



Mediterranean
Action Plan
Barcelona
Convention



The Mediterranean
Biodiversity
Centre

NATIONAL ACTION PLAN for the Conservation of Marine Turtles and their Habitats in Libya



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Foreword

Libya has an extended 2000 km coastline on the Mediterranean Sea, with about 1400 km sandy beaches and less development than nearby Mediterranean countries regarding population density, industrial and tourism pressures. These are ideal habitats for nesting marine turtles.

Three species of Marine Turtles can be found in the Mediterranean and Libya: the Loggerhead turtle (*Caretta caretta*) and the Green turtle (*Chelonia mydas*), and the Leatherback turtle (*Dermochelys coriacea*). Only the first species (loggerheads) are regular breeders in Libyan Sandy beaches, while the Greens are spending post-breeding and wintering stages in rich seagrass beds along the coast. Leatherbacks are incidentally caught in fishing operations with no nesting activity nearly at all Mediterranean areas.

Due to the low population density and accordingly lower activities both at Sea and on the coastline, all known human causing threats to marine turtles can be found in Libya, but to less extent than other southern Mediterranean countries. However, as in other countries, the main threats to marine Turtles are:

- Deterioration status of their nesting, feeding and wintering areas, and key migration passages that are critical to the turtles life cycle
- Direct impacts on turtle populations by incidental capture in fisheries, intentional killing for meat, blood and egg consumption, and boat strikes.
- Pollution, which can have an impact on both habitats and species.

Regardless of the relative better condition of both marine Turtles and their habitats in Libya, the above threats should always be taken into account when planning or executing any conservation measures to these globally Endangered species, as Libyan territories are not only crucial for "Libyan turtles" but to the whole population of these species on regional and international levels. Calsa et al. (2013) proved that the population nesting in Libya emerged as the oldest population in the Mediterranean, dating from the Pleistocene ca. 65,000 years ago (20,000–200,000). Furthermore, Saied et al. (2012) found that Libyan loggerhead turtles' genetic structure qualifies for an independent management unit. The protection of this nesting stock is fundamental to managing the Mediterranean loggerhead Turtle population.

Considering (i) the cultural, economic and social services obtained from conserving marine turtles and their habitats in Libya, (ii) the ratification of Libya of set of regional and international multilateral environmental agreements, that include the conservation of biodiversity in general and conservation of

marine turtles in particular, such as Barcelona Convention and its Biodiversity and protected areas Protocol, and the regional action plan for the conservation of marine turtles and (iii) national decrees and legislations regarding protection of animal marine species, the following National Action Plan is a revised version of the first National Action Plan prepared in 2002 in the framework of the elaboration of the Strategic Action Programme for the conservation of Biological Diversity (SAP BIO) in the Mediterranean Region, as one of three National Action Plans prepared back then to harmonise the conservation work on marine turtles, seabirds and coastal protected areas (UNEP-MAP-RAC/SPA, 2003).

The present revision came after seventeen years of conservation work on marine turtles in Libya and after the Establishment of The Libyan Seaturtle Program, since 2005, which is considered the first step towards *instu* conservation of marine turtle and their nesting beaches in Libya.

The preparation of this Action Plan is based mainly on expert opinions, which will be later reviewed and adopted by the main stakeholders in Libya (Sea users, professionals, fishermen, public institutes, individual researchers, NGOs active in marine conservation) during a national consultation workshop to be held in 2020. The research results conducted by LibSTP in cooperation with other researchers and programs in Italy, Spain, and Tunisia was also considered.

The primary objectives of this revised Action plan are to promote the favourable conservation status of marine turtle species and their habitats in Libya through:

1. The improving and updating of national legislations,
2. The monitoring of known nesting beaches and newly less-known nesting areas. The monitoring should be in line with the National monitoring programme for marine Biodiversity in Libya.
3. The appropriate protection, conservation and management of the marine turtle habitats, including nesting, feeding, wintering areas and migration routes, in coordination with other Mediterranean efforts.
4. The Improvement of scientific knowledge by research and monitoring.

This Action Plan should be reviewed every FIVE years, through a review process that should assess the implementation of planned activities, problems and shortcomings, to redesign this Plan accordingly in consultation with relevant national stakeholders.

