their eggs are sold for income generation and for household consumption. This primarily occurs in coastal communities where there is no marine turtle conservation program. Beach erosion and high tides also further reduce nest survival.

Law enforcement is weak due to limited resources to enable the National Fisheries and Aquatic Authority (NaFAA) and the Environmental Protection Agency (EPA) to mitigate measures that fully protect marine turtles from over-exploitation.

Some success has been achieved in the protection of marine turtles through local community-oriented monitoring activities since 2005 and increased community involvement as well as contribution to community development projects at the Little Bassa and Borgor Point nesting beaches. These activities have positively improved the protection of nesting marine turtles at those protected beaches in Liberia.

Table 1: Records of nesting and bycatch (2012–2022).

	Nesting Season									
	12/13	**13/14**	**14/15**	**15/16**	**16/17**	**17/18**	**18/19**	**19/20**	**20/21**	**21/22**
Green turtles										
Total successfully hatched:	11	46	68	38	24	38	53	30	32	31
Number of hatchlings (seen/after nest excavation):	-	769	-	-	412	244	456	122	291	311
Total bycatch released:	8	7	8	1	3	4	7	-	6	2
Olive ridley turtles										
Total successfully hatched:	45	17	26	10	19	23	43	53	22	21
Number of hatchlings (seen/after nest excavation):	-	388	-	55	292	118	98	457	233	254
Total bycatch released:	-	2	1	1	-	-	4	-	-	2
Leatherback turtles										
Total successfully hatched:	55	59	73	43	31	43	33	51	40	44
Number of hatchlings (seen/after nest excavation):	-	582	-	325	121	48	22	56	73	66
Total bycatch released:	1	8	1	1	1	1	-	3	-	-
Loggerhead turtles										
Total bycatch released:	-	-	-	-	-	2	-	-	-	-
Number of nests damaged/destroyed as a result of erosion, poaching, and/or predation:	12	20	14	10	14	12	18	15	7	11

However, for marine turtle conservation programs to be effective, it will require the implementation of a long-term monitoring scheme along Liberia's coastline with increased local community participation. Also, the National Fisheries & Aquatic Authority and Environmental Protection Agency need to improve their national conservation plans and environmental law enforcement as well as collaborate with non-governmental organizations to conduct monitoring activities along the coast.

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Guiding Framework to Address Sea Turtle Poaching in a Local Community: A Case Study from Ghana

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The Ghana Turtle Conservation Project is the first and longest sea turtle project in Ghana. It has been in operation since 2006 and expanded its nesting beach activities in 2018 to a new beach, Anloga in the Volta Region, that lies in the eastern end of Ghana. It is the most important nesting beach for leatherbacks in Ghana with up to 99 leatherback nests in a season (Agyekumhene *pers. comm.*). Sea turtles are "Completely Protected" under Ghanaian law, but the community has been killing every leatherback that comes ashore by chopping off the head with machetes and cutlasses. Nesting olive ridleys are also not spared. The reasons for this extensive killing appear to be local consumption and sale in neighboring countries (Togo and Benin). Local authorities have not been successful at implementing the law and controlling the killing of turtles. Some wildlife officers live in the community, but if they apply the law, they would be threatened by community members. Logistics and inadequate financial resources also hinder the operation of enforcement officers. Though community awareness has been carried out in the past, this method appears to have not been effective at reducing the rate of poaching. It has therefore become critical to find appropriate, long-lasting solutions that are sensitive to the cultural, socioeconomic, and political framework of Ghana. Therefore, VOCAL —West Africa (VOCAL = Voice of Conservation Action Leaders), a consortium of sea turtle project leaders from 7 countries (Sierra Leone, Liberia, Côte D'ivoire, Ghana, Togo, Benin, Nigeria) met online on 12 January 2023 to discuss the situation. The assessment/advice/guidance provided by these West African project leaders from successful strategies implemented in their countries included:

- Nesting surveys should not be prioritized without first engaging in discussions with the community and establishing a strong direct relationship with the community.
- The entry strategy into a new community is very important. The starting point should be a community meeting, a socioeconomic evaluation of the community, and a species status assessment.
- Discussion should be held with the community and community leaders to seek their views and opinions on what needs to be done so that turtles are not killed. Finding solutions to protect turtles should be a joint process so that the community will more easily commit to conservation.
- In these communities, the project will need to prioritize community development and address some socioeconomic issues so that the whole community benefits from the presence of the project and not just a few selected individuals. Community development issues addressed by the project could include enhancing the welfare of the community, improving the livelihoods of the people, and/or introducing additional income-generating activities.
- Community development can even be offered on a small scale. The community can be asked to identify their needs and the project then selects to support a need (or needs) that fits/fit within its budget. This demonstrates to the community that protecting turtles brings value and benefits to their community.
- Conversion of turtle poachers to turtle protectors is also important. The project would need to identify the turtle poachers, hire them as turtle protectors, and make them part of the turtle project team. These former poachers will contribute a lot to the team and have an influence on their immediate families. In some projects, 95% of the patrollers are ex-poachers.

- Local champion(s): It is also important to have an individual or group in the community that speaks for and on behalf of the project, especially while conducting awareness activities. Such individuals must be natives of the area and must be respected individuals in the community who the people easily and completely trust.

- Coming in with the law and law enforcement authorities, as a first strategy, is not a good approach to build a relationship with the community. However, once a relationship has been established with a community, local law-enforcement authorities can accompany the project in their education and awareness activities, not to enforce the law but to speak on the illegality of killing turtles and to help the community understand the benefits the project brings to the country.

- Additionally, bringing local students and other key people from the city (fisheries/wildlife authorities) to the project site demonstrates to the community that there is a broader interest in and appreciation for what they are doing.

- Students can undertake various projects on sea turtles in the area which will further help to highlight the fact that the importance of turtles goes beyond just the consumptive need of the communities.

- Seeking local community enforcement mechanisms is helpful in addressing poaching. In some communities, it is important to engage their local authorities to enact regulations (by-laws) that protect the turtles. This is usually well respected by the communities who do not want to go against the decisions of their leaders.

- Awareness creation methods must be tailored to the communities. The strategy used in raising awareness in communities must take into consideration the literacy level of the community and must be varied. Successful methods include one-on-one engagements, video shows, billboards, posters, radio broadcasts, and television.

- During awareness campaigns, it is helpful to vary the educators. The project can bring people from the city or other institutions to lead the awareness program.

- It is important to work on transformative environmental education that focuses on formal education (schools), informal education (encouraging all initiatives and extending them to diverse groups), and finally non-formal education that integrates spiritual and indigenous practices for the conservation of bio-cultural diversity.

- The project must have a presence in the community. The establishment of a center for the project in the community has been found to help integrate the vision and the norms of the project well into the community. The center can be made available for other conservation bodies to utilize when visiting the community to help support the project. Another way to have a strong presence in the community is to employ members of the community when there is an opportunity. This also demonstrates the added value from the presence of sea turtles.

This community engagement approach has been so successful in some countries that the community's leaders themselves enforce the law. Even the consumption of dead turtles is not allowed.

In addition to the above guidance framework, the group talked about the importance of education and awareness about the laws of the country and its wildlife. Creation of a local WhatsApp group (when possible) was also recommended where every dead turtle is reported, and social pressure is placed on the poacher(s). Ecotourism was also suggested as an option (where feasible) to encourage communities to conserve their resources. This could create employment and revenue for the local community and help gain their support.

The group also discussed whether there were immediate actions the project could undertake in the short term without turning the community against the project. Immediate actions recommended were a high-level community meeting with its leaders (and other local authorities if deemed appropriate in the local context), and the sharing of laws and penalties for protected species as well as education and awareness materials (with the government logo), in addition to discussing how the project could benefit the community. Putting the community at the center of the project and signing a Memorandum of Agreement with the community are also important for successfully working with the community. While these actions may not immediately stop poaching, they should slow it down in the short term while pragmatic solutions are put in place for the medium to long term.

Finally, the option of bringing in foreign institutions and/or Embassies to address the current poaching situation in Ghana was also discussed. The advice of the group was that this would not be a wise first step. It is much more important for the project to first engage with the community and build a relationship, as discussed above, because they are the custodians of the resources. Only then the involvement of foreign institutions and Embassies would be impactful because they could leverage greater interest and engagement from the government.

Project success is entirely dependent on how the project enters/approaches the community. The human dimension needs to be addressed wisely and strategically if the project is to have any chance at conservation success.

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A Local Initiative to Save Turtles to Turn into the Biggest Co-managed MPA in Côte d'Ivoire

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It is a busy day on the beach in Grand Béréby, a town in the West African nation of Côte d'Ivoire. Fishing boats are arriving, and hundreds of people have gathered to meet them.

Young men pick up work hauling bins of fish. Women sit on overturned buckets cleaning and scaling fish. Children chase each other in the sand. Older gentlemen — retired fishermen — sit on benches facing the sea and watch the boats come in, like spectators at a sporting event.

The boats are large wooden canoes called "pirogues". Each carries about a half-dozen men who have toiled at sea for three or four days. Every time a pirogue motors in, young men dive into the waves and swim out to meet it. Minutes later, they wade back through the surf balancing heavy bins of fish on their heads. As they march up the beach, their feet digging deeply into the sand, women with empty buckets crowd around them. Then the bargaining begins.

