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Sea turtles in the Mediterranean

Distribution, threats and conservation priorities

Edited by Paolo Casale and Dimitris Margaritoulis



IUCN-SSC MARINE TURTLE SPECIALIST GROUP



LIBYA

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1. General remarks

The three species of sea turtles reported from Libyan waters are: the green turtle *Chelonia mydas*, the leatherback turtle *Dermochelys coriacea* which is irregularly and rarely observed at sea, and the loggerhead turtle *Caretta caretta*, which is the only reported nesting species along the Libyan coast (Schleich, 1987, Laurent et al., 1997, 1999).

The coast extends for approximately 2000 km (Fig. 1). Most of this coastline is still in a pristine condition; not only due to the limited human activities, but because of the underdeveloped nature of the Libyan fishing industry, compared to its neighbouring countries (Laurent et al., 1995). The continental shelf in the western region is a continuation of the eastern fraction of the Gulf of Gabes, and is characterised by sandy or muddy substrate, whereas in the central and eastern region, the continental shelf is narrow and almost absent in Cyrenaica, and the substrate is rocky ((Abulogma and Elgzeri, 1997).

Tidal movements are relatively limited and insignificant, with the exception of the coast between Zwara and Ras Ajdir towards the Tunisian border, due to its proximity to the Gulf of Gabes (Howege and Hamza, 2002).

The Gulf of Sirte's coastal area and some shallow bays of Cyrenaica (Bay of Bumba and Ain Alghazala), are characterised by immense meadows of *Posidonia oceanica*, and due to limited fishing activity, are among the most important nesting grounds for loggerhead turtles in Libya and potentially among the best in the Mediterranean in terms of nest counts

However, threats posed by high canine

(Res Foxs and Jackals) predation levels which were observed by Laurent et al., 1995, 1997, increases the need for conservation measures to be put into place at certain important nesting sites.

2. *Caretta caretta*

2.1. Present distribution and abundance

Studies on distribution and abundance were mainly dealt with nesting sites identification and assessing their relative importance, based on track and nesting densities, first with single surveys (Laurent et al., 1997, 1999) and later with daily or weekly surveys (Hamza and Ghmati, 2006; Hamza, 2007; Saied et al., 2008). However these surveyed areas only cover 34% of the whole length of Libya's sandy beaches (1089 km)

2.1.1. Nesting sites

A few publications have reported the nesting activity of sea turtles in Libya. The earliest available records date back to late 1970's and early 1980's during the field studies to establish the Kouf National Park (KNP) northeast of Cyrenaica (Herbert, 1979; Armsby, 1980). Further information was published on the herpetofauna of KNP, this included details on loggerhead sea turtle nesting density and predation levels on adult females and hatchlings by canine predators (Schleich, 1987). The nesting of loggerhead turtles starts during the last week of May and ends between late July and early August (Laurent et al., 1999) although there were a few nests laid in September during 2005 season (Hamza and Ghmati, 2006).

Table 1. Beach length, nest counts and nesting density for 28 loggerhead turtle nesting beaches along the Libyan coastline. Beaches are ranked basing on 2006 and 2007 data only. Collection of more data could alter this ranking as density and number of nests vary between years. More data will be needed to evaluate the relative importance of each of those sites. NS: not surveyed; D: daily; W: weekly.