Several sections of this present Action Plan are in line with the principles, objectives, and priorities of the "Action Plan for the Conservation of Marine Turtles in the Mediterranean Sea-2019" adopted by the

CoP 21 (Napoli, Italy 2-5 December 2019)¹ by the conference of contracting parties in Barcelona Convention.

Acknowledgements

The National Action Plan for the Conservation of Marine Turtles in Libyan Waters was developed in coordination with the Libyan Seaturtle Program (LibSTP), and the Nature Conservation Department at the Libyan Environment General Authority (EGA). Special thanks to the Special Protected Areas Regional Activities Centre (SPA/RAC) for supporting the preparation of the first and the current revised action plan. The final version of this Action Plan was discussed and approved by a national online workshop, attended by more than 50 participants, represented several stakeholders from Government, research institutions, NGOs and fishers.

¹ UNEP/MED IG.24/10, Annex III

**National Action Plan for the Conservation
of Marine Turtles and Their Habitats in Libya
(Draft version)**

1. Introduction

1.1. Justification

Sea turtles are marine reptiles, living since about 200 million years back. The present sea turtles of the Mediterranean believed to be existed for 10,000 years, after the regression of the last ice-age, and the warming environment became sustaining nesting on the basin shores.

As an essential marine ecosystem component, marine turtles are useful indicators of the marine environment quality, as they play a vital role in ecosystem balance. Being migratory species, using different habitats at different life-stages throughout their lives, their protection is, therefore, a shared responsibility of all coastal countries. This is particularly true for those around a semi-enclosed sea like the Mediterranean Sea, bordered by 22 countries.

The Mediterranean countries are invited to establish National Plans to identify gaps and support conservation authorities and other stakeholders involved in the survival of marine turtles and other megafauna of the country, as specified in the regional marine turtle Action Plan.

The commitment of Libya to marine and coastal biodiversity conservation is evident through the early ratification of the Barcelona Convention for the Protection of the Mediterranean Sea against Pollution (signed on 31st January 1977 and ratified on 31st January 1979), including its annexed protocols, with particular emphasis to the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean (1995) and its amendments.

Libya also participated actively in the two expert meetings in Arta 1998 and Tunis 1999 to develop the first version of the Action Plan for the conservation of marine turtles in the Mediterranean and its subsequent revisions in 2007 (after an expert meeting hosted by Libya in 2006) and of 2013, which were accordingly adopted.

Libya was also one of the first countries in North Africa to develop a National Action Plan (NAP) for the conservation of marine turtles, and its habitats in 2002, following the regional Action Plan elaboration in the early 2000s. That first National Action Plan was developed in the Strategic Action Programme framework for the conservation of Marine and Coastal Biodiversity in the Mediterranean (SAP-BIO)" adopted by Mediterranean countries in 2003.

This revision of the NAP is necessary for several reasons:

- (i) The targets of the 2002 NAP were already reached while others have changed on the national and regional levels,
- (ii) Studies showed the Libyan coast's importance for both nesting, foraging, migratory and overwintering areas for several marine turtle rookeries from all over the Mediterranean. Thus, conservation of the marine turtles in this area is an essential contribution to marine conservation throughout the region (for example, 32% of marine turtles from Zakynthos, Greece, migrate to the northwest marine area in Libya and southeast Tunisian waters (Schofield et al., 2013).
- (iii) Marine turtles are under continuous pressure from human activities both on land and at Sea. The future development in Libya and the existing pressure from illegal fishing and the unknown levels of the incidental catches require to be highlighted for decision-makers to avoid habitat destruction caused by future coastal development.
- (iv) The existing Libyan Seaturtle Program (LibSTP) should be strengthened. The NAP will act as a roadmap for governmental, non-governmental organisations, and the general public towards better understanding and conservation of the marine environment using marine turtles as a model.
- (v) Libya is committed by both national legislation and international agreements to conserve and protect marine turtles and their habitats to reach a favourable conservation status. This Action Plan should be used as a guide in identifying the national priorities towards either surveying, lobbying, outreach, conservation of these endangered populations.

Therefore, this NAP should be disseminated and shared via all means to the general public, particularly to Sea-users (Researchers, Fishing and maritime sector, tourism...etc.), to achieve effective conservation effort. The LibSTP and its associated NGOs have a role to play in this regard.

