



AFRICAN SEA TURTLE NEWSLETTER



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Conservation dog, Karetta, is trained to detect turtle meat and poached turtle remains on Boa Vista Island, Cabo Verde.

ISSN 2373-1575

No. **17** 2021

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Wildlife Conservation Dogs Used in Sea Turtle Protection on Boa Vista Island, Cabo Verde

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Dogs' special ability to detect and distinguish scents has made them very valuable in search work across a variety of different fields. Compared to other scent detecting instruments, a dog's nose is reliable even when molecules from other odors may interfere and when odors are present in minute amounts (Lesniak *et al.* 2008). Although they were first used in conservation over a century ago, it is only recently that conservation dogs have become popular (Beebe *et al.* 2016). Traditionally, conservation dogs are used to search for rare species and their scat, or diseases and pathogens (Beebe *et al.* 2016). Dogs that are used to detect contraband items such as poached animal parts or for tracking in police settings are known as wildlife dogs (Hurt and Smith 2009).

Fundação Tartaruga has explored the use of wildlife dogs and has created a special dog team that provides technical support to law enforcement to reduce sea turtle poaching on the island of Boa Vista, Cabo Verde. For this, the dogs are being trained to track and identify suspects and sniff out evidence that may lead to the arrest of active poachers.



Kelo with his handler Carlos Monteiro during mantrailing training (Photo: Marcel Maierhofer).

The dogs and their handlers are receiving training and support from world-renowned dog trainer and consultant, Marcel Maierhofer (<http://www.mantrailing24.de>), who has trained other wildlife conservation dog teams such as those of Virunga National Park in the Democratic Republic of Congo. The dog team will have two major tasks: mantrailing and searching. During mantrailing, the dogs are taught to track the scent of people using articles that they have worn or touched. A dog's nose is a very powerful tool that can create a scent profile for each individual and follow the trail of scent that a person leaves behind (Woidtke 2016). Dogs are

also said to “smell time” as they can determine the freshest trails and can detect the sequence of people who touched an item (M. Maierhofer, *personal communication*). Once training is completed, we will be able to use mantrailing to gather leads as to a suspect’s whereabouts and identify people of interest for further investigation by the police. Searching involves familiarizing the dogs with the scent of target items and training them to indicate the presence of those items to their handlers upon detection. Our dogs are trained to search for turtle meat and eggs to help law enforcement collect proof of poaching. With the help of their sensitive noses, the dogs will reduce investigation time and increase confidence in the outcome of searches. The island’s national police have already expressed interest in having our dogs help them carry out routine searches for contraband at the airport and shipping port.



*Karetta’s training at the airport to detect turtle meat hidden in luggage.
Photo: Jose Luis Rodrigues.*

The original dog team consisted of a brother and sister pair of Labrador Retrievers named Kelo and Karetta I. They were born four years ago in Slovakia and received training in Switzerland for the first couple of years of their life before travelling to their new home on Boa Vista in 2019. Their names are special because they are derived from the Latin names of the two most common sea turtle species found in Cabo Verde: Kelo comes from “*Chelonia mydas*” or Green turtle, and Karetta from “*Caretta caretta*” or Loggerhead turtle. After sustaining a leg injury that required surgery, Karetta I was returned to Switzerland where she remains with her first trainer. The dog team is now comprised of three dogs and their respective handlers. Kelo and his handler Carlos Monteiro practice higher level exercises than the other team members, because of the previous training that Kelo received, and their specialty is mantrailing. Kelo is an extremely friendly and calm dog that loves people, and especially children. Next to join the team was our one-year-old German Shepherd mix named Karetta II. She joined the team at only four months old as a namesake and replacement for Karetta I. Her breed is known for working as detection dogs and she has excelled in all her trainings. She works with Stephanie Butera (lead author of this article) and has quickly become the best at searching for turtle meat. Currently we are focusing on mantrailing exercises that push her to use her nose to follow the trail by slowly removing visual cues. Finally, we have Zeda, our six-year-old mixed breed who works with João Oliveira. She is our Director’s family dog, but she joined the team after showing interest in participating in trainings and because she is highly motivated to

please her handler. She began training as an adult, so she is still on a more basic level than her two teammates, but she loves working and has come a long way in a short time.