	Nesting site	Province	Length (Km)	Nests 2006	Nests 2007	Mean Nesting density (nests/km)	Survey frequency
1	Al- Gbeba	Gulf of Sirte	5.67	139	154	25.84	D
2	Al-Metefla	Benghazi	4.5	(16)*	104	23.1	W
3	Ain Ghazala1	Tobruk	1.4	NS	26	18.57	W
4	Al-thalateen	Gulf of Sirte	5	66	80	14.6	D
5	Al-Arbaeen	Gulf of Sirte	8.54	154	84	13.93	W
6	Al Malfa	Misratah	1.5	3	37	13.33	W
7	West Camp sirt	Gulf of Sirte	2.5	NS	25	10	W
8	Ain Ghazala2	Tobruk	1.3	NS	10	7.69	W
9	Banans	Al Jabal Alakhdar - KNP	2	10	18	7	W
10	Abulfraes	Tobruk	1.4	NS	9	6.43	W
11	Elogla	Al Jabal Alakhdar	3.9	4	30	4.36	W
12	Al-Gwezat	Misratah	5.49	13	33	4.19	W
13	Jarjaruma	Al Jabal Alakhdar - KNP	3.3	5	22	4.09	W
14	Al Arar	Misratah	6	7	37	3.67	W
15	Semeda	Misratah	9.42	14	54	3.61	W
16	Ogla misrata	Misratah	0.95	4	2	3.16	W
17	Elmahbula	Misratah	5.32	10	22	3.01	W
18	Marzuga	Misratah	5.46	8	17	2.29	W
19	Al Hasi	Al Jabal Alakhdar- KNP	2.8	4	8	2.14	W
20	Bagasa	Benghazi	4	NS	6	1.5	W
21	Almjarin	Misratah	17.7	29	22	1.44	W
22	Ramel Khaieb	Misratah	8.11	6	11	1.05	W
23	Shat habib	Benghazi	15	NS	14	0.93	W
24	Errgeta	Benghazi	7	10	2	0.86	W
25	El Mrekeb	Misratah	4.8	2	6	0.83	W
26	Buretma	Misratah	5.87	5	4	0.77	W
27	El Khowada	Misratah	10.9	10	2	0.55	W
28	Surrah	Misratah	4.84	1	2	0.31	W
	Total		154.67	520	841	4.69	

*Data of 2006 was not included in calculations, as it was incomplete.

However, it was only with the beach surveys in 1995-1998 that the importance of Libya as nesting ground was highlighted. These surveys were organized and funded by several national and international organizations (Mediterranean Association

for saving sea turtles (MEDASSET), Technical Centre for Environmental Protection TCEP (now the Environment General Authority, EGA), United Nations Environment Program-Mediterranean Action Plan-Regional Activity Centre for

Specially Protected Areas UNEP-MAP-RAC/SPA, Marine Biology Research Centre MBRC and World Wide Fund for Nature WWF); these surveys have identified several important nesting sites, and concluded that Libyan coast is one of the main nesting grounds of loggerhead turtles in the Mediterranean (Laurent et al., 1997; Laurent et al., 1999). The launching of the Libyan Sea Turtle Program (LibSTP) in July 2005 by EGA, was the latest movement towards studying and protecting sea turtles in Libya. This program aims to:

- assess the annual number of sea turtle nests laid on Libyan coast, by continuous monitoring of selected sites.
- study sea turtles in their different nesting, foraging and wintering habitats.
- provide capacity building for volunteers, biologists and conservationists from Libya and from other Mediterranean countries in future.
- raise public awareness on the importance of sea turtles as part of the Libyan Mediterranean marine biodiversity.

The program is coordinated and funded by the EGA, and in 2005-2006 was partially supported by UNEP-MAP-RAC/SPA.

From the available literature and the last three years personal observations, it appears that loggerhead nesting is mainly concentrated in four coastal sub-regions: the sandy beaches of the Gulf of Sirte (Gulf of Sidra) with a total length of more than 800 km, beaches located to the south and the north-east of Benghazi; on certain beaches of Aljabal Alakhdar (Cyrenaica), which are shorter and intersected with rocky formations, and at the area of Derna-Tubrok. The following rating of nesting beaches is set according to data collected during the nesting seasons of 2006 and 2007.

Al-Gbeba beach (Fig. 2) is located about 20 km west of Sirte (31°13'09.8"N - 16°23'12.3"E and 31°13.427"N - 16°19.862"E). and is 5.67 km in length, with a narrow beach (50-100 m wide), sand gradually increases

in elevation up to 3 meters above sea level at the sand dune area, that separates the beach from a long dry marsh area (Sebkha), flooded in winter. Plant coverage does not exceed 25%, and is composed of sand dune plant communities mixed with small shrubs, and then an area of salt tolerant plant communities (*Salicornium* and *Arthrocnemum* sp.) dominates the periphery Sebkha zone. The beach is used for recreation by local people.

139 nests were reported in 2006 and 154 in 2007, mean nesting density were 25.84 nests/km, with an average of 147 nests/season (Table 1).

Al-Metefla beach is located 100 km south of Benghazi (one of western Cyrenaica nesting sites), with 4.5 km of a low lying sandy beach, containing moderate plant cover of mixed sand dunes and halophytic vegetation. The first monitoring of this site was during the 2006 season, when partial surveys (July-August months) reported a total of 16 nests. Here only 2007 data were considered as it represents data a complete nesting season, with total nesting density of 23.1 nest/km (Table 1).

