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Chapter · July 2010

DOI: 10.1007/978-90-481-9673-9\_7

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# A General Assessment of Marine Turtle Nesting Activity on the Libyan Saline Coast

Daw A. Haddoud and Hisham M. El Gomati

**Abstract** Marine turtle nesting sites in Libya have remained unknown until 1992/1993 for a long time due to the shortage of information with the exception of Kouf national protected area. A nesting activities survey were first conducted in 1993 between the Egyptian border and Zweetina. The first phase to assess nesting activity was conducted in 1995 between the Egyptian borders to Sirte. The Second phase was carried out in 1996 and covered the coast from Sirte to Misratah, from May to August 1996. All the tracks identified as *Caretta caretta*, and the green turtle *Chelonian mydas* was observed during this phase. The third phase was conducted in July of 1998 between the Tunisian border and Misratah, 15 crawl tracks of nesting were recorded and identified as *Caretta caretta* later in July 1999. Three beaches were resurveyed in eastern part of Libya. A general assessment of marine turtle nesting activity on the whole coast was carried out to allow us to implement a sound conservation strategy for the conservation of this endangered species.

## 1 Introduction

The current number of species of marine turtles that live in seas and oceans amounts to eight types, three

of which have existence logged in the Mediterranean sea water, namely: *Caretta caretta*, *Chelonia mydes* and *Dermochelys coricea*. The existence of nests of the first two types was proved to be at the Mediterranean shores, and the studies conducted in the South Mediterranean countries proved the continuous decline for these two types due to environmental and natural causes (Kasperek 1993; Laurent 1990; Broderick et al. 2002, 2003). These studies have been conducted at the shores of Algeria, Morocco, and Egypt and the nest ratios logged in these countries do not represent any addition to the deteriorating stock of marine turtles in the Mediterranean sea, while at the northern and eastern parts of Mediterranean the activity of marine turtle nesting is concentrated on Greece, Cyprus and Turkey.

Relevant institutions and researchers in these countries gave much concern in setting certain programs to study such creatures and protect their nest locations (Demetropoulos and Hadjichristophorou 1988; Margaritoulis et al. 1992; Broderick and Godley 1996). Hazards which threaten marine turtles are outlined in the different pollution factors, and exploitation of sandy beaches in setting up tourism buildings increase and expand year by year, and which are concurrent with turtles' egg-laying on such shores.

Libya, being one of the Mediterranean States, and at the same time occupying a large space of the Mediterranean southern shore; deserves to have some studies conducted on its more significant shores as an attempt to estimate the real stock of marine turtles latent in the Mediterranean. The recent available information lacked sufficient and adequate accuracy

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and details. Part of such information was logging of existence of loggerhead marine turtles on the shores of natural protectorate at Al-Kuf Valley (Herbert 1979; Armsby 1980; Schleich 1987) as well as the information already logged about the locations of marine turtles nesting within the field visits paid in the years 1992–1993 for the shores of the eastern region (Haddoud D and Assigier 1995). As a completion for this exerted effort, a complete study was made along the Libyan coast as a part of an integrated program for determining the nesting locations of marine turtles, their species and possible dangers threatening turtles and nests. The study further included the determination of the shores that is in need for special protection programs being the most susceptible to pollution or in which predatory acts by natural hostilities are excessive. The aim of this study is a general assessment of marine turtle nesting activity on the whole Libyan coast to allow us in putting a good strategy for future conservation programs for this endangered marine organism.

## 2 Material and Methods

This 3-year lasting study concerning of the nesting sites of marine turtle has been accomplished on three phases where the Libyan shore was subdivided into three areas (Fig. 1) such as follows:

1. Phase I: The area located between the Egyptian borders and Sirte city.
2. Phase II: The area located between Sirte and Misratah city.
3. Phase III: The area located between Misratah city and the Tunisian borders. In all three phases different survey methods were applied such as “walk (w), motorbike (m), vehicle (v), Quad (q)” and by such means the targeted sandy beaches were surveyed once in Phase (I) and Phase (III) and several times for some shores selected in Phase (II) in addition to re-survey of three high density nesting shores located within the boundaries of Phase (I), in Summer 1999. As with respect to classifying nesting signs applied in all phases, they were within the following five classifications: UCT, FCT, NCT, CT, N “Laurent et al. 1995”.