The training phase of the project was planned to be completed in time for the 2021 nesting season, however due to the COVID-19 pandemic that made it impossible for Marcel Maierhofer to travel to the island, the training was interrupted. After struggling to advance through virtual training sessions, Marcel Maierhofer was finally able to visit in September 2021 and the training process has resumed. Despite still learning their role, the dog team spent the two previous nesting seasons living in one of our research camps on the beach of Boa Esperança, located on the northern coast of the island. There they support staff and volunteers with patrolling the beaches at night to deter poachers and they continue their training during the day. During the off-season, the dogs live in the town of Sal Rei where they are always cared for by their handlers, and they travel all over the island for training so that they get accustomed to all types of working environments.



*The dog team (left) and the drone team (right) with trainer Marcel Maierhofer (middle).
Photo: Fundação Tartaruga*

Apart from continuous training, the team also uses the off-season to educate communities about our work and more broadly about sea turtles and environmental conservation. We organize events with schools and bring Kelo along to demonstrate his skills to the children. Kelo really captures the attention of children, which allows us to have important discussions about conservation while they pet and cuddle him. Since consuming sea turtle meat is a tradition in parts of Cabo Verde, it is important that we educate communities about the value of turtles as living organisms and about alternatives that are available to them.

The dog unit is an important part of a larger team that delivers technical assistance and information to the national police and the Protected Area management. The team consists of two special units: dog and drone, but all members are trained to work on the ground in pursuit of evidence and information. The drones are equipped with a thermal camera that allows us to patrol the beaches at night and record footage that we can hand over to the police (Reischig *et al.* 2018). The key to our success is teamwork and effective communication. Despite being specialists in their own fields, the dog and drone units must bring their talents together to work towards a common goal: to help reduce sea turtle poaching to a minimum on the island of Boa Vista. Since the team's conception in 2017, there has been a drastic reduction in poaching on

the island, largely due to the deterrent effect of constant surveillance and a change in national law that can put poachers in jail if caught. Our dog and drone team is one of a kind and we hope to set an example for what is possible for conservation.



Kelo with his handler, Carlos Monteiro, enjoying the attention from children during a school visit. Photo: Stephanie Butera.

During a weeklong intensive training with Marcel Maierhofer in November 2021, the dog team made steps forward in mantrailing and search training and the whole team learned and practiced various nighttime surveillance techniques. We were also taught best practices for documenting information and evidence and preserving poaching scenes for police investigation. One of the first and most important decisions that the team must make when arriving at the scene of a crime is whether it is worthwhile to search the area and track the suspect or to concentrate on preserving the scene and gathering information. Our focus as a team is to provide the police with evidence leading to the identity of a suspect so that they can make a case for their arrest. The ability to make good decisions quickly and under pressure is key and is the focus of the team, along with working as a cohesive unit, as we train and get ready for the up-coming nesting season.

Thanks to the generosity of partners and donors, this year the dog and drone teams received technical equipment and materials that will facilitate work and increase the efficiency of the surveillance unit. While MAVA and PPI supported the salaries and training expenses of the team, BIOPAMA provided us with funding to buy two cars that are used for surveillance of Boa Vista's beaches on a nightly basis, and two pairs of night vision binoculars that have been added to the arsenal of tools that we can use to secure our advantage over poachers. Used in conjunction, dogs, drones, and radios for constant communication of information between the teams, we can effectively secure the beaches and confidently determine the presence or absence of potential poachers. Each member of the team has also been provided a uniform and a cell phone that increases productivity and gives an aura of professionalism that is undeniable.

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Macroplastic Ingestion by Loggerhead Turtles on the Island of Maio, Cabo Verde

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Plastics are considered a “planetary boundary threat” (Villarrubia-Gómez *et al.* 2018) and one of the most obvious human impacts of the Anthropocene (Zalasiewicz *et al.* 2020; Novillo-Sanjuan *et al.* 2021). Between 1950 and 2015, the total annual global production of plastic grew from 1.5 million to 299 million tonnes (Nelms *et al.* 2016). As a consequence, their abundance and spatial distribution have increased, both on land and in the sea (Barnes *et al.* 2009; Jambeck *et al.* 2015). The majority comes from land-based sources such as landfills and from human activities such as fishing and recreation (Derraik 2002; Barnes *et al.* 2009; Do Sul *et al.* 2011). This debris has affected a wide range of marine life, from microscopic zooplankton to large vertebrates (Laist 1997; Wabnitz and Nichols 2010), including sea turtles (McCauley and Bjorndal 1999; Tomás *et al.* 2002). Several species of sea turtle have been recorded with macroplastics in their digestive tracts (Schuyler *et al.* 2012; Nelms *et al.* 2016; Lynch 2018), which they actively ingested during feeding, perhaps mistaking it for food (Hoarau *et al.* 2014; Fukuoka *et al.* 2016). The effects of ingesting plastic can be lethal or sublethal (Schuyler *et al.* 2014; Gall and Thompson 2015) due to blockage or rupture of the intestinal wall (Derraik 2002, Santos *et al.* 2015), loss of sufficient nutrients for growth (McCauley and Bjorndal 1999; Tomás *et al.* 2002), and compromised reproductive success (Plot and Georges 2010). Assessing the impact of marine debris on the development, survival, health, and reproduction of sea turtles is highlighted as one of the global research priorities for these endangered marine reptiles (Hamann *et al.* 2010).