This Action Plan's primary goal is to promote the favourable conservation status of marine turtle species and their habitats in Libya by improving scientific knowledge by research and monitoring and the appropriate protection, conservation and management of marine turtle habitats, including nesting, feeding and wintering areas.

Actions to reach this goal should be focused on the following targets:

1. Develop and Enforce legal protection via update of existing regulations.
2. Monitor known nesting beaches and new less known nesting areas, in particular the beaches between Sirte and Benghazi as a priority, due to limited data, then the areas to the East of Benghazi, the scattered small beaches in Aljabal Alakhdar region and finally the area east of Derna to the Egyptian border. Also, to continue the flipper tagging and satellite tracking to understand "Libyan" marine turtles' post-breeding movements.

3. Establish new partnerships between the LibSTP and other national NGOs working along the coastline, to perform capacity building activities to help in obtaining a broader understanding of the nesting grounds, the establishment of national stranding network for marine turtles (and other marine megafauna, e.g. Cetaceans, Monk Seals and Seabirds) and the gathering of data on marine litter to assess the pollution along the Libyan waters.
 4. Assess at the national level the applied mitigation measures for interaction with fisheries to understand the impact of the "commercial and artisanal Libyan fishing industry", on marine turtles at Sea. This also can help to identify important foraging areas based on scientific information.
 5. Establish a national network of marine turtle rescue centres in coordination with both the Marine Biology Research Centre, its branches along the coastline and Universities.
 6. Set up an awareness strategy of marine turtle conservation in Libya, targeting all stakeholders involved in conserving marine endangered taxa and habitats.
- Assessment of this Action Plan's implementation will be conducted every five years, from the adoption date to ensure each target's achievement.

Overview of the current situation

The Libyan coast

The Libyan coastline lies between 11°.33' and 25°.10' East. It extends along the Mediterranean basin for about 1970 Km, i.e. nearly 37% of the total coastline of the Arab countries bordering the Mediterranean (Howe and Hamza, 2002).

The coast, in terms of turtle nesting importance, can be divided into three different areas as follows:

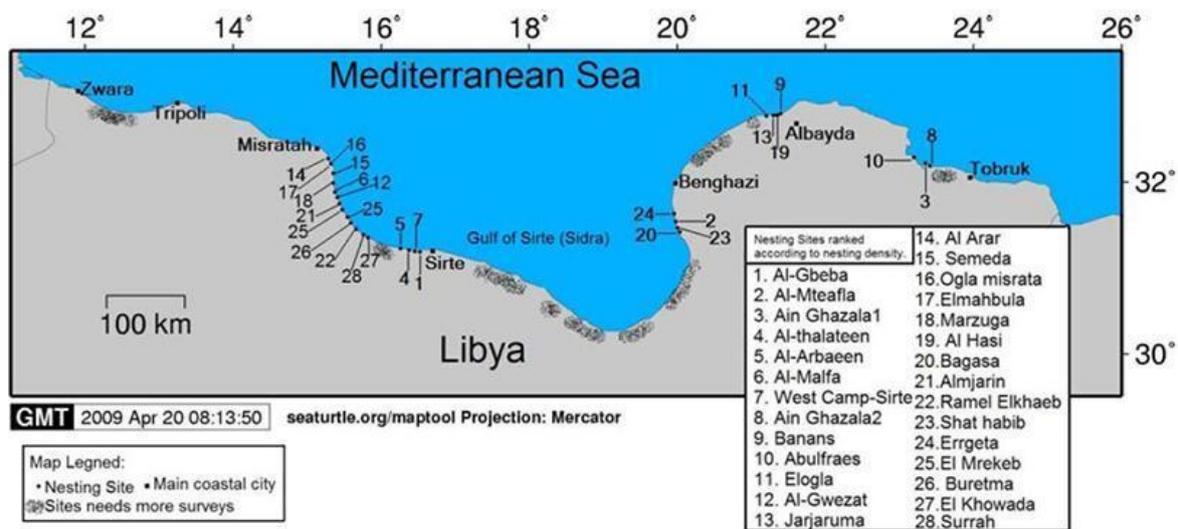


Figure 1. An overview of the Libya Coastal area showing known 28 turtle nesting sites.