In this town and countless others like it, men do the fishing and women buy and sell what they catch. But finding fish has gotten harder in recent years as fish populations have declined.

"Boats used to go out in the morning and come back full in the afternoon," says Alice Kouhé Trahim, who has come to the beach to buy fish to smoke and sell. Now the boats have to travel further and stay out for days.

One reason, Trahim says, is the number of customers. "People here used to fish just to feed their families. Today, fish traders come from San Pedro, from Abidjan" — the nearby regional capital and the country's largest city, a ten-hour drive away — "from everywhere."

Trahim also speaks about what might be an even bigger problem: foreign-owned industrial trawlers. "They come in with huge nets and take all the fish," Trahim says. National regulations prohibit industrial fishing within three nautical miles of shore, but those regulations are seldom enforced. Trahim got into the fish business after her husband died in 2010. She started by scraping together an initial investment of about $10. "I have to work for my children, to feed them and send them to school," she said. "If I sit with my arms crossed, who will feed us?"

The first MPA of Côte d'Ivoire?
Trahim's experience shows how important healthy fish populations are to the people of this community. Last year, the Côte d'Ivoire government announced that it would create a marine protected area near Grand Béréby to sustainably manage fisheries and to protect ocean wildlife. MPAs, which are used around the world to manage ocean ecosystems, allow for varying amounts of fishing and other uses. They attempt to strike a balance between the use and conservation of natural resources.

The Grand Béréby MPA will cover about 2,400 square kilometers of ocean. For comparison, that is about 80% the size of Yosemite National Park in the United States. It will include a 54-km stretch of coastal water. Besides vital fisheries, the area is home to endangered populations of leatherback, olive ridley and green sea turtles and threatened populations of sharks and rays. It will be the first MPA in Côte d'Ivoire, and one of the largest in West Africa.

While the Côte d'Ivoire government has announced that it will create the MPA, it hasn't created it yet. Jose Gomez Peñate, the founder of Conservation des Espèces Marines, or CEM, an organization that works to protect sea turtles in the area, said he expects the Ivorian government to officially create the MPA soon and that, "industrial fishing will be prohibited."

Many organizations have been working to promote the MPA. These include the Côte d'Ivoire government, the Rainforest Trust, and the UK government's Darwin Initiative, among others. But CEM is the main organization working with local communities and moving things forward on the ground.

Community-based Conservation Efforts to Protect Turtles

CEM is based in Grand Béréby. And though it was founded in 2014, Gomez Peñate has been working in the area since the 1990s. CEM protects sea turtle populations by working with local groups on conservation and development projects.

Over the years, CEM has wrangled funding from donors to build a new primary school in the nearby village of Roc. They also installed solar-powered water pumps there. Just recently, CEM worked with a women's fish processing cooperative to secure funding for refrigeration equipment. That will allow women like Alice Kouhé Trahim to sell better quality fish at a higher price.

CEM also worked with people in nearby fishing villages to create a community-managed conservation area that protects a 54-kilometer stretch of sea turtle nesting beach. (This beach will now form the northern boundary of the MPA). In addition to protecting the turtles, this provides opportunities for people who live nearby. Some work as research assistants, not only collecting data but sharing their knowledge of the ecosystem with scientists. Others work as eco-guides, bringing tourists to see turtles nesting at night.

These efforts and others have virtually eliminated the poaching of sea turtles and sea turtle eggs in the area. The number of green turtle nests have increased from 10–20 per year in 2010 to 130–150 today. The number of olive ridley nests have doubled from roughly 300 to 600 over the same period.

Hopefully, the same dynamic of community involvement will take hold with the MPA. The MPA will benefit people because, among other things, it will prohibit industrial fishing throughout its 40-plus kilometer extent from shore. But this prohibition will only be effective so far as if it can be enforced.

Upscaling Surveillance in the Area

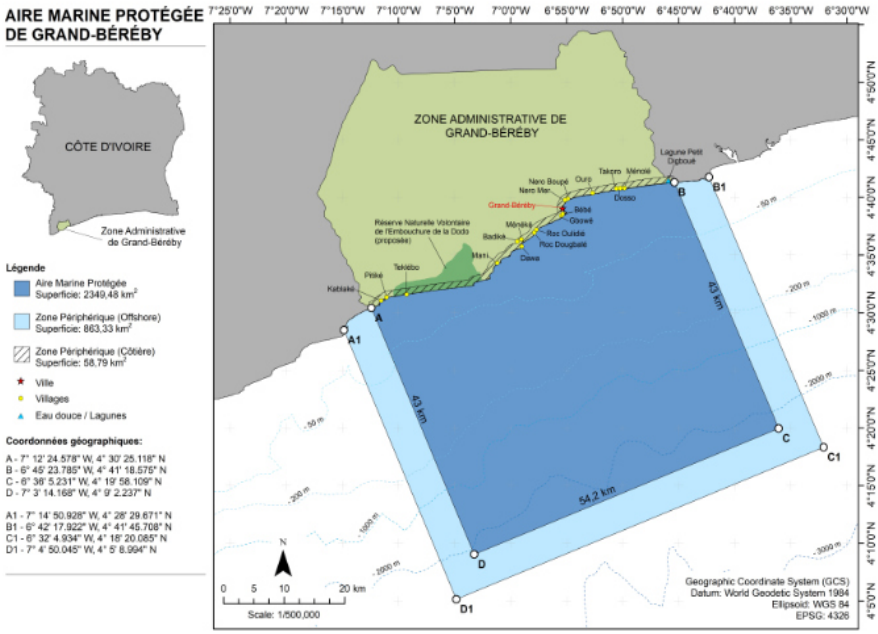
To help with that, CEM and Rainforest Trust recently collaborated on purchasing a seven-meter motorboat for use by the Grand Béréby Maritime Police, with ongoing funding for gasoline and maintenance. This is the first time the maritime police have a patrol boat and the first time that authorities there, or most anywhere along the Ivorian coast, have the operational means to combat illegal fishing.

In November 2021, on one of their first patrols, the maritime police spotted a trawler with its nets deployed about three kilometers from shore, well within the coastal zone where industrial fishing is already prohibited. The police ordered the trawler to cut its engine and haul in its nets. They then boarded the trawler and confiscated its papers so authorities in the capital can impose a fine.

One patrol boat will not be able to solve the problem of illegal industrial fishing. For starters, the MPA will be far too vast for it to patrol completely. Also, the authorities in the capital may not follow up with fines. Even if they do, the trawler owners might refuse to pay. The trawler in the recent encounter, Lu Rong Yuan Yu 220, is a sister ship of one that refused to pay a US$ 1 million fine for illegal fishing off the coast of Ghana in 2019.

But the maritime police will be able to patrol the waters near Grand Béréby at least. And the trawlers now know that if they're caught in the area, they'll be forced to haul in their nets and leave. If nothing else, that will cost them a day's fishing.

"I believe in the possibility of small successes," Gomez Peñate said. "And I think the trawlers will learn that they should fish someplace else."



Photos: Rich Press

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Collaborative Community-Based Conservation Work and Scientific Research: Understanding Fibropapillomatosis Disease Affecting Sea Turtles

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Local Ocean Conservation (LOC) is a Kenyan grassroots marine conservation organisation based in Watamu, which uses sea turtles as a flagship indicator species of marine health. Kenya is home to five species of sea turtles: green (*Chelonia mydas*), loggerhead (*Caretta caretta*), hawksbill (*Eretmochelys imbricata*), olive ridley (*Lepidochelys olivacea*), and leatherback (*Dermochelys coriacea)*. According to the IUCN Red List, two of the species found in Kenya are classified as either Endangered (green) or Critically Endangered (hawksbill), with the remaining three species being classified as Vulnerable. Globally, sea turtles face a number of threats, some of the most severe being bycatch in fisheries (Wallace *et al.* 2010), habitat destruction (Biddiscombe *et al.* 2020), and marine pollution (Duncan *et al.* 2019). Along the Kenya coast, these anthropogenic pressures are correlated with a growing human population, particularly within fishing communities such as Watamu.

Alongside bycatch and other anthropogenic pressures, an emerging threat to sea turtles is the disease fibropapillomatosis (FP), a condition characterised by benign but ultimately debilitating epithelial tumours (Aguirre and Lutz 2004). Whilst predominately found in green turtles (Jones *et al.* 2016), FP has subsequently been identified in all seven species of sea turtles in all major oceans (Alfaro-Núñez *et al.* 2014). However, there is a limited number of published studies describing the prevalence of FP amongst sea turtles in African waters (Formia *et al.* 2007; Mint Hama and Fretey 2014; Jones 2021; van de Geer *et al.* 2022). Although very little is known about the exact cause of FP, herpesvirus (Jones *et al.* 2020) and papillomavirus (Mashkour *et al.* 2021) are implicated in a growing body of evidence. Increased FP incidences have been observed at watersheds with elevated nitrogen-footprints (van Houtan *et al.* 2010), suggesting influence of natural and anthropogenic factors that cause coastal eutrophication.