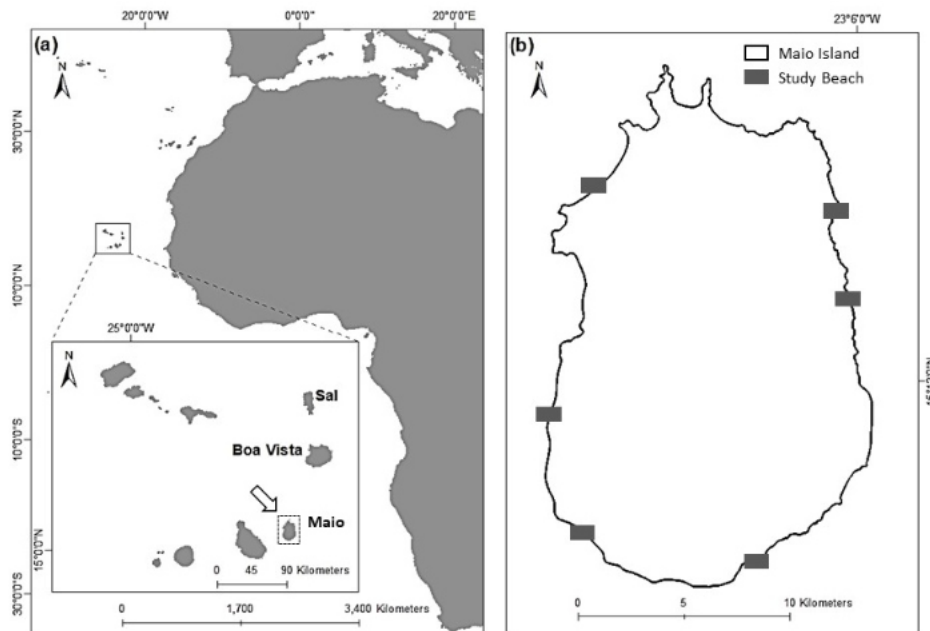


Figure 1. (a) Map of Cabo Verde; (b) Maio Island and the beaches where the stomach contents of naturally disorientated and dead breeding females were sampled.

Cabo Verde hosts one of the largest nesting rookeries of the loggerhead turtle, *Caretta caretta*, in the world (Patino-Martinez *et al.*, 2020), which is identified as a separate genetic stock (Monzón-Argüello *et al.* 2010; Wallace *et al.* 2010) and is threatened with extinction due to the effects of human development in its habitat over the past 50 years (Casale and Marco 2015). Conservation and protection programs for nesting females have been implemented nationwide

in the last decade, and have generated a high level of understanding as well as mitigation of hazards on nesting beaches. However, threats to turtles at sea are the least studied. This study aimed to identify, for the first time, one of several possible threats at sea, by looking at the ingestion of macroplastics by nesting females on Maio Island (15°12'N-23°6'W, Fig. 1).

Maio island hosted between 14,364 and 45,000 nests per year between 2018 and 2021. There are often accidental deaths of females that become disorientated and trapped in holes, mud, or rocks on the beaches. Dissecting the digestive tract of these females can provide important information on the ingestion of marine plastics. The stomachs of nine female loggerhead turtles, found dead from accidental disorientation, were dissected. The turtles were found on six different beaches on the island (Fig. 1), between July and September 2021. All had apparently good body condition (with mean carapace length of 79.5 cm \pm 2.98 SD and mean carapace width of 77.3 cm \pm 2.92 SD). Of the nine turtles sampled, six (66.7%) contained macroplastics (> 5mm) inside the stomach. About 83.3% (n=5) of the females had macroplastics from both domestic and fishery sources (Fig. 2), which varied between small pieces of transparent plastic bags, plastic cups (white colored) and fishing net ropes (green and brown colored). The remaining females (16.7%; n=1) contained pieces of buoys used in aquaculture (black colored).