1. **Area I (from Tunisian border to Misratah)**: this area is characterised by a broad continental shelf of 55.000 sq Km, which starts from the Gulf of Gabes to Misratah . (Sogreah, 1977). This area is generally low elevated, extends to 407 km long, representing 22.5% of the coastline, and has 160 km of sandy beaches (Laurent *et. al.* 1999). It exhibits mostly sandy beaches. Salt marshes characterise the western limit of it up to the East of Zuwara, including Farwa island, then sandy coastline covering the area up to Sabratah, with some rocky low elevated areas with little development and human activity. From Sabratah to Tajoura the coastline becomes rockier and highly developed in the area of Tripoli's capital city. From Tajura to Mistratah, the coast is mostly sandy, then its changes to long rocky cliffs with diverse habitat types, i.e. Dunes, estuaries of wadies, agricultural landscapes, and Mediterranean shrubby lands.

Based on phase III of nesting activity assessment (Laurent *et. al.*; 1999) the most important nesting sites in this area are the northern coast of Farwa Island, Zuwara and Tillil. (See annexe 1)

2. **Area II (from Misratah to Sirte):** This area is generally low sandy coast, representing 11.5% of the total Libyan coasts, and has 186.3 km of sandy beaches. This extended area is wild beaches with very low human activity and hosts a vast salt marsh area separating the main road away from the coastline, making access to it very difficult. The coast between Fnar Qaser Ahmed towards the East is rocky and then changes to flat sandy (See annexe 1). This area hosts an important nesting activity for loggerhead marine turtles, especially from Bouwerat Lahsun towards the west area of Sirte.

3. **Area III (Sirte to the Egyptian Border):** This area hosts the country's most important nesting grounds, being less populated. This area is diverse in its coastal area characteristics. It starts from east Sirte, mostly sandy shores with a vast salt marsh area isolating these shores from the desert fringe. These areas, in general, are known for their low fishing activity. Therefore it hosts most of the loggerhead nesting and feeding grounds of the country. On the other hand, the coasts start to be higher from Tolmeitha (Tukara) up to about 40 km long to the coast of Wadi Kouf National Park (KNP), where other shorter isolated sandy beaches are present (El-Ugla, Al-Hasi and Al-Bananes, Alhamama). The other low sandy coasts start from the East of Derna city towards the Egyptian border.

1.1.1. Marine turtles in the Mediterranean

There are mainly three species of marine turtles, among seven known globally, that feed in the Mediterranean Sea, and two species use the beaches of this basin to reproduce. These species are: the loggerhead turtle *Caretta caretta* (Cheloniidae), the most common turtle species which nests on many Mediterranean beaches, the green turtle *Chelonia mydas* (Cheloniidae) which, prefers the eastern shores of the Mediterranean (mainly Turkey and Cyprus), and the leatherback turtle *Dermochelys coriacea* (Dermochelyidae), which visit the Mediterranean basin from the Atlantic ocean to feed.

The Mediterranean populations of the first two species usually mix up with the Atlantic population. These visitors enter the basin via the Strait of Gibraltar, but they only have a limited gene flow (Encalada et al., 1998; Laurent et al., 1999). The threats in the Mediterranean affect both populations equally, which add more emphasis on mitigating them.

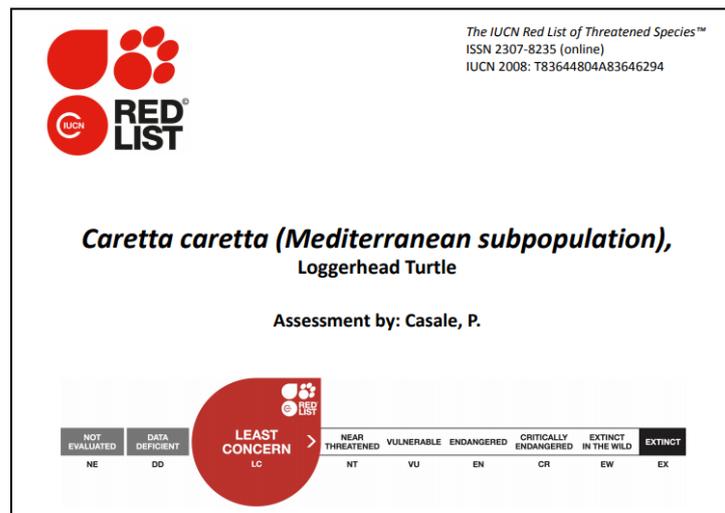
Two other visitor marine turtles have recorded sporadically in the Mediterranean: the Kemp's Ridley (*Lepidochelys kempii*), and the hawksbill (*Eretmochelys imbricata*).