FP predominantly afflicts green turtles, and hence, there is reason to suspect a genetic role in the species' susceptibility. To investigate potential genetic and environmental drivers of FP, LOC has partnered with a conservation genomics research team at Pwani University's Bioscience Research Centre (PUBReC). Using DNA sequencing technology, the research team is comparing immune genes of tumoured with non-tumoured turtles brought to LOC's Turtle Rehabilitation Centre (TRC) through their 'Bycatch Rescue and Release' program. LOC collaborates with a network of over 500 fishermen who report bycaught turtles to LOC's rescue team. Healthy turtles are immediately released back to the ocean, while sick and/or injured turtles are taken to the TRC for veterinary care. The research aims to identify any genetic differences that might predispose certain individuals to FP. Moreover, various physico-chemical parameters are being tested at sites of varying FP prevalence to determine if any parameters predict prevalence patterns.

Left: Vet preparing to cauterise tumours from FP patient at the LOC TRC; Right: Skin sample being taken from rescued turtle (Photos: LOC).

This research is crucial to enhance a global understanding of the rise and causes of the FP disease affecting sea turtles, and links to the detrimental impact of pollution on the productivity of marine ecosystems. Preliminary analyses of the sequence data show exciting patterns. Once finalised, the findings will be shared internationally through peer-reviewed publications and communicated to the local fishing communities in Watamu and Mida Creek where the FP turtles are rescued from.

Sammy Wambua and researchers at PUBReC (Photo: PUBReC).

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Marine Turtle Poaching Within the Primeiras and Segundas Islands, Mozambique

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The Primeiras and Segundas Environmental Protection Area (Área de Protecção Ambiental das Ilhas Primeiras e Segundas - APAIPS) is the largest marine environmental protection area in Mozambique (ANAC 2015; Teixeira *et al.* 2015). It extends over an area of 1,000,000 hectares, with 205 km of coastline and adjacent pristine habitats including mangrove forests, seagrass meadows, and coral reefs (MAE 2012; Teixeira *et al.* 2015). The APAIPS includes the districts of Angoche, Moma, Larde and Pebane (Fig. 1). Poverty is high and the majority of the local population relies on fisheries resources for their livelihoods (Carlos Litulo *pers. obs.*).

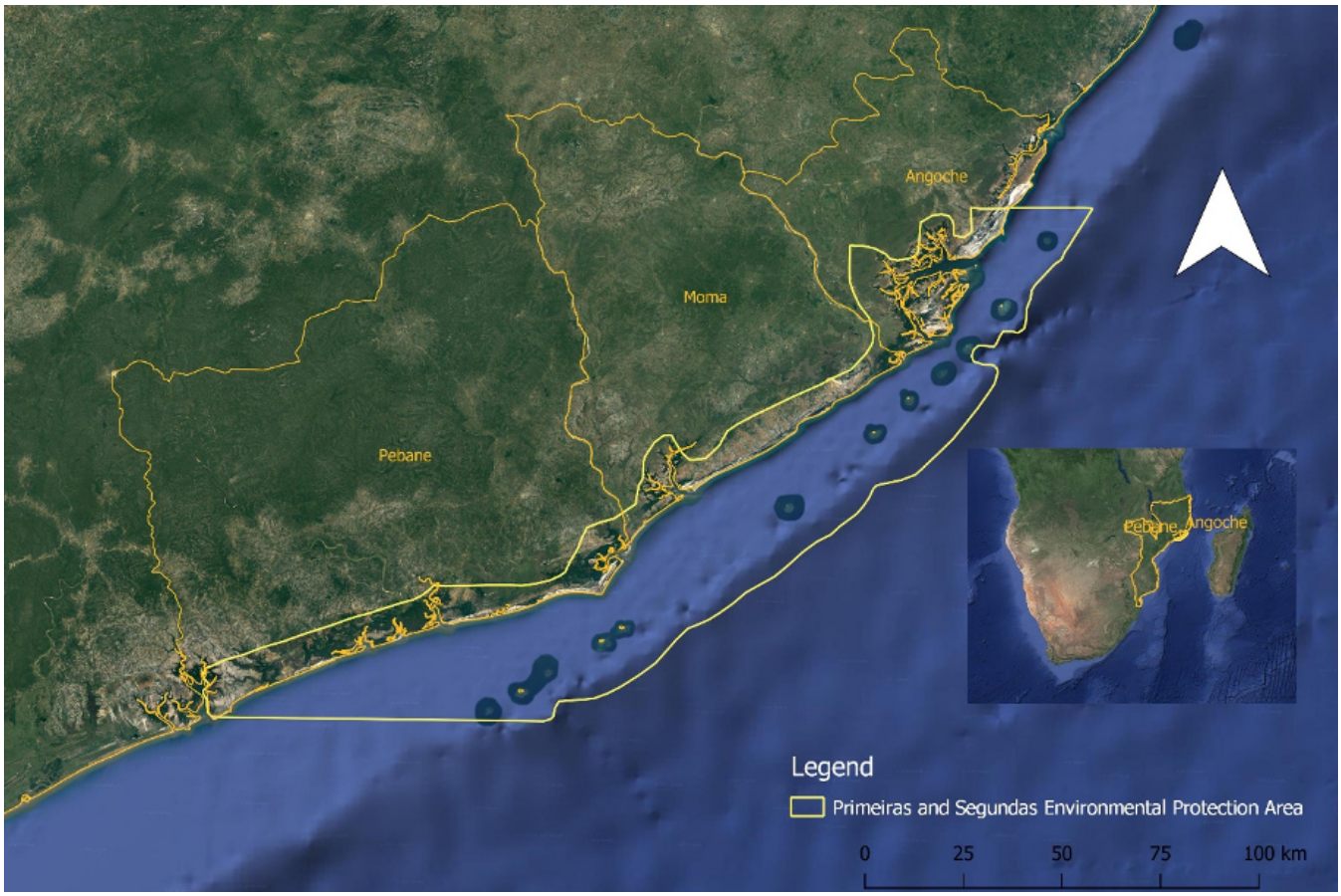

Figure 1. Map showing the boundaries of the Primeiras and Segundas Environmental Protection Area.

Five species of marine turtles occur within APAIPS: green (*Chelonia mydas*), loggerhead (*Caretta caretta*), hawksbill (*Eretmochelys imbricata*), olive ridley (*Lepidochelys olivacea*) and leatherback (*Dermochelys coriacea)*. Green, hawksbill, and olive ridley populations are of national significance, making the area an important focus of monitoring and conservation programs for these species (Costa *et al*. 2007; ANAC 2015).

Here we present two recent cases of illegal capture and killing of green turtles that took place in Moma District, Nampula Province, northern Mozambique, within the APAIPS. Almost nothing is known about green turtle nesting activity in APAIPS, but it is believed to be an important foraging ground for the species. Green turtles are under threat of extinction and are protected under several Mozambican laws (Louro *et al.* 2006; Fernandes and Pereira 2019).

Description of the apprehensions: On 24 June 2022, the District Services for Economic Activities (SDAE) of Moma, Nampula Province, received a phone call from local residents of Mirrupi stating that, allegedly, some individuals had been seen in possession of three live marine turtles. “We took all precautions and allocated a joint team composed of two officers of the Forces of Coastal, Lacustrine and Fluvial Protection (FPLMF) and technicians of the SDAE of Moma to get accurate information and detain the poachers. We succeeded in this operation and ended up arresting two individuals in possession of one big marine turtle, which was being transported to the buyers using a bicycle in the outskirts of Mucoroge Community around 10:30 pm of the same day” (Cantiflas Jerónimo, Moma SDAE Director).

Both individuals intercepted by the Mozambican authorities were residents of Zambézia Province. Further information revealed that two more poachers belonging to the same group managed to escape before the authorities arrived on the scene. The green turtle had a curved carapace length (CCL) of 105 cm and a curved carapace width (CCW) of 75 cm. The turtle had several injuries on the carapace and eyes, inflicted by the poachers during its capture (Fig. 2).

According to the statement given to the local authorities, the group of poachers bought the green turtles from artisanal fishermen operating in the vicinities of Mucoroge Community at a price of 5.000,00 MZN (approximately USD 78). The meat was intended for sale and consumption locally. On 25 June, at around 8:00 am, a team comprised of the APAIPS administration, a technician of Centro Terra Viva (CTV), Delegation of Maritime Administration of Moma District, and the FPLMF made logistical arrangements and managed to return the captured turtle alive to the ocean (Fig. 3). The two poachers are still detained while awaiting a formal trial, which will take place in the Judicial Court in Nampula Province.

Figure 2. Poachers held at the police station of Moma District with the green turtle they captured (left), which was recovered by local authorities with injuries (right). (Photo: M.T.E. Chuluma).

“As far as we recall, this is the first apprehension of the year. Last year (2021), we apprehended one individual carrying about 55 kgs of fresh green turtle meat in the outskirts of Nambo (about 6 km away from Moma District). We believe that Nambo is another hotspot for marine turtle meat smuggling and consumption” (Benjamim Encarnação, Officer of Forces of Coastal, Lacustrine and Fluvial Protection).

In another similar operation conducted in 2021, the Special Force of Maritime, Lacustrine and Riverine Protection was able to recover two green turtles that were being sold by artisanal fishermen in Nambui and Mucoroge communities through denunciations made by community members. The local forces at Moma District have been working in close collaboration with community leaders, mainly Mucorodge, Pilivili, Topuito, and Tipane to discourage acquisition and consumption of marine turtle meat among the villagers.

