

NOTE BRÈVE

DIVERSITY AND DISTRIBUTION OF SEA TURTLES IN THE NIGER DELTA, NIGERIA

Godfrey C. AKANI¹ & Luca LUISELLI²

RÉSUMÉ. — *Diversité et distribution des tortues marines dans le delta du Niger, Nigeria.* — Des recherches ont été conduites en 2007 et 2008 le long de la côte du delta du Niger (Nigeria) sur la diversité et la distribution des tortues marines. Cinq espèces ont été identifiées comme visitant les côtes nigérianes, en particulier les plages sableuses d’Akassa, Brass, Bonny et Andoni. *Chelonia mydas* fut l’espèce la plus communément rencontrée; *Lepidochelys olivacea* et *Dermochelys coriacea* se sont avérées répandues dans toutes les stations inventoriées. En revanche *Eretmochelys imbricata* et *Caretta caretta* n’ont que très occasionnellement été rencontrées. Les eaux nigérianes peuvent constituer des zones importantes pour la conservation des tortues marines, plus particulièrement pour *Dermochelys coriacea*, mais des études plus détaillées sont nécessaires pour mieux évaluer l’abondance de ces espèces.

Sea turtles research has extensively been conducted in various parts of the world, and particularly in the West Atlantic Coasts and the Caribbean Islands where large numbers of individuals are recorded (e.g., Davis, 2005; Godfrey & Godley, 2008 for two recent papers among the hundreds published). Sea turtle study on the Atlantic coast of Africa commenced far back in the late 1950s (Carr, 1957; Carr & Hirth, 1962), and has recently begun also in the Gulf of Guinea, West Africa (e.g., Carr & Carr, 1991; Fretey, 2001; Catry *et al.*, 2002; Formia *et al.*, 2008). In this part of the continent, a West Africa Turtle Conservation Network (WASTCON) has recently been established, with the aim of taking charge of coordination of sea turtle research for the region situated in-between Sierra Leone and Nigeria (Formia *et al.*, 2008). These coordinated research efforts have demonstrated that, as far as Nigerian coastal waters (i.e., Bights of Benin and Bonny) are concerned, five out of eight species of sea turtles of the world (Margues, 1990) have been reported to occur (Powell, 1995; NDES, 1998), namely the Loggerhead, *Caretta caretta*, the Green turtle, *Chelonia mydas*, the Hawksbill turtle, *Eretmochelys imbricata*, the Olive Ridley, *Lepidochelys olivacea* and the Leatherback, *Dermochelys coriacea*. However, the ecology, abundance and distribution of these species in Nigeria remain entirely unknown, as well as their status and conservation concerns. Furthermore, as in many parts of the world, sea turtles are hunted in this sector of Africa for their meat, eggs, carapace

¹ Department of Applied and Environmental Biology, Rivers State University of Science and Technology, P.M.B. 5080. Port Harcourt, Nigeria. E-mail: gakanina2000@yahoo.com

² Center of Environmental Studies, DEMETRA s.r.l., Via Olona 7. I-00198 Rome, Italy. E-mail: lucamlu@tin.it

used for decoration and art work (Hilterman & Goverse, 2005), and because they may also be used for traditional medicine, including e.g. the treatment of rheumatism, earache, and sore throat (Begossi, 1992; Costa-Neto, 2001; Seixas & Begossi, 2001; Alves, 2006; Formia *et al.*, 2008).

During the last 15 years, we have accurately studied the ecology of reptiles of the Niger Delta region, southern Nigeria (e.g., Luiselli *et al.*, 1998, 1999, 2002, 2006; Akani *et al.*, 1999), and in order to perform these long-term studies we surveyed a large number of sites along the Atlantic coast of Nigeria. In several instances we opportunistically collected data and information concerning the sea turtles, although we never focused our research efforts on these marine chelonians. In this note, we collate much of the information obtained on these animals during the last years of field studies in the hope to improve the scanty knowledge on the biology of these animals in this part of Africa.