Broderick et al. (2002) estimated that only about 2,280-2,787 loggerheads and 339-360 green adult female turtles nest in the Mediterranean. Casale and Margaritoulis (2010) estimated that the average

number of nests is 7,200/year for loggerheads and 1,500/year for green turtles based on surveys conducted to date.

Marine turtle species found in the Mediterranean are classified under the IUCN Red List of Threatened Species (Version 2016-3) as being:

- Vulnerable [Vu] (Globally) and Least Concern (LC) since 2015 in the Mediterranean Sea: the loggerhead turtle (*Caretta caretta*)
- Endangered [EN] (Globally): the green turtle (*Chelonia mydas*);
- Vulnerable [Vu] (Globally): The leatherback turtle (*Dermochelys coriacea*).



Mediterranean marine turtle species also listed in Annex II (list of endangered or threatened species) of the SPA/BD Protocol of the Barcelona Convention, meaning that the Mediterranean countries shall ensure the maximum possible protection and recovery.

Threats to marine turtles vary in time and space and relatively to different populations. Threat categories affecting marine turtles were described by Wallace et al. (2011) as:

- Fisheries bycatch: incidental capture of marine turtles in fishing gear targeting other species;
- Take: direct catch of turtles or eggs for human use (i.e. consumption, commercial products);
- Coastal development affecting critical turtle habitats: human-induced alteration of coastal environments due to construction, dredging, beaches modification, etc.;
- Pollution and Pathogens: marine pollution and debris that affect marine turtles (i.e. through ingestion or entanglement, disorientation caused by artificial lights), as well as impacts of pervasive pathogens (for example, Fibropapilloma virus) on turtle health;

- Climate change: the current and future impacts of climate change on marine turtles and their habitats (increasing sand temperatures of nesting beaches affecting hatchling sex ratios, sea-level rise, storms frequency and intensity are affecting nesting habitats, etc.).

1.1.2. Marine turtles in the Libyan Mediterranean coasts

Among the eight species of sea turtles in the world's oceans, three species occurring in the Mediterranean, the Loggerhead *Caretta caretta*, the green turtle *Chelonia mydas*, and the leatherback sea turtle *Dermochelys corinica*. The three species have been recorded in Libyan waters, Loggerhead, the Green Turtle (Hamza, 2010, Snape et al., 2016), and The Leatherback turtle².

- Nesting

Loggerhead is the only species recorded nesting on the Libyan coast. Major nesting sites lie between Misratah and Ajdabiyah, covering all of the Gulf of Sirte, further to the East, Shat Albadeen, Almagroon, Ergetah, Al-Agoriyah, Al-Hasi, Jarjarumah (Kouf National Park), to the beaches of Ain Al-Ghazala, and East of Tobruk. However, several of these beaches were surveyed for only a few years, and a focused annual full-season monitoring is needed to estimate nesting density at each of them. Furthermore, many gaps still exist within the region from Sirte to Ajdabiyah, as only a few kilometres surveyed during the past years.

Lower nesting activity occurs on Tripoli's coast to Ras Ajdir (the primary monitored site here is Farwa island northern beaches and some of Zuwarah municipality beaches). Also, less is known on the nesting activity to the west of Misratah to Tripoli, as the sandy beaches are restricted to few bays within the high sandstone coastline and higher human population density related anthropogenic activities.

- Marine areas

Libya is one of the main foraging areas for both loggerhead and green turtles (Margaritoulis et al., 2003; Casale and Margaritoulis, 2010; Snape et al. 2016). This information could be confirmed through Satellite tracked marine turtles from Cyprus and Greece, as they head immediately during the post-nesting period towards Egyptian Mediterranean water. They reside in Libyan waters to feed on extensive natural seagrass habitats (Khaleej Bumbah, Gulf of Sirte). Some turtles continue moving towards the Gulf of Gabes in Tunisia as a final destination.