"However, the lack of enforcement and nocturnal patrols by local forces around Mucorodge area and vicinities has been contributing to the high rates of marine turtle poaching for meat smuggling in Moma District" (Benjamim Encarnação, officer of Forces of Coastal, Lacustrine and Fluvial Protection).

According to Cantinflas Jerónimo (Moma SDAE Director), truck drivers also play a key role in the marine turtle meat smuggling chain. "They conceal the turtle meat in boxes containing fresh sea fish to be sold in Nampula City. They mostly travel at night (between 10:00 pm and 11:00 pm) because they are sure there are no police on the roads around that time. We believe they have got buyers and a market for fresh marine turtle meat in Nampula City".

During the same week, police forces based in Moma District dealt with another case of marine turtle poaching. In the afternoon of the celebration of Mozambique's Independence Day (25 June), a phone call was received at the local police station in Moma, stating that another group of people were in possession of fresh marine turtle meat, again in Mucoroge. A heavily armored contingent of Special Forces of Rapid Intervention landed on site, along with some technicians from the District Government of Moma, the APAIPS warden, and one CTV researcher. Once on site, the authorities managed to arrest five poachers in possession of 90 kgs of fresh meat resulting from the killing of two green turtles in Nambui and Mucoroge.

Figure 3. Local authorities (SDAE and Maritime Administration) return the green turtle to the sea in Moma District, Nampula Province in Mozambique. (Photo: C. Litulo).

Scales, knives, pots, and cooked meat were also found on site and seized by the authorities (Fig. 4). The meat was transported to the District Government of Moma and incinerated to avoid exhumation and consumption by local residents (Fig. 5).

The leader of the second group of five poachers arrested in Mucoroge has got strong connections with some artisanal fishermen who normally catch marine turtles and sell to him around Murodo in Mocoroge at the price of 4.000,00 MZN (approximately USD 62) per turtle. His young brother also takes part in the business and is responsible for finding clients who normally buy each kilo of fresh meat at 150,00 MZN (about USD 2.5) (Source: Benjamim Encarnação, officer of Forces of Coastal, Lacustrine and Fluvial Protection).

All seven individuals are currently detained at the District Command of Mozambique's Police in Moma. The District Attorney is processing paperwork in collaboration with the National Services of Criminal Investigation, in order to take the seven individuals to trial in the judicial court of Nampula Province.

The leader of the poachers stated that he was unaware of the laws prohibiting trade and consumption of marine turtles. "Marine turtle meat is part of our culture and tradition. We grew up eating marine turtle meat with our ancestors and it wasn't forbidden at that time. As you know, today we are celebrating Mozambique's Independence Day. There is nothing better than celebrating the festivities with turtle meat. We can't afford cow's meat here because it is very expensive. I didn't know that capture and consumption of marine turtle meat is a criminal act, punishable by law. I feel sorry for my family. Today is also my birthday. I am turning 53 today and I will be going to prison for 16 years. I think I will die in prison".

In Mozambique, marine turtles are impacted by illegal, unregulated, and unreported fishing, the illegal wildlife trade, and large-scale industrial development (Brito 2012; Pilcher and Williams 2018). Additionally, turtle meat and eggs are harvested for consumption while carapaces are used to make souvenirs or sold in flea markets (Costa *et al*. 2007; Fernandes *et al*. 2018; van de Geer *et al*. 2022). According to the Mozambican legal instruments, a person caught in possession of marine turtle meat can face up to 16 years in prison along with a fine equivalent to 50 Mozambican minimum wage (the minimum wage at the time of the present case was 4.691 MZN, approximately USD 73). However, despite the existence of robust legislation in Mozambique, further efforts are still needed to eliminate direct take of marine turtles for consumption in the largest marine reserve of Africa, the Primeiras and Segundas Environmental Protection Area.

Figure 4. Green turtle meat (fresh and cooked), along with knives and scales seized during the operation carried out by police forces in the vicinities of Mucoroge, District of Moma, Nampula Province (Photo: C. Litulo).

Figure 5. Police forces incinerate green turtle meat seized during the operation carried out by police forces in the vicinities of Mucoroge, District of Moma, Nampula Province (Photo: C. Jerónimo).

Acknowledgments: We would like to express our sincere gratitude to the administration of the Primeiras and Segundas Environmental Protection Area, the District Government of Moma, SDAE of Moma District, Delegation of Maritime Administration of Moma District, Mr. Cantiflas Jerónimo, Forces of Coastal, Lacustrine and Fluvial Protection, Special Forces of Rapid Intervention, BIOFUND, and The Netherland Embassy in Mozambique for logistical support. Raquel S. Fernandes, Cristina M. M. Louro, and an anonymous reviewer provided valuable comments on the earlier draft of the manuscript.

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Preliminary Results on the Conservation Activities of the New First Aid Sea Turtle Centre, Sfax, Tunisia

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All sea turtle species are protected throughout the Mediterranean region. In the past four decades, the interest in sea turtles in the Mediterranean has steadily increased, motivated mainly by the conservation concern for these animals and specifically by the need for adequate knowledge about threats and relevant biological and ecological parameters for their conservation (Casale and Margaritoulis 2010). Monitoring and conservation projects occur in most countries throughout the Mediterranean (Casale *et al.* 2020), and rescue centres are one of the activities that help sea turtles and enhance research and awareness.

According to MEDASSET, there are a total of 46 Sea Turtle Rescue Centres (STRCs) in the Mediterranean, of which 27 are Treatment Centres (i.e., STRCs equipped with surgery rooms), 14 are First Aid Centres (FASTs, i.e., centres that treat turtles with simple injuries that do not require surgery), and 5 are Informal or Temporary Rescue Facilities (IRFs). The majority of these centres are based along the northern coast of the Mediterranean.

Tunisia has ratified most international conventions dealing with sea turtle conservation and biodiversity and has adopted the Action Plan for the Conservation of Marine Turtles in the Mediterranean (SPA / RAC -UNEP-PAM 2007) and the recommendations of the GFCM (General Fisheries Commission for the Mediterranean) and ICCAT (International Commission for the Conservation of Atlantic Tunas). In order to implement these international tools, Tunisia promulgated a national decree forbidding the capture and use of sea turtles and their eggs (Decree of the Minister of Agriculture on 28 September 1995; Bradai and Jribi 2020) and created an STRC in 2004 in the INSTM centre of Monastir (National Institute of Sciences and Technologies of the Sea) located near the Kuriat Islands, the most important monitored nesting site of the loggerhead sea turtle (*Caretta caretta*) in Tunisia (Jribi *et al.* 2006; Bradai and Jribi 2010; Bradai and Jribi 2020).

In 2004, Tunisia also launched the national stranding network and developed and adopted its national action plan in 2020 (SPA/RAC-ONU Environment/PAM 2020a) and a strategy to combat illegal trade in sea turtles (SPA/ RAC-ONU Environment/PAM 2020b).

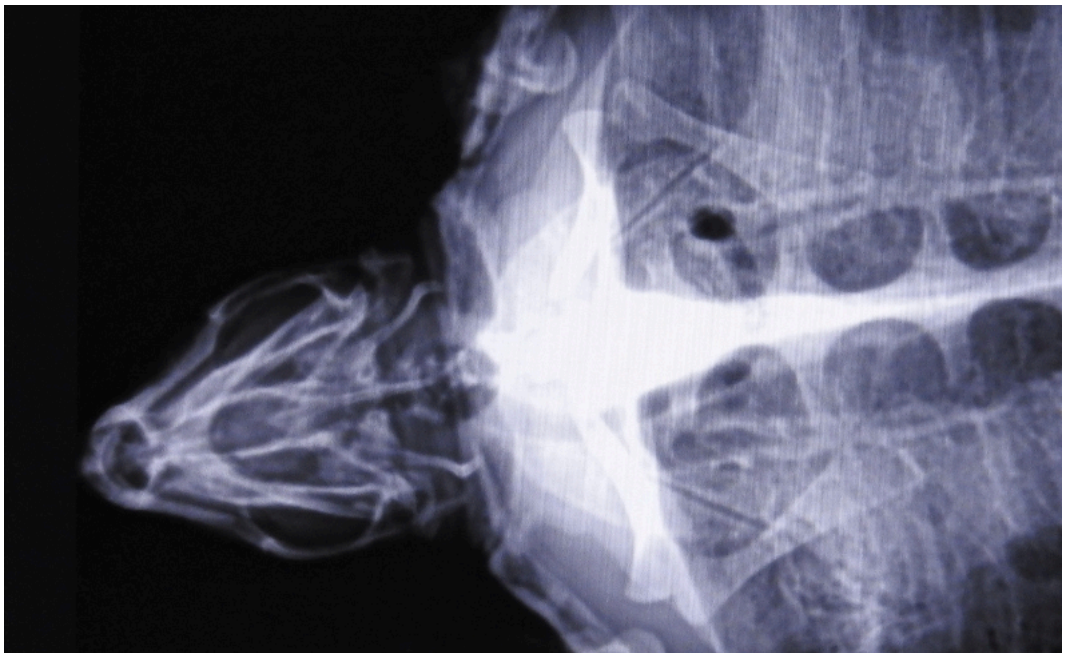

Figure 1. X-ray of a turtle hospitalized at the Centre

In June 2021, a second Centre was established in Sfax within the framework of the Life MedTurtles project which is co-funded by the LIFE financial instrument of the European Union and the Sfax Faculty of Sciences, the national Tunisian partner. Its overall mission is to improve the conservation of sea turtles in the Gulf of Gabès, which is the most important fishing zone in Tunisia, where the interaction between sea turtles and fishing gear is known to be high (Jribi *et al.* 2007, 2008; Eshwikhi *et al.* 2010, 2011). This area is also known as a sea turtle foraging and wintering area (Margaritoulis *et al.* 2003; Bradai and Jribi 2010; 2020).