Predation by foxes and some poaching represent the main threats to turtle nests.

Ain Ghazala 1 beach is a sandy beach located to the north-eastern side of Ain Ghazala lagoon and is about 60 km west of Tobruk. The beach measures approximately 1.4 km in length and is bordered by medium rocky formations and is not easily accessible from land due to rocky formations. An important nesting site, with high canine predation (Laurent et al., 1995). The site was surveyed weekly during the 2007 nesting season from late June to mid August. A nesting density of 18.57 nests/km was recorded (Table 1). Natural predation by foxes and jackals has exceeded 85% (Hamza et al., 2007), therefore conservation measures are urgently required. At this beach the first loggerhead (LY0002) was tagged in August 2008 with inconel flipper tags.

Al-Thalateen beach (Fig. 3) is located approximately 28 km west of Sirte (31°13'42.9"N - 16°19'86.0"E and 31°13.666"N -

16°19.473'E) and is separated from the Al Ghbeba site by a 200 m rocky formation (known locally as Gharnata beach). The beach is 5 km long and between 100-200 m wide. Some parts of this beach are 4 m above the sea level. The middle area of this beach is used by local inhabitants for recreational bathing, especially at the weekends. A small landing site with a few boats is also present. The western edge of the site is disturbed by the human activities of the nearby village (i.e. bathing, grazing and some waste dispose).

In 2006, 66 nests were reported and in 2007 there were 80 nests recorded, with a nesting densities of 13.2 nests/km and 16 nests/km respectively (Table 1).

Al-Arbaeen beach is located at approximately 37 km west of Sirte (31°15'19.5"N - 16°07'21.8"E and 31°14.012'N - 16°13.737'E). The total beach length is 8.54 km, with a width of 150-300 m, with a less dense shrub community and notably a greater density of sand-dune floral communities. This is possibly due to lower level of human disturbance compared to the other two sites of Sirte. The beach separates the sea from a lower salt marsh zone (Sebkha), with its typical halophytic communities of *Arthrocnemum* and *Salicornium* sp.

2.1.2. Marine areas

The coastline of Libya extends for approximately 2000 km, and includes a wide diversity of coastal and marine habitats. These coastal habitats are which mostly in near-pristine condition, and due to the very limited fishing industry, compared with neighbouring countries (Laurent et al., 1999) allows Libya to be an important Mediterranean country for sea turtle populations, during their nesting and/or foraging and wintering periods. Although to fully assess this important further studies on turtles are required in order to fully assess the contribution of Libyan waters in sustaining sea turtle populations.

However, few studies has addressed sea turtles in marine habitats; some research efforts using satellite telemetry for both green and loggerhead sea turtles, showed a

noticeable tendency of many tracked individuals towards Libyan waters, especially during autumn and winter (Bentivegna, 2002). Warmer water seems to drive turtles to spend these non-breeding periods near Libya, as it is the most southern limit of the Mediterranean and in close contact with the Sahara desert fringe. There has also been reported fidelity in loggerheads and green turtles nesting in northern Cyprus to Egyptian and Libyan marine areas, as shown by satellite tracking (Broderick et al., 2006)

During spring 2006, with the support of RAC/SPA and the zoological station in Naples, , three loggerhead turtles caught by fishermen from Libya, were rehabilitated and later equipped with satellite transmitters.

Two satellite tagged females remained near Libyan coast of Misrata to Sirte and possibly had nested there, while one male (Tajura) left directly to Sicilian coast, where it got entangled in fishing gear and later released, when it then moved to the south part of Adriatic sea (Fig. 2). Differences in habitat use were noticed from tracking data, The two tagged females (of Mediterranean haplotype) remained in coastal zone, whereas the male (of Atlantic haplotype) used deeper and colder waters in the north Mediterranean (Bentivegna et al., 2008).

Feeding is thought to be confined to shallow areas of the Gulf of Bumba and the nearby Ain Al Ghazala lagoon (northeast Libya), the eastern limits of the Gulf of Gabes in the west, and in particular the area of Farwa lagoon (Broderick et al., 2006; Hamza, pers. observ.).

Ain Al Ghazala is an important mating site during the pre-nesting period (April-early May): mating turtles were observed in several occasions during these months (Hamza, pers. observ.).