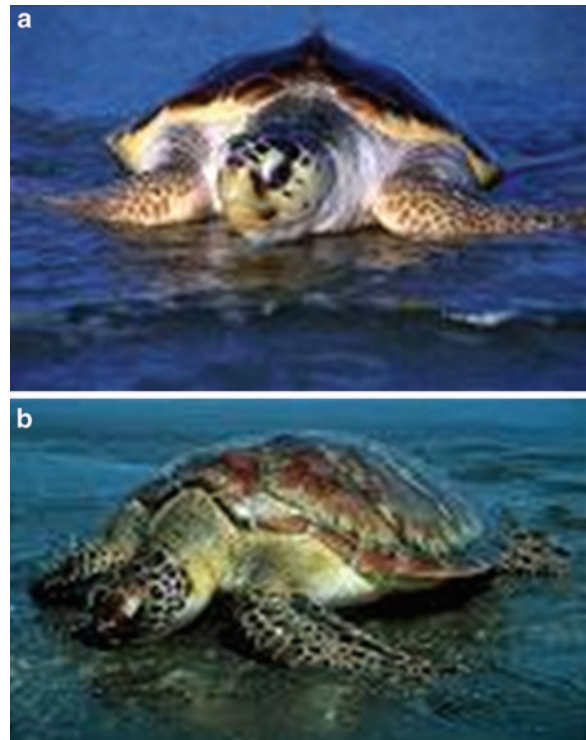


Fig. 1 (a) *Caretta caretta*. (b) *Chelonia mydas*

## 3 Results

The total length of the Libyan coast is 1,975 km, of which a total of 1,144 km was for the sandy beaches. A large number of halophytes are distributed in the country such as the species of *Acacia*, *Tamarix* and *Calotropis procera*. The coastal zone vegetation strip is dominated by dunes covered by *Ammophila arenaria*, *Agropyron junceum*, *Aeluropus littoralis*, bulbous plants like *Urginea maritima* and *Pancreatium maritimum*, along with scattered shrubs *Lycium europaeum*, *Rhus tripartit*, woody plants like *Limoniastrum monopetalum*, *Tamarix nilotica*. The seasonal mud flats include the halophytes such as *Suaeda fruticosa*, *Juncus maritimus*, *Mesembryanthemum nodiflorum* and *Cakile maritima*. *Phragmites communis*, *P. australis* and *Typha capensis*, together with the species of *Limonium*, *Salicornia*, *Sarcocornia*, *Suaeda*, and *Juncus maritimus* are scattered over the coast (Boulos 1975). There are several thousand hectares of mixed stands of *Acacia saligna*

**Table 1** Loggerhead turtle nesting activity during the three phase of study

Phase of study	Coordinate of phase		Coastline (km)	Sand Beach Length (km)	Number of sites sampled	Total length of sand beach sampled (km)	Total crawl tracks (N + NC)
1995	31° 57 69'	31° 13 00'	1,195	797.7	50	141.65	342 (176)
Phase I	24° 59 28'	16° 40 00'				(17.76)	
1996	31° 13 28'	32° 12 13'	209	186.3	8	87	58 (27)
Phase II	16° 22 98'	15° 19 26'				(46.70)	
1998	32° 25 06'	33° 07 58'	407	160	23	105	15 (7)
Phase III	14° 59 62'	11° 41 15'				(65.63)	
Total			1,811	1,144	81	333.65	415(210)
						(29.17)	

**Table 2** Crawl tracks survey at the east coast of Libya

Coastal area	Prospected beaches		Crawl tracks		
	Coordinator		1992/1993	1995	1999
	Latitude	Longitude			
Ayn el Ghazalah 1	32° 12 30'	23° 20 70'	24 (15/8/1992)	2 (20/6/95)	7 (23/7/99)
Ayn el Ghazalah 2	32° 12 36'	32° 20 56'	33 (23/7/1993)	11 (20/6/95)	23 (20/7/99)
Abu el Frais	32° 16 00'	23° 13 00'	18 (21/7/1993)	8 (19/6/95)	17 (23/7/99)

**Table 3** Dead Turtles recorded from 1987 to 1998

	1990–1992	1995	1996	1998	Total
		phase I	phase II	phase III	
Ayn el Ghazalah (1)	2	19	7	9	37
Ayn el Ghazalah (2)	2	2	2	–	6
Abu el Frais (3)	1	–	–	–	1

and *Atriplex canescens* found in the country. All these habitats form seclusive areas for the turtles.