Since the Centre's creation, effort has been focused on scientific research, training of students, environmental education, and rehabilitation of sea turtles that have been injured or accidentally captured in fishing gear. It also involves fishermen, students, and the local population in conservation.

Here we present data from six months of rescue and awareness activities in the First Aid Centre of the Sfax Faculty of Sciences.

Methods: Dead sea turtles were generally collected on beaches (from strandings) or at sea (dead floating turtles or bycaught individuals). Live individuals, accidentally caught in fishing gear, in need of treatment for injuries, were transported, when possible, and hospitalised in the First Aid Centre in close collaboration with fishermen, coast guards, and other stakeholders. Social media contributed significantly to stranding records.

Curved carapace length (CCL), curved carapace width (CCW), and weight of sea turtles taken to the Centre were recorded. Sex was determined for individuals exceeding 70 cm in length by evaluating tail length (male tails extend beyond the edge of the carapace).

Live injured turtles were examined on arrival at the Centre by a vet and prescribed treatment such as injections, if necessary, and also a daily quantity of food (fish, crabs, etc.). The vet followed the health of the turtles during rehabilitation in a sea water tank.

Figure 2. Necropsy of a dead turtle.

After treatment at the Centre, turtles were tagged with a metal tag in the front flippers before release. In some cases, if there was any suspicion of hook ingestion after capture in longlines, an X-ray diagnosis was performed (Fig. 1).

Students, internships, researchers, and other different social groups (young children, citizens, tourists, and journalists) were invited to attend the release, and educated about the importance of this work.

Necropsies were performed on dead turtles using the SPA/RAC-INDICIT protocol (SPA/RAC-UNEP/MAP, INDICIT 2019) (Fig. 2).

Results and discussion: Between June and November 2021, a total of 17 sea turtles (16 loggerheads and 1 green turtle, *Chelonia mydas*; Table 1) were hospitalised in the First Aid Centre, indicating that the loggerhead is the most common species in the Gulf of Gabès (Bradai and Jribi 2010), whereas the green turtle is rare (Bradai and Jribi 2010; Karaa *et al.* 2012). The treatment and rehabilitation period depended on the injury (trauma, hook in the mouth or in the esophagus, collision, amputation, etc.). Two turtles died — one with a breathing problem because it was trapped in fishing nets for a long period, and the other probably because of digestive problems, despite the treatment it was given. Twelve turtles were released after regaining their health.

The majority of these turtles (59%) originated from Kerkennah Island, which seems to be a hot spot for these animals in the Gulf of Gabès, and an important foraging and wintering area for sea turtles in the Mediterranean (Margaritoulis *et al.* 2003; Bradai and Jribi 2010; 2020; Fig. 3).

Most of the turtles received at the Centre were captured accidentally in the *charfiya* (53%; n=9; Fig. 4) followed by bottom trawling and longlines (17.6% each; n=3 each; Fig. 4). The *charfiya* is artisanal, fixed fishing gear built with palm leaves (Fig. 5) and still used today by fishermen in Chebba and Kerkennah regions. This fixed fishing gear seems to have a high catch rate even if the mortality rate is almost zero because the turtles that are caught remain alive, free, and can move to the surface to breathe; however, they are sometimes a little injured. The captured turtles needed a short stay in the Centre to ensure they were in good physical condition and to take

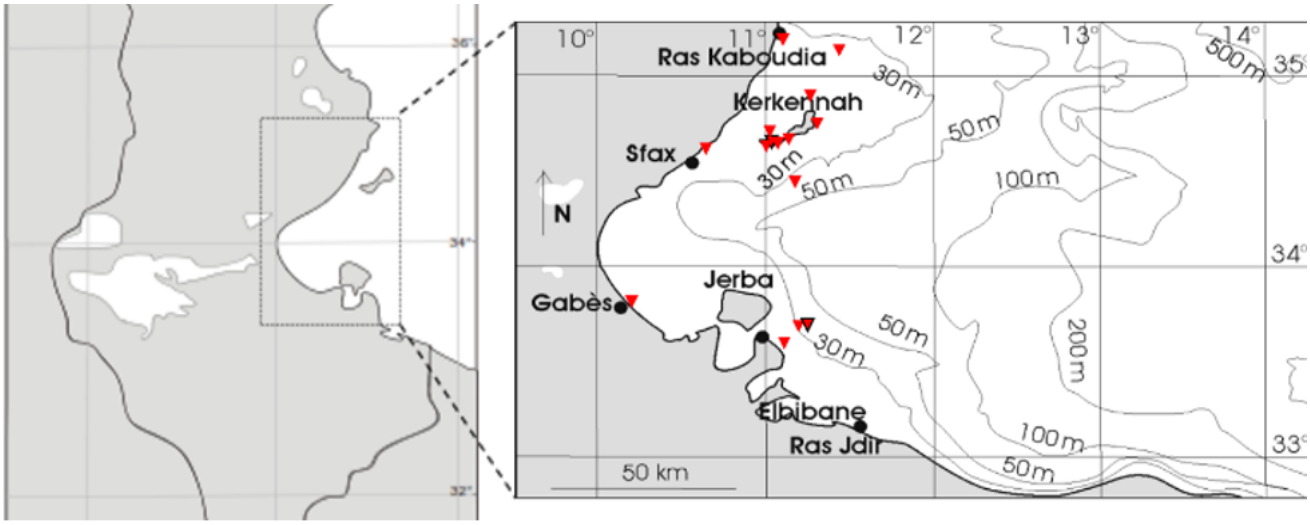

Figure 3. Locations where turtles were rescued in the Gulf of Gabès.

measurements and samples for further studies. Asphyxia, weakness, trauma, amputated limbs, and malformations were the major types of injuries in turtles hospitalised at the Centre.
The CCL of loggerheads received at the Centre ranged between 38 and 68 cm with a mean of 53.1 cm (n=16) indicating that all individuals were juveniles and subadults. The green turtle had a CCL of 73 cm and could be considered a subadult (Türkozan *et al.* 2013). However, she could also be considered an adult female based on the size of the smallest nesting female (CCL = 72 cm) observed in Samandağ, Turkey (Sönmez 2019). Juveniles appear to be the most frequently captured size class in the Gulf of Gabès (Jribi *et al.* 2006, 2007; Echwikhi *et al.* 2010, 2011, 2012).

The environment education program at the First Aid Centre has proved to be a powerful tool to raise awareness for sea turtle conservation in the Gulf of Gabès and is an inspiring way to gain the support of different groups of people. Nine hundred and ninety people have visited the First Aid Centre since its opening, of which 794 were students, 110 schoolchildren, 56 professors and 30 foreigners of different nationalities (Fig. 6).

Social networks, newspapers, and radio broadcasts are good platforms for monitoring the audience and the effectiveness of our activities at the First Aid Centre, via the number of reactions received (photos and videos).152,920 people were reached through our publications, participation in social networks, and the media.

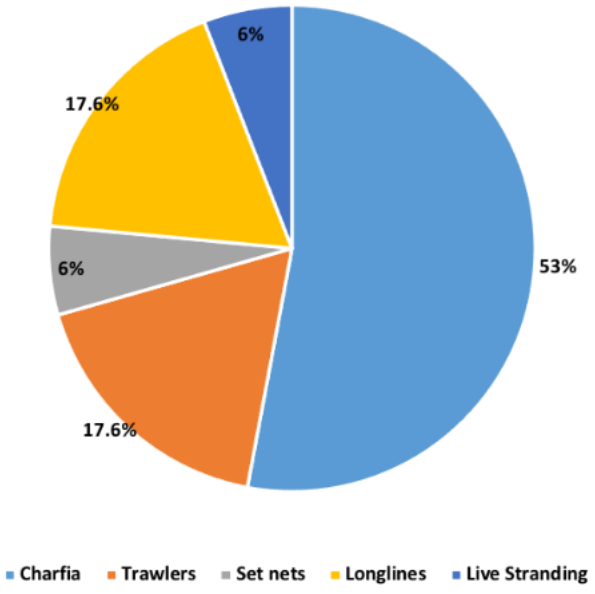

Figure 4. Percentage of fishing gear that caused turtle hospitalisations at the sea turtle First Aid Centre.

Finally, sea turtles treated at a First Aid Centre represent a wealth of information. Biological samples that would otherwise be hard for scientists to obtain are within reach. Blood and fresh tissue samples can be collected, and chemical analyses can be conducted on very fresh tissue obtained from recently dead turtles without loss, or chemical changes, in important contaminants. A First Aid Centre can be involved in many studies such as genetics, biology, biochemistry, toxicology, parasitology, etc. This can provide a baseline for future comparisons between different areas or between different turtle species. The occurrence of parasites, for example, can be used not only to assess the health status of their hosts, but also as an important tool to understand aspects of the host's biology, namely their migratory behavior, distribution, and feeding ecology.