2.2. Past distribution and abundance

Sea turtles in Libya have been used by Libyans inhabiting coastal cities for many centuries; carapaces were traditionally used as baby cradle, and for ornamental purposes in their houses. Unfortunately very little information is available on historic background of nesting activity. Old

fishermen in Tripoli confirmed that nesting activity occurs at many sites, even near the centre of Tripoli, on the sandy coasts of Tajoura (Hamza, unpubl. data); in fact during 2006 season, information confirmed that nesting occurred on this beach, which had a high number of bathers during July (Hamza, pers. observ.). Scientific research on sea turtles in Libya is relatively recent; observations were made during late seventies and the eighties by several researchers along the coastline in Kouf National Park, during the extensive surveys to establish the park (Herbert, 1979; Armsby, 1980; Schleich, 1987). These reports focused on the area of Kouf only, and reported the numbers of nests, track densities, canine predation, and standings of loggerheads.

2.3. Threats

2.3.1. Terrestrial Habitats

2.3.1.1. Coastal development

Human presence and coastal construction.

Along the coastal area the population density is about 50 persons per square km in the two northern regions of Tripolitania and Cyrenaica, but falls to less than one person per sq. km elsewhere. Ninety percent of the human population live in less than 10% of the area which is primarily along the coast. More than half the population is urban, mostly concentrated in the two largest cities, Tripoli and Benghazi. The remaining coast is characterised with vast areas of beaches with very scarce or no development.

During the last 5 years national planning and opening of the country to foreign investors, and the resulting planned intensification of tourism may threaten important nesting sites, unless urgent steps to minimise the effects of construction and human presence on nesting populations, are to be taken by national and local authorities.

Pollution.

Most of the "known" nesting beaches are located in areas with limited human activity; however, many of these sites are receiving large amounts of solid wastes, either land based or by marine currents from other countries. A survey in Al Gbeba

(west of Sirte) found that more than 30% of these waste were brought in from the sea (the Gulf of Sirte includes the southernmost point of the Mediterranean). Furthermore, plastic bags, cans and bottles left by bathers constitute an important part of waste too.

Wastewater pollution is also a concern, as many treatment plants have become old and lack regular maintenance. The beaches around Benghazi and some Tripoli beaches are severely affected by this type of pollution. Wastewater pollution can be found at most of the nesting beaches.

Oil pollution is a major threat to nesting beaches in Libya, being a major oil exporter; many nesting sites are nearby oil exporting terminals, especially those in the gulf of Sirte and near Tobruk. Ballast water emptied by foreign oil tankers in the open sea, forms tar balls which move gradually by surface currents, and settle on the coast. Tar balls are a major pollutant at some sites.

Artificial lighting.

As most important nesting sites are located away from human settlements, and in addition tourism is still not highly developed, the problem of artificial lighting on beaches is up to now of minor concern.

Beach cleaning.

Very limited beach cleaning is evident, mainly in bathing beaches around east and west of Tripoli. This activity is still new in Libya, and most recreational beaches laboring persons to manually clean the beaches.

Vehicle driving.

The open ended, unprotected beaches attract many 4X4 vehicle drivers each summer, which coincides with the nesting season. The most affected beaches during the last three season's are: Beaches of Misratah-Bowerat Lahsun area (NW Gulf of Sirte), where fishermen and bathers have to pass several kilometers to reach seasonal landing sites. To a limited extent vehicles also pose a problem in beaches south of Benghazi.

2.3.1.2. Beach restructuring

Many nesting sites (especially in Cyrenaica) have recently suffered from

unsustainable sand mining activities, most of which are illegal. The problem of sand mining was not a noticeable problem until the last 4-5 years. Due to local economy decentralization policy all Shabiyates (Governorates) were called to utilize their own natural resources for development, and the active building in the country, which caused the construction industry to use more and more sand from the Shabiyat resources. Many nesting sites such as Kouf National Park were illegally sand mined and other beaches near Benghazi, Tolmitah, Derna and Toubruk also suffered from these unsustainable practices. The problem reach national level when EGA reported many of these illegal actors to the police for investigation. Some of them were stopped by a special committee formed by the General peoples committee (First ministry) but some are still illegally active. Further local and national coordination will be needed to tackle this problem. Sea turtle nesting was one legal instrument used to stop these illegal practices at many sites.