Within the three phases a total of 81 shores with 333.65 km were surveyed which they represent a percentage of 29.16% of the total length of the sandy beaches along with the Libyan coast. The total crawl tracks which recorded in three phases is 415, 210 of which were tracks of turtle nests “loggerhead type”, namely the percentage of 50.60% of the total sum of tracks so logged (Table 1).

A three shores (1, 2, 3) located at the eastern part of the Libyan coast were re-surveyed in summer of 1999 these were: Ayn Al-Ghazalah (1), Ayn Al-Ghazalah (2), and Abu El Frais and the number of tracks logged were 7, 23, and 17 respectively (Table 2). The number of dead turtles logged along the Libyan coast before

and within the 3 phases of survey was 44 turtles (Table 3) distributed such as follows.

Thirty seven *Caretta caretta* loggerhead, six *Chelonia mydas* (green turtle), one *Dermochelys coriacea* (leather back turtle). Two turtles of *Dermochelys coriacea* type were caught alive at Tajura shore by means of small coastal fishing gear. The length of the first turtle was 137 cm (1996), while the length of the second turtle was 1.40 cm (November 2000). The tagged turtles within the past years 1995–2002 were recoded; all being the loggerhead type. Five turtles were tagged with Phase I, one turtle was tagged in Phase II and ather most of them tagged in the sea (Table 4). The percentages of the predator nests within survey duration were 44.8%, 37.0% and 45.4% in the three phases respectively.

**Table 4** Tagged Turtles *Caretta caretta* recorded from 1995 to 2002

Name of beach	Coordinates	Date	Carapace length (cm)	Number of tag
Deriana	32° 17 60'	25/6/1995	79.5 cm	F 3031
	20° 13 31'			
	31° 02 23'			
Sultan	20° 09 25'	29/6/1995	74.5 cm	F 3021
		29/6/1995	74.3 cm	F 3011
		29/6/1995	81 cm	F 3051
		29/6/1995	86.3 cm	F 3001
Al Gbiba	31° 13 28'	23/6/1996	83 cm	F 3101
	16° 22 98'			F 3121
Tajura	32° 53 73'	15/12/1996	72.5 cm	F 3022
	13° 22 54'			
North Musratha	32° 31'	20/4/2002	SCCL 74	F 3104
	15° 52'		CW 52	
North Benghazi	32° 08'	24/4/2002	CCL 71	F3172
	19° 15'		CCW 62	
North Benghazi	32° 35'	3/5/2002	CCL 90	F3123
	19° 36'			
North Benghazi	32° 51'	8/6/2002	CCL 76	F3128
	20° 10'		CCW 71	
North Bengazi	32° 27'	17/6/2002	CCL 61	F3105
	19° 51'		CCW 55	
South musratha	31° 29'	20/6/2002	CCL 68	F3106
	16° 12'		CCW 56	
North Benghazi	32° 21'	28/6/2002	CCL 62	F3114
	15° 40'		CCW 52	

## 4 Discussion

Based on the currently emphasized information, a number of three types of marine turtles in the Libyan waters was logged, namely: *Caretta caretta*, *Chelonia mydas*, and *Dermochelys coriacea*. Numerous researchers agreed upon the existence of *Caretta caretta* along the Libyan coast and with large (Laurent et al. 1995), nesting number and the findings of this comprehensive study confirms this fact and further support the already logged findings prior to this study, by other researchers during their study conducted for the natural protectorates shores at Al-Kuf Valley (Herbert 1979; Armsby 1980; Schleich 1987). The existence of, for *Chelonia mydas*, its existence in Libyan waters was emphasized for the first time, but its recorded in Ayn Al-Ghazala lagoon in the far eastern shore of Libya (Hadoud D and Assigier 1995) and the same existence was re-logged again in one of Phase (II) shores, namely: Abuwirat Al-Hasson shore (Hadoud and El Gomati 1997).