MATERIALS AND METHODS

STUDY AREA

The work was carried out mainly at four stations in the coastal barrier islands of the Niger Delta, where sea turtles are known by local people to visit the beaches. These sites were Akassa and Brass (Bayelsa State) and Bonny and Andoni (Rivers State) (Fig. 1). All sampling areas lie below latitude $4^{\circ} 30' N$, are characterized by broad, white sandy beaches, ranging between 100 to 350 m wide at the lowest tide, with ridges rising some 4 m above the sea (NDES, 1998). The beach and sand ridge soils are composed of very coarse sands which suffer from excessive drainage and are prone to desiccation during dry weather spell (NDES, 1998). All study sites have equatorial climatic condition, essentially warm and wet; they experience windy spells and strong storms especially during rainy season, causing coastal erosion. The fringing vegetation behind the sand bars and levees is often a mosaic of pockets of freshwater swamps and mangrove swamps, co-dominated by *Rhizophora* sp., *Laguncularia* sp., *Avicennia* sp., and *Pandanus candelabrum*. At intervals along the coast, especially around Bonny and Brass, little canals of 3-5 m lead dark brown water from the freshwater swamps into the ocean. It is important to remark that one of our study sites, Bonny, is one of the most important coastal sites for oil and gas industry in the Niger Delta, which is the most productive oil area of the African continent (De Montclos, 1984).

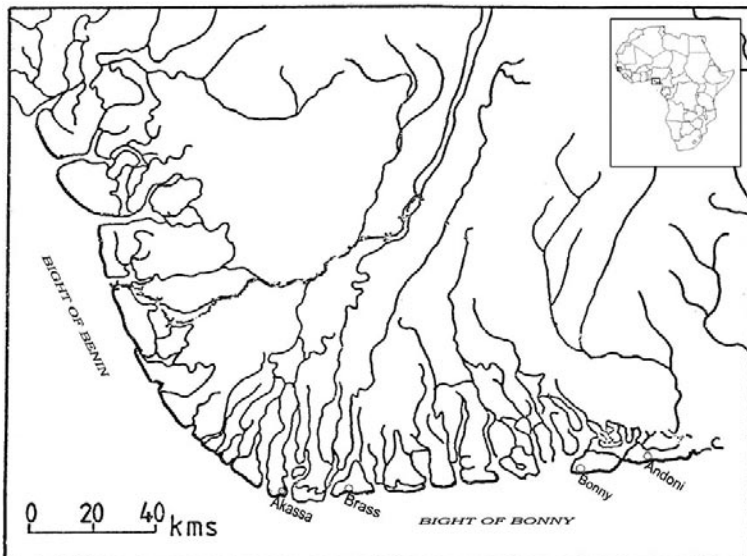


Figure 1. — Localities surveyed for sea turtles in the Niger Delta (Nigeria).

SAMPLING PROTOCOL

The study is based on data collected between 2005 and 2008, in the course of our herpetological surveys of the Coastal barrier islands of the Niger Delta basin (Akani & Luiselli, in prep.) and as part of a series of Environmental Impact Assessment (EIA) projects conducted by some oil companies and environmental/biodiversity conservation organizations (e.g. Niger Delta Wetland Centre; Fugro Consultants Nigeria Limited, Nigerian Agip Oil Company Ltd., etc.). Two types of data were acquired during field surveys: (i) dealers landings (McDaniel *et al.*, 2000) and (ii) direct field search for strandings (dead turtles washed ashore, carapace) and nests. At fishing settlements of Andoni, Bonny, Brass and Akassa, we interacted with artisanal fishermen who use trawlers and long-line to fish. In the process, we examined the turtles/carapace in their store and interviewed them on the mode of capture, site of capture, time, and cultural uses of turtles in the area. These data were completed also by additional information which was acquired through 50 structured questionnaires per station (see Tab. I) distributed to enlightened members of the society including teachers, students, traders, etc. On each trip, which lasted 4-7 days, we walked 5-10km along the beaches, recording by GPS all exact sites where sea turtle remains (nests, shells of died animals, etc.) were observed. In each site we also assessed on a qualitative basis the anthropogenic activities going on there.

TABLE I

Structured questionnaire distributed at each station, during the survey

Questions	Comment / Options	Reason
1. Have you ever sighted a sea turtle in this area before?	Yes / No	Experience of the respondent
2. Where precisely did you see it?	In the sea On the beach Behind the beach In the market	Habitat
3. When did you see it or when are sea turtles commonly seen here?	Time (morning, afternoon, evening, night) Month of the Year	Activity peak Spawning season
4. What was it doing when you saw it?	Nesting / laying egg Crawling from the beach towards the sea Moving towards the beach	Spawning/ post-spawning return to sea. About to lay eggs
5. If you saw it laying eggs, about how many eggs did you count?	-	Confirmation of spawning
6. How many kinds of sea turtles can you distinguish, which visit this beach?	Describe each type you have seen	Species diversity
7. How do people here see sea turtles?	Source of tasty meat Totem	Cultural value / threat factor?
8. Of what use are turtle carapaces in your locality?	Juju worship Musical instrument Town-crying	Cultural value
9. What is the cost price range for a carapace?	-	Threat factor
10. Do you know of any organization making efforts to protect sea turtles in this locality?	-	Conservation promotion
11. Comment freely on your knowledge of sea turtles in this area	-	More information