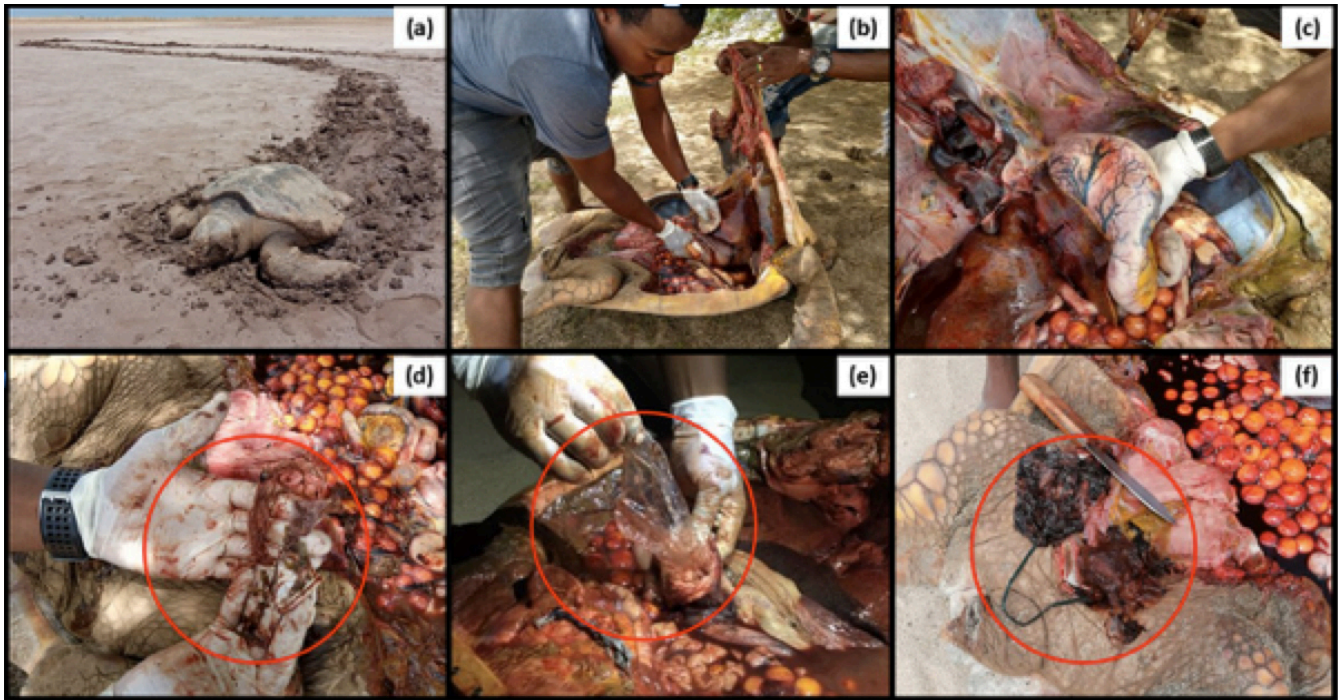


Figure 2. (a) A nesting female loggerhead turtle that died naturally through disorientation and dehydration in the sun; (b, c) dissection of the abdominal cavity and stomach of the female; (d, e, f); macroplastics found inside the stomach (pieces of plastic cups, transparent bags, and fishing rope). Photos: FMB.

All macroplastics recorded were flexible, had a mean length of 8.25 cm \pm 2.64 SD, and were found attached to the stomach wall with no food present. It is possible that more plastics were present in other parts of the gastrointestinal tract, which were not assessed (Poli *et al.* 2015; Clukey *et al.* 2017).

We have shown here for the first time that apparently healthy female loggerhead turtles nesting in Cabo Verde ingest macroplastics at sea. This indicates that poorly known feeding and migration areas of the loggerhead turtle in the Northeast Atlantic may be contaminated with marine plastics, which is a factor of concern (Lazar and Gračan 2011). Plastics are already being incorporated significantly into the food chain, affecting different species and

populations of sea turtles globally (Moon *et al.* 2021), which may result in possible lethal and sublethal effects to individuals (McCauley and Bjorndal 1999; Poli *et al.* 2015; Sala *et al.* 2021). This highlights an urgent need for further studies to assess the effects of plastic ingestion on the health and viability of sea turtle populations.