2.3.1.3. Non human predation

Evidence of canine predation (foxes and jackals) on eggs and nesting females were mentioned by several authors (Schleich, 1987; Laurent et al., 1995). The levels of predation in Libya are considered high ranging from 50-80% at some nesting sites (Laurent et al., 1999). Predation is mainly by the red fox and occasionally by jackals and stray dogs. During the 2005 season a reptile predator of eggs (*Varanus* sp.) was reported from Al Gbeba near Sirte. Furthermore ghost crabs are also active predators on eggs and hatchlings at many sites (Hamza and Ghmati, 2006).

2.3.1.4. Human exploitation

Meat and egg consumption is rare, as many Libyan fishers respect sea turtles and consider them a bad omen if they are caught and eaten. However, occasionally turtles may be caught in fishing nets and the flesh is consumed mainly by foreign fishermen. In recent years (1995 onwards), egg poaching has become more intensive in certain areas, mainly because of the mythical belief that they help in treating

human fertility disorders. The practice was first noticed in the western region (Tripoli to Tunisian boarder) during the 1998 surveys as a local tradition (Laurent et al., 1999), which may explain the recent decline of nesting activity in this area.

Egg poaching and illegal trading were also reported in Misuratah and Sirte it was claimed for medicinal uses. This phenomenon was reported from the Gulf of Sirte (3 sites) beaches during 2005-2007 seasons, with over 12.5% of nests being poached in 2005 (Hamza and Ghmati, 2006). One of LibSTP objectives in awareness raising activities is to limit the poaching of turtle eggs. Measures were taken by EGA during the nesting seasons to monitor fish markets for illegal turtle/egg trading. These activities included articles in local and national newspapers, live radio interviews and audience discussions , several TV interviews with conservationists and physicians aimed to show how dangerous the consumption of sea turtle eggs is on human health and the species future.

2.3.1.5. Other threats

Data not available.

2.3.2 Marine Habitats

2.3.2.1 Incidental catch

Laurent et al. (1995) emphasized incidental captures of sea turtles by bottom and drifting longlines, trammel nets and gillnets, but the numbers appeared to be low (Camiñas, 2004), mainly due to the small number of fishing units in Libya compared with its neighbouring countries (Lambeuf et al., 2000).

Studies on interaction of fisheries with sea turtles are limited and mostly done as observations during other studies (e.g. by MBRC Tuna fishing observers scheme). More effort is needed to quantify the actual contribution of fishing gears on turtle bycatch. A questionnaire of 100 artisanal fishermen in 5 landing sites along the coast in 2000 revealed that an average of 2.4 turtles/boat/year were caught (Hamza, unpubl. data). The issue of quantifying mortality rates caused by different fishing gears is a national priority.

2.3.2.2. Intentional killing and exploitation

It seems not common for fisherman to kill turtles: none of 100 fishermen questioned in 1999-2000 claimed that they ever killed a turtle intentionally (Hamza, unpubl. data).

While turtle flesh consumption is not a common practice in Libyan fishing communities, observations of foreigner fishermen working in Libya indicate the occasional consumption of turtle meat onboard their vessel, as it is strictly illegal to bring a turtle or any part of it to the port.

2.3.2.3. Other threats

Pollution.

As a major oil exporter, and located in the passage of oil tankers from Middle East to Europe, Libya is susceptible to marine oil pollution. So far no major leakages that harm the marine life, including sea turtles, have been reported. All oil companies have an emergency plans, and mitigation strategy in case of offshore accidents. They coordinate with EGA, MBRC and the national authority of combating disasters (formed recently).

Dynamite fishing.

As in most Mediterranean countries, the problem of dynamite fishing is present and practised illegally all year around (Hamza et al., 2006). The authority's have campaigned from time to time to control the spread of this harmful practice, but this still yields limited results. Dynamite fishing in Libya uses dynamite from World War II mine fields, that still exist in many parts of Libyan Desert (programs of mine clearance is limited due to lack of maps of many of these minefields). The presence of such practices poses a threat to the whole marine ecosystem, and introducing alternative fishing methods should be a priority for local and national environmental institutes.

The region between Misratah till the Egyptian border hosts less than one third of Libya's artisanal fishing fleet (Lambeuf et al., 2000), however, more research will be needed to quantify impacts of this practice on the marine environment and ecosystem. Socio-economic studies also urgently should address this problem, to seek

possible solutions.

Oil exploration.