RESULTS AND DISCUSSION

For practical reasons, in the following text we present data divided by study area. Overall, we observed a total sample of 89 marine turtles during the present project. This total number of individuals, divided by species and by area, is given in Table II. The sample observed showed an uneven distribution by species (χ^2 test, $P < 0.05$), with *Chelonia mydas* being the most frequently observed species.

TABLE II

Diversity and numerical abundance of sea turtle recorded at the sampled stations

Species	Andoni	Bonny	Brass	Akassa	Total
<i>Chelonia mydas</i>	11	5	14	19	49
<i>Dermochelys coriacea</i>	7	1	9	5	22
<i>Leptochelys olivacea</i>	4	-	3	8	15
<i>Eretmochelys imbricata</i>	-	-	2	-	2
<i>Caretta caretta</i>	-	1	-	-	1
Total	22	7	28	32	89

Andoni. - At Andoni we observed that sea turtles were caught by fishermen using long-line and drift net and gillnet. The catches were relatively common during the last years (2007-2008). A total of 15 dead turtles ready to be butchered and 7 carapaces were examined during the period. From this sample, it appeared that *Chelonia mydas* was dominant, followed by *Dermochelys coriacea* and *Leptochelys olivacea* (Tab. II). Fishermen also reported having encountered sea turtle eggs (species unknown) on the edges of the sandy beaches. There was no evidence of sea turtle cultural conservation in the place.

Bonny. - Sea turtle catch in Bonny was reported to be very occasional, compared to other stations. Only 7 specimens were found during the survey period, which consisted of three species, i.e. *Chelonia mydas*, *Dermochelys coriacea*, and *Caretta caretta* (Tab. II). This low number of individuals seen may depend on the strong industry development of this site (especially for the works of the Nigerian liquefied natural gas project, LNG), and indeed fishermen indicated that before the establishment of oil and gas companies in Bonny, sea turtles and their eggs were more frequently encountered than now, along the sandy beaches. Disturbance along the beaches due to increased traffic by LNG workers and working activities, producing a great lighting at night, and also gas flaring by oil and gas companies, laying of pipelines, seismic operations, etc. could be the reason for the drop in turtle visit experienced at Bonny.

Brass. - In Brass, the turtles are caught as bycatch with various nets (especially those of 45 cm mesh size, locally called "stroke" or 8-finger net). Most catches were taken in the months of June / July, and over 80 % of the captured turtles were egg-laying females. The large proportion of the captured females bearing eggs at this period would suggest that this is their spawning season. Female turtles oviposited regularly at Brass Island during the recent years: the fishermen in the area captured them consecutively in 2005, 2006, 2007, and 2008. On two occasions, one of the fishermen reported he had captured sea turtles with forelimb marked with stainless metallic rings with engraving he could not interpret. He remembered that one of these rings had the inscription '78' in it. Obviously these should be marked animals from projects studying the migratory routes and biology of sea turtles. It is unfortunate that we could not get more details of these tagged specimens from the fishermen. Fishermen in Brass make brisk business when they land sea turtles. The price ranges, according to size, from Naira 6000 for smaller animals to N 22 000 for large animals like *Dermochelys coriacea*.

During our visits to fishing ports and beaches of Twon and Brass, we observed 6 live turtles, 3 stranded turtles and 19 carapaces around, belonging to four different species i.e. *Chelonia mydas*, *Dermochelys coriacea*, *Eretmochelys imbricata*, and *Leptochelys olivacea* (Tab. II). According to local residents, major nesting sites were found at Opokunabadi, Tombibele, Deema and Okpoama beaches. According to these respondents to our questionnaires, both *Eretmochelys imbricata* and *Caretta caretta* were very occasionally located at the mouth of brackish waters of St. Nicholas, Brass, Nun, Sangana, and Fish town.