The authors would like to thank the following collaborators for their help with fieldwork: Herval Silva, Carla Fortes, Éder Dos Santos, Nídio Teixeira, José Santos, Mariana Parente, and Elisa Dierickx.

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The Women's Cooperative "Mawjat Belyounech" in Morocco: A Model for Women's Success in the Artisanal Fisheries Sector

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Artisanal fishing plays a very important role in poverty reduction (Derdabi and Aksissou 2021) and is responsible for almost half of the world's seafood catch. Alongside men, a large number of women are directly and indirectly involved (Mahjoub *et al.* 2021). Globally, women's fishing activities account for about 3 million tons of marine fish per year, with an estimated economic value of 5.6 billion dollars per year, corresponding to approximately 12% of the landed value of all artisanal fisheries catch (Harper *et al.* 2020). However, gender continues to be underestimated in policies, and its contribution thus remains insignificant as it does not appear in official statistics (Vunisea 2004).

In Morocco, artisanal fishing has long been dominated by men in the Atlantic and the Mediterranean (Derdabi and Aksissou 2021; Najih *et al.* 2015) and the participation of women remains limited and invisible. However, to integrate gender into decision-making policies, the Maritime Fisheries Department of Morocco has created a unit specializing in the gender approach and is committed to carrying out around ten projects aimed at the integration of women in the artisanal fishing sector (www.mpm.gov.ma 2019). This strategy has resulted in the creation of a dozen women's cooperatives across the country. Here, we will present the women's cooperative *Majwat Belyounech*, the first cooperative of women "fishermen" in Morocco.

History

The idea of creating a women's cooperative at the Belyounech fishing site came after a series of discussions among members of the M'diq Maritime Fisheries office, women who now form part of the cooperative, and the men's cooperative *Jbel Moussa*. At these meetings it became clear that the majority of women have a direct link with the sea and often accompany a member of their family during fishing operations. Many of these women help their husbands or family members repair nets and set up hooks. This led to the creation of a women's cooperative, thereby transforming the work they do at home into an official activity.

The first step was the creation of a women's unit consisting of 5 women within the men's cooperative. This event took place on 17 January 2019, and was attended by representatives of the M'diq Maritime Fisheries office, representatives of the bilateral cooperation service, the gender approach service of the Department of Maritime Fisheries, representatives of the Larache Institute of Fisheries Technology, and representative of the Japanese international cooperation agency (JICA). On 8 March 2019, and on the occasion of World Women's Day, the women's cooperative was created and named "Cooperative Mawjat Belyounech".

Trainings

The first training of 22 women from the cooperative took place from 4-8 March 2019 and included the mending of nets and the assembly of hooks, communication and conflict management, good seafood hygiene practices, coordination with state authorities, and promotion of seafood for local economic development. The training was conducted by the Department of Marine Fisheries in collaboration with JICA and trainers from the Larache Institute of Fisheries Technology.



Ceremony to launch the women's cooperative "Mawjat Belyounech" (Photo: Dardabi).



Learning to mend nets (Photo: Dardabi).



Women's discussions with trainers (Photo: Dardabi).

A second training about the evaluation of seafood products took place from 16-20 July 2019. During this training, participants learned about the different protocols for manufacturing and processing of seafood products, from the receipt of raw material to storage, including filleting, marinating, etc. The participants then tested their new skills under the supervision of specialized trainers.

From 27-29 August 2019, members of the cooperative once again benefitted from training on net mending organized by the FAO.



Training to evaluate seafood products (Photo: Derdabi).

Fishing activities

In November 2019, seven women from the cooperative went on their first trip to sea as "professional fishermen" and also benefitted from a 3-day training on navigation and safety. This initiative was received very positively both nationally and internationally and was covered by several TV channels and the media.



The seven women who went on their first fishing trip (Photo: Derdabi).

At the local level, this initiative was also supported by local fishermen who did not hesitate to provide all the help necessary to ensure that these trips ran smoothly at sea.

Additional activities

Parallel to their fishing activities, these women also carry out ancillary activities related to recycling and reuse. They make decorative paintings using ropes, wooden trunks, seashells, worms, etc., which they themselves have collected.