² recorded as bycatch at Tunnara nets used for Tuna fishing in Tripoli and Benghazi by Capra since 1949 (Hadoud and Elgomati, 1996) as well as in Misratah where it was caught incidentally in Gill nets (Hamza et al., 2009)

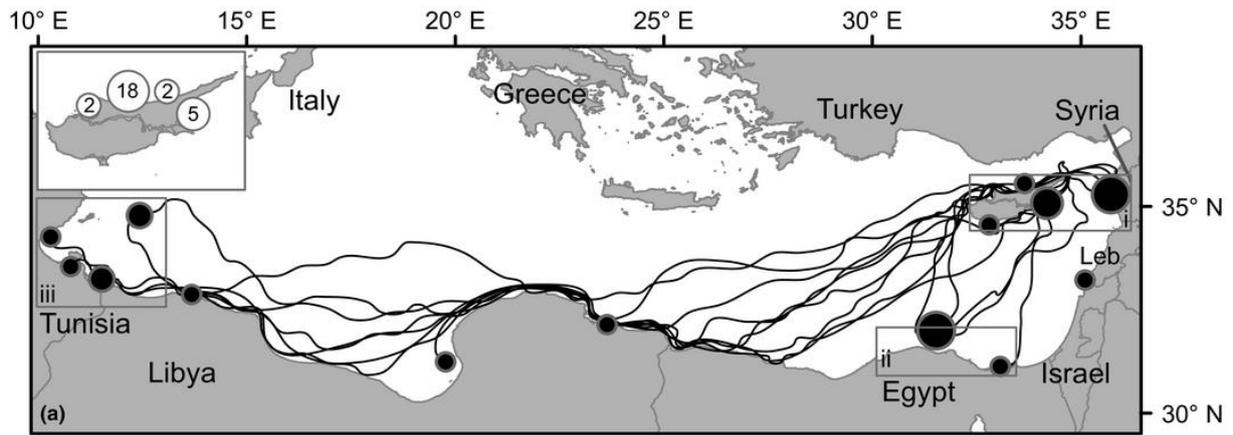


Figure 2. Loggerhead turtle migration routes (n=24) and final residence locations (Snape et al., 2016). Black circles are scaled to the number of individuals residing in each area (1–4).

For Green turtles, waters in Khaleej Bumbah, Ain Al-Ghazala, West of Sirte, and the far west at Farwa lagoon are vital for migratory green marine turtles *Cyprus rockery* (15 out of 21 turtles stayed at Libyan waters). This migratory foraging corridor is derived from Alexandria's northern Egypt waters, as turtles continue heading to Libya after staying at Egyptian waters for feeding (Godley et al. 2002; Broderick et al., 2007, Stokes et al. 2015).

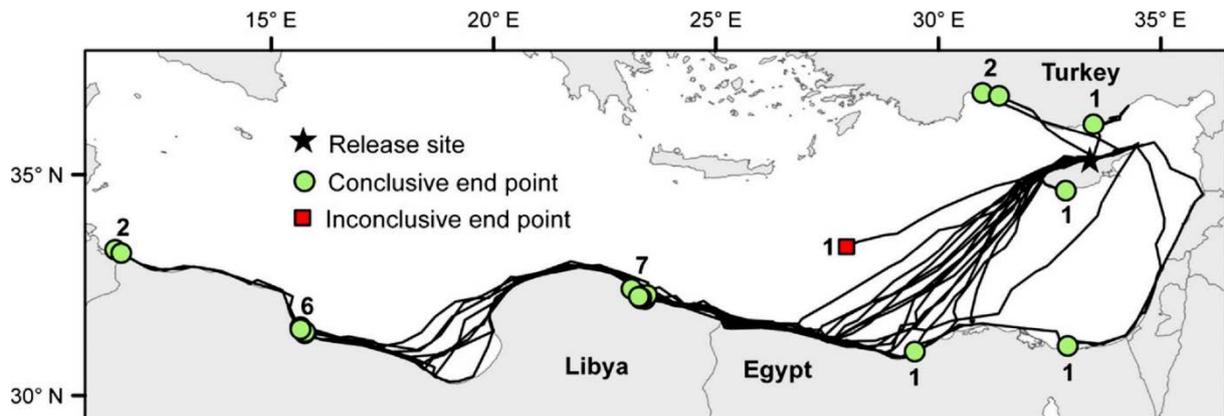


Figure 3. Green turtle migration routes and final locations of residence (n=21) of female turtles satellite-tagged and tracked from Alagadi beach, Cyprus (Stokes et al., 2015)