Akassa. - A community based conservation of sea turtles is gaining momentum in Akassa. Organized by an NGO, Pronatura International, conservation education has been included as part of Akassa Community Development Project. Thus, sea turtles are recognized as an essential part of the natural heritage; most nests are protected and live stranded turtles are released (Formia *et al.*, 2003). The turtle conservation efforts started in 1998 and had been geared up

by enthusiastic conservationists including Bill Night, Philip Hall, Michael Weeks, Ben Wolf, Chris Alagoa, etc. Unfortunately, the operations of this NGO have been considerably damaged by the ugly era of hostage taking by Niger Delta militants in the years 2006-2009. There are confirmed records of nesting sites on the sandy beaches of Oginibiri, Okumbiri and Fishtown. Commonly called 'Abadi Ikagi', three species of sea turtle are known in the area (Tab. II).

Other nesting sites. - There are indications that turtles also visit other coastal areas of Nigeria to nest, namely the coast of Calabar and Lagos lagoon. A couple of years ago a fisherman reportedly trapped a leatherback. He was about to butcher his "bounty" for sale, when officials of Nigerian Institute of Oceanographic and Marine Research (NIOMR) intervened. The turtle was bought over from the fisherman at the rate of over Naira 3000 by the Institute, which eventually released it back into the Lagos lagoon, after rehabilitating it for about four days. To increase awareness of the need for conservation of sea turtles, the release was showed on television by Nigerian Television Authority (NTA) and it constituted a news item.

Overall, our data, although preliminary, showed that some species of sea turtles visit regularly the coastal beaches of southern Nigeria in order to nest, and are frequently encountered and captured by local people. Although species status and population trends are still largely unknown and certainly our paper could not really help in this regard, it is clear from the high numbers of individuals seen in our surveys that coastal Nigeria may be considered an important sea turtle habitat and should be further explored. Other important sea turtle habitats have been identified along the Gulf of Guinea, including Corisco Bay, Equatorial Guinea / Gabon (Formia, 1999), the Bijagos Archipelago, Guinea Bissau (Catry *et al.*, 2002), São Tomé and Príncipe (Dontaine & Neves, 1999), and Bioko Island, Equatorial Guinea (Tomas *et al.*, 1999). In addition, olive ridley is well known in nesting and feeding grounds throughout the Gulf of Guinea (Dontaine & Neves, 1999; Fretey, 2001; Tomas *et al.*, 1999), hawksbill in São Tomé, Equatorial Guinea, and Cameroon (Fretey *et al.*, 2002), whereas reproduction of *Dermochelys coriacea* in Nigeria was also confirmed before our study (Fretey, 2001), although the more important nesting concentration areas for this species are in Gabon (Fretey *et al.*, 2007). The fact that *Dermochelys coriacea* were frequently observed in our surveys (they are the second most common species after *Chelonia mydas*) would suggest that the Nigerian population of this species may be important. This species was the second most important species to nest also in other areas of West Africa (e.g., Ghana; Amiteye 2000; Fretey *et al.*, 2007). Further studies are necessary to confirm the relevance of the Nigerian populations of this species for conservation purposes.

REFERENCES

- AKANI, G.C., BARIENEENE, I.F., CAPIZZI, D. & LUISELLI, L. (1999). — Snake communities of moist forest and derived savanna sites of Nigeria: Biodiversity patterns and conservation priorities. *Biodiv. Cons.*, 8: 629-642.
- ALVES, R.R.N. (2006). — Use of marine turtles in zootherapy in Northeast Brazil. *Marine Turtle Newsletter*, 112: 16-17.
- AMITEYE, B.T. (2000). — *Distribution and some aspects of the reproductive biology of sea turtles in Ghana*. Unpublished Msc Thesis, University of Ghana, Accra, Ghana.
- BEGOSSI, A. (1992). — Food taboos at Buzios Island (Brazil): their significance and relation to folk Medicine. *J. Ethnobiol.*, 12: 117-139.
- COSTA-NETO, E.M. (2001). — *A cultura pesqueira do litoral Norte da Bahia*. EDUFAL, Bahia, Brazil.
- CARR, A. (1957). — Notes on the zoogeography of the Atlantic sea turtles of the genus *Lepidochelys*. *Revista de Biologia Tropical*, 5: 45-61.
- CARR, T. & CARR, N. (1991). — Surveys of the sea turtles of Angola. *Biol. Cons.*, 58: 19-29.
- CARR, A & HIRTH, H. (1962). — The ecology and migration of sea turtles, 5. Comparative features of Isolated green turtle colonies. *Amer. Mus. Novit.*, 2091: 1-42.
- CATRY, P., BARBOSA, C., INDJAI, B., ALMEIDA, A., GODLEY, B.J. & VIÉ, J.-C. (2002). — Biology and conservation of the green turtle (*Chelonia mydas*) nesting at Poilao, Bijagos Archepelago (Guinea Bissau). *Oryx*, 36: 400-403.
- DAVIS, F.R. (2005). — Saving sea turtles: the evolution of the IUCN Marine Turtle Group. *Endeavour*, 29: 114-118.
- DE MONTCLOS, M.A. (1984). — *Le Nigéria*. Kurthala, Paris.
- DONTAINE, J.F. & NEVES, O. (1999). — Le Projet Tato à São Tomé. *Canopée*, 13: i-iv.