Analysis and recommendations

The women's fishing cooperative *Mawjat Belyounech* highlights the importance of women in the artisanal fishing sector. The members of this cooperative were able to acquire a lot of knowledge and enrich their know-how through the various training courses provided.

The activities carried out by these women, with so little means and technical capacity, show to what extent these women are capable of promoting female leadership. This determination and success will undoubtedly encourage other women to follow suit and enter the field of artisanal fishing.



Women fishing (Photo: Derdabi).

This will strengthen the position of women in the field and allow them to have a more active role in decision-making and in the fight against discrimination.

For its part, the Moroccan State, through its Department of Maritime Fisheries, must work to ensure that gender considerations take priority at all political levels and in fisheries management strategies. Gender equality, as stipulated by the United Nations Sustainable Development Goal #5 (<https://sdgs.un.org/goals/goal5>), must be a priority in order to ensure the equitable integration of women in the artisanal fisheries sector. Official statistics should be disaggregated by sex and the activities carried out by women should be well documented and recorded.



Women's ancillary activities (Photo: Derdabi).

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A Movement to Prevent Ocean Pollution

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On World Sea Turtle Day this year (16 June 2021), the Institute of Biodiversity and Protected Areas Dr. Alfredo Simão da Silva (IBAP) in Guinea Bissau and its national and international partners – Palmeirinha and Programa Tatô, respectively – once again celebrated and highlighted the importance of sea turtle conservation and their habitats in Guinea Bissau and globally.

For more than 15 years IBAP has been the leading organization for sea turtle conservation actions in Guinea Bissau particularly in the Protected Areas, and Palmeirinha has dedicated its efforts towards awareness and environmental education in local communities. Programa Tatô is an international organization that leads sea turtle conservation efforts on São Tomé Island, but is also responsible for building the capacity of Guinean actors – IBAP and Palmeirinha – in sea turtle conservation techniques, environmental awareness and education strategies, and environmental communication tools that raise awareness about sea turtles conservation in the local communities.

Sharing of knowledge and experiences between people committed to conservation actions is probably one of the best tools to build capacity, improve motivation, strengthen communication, and explore new approaches and collaborations that can benefit a common conservation goal. This year – as part of the “Tartaruga, Nô Okinka di Mar” (Sea Turtle, Our Queen of the Sea) awareness campaign implemented in 2018 – the objective was to raise awareness about the impact of waste disposal on the marine environment in Guinea Bissau and how it affects sea turtles and public health. This initiative could not have been successful without the participation of several organizations, and their engagement was absolutely incredible, resulting in a movement to fight against marine pollution. With the precious support of more than 200 volunteers from 25 Guinean civil society organizations, more than 7 tons of trash was collected at three fishing ports in the city of Bissau and on the island of Bubaque.



Collection of inorganic garbage from fishing ports in the city of Bissau and the island of Bubaque (Photo: Programa Tatô, Palmeirinha and IBAP).



Transformation of the garbage collected into a sea turtle (Photo: Programa Tatô, Palmeirinha and IBAP).

As part of the intercultural exchange, a Brazilian artist, Eduardo Rodrigues, who creates replicas of various species with several conservation projects in Brazil, was invited to participate. Eduardo Rodrigues, together with several local artists, transformed some of the garbage collected into art.

While one group was collecting garbage and simultaneously raising awareness, another group was learning to reuse the collected garbage and transform it into art. A mural was built for sea turtles and ocean conservation with the slogan: “Ermon, lixo ta dana nô vida, fassi bu parti” (Brother, garbage is destroying our life, do your part).

This event was a very effective strategy to promote the socioeconomic and environmental importance of the ocean; to reinforce public awareness about Guinea Bissau’s coastal areas; to train and involve young local artists; and to engage other civil society organizations in environmental conservation.



Mural built with the awareness campaign logo “Tartaruga, Nô Okinka di Mar” (Sea Turtle, Our Queen of the Sea) and the slogan of this year’s activity: “Ermon, lixo ta dana nô vida, fassi bu parti” (Brother, garbage is destroying our life, do your part) Photo: Programa Tatô, Palmeirinha and IBAP.