Tunisia has made considerable efforts in the conservation of sea turtles, not only at a national scale, but also at a regional level because of the migratory nature of these species. The new First Aid Centre established in 2021 in the Sfax Faculty of Sciences will support all these efforts and will contribute to developing research activities and awareness campaigns through its location close to the students and to Tunisia's most important fishing area, the Gulf of Gabès. The Centre looks forward to continued improvements in facilities and equipment.

Table1. Data on sea turtles hospitalised at the First Aid Centre.

Turtle	Species	CCL	CCW	Sex	Injury type	Release
001	*Loggerhead*	60	54	Immature	Weak	Yes
002	*Loggerhead*	59	58	Immature	Weak	Yes
003	*Loggerhead*	41	38	Immature	Weak	Yes
004	*Loggerhead*	64	59	Immature	Weak/ shell malformation	Yes
005	*Loggerhead*	52	47	Immature	Weak	Yes
006	*Loggerhead*	53	47	Immature	Weak	Yes
007	*Loggerhead*	38	30	Immature	Left flipper amputated	Yes
008	*Loggerhead*	50	46	Immature	Respiration problem	No
009	*Loggerhead*	38	35	Immature	Hook ingest/Inflamed right member	Yes
010	*Loggerhead*	56	50	Immature	Asphyxia	No
011	*Loggerhead*	55	52	Immature	Head injury	No
012	*Loggerhead*	46	42.5	Immature	Weak	Yes
013	*Loggerhead*	43.4	40	Immature	Malformation of the left limb	Yes
014	*Loggerhead*	62	57	Immature	Weak	Yes
015	*Loggerhead*	64	62.5	Immature	Weak	Yes
016	*Loggerhead*	68	62	Immature	Hook in the esophagus	No
017	*Green turtle*	73	70	Female	Shell lesion	No

Figure 5. Charfia in the Kerkennah Islands.

Figure 6. Awareness session for visitors at the First Aid Centre.

Acknowledgments: This work was done at the First Aid Centre of the Sfax Faculty of Sciences (FSS), which was created under the framework of the Life Medturtles Project, co-funded by the LIFE financial instrument of the European Union. We would like to thank WWF North Africa, all the administrative staff of FSS, and all the volunteers for their valuable support to our Centre. We are grateful to all the fishermen who have helped in the rescue of injured sea turtles, as well as the NGOs that facilitated the transfer of sea turtles to the Centre.

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Photos: Life Medturtles Project Tunisian team.

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Première ponte certifiée d'une tortue verte en République du Congo

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Abstract: On 5 December 2021, Renatura Congo's team observed a green turtle laying eggs near the village of Niandji in Conkouati-Douli National Park. Green turtle nesting had been suspected for a long time, based on track observations, but this is the first time it was confirmed through direct observation. The female measured 100 cm in curved carapace length and 95 cm in curved carapace width. She was tagged with monel tags (REN23130 left front flipper; REN23131 right front flipper).

Les plages de la République du Congo sont connues pour être des sites importants de nidification pour deux (2) espèces de tortues marines : les tortues olivâtres (*Lepidochelys olivacea*) et les tortues luths (Dermochelys coriacea) (Godgenger et al. 2009; Bréheret et al. 2018; Omeyer *et al*. 2022). Ses eaux accueillent également des populations, majoritairement juvéniles, de tortues vertes (*Chelonia mydas*) ainsi que quelques tortues imbriquées (*Eretmochelys imbricata*) (Bréheret *et al*. 2018; Metcalfe *et al*. 2020; Mianseko *et al*. 2020).

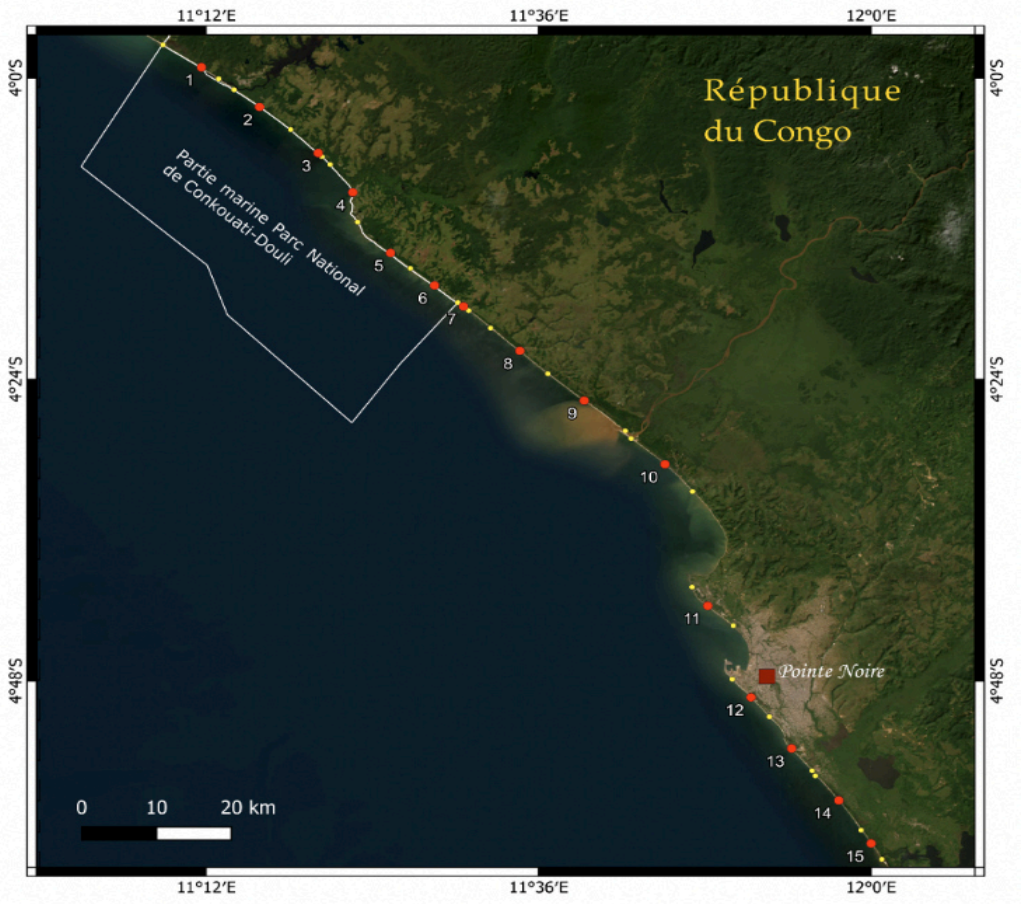

Figure 1: Localisation des quinze plages de ponte suivies par Renatura Congo pendant la saison de ponte: (1) Niandji, (2) Mvandji, (3) Paris, (4) Kondi, (5) Bondi, (6) Longo-Bondi (PNCD), (7) Longo-Bondi, (8) Bellelo, (9) Bas-Kouilou Nord, (10) Bas-Kouilou Sud, (11) Nkounda, (12) Pointe-Noire, (13) Mvassa, (14) Djeno, et (15) Cabinda. Les points jaunes indiquent le début et la fin de la plage suivie, et les points rouges en indiquent le centre. Les lignes noires indiquent les plages de pontes des aires protégées.

Renatura Congo est une ONG congolaise créée en 2005 qui œuvre pour la préservation des tortues marines et de leur habitat en République du Congo.

Chaque année, afin d'étudier et de protéger les femelles et leurs pontes, l'association déploie des équipes de suivi sur l'ensemble du littoral, de la frontière du Cabinda jusqu'à la frontière gabonaise au nord. De mi-septembre à mi-mars, des patrouilles diurnes et nocturnes sont organisées dans le but d'observer les femelles en ponte, de suivre l'évolution des nids jusqu'à éclosion et aussi d'assurer une présence dissuasive contre le braconnage. L'étude, réalisée sur le linéaire côtier congolais, couvre 150 des 170 kilomètres appartenant au pays (Fig. 1).

Les patrouilles diurnes sont menées chaque matin à partir de 06h30. Afin d'enregistrer tous signes d'activités de ponte, un technicien marche le long de la ligne de la végétation et l'autre le long de la ligne de haute marée. Au cours de ces patrouilles, les activités de nidification sont identifiées à l'espèce; ceci est relativement simple pour les tortues luths dont les traces sont larges et facilement reconnaissables. Pour les autres traces ne pouvant être associées avec certitude à l'espèce, les agents de Renatura mesurent la largeur de l'empreinte au sol et déterminent si elles sont symétriques, pouvant être attribuée à une tortue verte ou une jeune tortue luth, ou asymétriques pouvant alors être attribuées à une tortue olivâtre ou caouanne.

Chaque année des traces symétriques de tailles inférieures à 100 cm étaient enregistrées (Fig. 2), suggérant des pontes de tortues vertes, mais aucune observation physique d'une femelle en ponte n'avait été réalisée jusqu'à présent.