The third type "*Dermochelys coriacea*" has an existence, which was logged for the first time in the Libyan waters in years 1927, 1928 in Benghazi and Tripoli Coasts (Capra 1949). Recently two turtles of this type were suspended at Tajura area during 1996 and 2000. However, the nesting of this type at the Libyan shores has not been proved yet up to this date. Fretey (1986) presumed the existence of nesting activity of this species of turtles on the Libyan shores although there is nothing to enhance the correctness of this presumption. The density of crawl tracks in the three phases was 2.16, 0.66, and 0.113/km respectively with overall average of 1.24/km for tracks and 0.62/km as nesting density. Such ratios give intense significance to the Libyan shores and render them the most important nesting locations for *Caretta caretta* type worldwide.

In contrast with the logged density in the shores of the neighboring African States, it will be noticeable that in Morocco and Algeria no tracks were reported

during the multiple survey made for 97.9 km. of the shores (Laurent 1990), while in Tunisia the average tracks was 0.16 km (Bradai 1993) and a calculated density of 0.039 km. witnessed by Egypt during the study conducted on the western Egyptian shores (Kasperek 1993). The large increase in the activity of marine turtles nesting on the Libyan shores in comparison with the neighboring States is the length of its sandy beaches which are still conserving their natural condition as well as the few number of turtles that subject to intentional catching and that is mainly attributed to the fact that their meat does not constitute a foodstuff as it is the case in the neighboring states. The density of the tracks logged in the three phases were not convergent, as they range from zero in some shores and frequently reach 5.8/km. in Abu El Fraish shore in Phase I: (Laurent et al. 1999) and 4.4/km. In the second shore in Phase II (Hadoud and El Gomati 1997). The imperfection of density in some sandy beaches could not be perfectly interpreted rather than some probabilities would be made on the grounds of the scientific observations already logged within the study.

For instance, in phase I: that could easily be attributed to the apparent pollution in some shores with tarball, while in the shores of Phase II: interpretation of non-existence of nesting density in some shores could be made despite the fact that they are sandy beaches, with low pollution rate and far from whatever population activity. However, one fact can be taken into account, namely the concurrence of turtle nesting season with the season of egg-laying of some species of sharks which approach in large quantities towards these shores the thing which cause leaving of turtles far away from these areas. As regards to Phase III: the least nesting density area is because of the high population density and centering of the main cities of Libya within the limits of this area.

The risks that threaten the marine turtles are much diversified. For instance, turtles in the sea water are suspended in nets of fisherman, like Tunara – fisheries of tuna fish – also there are some fisheries for sharks which are gill nets called “Khanagates” in which marine turtles are suspended. What increase the number of suspended turtles in these two types of fisheries is the concurrence of tuna fishing season “June” and the shark fishing season (February – June) with the season of turtles reproduction and their approaching to

the shores. And most dangerous impact of sea turtle in the Libyan coast through the season of tuna by the foreign fisheries in April to July every year many turtle catch by long line and surrounding nets. Likewise the female turtles are liable to predatory when moving out for egg-laying and the most important predators is “Jackal *Canis aurens*”. As for nests, the Predatory percentages were too high and the predators reported within the study were “fox *Vulpes vulpes*, sand crab, *Ocypode cursor*, Jackal *Canis aurens*”.

Comparing the logged percentages for marine turtle nest, predatory acts at the Libyan shores, with other shores, we will find them 44.8% in phase I (Laurent et al. 1995), 37.0% in phaseII, (Hadoud and El Gomati 1997), 45.4% in phase (3) (Laurent et al. 1999), 41.2% at Turkish Shores (Brown and Macdonald 1995) and 70% at the southern shores of Cyprus (Demetropoulos and Hadjichristophorou 1988). That will definitely make it obvious that the phenomenon of nest ravening is deemed to be a natural phenomenon of which both increase and decrease will be controlled by environmental mode of each shore and the existence or non-existence of predators. Within the past years a number of seven *Caretta caretta* were tagged while moving out to lay eggs. This process has become a routine style for data collection and clarification of some vague points concerning the biology and behavior of this animal such as study of rates of growth of this creature and migration (Carr 1967) as well as the nutritional locations and the places in which turtles spend the winter season (Margaritoulis 1988) and finally the ages of the turtles (Mrosofsky 1983).