1.1.3. Threats

As they have to return to land, depositing their egg clutches on sandy beaches, females face several threats while laying their eggs, such as predation by mammalian predators, such as Jackals, or even human-caused kill for their meat (rare in Libya). Hatchlings, crawl on the sand towards seawater may get predated, killed by 4x4 cars, or taken away with eggs during illegal sand mining for construction purposes. In general, threats to marine turtles can be divided into Threats at the terrestrial habitats and the marine habitats.

- Coastal development

Libyan coastline is one of the least developed areas in the whole Mediterranean, as the country depends mostly on fossil fuel extraction as the main national income. Development of the sandy beaches for tourism is quite limited. However, about 21 out of 29 sites along the coast are targeted by development within the National Plan to enhance tourism contribution to the national economy (Hamza et al., 2011). In the future, these developments should take in consideration the existing national regulatory basis of development, such as EIA and related regulations. It should also be designed and constructed following eco-friendly planning principals, including using dimmed lights on sandy beaches to avoid distraction to emerging marine turtles for nesting. Development for Oil and Gas facilities should also follow same rules.

The problems caused by such development include stationary lights (street lights, hotels, apartments, houses, etc.), moving lights (cars, etc.), movement of holiday-makers on beaches at night (and day) and barriers of Sunbeds and umbrellas, physical alteration of nesting beaches and environment.

- Predation

Ghost crabs depredating hatchlings were reported on nesting beaches in Libya (Laurent et al., 1995& 1999). Other predators include North African Red Fox, Jackals, and stray dogs. The mean of the nest predation estimates exceeds 60%, which can be taken as the level of predation along the entire Mediterranean coast of Libya (Laurent et al., 1999).

- Pollution

The Libyan coastline is receiving plastic pollution from inland sources and offshore sources (via currents) from northern Mediterranean countries and debris illegally dumped by shipping vessels. However, no published data exist on the types and severity of these pollutants. The second type of pollution is oil spills. These can be originated from ballast water of oil tankers or spills during the exploration of Oil and Gas in the offshore area. So far, no major pollution events had affected sandy beaches of nesting marine turtles, but these areas are considered sensitive areas to oil spill within the oil companies' contingency plans on national or international levels.

- *Human exploitation*

Contrary to the neighbouring countries in North Africa, marine turtle meat's direct consumption is rare in Libya. Consumption of turtle blood does not exist. Nevertheless, isolated egg consumption and even sale incidents were noted mainly in Zwara, Misratah and Sirte, lesser pressure found in the Northeastern coasts.

- *Bycatch*

No fishery targets marine turtles in Libya directly. Almost all fishermen stated that they do not intentionally aim for sea turtles, and they just found them in their nets or hooks accidentally (Hamza et al., 2007), as there is no demand for marine turtle meat or blood in the country. However, in most cases, fishers either cut the longline hook with the hook in the turtle mouth, which may cause a localised infection that can lead to lesions and death in a few days/weeks.

There is no information on the bycatch at both industrialised and artisanal fisheries. However, based on data presented by Casale et al. (2011), the Mediterranean bycatch is responsible for the mortality of 132,000 marine turtles. About 7.36% of them (9715.2 turtles) are estimated to be caught in Libyan waters by Libyan fisheries. This number needs further investigation to assess the current contribution of Libyan fisheries to marine turtle mortality. However, there is a need to assess the illegal, unreported and unregulated fishing by foreign fishing vessels in the Libyan waters, especially after the drop of law enforcement since 2011.