- FORMIA, A. (1999). — Les tortues marines de la Baie de Corisco. *Canopée*, 14: i-ii.
- FORMIA, A., TIWARI, M., FRETEY, J. & BILLES, A. (2003). — Sea turtle conservation along the Atlantic coast of Africa. *Marine Turtle Newsletter*, 100: 33-37.
- FRETEY, J. (2001). — *Biogeography and Conservation of Marine turtles of the Atlantic Coast of Africa / Biogéographie et conservation des tortues marines de la côte Atlantique de l'Afrique*. CMS Technical series Publication No. 6, UNEP/CMS Secretariat, Bonn, Germany.
- FRETEY, J., BILLES, A. & TIWARI, M. (2007). — Leatherback, *Derموchelys coriacea*, nesting along the Atlantic coast of Africa. *Chelonian Cons. Biol.*, 6: 126-129.
- FRETEY, J., MEYLAN, A. & TIWARI, M. (2002). — The occurrence of the hawksbill turtle (*Eretmochelys imbricata*) in West Africa. Pp 95-96 In: A. Mosier, A. Foley & B. Brost (eds.), *Proceedings of the Twentieth Annual Symposium on Sea Turtle Biology and Conservation*. NOAA Technical Memorandum NMFS-SEFSC-477.
- GODFREY, M.H. & GODLEY, B.J. (2008). — Seeing past the red: flawed IUCN global listings for sea turtles. *Endangered Species Research*, 6: 155-159.
- LUISELLI, L., AKANI, G.C. & CAPIZZI, D. (1998). — Food resource partitioning of a community of snakes in a swamp rainforest of south-eastern Nigeria. *J. Zool.*, 246: 125-133.
- LUISELLI, L., AKANI, G.C. & CAPIZZI, D. (1999). — Is there any interspecific competition between dwarf crocodiles (*Osteolaemus tetraspis*) and Nile monitors (*Varanus niloticus ornatus*) in the swamps of central Africa? A study from south-eastern Nigeria. *J. Zool.*, 247: 127-131.
- LUISELLI, L., AKANI, G.C. & POLITANO, E. (2006). — Effects of habitat alteration caused by petrochemical activities and oil spill on the habitat use and interspecific relationships among four species of Afrotropical freshwater turtles. *Biodiv. Cons.*, 15: 3751-3767.
- LUISELLI, L., ANGELICI, F.M., AKANI, G.C. (2002). — Comparative feeding strategies and dietary plasticity of the sympatric cobras *Naja melanoleuca* and *Naja nigricollis*, in three diverging Afrotropical habitats. *Can. J. Zool.*, 80: 55-63.
- MARGUES, M. R. (1990). — *FAO species catalogue, vol. II. An Annotated and illustrated catalogue of Sea turtles of the world*. FAO, Rome.
- MCDANIEL, C.J., CROWDER, L.B. & PRIDDY, J.A. (2000). — Spatial dynamics of Sea turtle abundance and shrimp Intensity in the U.S Gulf of Mexico. *Cons. Ecol.*, 4:15. [online] URL: <http://www.consecol.org/vol4/iss1/art15/>
- NDES (1998). — *Environmental and socio-economic characteristics (vol.1)*. Niger Delta Environmental Survey, Yenagoa, Bayelsa State, Nigeria.
- POWELL, C.B. (1995). — *Wildlife study 1*. Environmental Affairs Department, Shell Petroleum Development Company (SPDC) of Nigeria, Port Harcourt, Rivers State, Nigeria.
- SEIXAS, C.S. & BEGOSI, A. (2001). — Ethnozoology of fishing communities from Ilha Grande (Atlantic Forest Coast, Brazil). *J. Ethnobiol.*, 21: 107-135.
- TOMAS, J., CASTROVIEJO, J. & RAGA, J.A.. (1999). — Sea turtles in the south of Bioko Island (Equatorial Guinea). *Marine Turtle Newsletter*, 84: 4-6.