The occupation of Libya to the longest shore southwards the Mediterranean sea enabled it to acquire a special importance and in particular after the findings obtained in this three-phase study which showed a significant nesting density in the Libyan shores and which in turn requires focusing on the intensive re-surveying specially in the high density shares in order to reach realistic findings and estimations on nesting density and the types of turtles having nesting activity in the Libyan shores. Setting a permanent protection program in some important shores such as Ayn El Ghazalah, Al-Kuf, Abu Fraish shares within the limits of Phase I, and shore No. (1), within the limits of phase II as an attempt to preserve and develop the stock of this marine organism which is really threatened with extinction.

## References

- Armsby JK (1980) Koufnational park marine survey final report: Apr–July 1980 ACSAD
- Boulos L (1975) The Mediterranean element in the flora of Egypt and Libya. In *La flore du bassin méditerranéen: essai de systématique synthétique* No. 235CRNS, pp 119–124
- Bradai MN (1993) La nidificatiol de la Tortue marine *Caretta caretta* dans le sudest de la Tunisie. Rapport pour le RAC/SPA et I, Association de la Protection de la Nature et de I, Environnement a Sfax (APNES)
- Broderick AC, Glen F, Godley BJ, Hays GC (2002) Estimating the number of green and loggerhead turtles nesting annually in the Mediterranean. *Oryx* 36:227–235
- Broderick AC, Glen F, Godley BJ, Hays GC (2003) Variation in reproductive output of marine turtles. *J Exp Mar Biol Ecol* 288:95–109
- Broderick AC, Godley BJ (1996) Population and nesting ecology of the Green Turtle, *Chelonia mydas*, and the Loggerhead Turtle, *Caretta caretta*, in northern Cyprus. *Zool Middle East* 13:27
- Brown L, Macdonald D (1995) Predation on Green turtle *Chelonia mydas* nests by wild canids at Akyatan beach Turkey. *Biol Conserv* 71(1):55–60
- Capra F (1949) La *Dermochelys coriacea* (L.) nel Golfo di Genova e nel Mediterraneo. *Ann Mus Civ Stor Nat Genova* 63:270–282
- Carr A (1967) *So excellent afishe: a natural history of sea turtles*. Natural History Press, New York, pp 248
- Demetropoulos A; Hadjichristophorou M (1988) Turtles and turtle conservation in Cyprus (handout to visitors to the Lara Turtle Station). Department of Fisheries. pp 3
- Fretey J (1986) *Les reptiles de franco metropolitaino et des les Satellites. Tortues et lezards*, Paris, Hatier, pp 128
- Hadoud D, Assigier F (1995) Survey of sea turtle in eastern part of Libya. Premier Congres Magrepin des Sciences e la Mer. Hammamet-Tunisie, 20–22 Nov 1995
- Hadoud DA, El Gomati H (1997) The coast survey of marine turtle activity along the coast of Libya. Phase 2: between Sirte and Misratah. Deuxiemes Journees Maghrebines des sciences de la Mer. ISTPM
- Herbert J (1979) Kouf national park. Wildlife survey and development. The Arab center for the studies of arid zones and dry lands
- Kasperek M (1993) Marine turtles in Egypt. Phase I. Survey of the Mediterranean coast between Alexandria and EL-Salum. Report for Medasset and RAC SPA
- Laurent L (1990) Les tortues marines en Algerie et au Maroc (Mediterranee) *Bulletin de la Societe Herpetologique de France* 55-1-23.
- Laurent L, Bradai M, Haddoud D, El Gomati H (1995) Marine turtle nesting activity assessment on Libyan coasts. Phase 1 Survey of the coasts between the Egyptian border and Sirte. RAC/SPA
- Laurent L, Bradai M, Haddoud D, El Gomati H, Abdelmola AH (1999) Marine turtle nesting activity assessment on Libyan coasts. Phase 3 Survey of the coasts between the Musrata to Tunisian border. RAC/SPA
- Margaritoulis D (1988) Post-nesting movements of loggerhead sea turtle tagged in Greece. *Rapp Commun Int Mer Medit* 31(2):284
- Mrosovsky N (1983) *Conserving sea turtles*. British erpetological society, pp 176
- Schleich HH (1987) Contributions to the herpetology of kouf national Park (NE Libya) and adgacent areas. *Spixiana* 10(1):37–80