Or, le 5 décembre 2021 à 23h39, l'équipe de Renatura basée sur la zone de Niandji, plage de 10 kilomètres située entre la frontière du Gabon et l'embouchure de la lagune Conkouati dans le Parc de Conkouati-Douli, a observé une tortue verte en ponte (3°59.037' S ; 11°11.523' E ; WGS 84; Fig. 3). La femelle, non baguée, mesurait 100 cm de longueur courbe de carapace, 95 cm de largeur courbe de carapace. Elle a été marquée par deux bagues de type monel, numérotées REN 23131 à la patte antérieure droite et REN 23130 à la patte antérieure gauche.

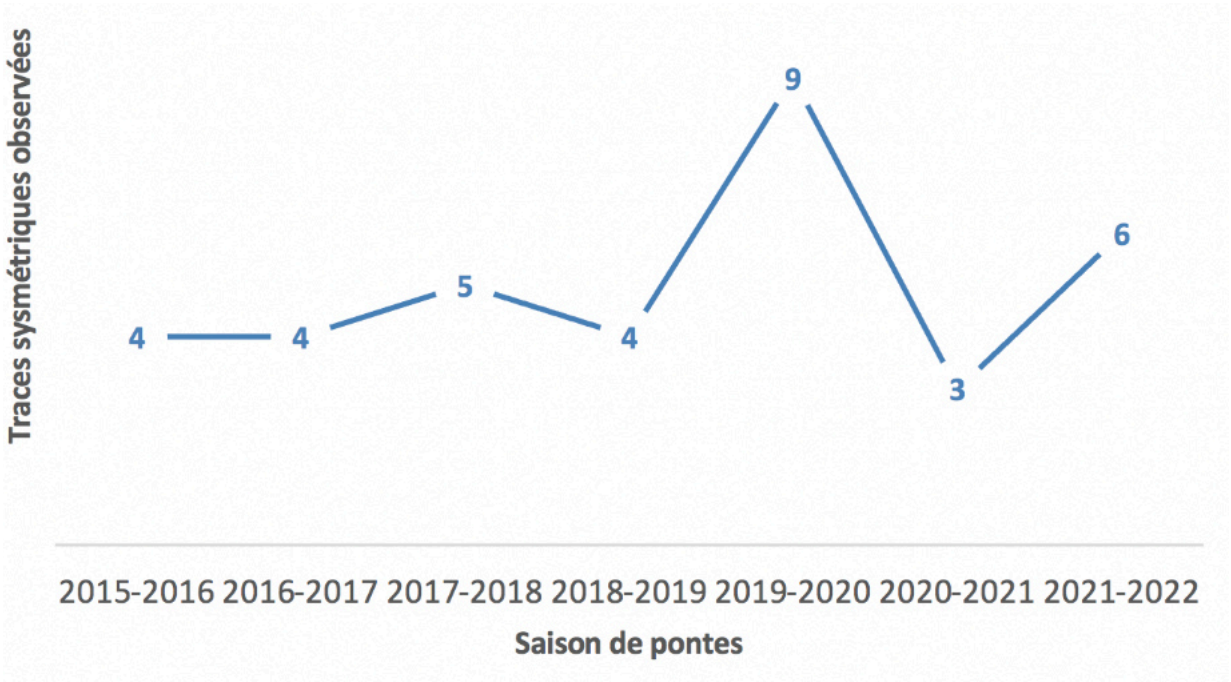

Figure 2: Evolution du nombre de traces symétriques observées entre 2015-2016 et 2021-2022.

Cette observation est donc une première en République du Congo et vient confirmer la présence d'une population adulte nidifiant au Congo. Cette information démontre à nouveau l'importance des plages et des eaux congolaises dans le cycle de vie des tortues marines de l'Est de l'Atlantique (Godgenger *et al*. 2009; Omeyer *et al*. 2022).

Au regard de ces informations, il est donc essentiel de poursuivre les efforts afin de protéger ces animaux menacés à tous les stades de leur vie mais aussi de préserver leurs habitats, en créant par exemple des aires marines protégées ou en accompagnant le développement des côtes du pays.

Figure 3: Tortue verte en ponte sur la plage de Niandji, décembre 2021.

Remerciement: Renatura Congo remercie sincèrement les organisations suivantes pour leur soutien et leur confiance: US Fish and Wildlife Service, Rainforest Trust, Biopama, Noé et Promar. Renatura Congo tient à exprimer toute sa reconnaissance au Ministère de l'Economie Forestière (MEF) de la République du Congo pour son appui continu. Enfin, un remerciement spécial aux agents de suivi des pontes pour leur travail et leur assiduité sur le terrain ainsi qu'aux communautés locales impliquées dans la collecte et la transmission des données.

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For English translation, please use: www.deepl.com

Cas d'une tortue luth retrouvée échouée et morte à El Jebha, Méditerranée centrale du Maroc

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Abstract: A leatherback turtle was found stranded dead on Rouiisse Beach of El Jebha on 28 November 2021. The turtle was in advanced state of decomposition. The leatherback measured 180 cm (carapace and head combined).

À l'extrémité occidentale de la Méditerranée, le Maroc forme la limite sud du détroit de Gibraltar et occupe une position stratégique. Il s'agit non seulement du couloir de migration des tortues marines entre l'Atlantique et la Méditerranée (Brongersma 1982; Caminas 1997; Casale *et al.* 2003; Revelles *et al.* 2007), mais aussi d'une région de grande diversité biologique. La zone côtière méditerranéenne du Maroc est principalement utilisée comme un habitat de recherche de nourriture par les tortues marines (Gerosa et Casale 1999; Margaritoulis *et al.* 2003; Benhardouze 2009; Aksissou *et al.* 2010). La circonscription maritime d'El Jebha, l'une des circonscriptions maritimes Méditerranéennes du Maroc, se caractérise par la richesse et la diversité de ses ressources halieutiques. Dans ce sens, plusieurs études (Tiwari *et al.* 1999; Benhardouze 2004; Benhardouze *et al.* 2005; Benhardouze *et al.* 2009; Tiwari *et al.* 2006; Aksissou *et al.* 2010; Casale 2011; Benhardouze *et al.* 2012; Chahban *et al.* 2017; Kaddouri *et al.* 2018; Aksissou *et al.* 2020) sont réalisées et signalent que trois espèces de tortues marines sont présentes en Méditerranée, la tortue caouanne (*Caretta caretta*), la tortue verte (*Chelonia mydas*) et la tortue luth (*Dermochelys coriacea*). Ces trois espèces apparaissent soit libres en mer, capturées accidentellement dans les engins de pêche ou échouées sur les plages. L'échouage des tortues caouannes vient en premier avec 95%, suivi par des tortues luths 4% et la tortue verte 1% de la population des tortues marines du Maroc (Benhardouze 2009; Benhardouze *et al.* 2018).

Figure 1. Site d'échouage de la tortue luth dans la région d'El Jebha.

Le 28 novembre 2021 à 12h40, lors de la marée basse, une tortue luth a été retrouvée échouée et morte sur la plage de Rouiisse, El Jebha (Fig. 1). Après quelques procédures des autorités locales, nous avons pu enfouir le cadavre sous le sable. Les caractéristiques morphologiques de l'animal était d'une longueur totale (longueur de la carapace + cou + tête) de 180 cm, et d'une largeur courbe de la carapace de 80 cm et poids plus de 200 kg. La tortue était putréfiée en état d'une décomposition avancée, mort non récente, sans doute décédé quelques jours avant de s'échouer sur la plage (Fig. 2). Elle avait signes de blessures sur la tête. Cet échouage peut être le résultat de l'impacte des prises accidentelles dans les engins de pêche. Peut être également à cause de la pollution marine principalement par les plastiques et les carburants.

L'évaluation des interactions des tortues marines avec les activités de pêche figure parmi les actions prioritaires du Plan d'Action pour la Conservation des Tortues Marines de Méditerranée (RAC/SPA 2001) et bien d'autres conventions et outils de conservation. Dans ce sens, la sensibilisation des professionnels de pêche à travers des ateliers, des rencontres sur le terrain et également la mise en œuvre des lois de la conservation des espèces protégées et de gestion de la pêche sont des principales voies pour atténuer la mortalité de ces espèces menacées en Méditerranée et arriver à l'objectif de conservation.

Figure 2: Tortue luth échouée sur la plage Rouiisse Jebha (Photo: Y. Ahannach).

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The Turtleman

A film by Jigar Ganatra

AFRISOS, Kilimanjaro, Tanzania

Click here to watch the film on YouTube.

Film synopsis: Nassoro was born on Juani Island, the Eastern-most island in Tanzania. Nassoro spent a lot of his childhood walking with his father on the beach where he would often see turtles coming to lay their eggs. At that time, it was common to take the eggs and eat them as well as to poach the turtles. The turtles were becoming critically endangered due to this. Like every other man on Juani, Nassoro became a fisherman when he turned 16. After nearly drowning twice while fishing, his father urged him never to fish again. He got some capital from his father to invest in a business instead, which Nassoro used to buy a trading boat. Unfortunately, that too sank, which left him totally devastated. With no money, ambition, or hope, Nassoro thought of ending his life. While walking along the beaches one day, he saw some turtles hatching and felt a connection to them. The turtles restored his purpose in life. He spends hours every day patrolling the beaches and over the course of the last 21 years working with the NGO Sea Sense, he has single-handedly helped 209,174 turtles reach the sea.