During the last three years important areas of Libyan waters were opened for oil exploration by National Oil Corporation (NOC), for national and international oil firms. By law No. 15/2003 on protection and improvement of the environment, all activities that might have an impact on the environment on land and/or at sea are requested to prepare and present an Environment Impact Assessment study to EGA and NOC's Environmental office prior granting the permission to work by EGA, the EIA's are mostly well prepared, but the monitoring of actual application of every single mitigation measure of that plan are largely weak.

3. *Chelonia mydas*

3.1. Present distribution and abundance

3.1.1. Nesting sites

The green turtle has not reported as nesting in Libya; surveys of Libyan beaches have failed to identify any green turtle tracks (Laurent et al., 1997). It is worth mentioning that there is an availability of nesting habitats along the coast, which makes nesting a future possibility.

3.1.2. Marine areas

The juveniles of green turtles are frequently recorded in Libyan coastal waters. The first record was in 1992 at Ain al Ghazalah (Hadoud and El Gomati, 1996). Since then, several other surveys have found juvenile green turtle in Ain al Ghazalah lagoon (Laurent et al., 1995) and along the coast between Sirte and Misratah (Hadoud and El Gomati, 1996). This suggests that Libya may represent an important feeding ground for juvenile green turtles coming from nesting populations in the Eastern Mediterranean. This might explain why adult green turtles shows long over-wintering stays near the Libyan coast (during their post-nesting movements; Godley et al., 2002).

3.2. Past distribution and abundance

Data not available.

3.3. Threats

3.3.1. Terrestrial Habitats

Not applicable, because the species does not nest in this area.

3.3.2 Marine Habitats

3.3.2.1 Incidental catch

The proportion of green turtles caught by different fishing gear is unknown. However, given the current information available through questioning fishers, this proportion seems to be lower than the total loggerhead bycatch (Hamza, unpubl. data).

3.3.2.2. Intentional killing and exploitation

No available information on a specific targeting of green turtles by intentional killing or exploitation in Libya, however some fishers (mainly foreigners) stated that green turtle flesh is more palatable than the other species.

3.3.2.3. Other threats

Threats concerning loggerheads (2.3.2.3.) are valid for green turtle too.

4. *Dermochelys coriacea*

4.1. Present distribution and abundance

The leatherback turtle is occasionally observed in Libya waters, as bycatch (one specimens was observed off Tajura coast in 1996, then died at rehabilitation facility at the Marine Biology Research Centre, it was then taxidermied at MBRC museum), No nesting of this species is known in Libya.

4.2. Past distribution and abundance

Except for the mention in one Mediterranean review (Capra, 1949), no other information was found on the historic presence of this species in Libya. Old fishermen can recognise this species apart from loggerhead and green turtles. The leatherback turtle used to be called 'Khanfusa' which means "the beetle" by local fishermen in Tripolitania area (Hamza, pers. observ.).

4.3. Threats

4.3.1. Incidental catch

Fishermen tell that this species is seldom caught, and mainly during winter months (Hamza, pers. observ.).

4.3.2. Intentional killing and exploitation

Data not available.

4.3.3. Other threats

Data not available.

5. Other species

No other sea turtle species are reported from Libya.

6. Conservation status

A national Action Plan was prepared under the supervision of the Regional Activity Centre for Specially protected Areas (Hamza, 2002), however this first action plan in need of revision after 10 years, in order to update objectives for the next phase.

By law, each activity that might cause any destruction or disturbance to the environment or its elements must be assessed using an Environmental Impact Assessment procedure (EIA). EGA has put safety and mitigation measures for the marine environment and its living elements as a primary priority in evaluation of any project EIA. Any impact assessment has to be prepared and presented for comments to the EGA before the granting of any exploration or working permits.

Mitigation measures are set at oil terminals to tackle and minimise any threat of oil pollution accidents on marine wildlife. EGA, the Marine Biology Research Centre, the National Board of Disaster control and the National Oil Corporation are in contact regarding this issue.

National legislation

- The law on the protection and improvement of the environment No 15/2003 stating that all endangered species (marine or terrestrial), and

protected areas should be established to maintain biodiversity and secure a sustainable use of natural resources. The law also specifies certain measures to combat marine pollution.