Acknowledgments: We would like to thank Eduardo Rodrigues for accepting the challenge and joining us in Guinea Bissau and for his amazing work. We also would like to thank the following organizations who voluntarily participated in this activity: Homem Novo; Núcleo Social Rasta Turpesa (NSRT); Amigos do Ambiente; Clube Agenda XXI; Nô Rapada Ambiente na Guiné-Bissau; Associação de Jovens para Proteção do Meio Ambiente e Afins (AJPA); Associação Juvenil dos Técnicos Artistas Profissional (AJUTAP); Corpo Nacional de Escuta (Movimento nº1); AJPS; Associação Nindjon; Rede dos Professores Ambientalistas de Bubaque; Konhenguena; and National Security Forces. We would like to thank MAVA Foundation and PRCM for funding these activities.

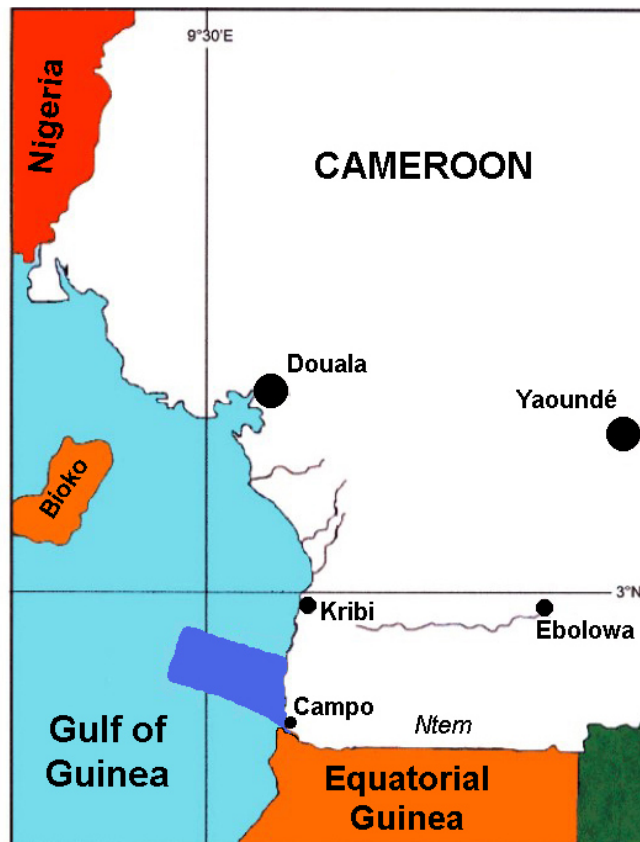


Good news from Cameroon: The First Marine National Park!

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The Prime Minister of Cameroon, His Excellency Joseph Dion Ngute, recently (July 2021) signed the Decree 2021/4804/PM and created the Manyange na Elombo Campo National Marine Park.



*Location of the Marine National Park
(blue rectangle) in the Gulf of Guinea.*

The French NGO, Chélonée, provided technical assistance to Cameroon's Ministry of Forests and Fauna (MINFOF) for 18 years and helped create this vast Marine Protected Area. This Decree is a great victory!

The Marine Park is 110,300 ha, with a buffer zone of 3,400 ha on the terrestrial side that is 350 m wide and reserved for community activities. It extends 44 km out to sea in the direction of Bioko Island. At its southern end, it meets the Ntem River and joins the Campo-Ma'an National Park.

This vast Marine Park, the first of its kind in Cameroon, will be the fifth largest in West Africa. It aims to prevent trawlers from entering this area, which is important for the reproduction of several cetaceans, manatees, and marine turtles (olive ridleys, leatherbacks, green turtles). These coasts, rich in seagrass, corals, and mangroves, provide feeding and developmental

habitats for young hawksbills, green turtles, and possibly olive ridleys (which is unusual). Olive ridleys nest on these beaches as well as a few leatherbacks and green turtles.



Through more permanent support, this Decree will allow for improved conservation of nesting beaches and marine habitats. This Marine National Park will also protect the Iyassa and Pygmy Bagyeli cultures — threatened by rapid modernization and a nearby commercial port — by bringing them new resources (revival of smoked fish, ecotourism, employment as nature guides, etc.). The terrestrial section of the Park includes sacred sites, which will also be protected.

The next step, with the Ministry of Forests and Fauna, will be to combine two nearby Cameroonian National Parks with the Rio Campo Reserve in Equatorial Guinea into a single large transboundary complex.

*A departing green turtle in front of the sacred Manyange rock shaped like a turtle.
Photo: J. Fretey*



Bekolobe nesting beach (Photo: J. Fretey).



Publications from Africa in 2021

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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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This newsletter is supported by

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