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Rapport/Report

7ème conférence Méditerranéenne sur les tortues marines

7th Mediterranean Conference on Marine Turtles 18-21 Octobre 2022, Dream's Hotel, Tetouan, Maroc www.7medconf.atomm.net

Mustapha Aksissou & Wafae Benhardouze

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Du 18 au 21 octobre 2022, l'Université Abdelmalek Essaâdi - UAE, la Faculté des sciences de Tétouan, le Département de Biologie, le Laboratoire Ecologie, Systématique, Conservation de la Biodiversité (LESCB) et l'Association de Protection des Tortues Marines au Maroc (ATOMM) ont organisé la 7ième conférence Méditerranéenne sur les tortues marines. Depuis la première édition en 2001, cette conférence a été soutenue par l'UNEP, MAP-RAC/SPA, la Convention de Berne, la Convention for Migratory Species et cette année aussi par le US Fish and Wildlife Service.

Cet événement a eu lieu dans la ville de Tétouan sur la côte de la Méditerranée occidentale Marocaine, l'un des habitats d'alimentation et de migration les plus importants pour les tortues marines de la Méditerranée.

Les travaux de ce congrès international s'inscrivent dans le cadre des objectifs de développement durable (les ODD), en perspective de la participation du Maroc aux échéances régionales et internationales en rapport avec le suivi de l'agenda 2030 pour le développement durable.

Dans ce cadre, l'accueil de cet évènement international au niveau de l'Université Abdelmalek Essaâdi (UAE) et la province de Tétouan a un effet notable sur la promotion de la participation du Maroc en tant que pays leader dans l'engagement vis-à-vis des compromis internationaux sur le plan de développement durable et la lutte contre les changements climatiques. Localement, cet évènement, reflète l'importance des efforts octroyés par l'UAE et la Faculté des sciences de Tétouan dans le processus d'accompagnement des actions et projets encadrés par les ODD.

Plus de 170 personnes ont participé à cet évènement: experts, chercheurs, étudiants, professionnels, etc., venant de 24 pays de 4 continents. Il s'agit du 7ème Congrès à caractère international visant l'inter-échange scientifique, la sensibilisation écologique des acteurs et de la population, ainsi que l'engagement des pays, vis-à-vis de l'importance de la conservation de la biodiversité marine, concrètement la conservation des Tortues au niveau de la Méditerranée.

Cet évènement à caractère scientifique et écologique, a sans doute permis de renforcer les liens de collaboration régionale et internationale, entre les différents acteurs et pays participants et ayant comme objectif principal, la conservation de la biodiversité marine après la pandémie Covid-19.

Elle a permis de donner aux scientifiques et aux écologistes spécialistes des tortues marines travaillant en Méditerranée, l'opportunité de partager les connaissances scientifiques et techniques les plus récentes et l'expérience de gestion, sur les questions de conservation et de biologie des tortues marines en Méditerranée. Elle permet également à fournir une plateforme pour sensibiliser les décideurs et le grand public aux problèmes les plus urgents auxquels sont confrontées les tortues marines dans la région méditerranéenne.

D'autre part, cet évènement participe à la promotion touristique de la ville de Tétouan qui est une des destinations touristiques les plus célèbres du Maroc, avec un patrimoine historique et culturel diversifié. Elle est considérée comme la ville la plus andalouse du Maroc. Déclarée site du patrimoine mondial par l'UNESCO, la région contient de beaux paysages et monuments historiques. Le logo de la 7ième conférence avec la carte de la méditerranée, symbolise la tortue marine au centre de la Méditerranée, la ville de Tetouan par une étoile et l'histoire commune des peuples méditerranéens, ainsi que nos efforts contemporains visant la conservation des tortues marines et du milieu marin en général.

Les activités programmées lors de cet évènement sont riches et diversifiées: 38 communications orales, 5 ateliers, 112 posters, 3 réunions et la table ronde pour conclusion et recommandations. Le dernier jour est réservé à la sortie de terrain au village de pêche de Belyounech et son projet d'aire marine protégée.

L'évènement a organisé aussi les élections du Président de la 8ème conférence méditerranéenne sur les tortues marines. Ainsi, le programme est clôturé par le dîner de gala au Place Bricha, distribution des prix et certificats, et l'annonce des résultats de vote du Président de la 8ème conférence (Aliki Panagopoulou de Grèce) et le rendez-vous pour la prochaine conférence qui aura lieu en 2025.

Participants au 7th Mediterranean Conference on Marine Turtles (18-21 Octobre 2021, Dream's Hotel, Tetouan, Maroc).

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Remembering Francis Jusu Tucker

Edward Aruna

Reptile and Amphibian Program – Sierra Leone

Photo: M. Tiwari

Mr. Francis Jusu Tucker, fondly known as "Jay U," died after a sudden heart attack on 15 October 2022. He was a founding member of the Marine Turtle Conservation Program in Sierra Leone and started his task in a dugout canoe in 2007. Having realized his competence at braving the sea between islands in the Turtle and Sherbro Islands in Sierra Leone, the Marine Turtle Conservation Program secured a speedboat and appointed Jay U as the boatman.

Jay U was an honest and loyal staff member who always put smiles on the faces of all the staff and visitors. His confidence in manning the speedboat during rough seas always left both staff and visitors amazed. Being a quick learner, Jay U was able to fix most engine problems both at sea and on the islands, so no one was worried about a breakdown at sea with him because if it did happen, he would still paddle his way back to any nearby harbor or place a call for rescue.

Jay U always ensured that any turtle brought to land under his watch was released back to sea and the necessary data were collected. He was no friend to people who tried to disobey the laws protecting wildlife in Sierra Leone. His years with RAP-SL took him to an unimaginable level in nature conservation and he had no fear in taking marine turtle issues to the highest authorities within his immediate reach.

RAP-SL, marine turtles, and other species of threatened and endangered species have lost another hero. Live on Jay U, may your Soul Rest in Perfect Peace.

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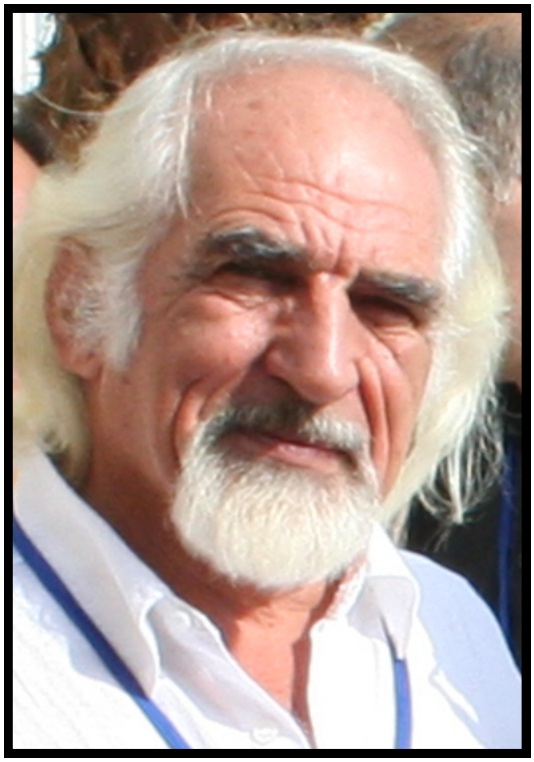
Remembering Andreas Demetropoulos

Mohamed N. Bradai

Institut National des Sciences et Technologies de la Mer, Tunisia



With great sadness we lost one of our most committed ecologists and environmentalists fighting for sea turtle species' conservation in the Mediterranean Sea. Andreas Demetropoulos was born in Nicosia in 1938 and he passed away on 5 November 2022 at the age of 84.

Andreas studied Marine Biology and Oceanography at the University College of North Wales, Bangor. He was the former Director of the fisheries department and the Head of the Cyprus Wildlife Society.

He is well known for his work on sea turtle conservation in Cyprus, where, together with Myroula Hadjichristoforou, he started the first research on sea turtle nests on the beaches of Lara and Toxeftra in the Akamas Peninsula at the end of the '70s and pioneered the protection of the marine environment and the conservation of wildlife in Cyprus. He was listed in the "Global 500 Roll of Honour" in 1988 for his research in sea turtle conservation.

Andreas was a key figure also on the regional scene with his participation in the IUCN-MTSG and his active cooperation with the Barcelona Convention and the Bern Convention for sea turtle conservation. As a specialist for the United Nations Environment Programme / Mediterranean Action Plan, Regional Activity Centre / Specially Protected Areas and for the other conventions, he made Lara nesting beach a ground for training new Mediterranean researchers on how to monitor nesting beaches. The majority of researchers on marine turtles, mainly the older generation, passed by Lara.

He published many papers and books on fishery development, the marine environment, and turtles. His main document remains the Manual published in 1995 used even now by scientists in the field.

For us, he was a great teacher, excellent partner, and good friend. As Dimitris Margaritoulis said, "we will miss his wisdom, humour, realism, and his determined spirit that surpassed bureaucracy and other impediments to sea turtle conservation."

Our deepest condolences to Andreas' family, particularly Myroula and Simone, and turtle friends.

Andreas Demetropoulos in the 3rd Med Conference 20 – 23 October 2008 in Yasmine Hammamet (Tunisia).

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