- The Law no. 14/1989 on exploitation of marine wealth also specifies a whole chapter on establishment and management of marine protected areas, for sustaining marine biodiversity elements of Libyan maritime territories. However this chapter needs to be elaborated and developed in the form of national Law on Marine protected Areas.
- Sea turtles protection is included in the decree of the Secretariat of Agriculture No. 453/1993 stating that "*All species of turtles and tortoises are protected by law in Libya*" furthermore it states that "*Any use of these species or its*

products (skin, eggs, flesh) is banned by law in Libya" and "*Any violation to these articles, will be persecuted with legal system according to Hunting Law no.28 of 1968*". These paragraphs are still in need of development to include habitat protection (terrestrial and marine), and to update the hunting and fishing laws.

International legislation

Libya has ratified several regional and international conventions dealing with marine conservation. Many activities involving marine conservation in Libya are in the framework of implementation of those conventions, including the establishment of the Libyan Sea Turtle Program in 2005.

Table 2 summarizes the position of Libya towards these conventions.

Table 2. Conventions ratified by Libya and including turtle protection.

Convention	Adoption	Ratification
The Convention on Wetlands of International Importance, especially as Waterfowl Habitat	1971	2000
The World Heritage Convention	1972	1978
the Convention on International Trade in Endangered Species of Wild Fauna and Flora	1973	2003
The African Convention on the Conservation of Nature and Natural Resources (Algiers Convention)	1968	1969
Barcelona Convention for Protection against Pollution in the Mediterranean Sea	1976	1979
The Convention on the Conservation of Migratory Species of Wild Animals(CMS)	1979	2002
Specially Protected Areas and Biodiversity Protocol (1995) and its Annexes (amendment)	1995	1995
Convention on Biological Diversity	1992	2001
the Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and contiguous Atlantic area (ACCOBAMS)	2001	2002

7. Conservation needs

- The effectiveness of legal protection of sea turtles needs to be enforced, and the drafting of a new comprehensive legal instrument for sea turtle protection at nesting sites (protected areas) and at sea is an urgent priority.
- Establish a network of Marine and Coastal protected Areas, with special emphasis to protect nesting beaches.
- Strengthening capacity building programs in the protection and studying of sea turtles.
- Develop a program to study the interaction of Libyan fisheries with sea turtles.
- Develop a project to study and quantify the level and impact of dynamite fishing.
- Establish a national stranding network

for sea turtles and other endangered marine species.

- Develop the present partnership ties between Libyan institutes with regional and International organisations.

8. Miscellaneous

Rescue centres.

The Marine Biology Research Centre is nominated by Libyan authorities to conduct sea turtle rescue activities. To date more than 15 loggerhead turtles were treated, rehabilitated and released back to the sea. It's important to stress here the need to undertake the following steps: designate a special unit for the rescue centre; conduct capacity building activities for veterinary staff and finally make the rescue centre accessible to fishermen, school children and the general public.

Stranding network.

Currently no stranding network operates in Libya. Information on stranded sea turtles is either received by MBRC or EGA. There is little coordination between them in dealing with this issue. A national stranding network stays a national priority and requires effort to enforce it.

Genetic studies.

The first Genetic analyses of sea turtle from Libya, was conducted within a Mediterranean study where a specific haplotype "A1" was found in 7 samples, furthermore haplotype "A5" is suggested to represent an endemic population in Libya (Laurent et. al., 1998).

More recently analyses of loggerhead hatchling tissues samples (n = 9), from Algbeba during 2006 season, has been conducted in collaboration with Barcelona University. Preliminary results showed that Libya is genetically different from other Mediterranean nesting areas and have an exclusive haploype (CC-A26). Hence, Libya is an isolated independent management unit (Carlos Carreras, personal comm.).

These findings shows the need of comprehensive study of sea turtle genetics in Libya. Currently LibSTP has collected more samples for this purpose and results

will appear in the second half of 2009.

9. Institutions and organizations involved in conservation, management, and research

9.1. Public

- Libyan Sea Turtle Program (managed and funded by EGA) – duties mentioned in section 2.1.1.
- Marine Biology Research Centre (Rescue, nesting surveys, education, Protected areas).
- Universities (Student volunteers)

9.2. Private

There is no specific NGO dealing with turtles but some NGOs related to environment, like the National Movement of Libyan Scouts have helped actively in 2005 surveys and in organising workshops and lecture talks, where LibSTP personnel had been invited to present their experiences and discuss issues of sea turtle conservation.

10 Resources available about marine turtle research and conservation

1. Two technical reports by Laurent et al. (1995, 1999) on the coastal survey of nesting activity.
2. One technical report (Arabic) by Haddoud and Gomati for 1996 survey of Sirt-Misuratah area.
3. Annual reports (Arabic) by Hamza et al., on monitoring of nesting sites in: Sirte, Benghazi, Misuratah, Albayda and Tobruk (all 2007) except Sirte (2005-2007), Misuratah (2006-2007).
4. Two articles (in Arabic) at Al-beeah bulletin of the EGA.
5. Several recorded lectures, talks and voice records.

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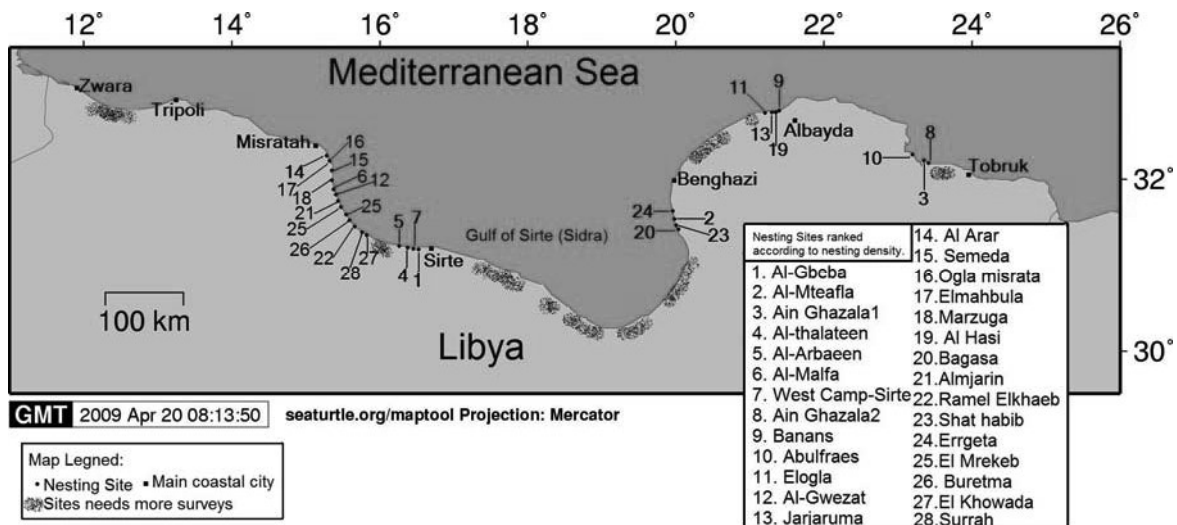


Figure.1. Map of Libyan coast showing known loggerhead sea turtle nesting sites.



Figure 2.
Al Gbeba Beach
(Photo: EGA-LibSTP).

Figure 3.
Al Thalateen Beach
(Photo: EGA-LibSTP).

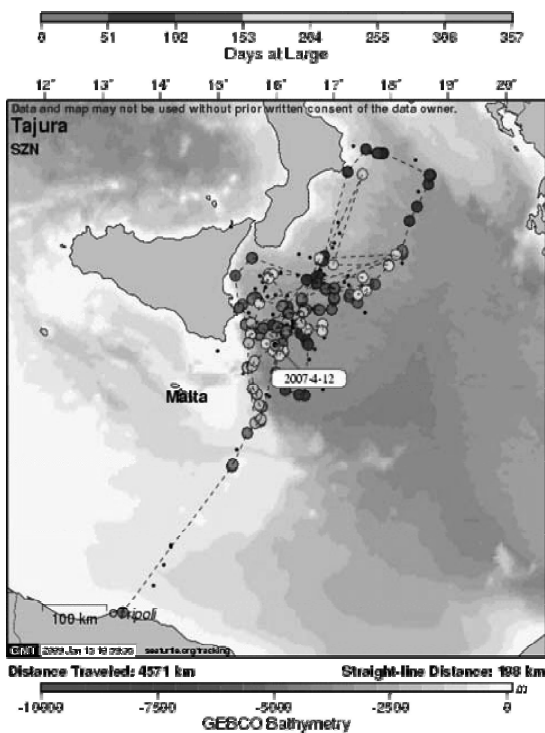


Figure 4.
Tracking routes of "Tajura" loggerhead sea
turtle released from Libya.

Figure 5.
Hatchery on Al Gbeba
beach (Photo: EGA-
LibSTP).





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