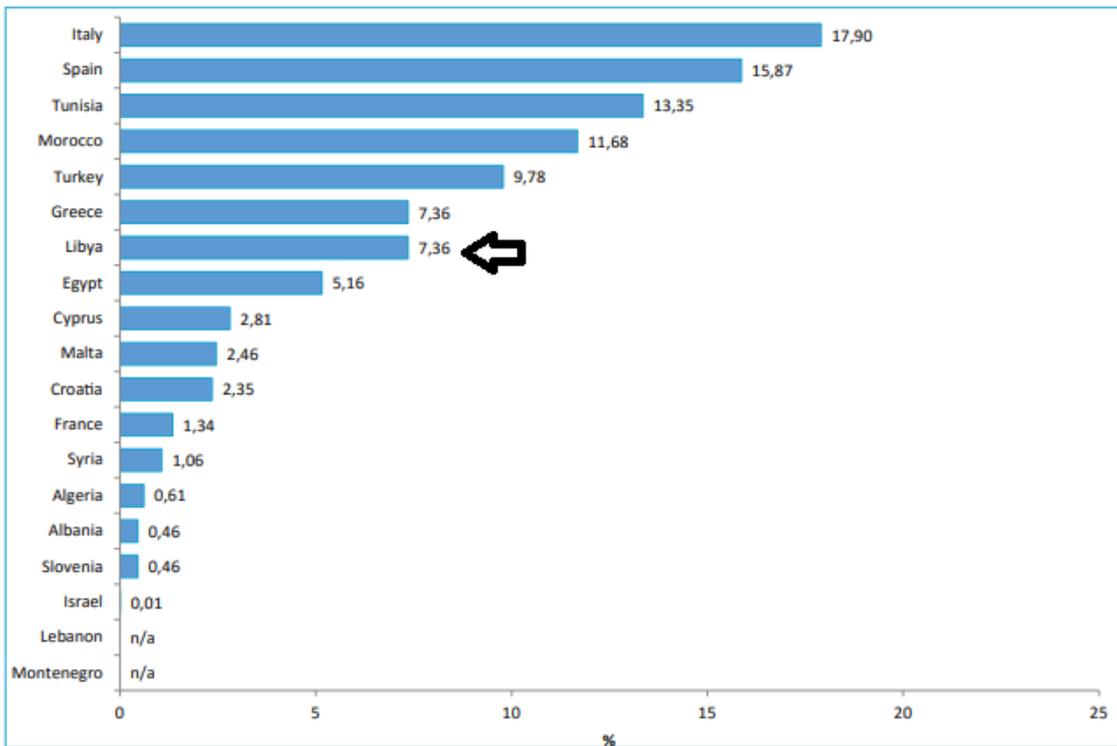


Figure 4 Contribution to marine turtle incidental catch (100% = 132,000 individuals / year) estimated by country in the Mediterranean (Casale 2011)

1.2. Libyan Seaturtle Program work review:

Since 2005 when the Libyan Seaturtle program established, several achievements were made for the conservation of sea turtles in Libya, among them:

1. Provide hands-on training for more than 40 personnel locally. Trainees came from EGA, MBRC, the Universities, NGOs, beach monitoring techniques, and tagging, following standard methods used in other Mediterranean countries.
2. Taking part in training courses organised by the Regional Activity Centre for Specially Protected areas, related to nesting beach management (Cyprus), Genetics (Italy and Turkey) and marine turtle rescue training (Italy).
3. Participation in both the Mediterranean marine turtle conferences (Med Turtle Conf.) and the international Sea turtle Symposiums (ISTS), to publish the program results on nest monitoring, Genetic studies, sex ratio studies, tracking, physiology and public participation in conservation efforts.
4. Publication of several papers with other researchers from Tunisia, Italy, Spain examples include the following:

	Article/ Report	Main findings
1.	Hamza, A. (2003). A proposed management program for marine turtle population in Libyan Arab Jamahiriya. In <i>of the twenty-Third Annual Symposium on Sea Turtle Biology and Conservation</i> (p. 54).	The Libyan Seaturtle Program establishment plan was presented during the 23rd <i>Annual Symposium on Sea Turtle Biology and Conservation</i> held in Kuala Lumpur, Malaysia.
2.	Hamza A. & H. El Ghmati. (2006). Conservation of marine turtles nesting at three sites west of Sirte, Libya. Final report. The Regional Activity Centre for Specially Protected Areas (UNEP-MAP-RAC/SPA), Tunis. 35pp.	The first LibSTP technical report on West of Sirte monitoring and training sessions held in 2005.
3.	Hamza, A. (2007). Marine turtle nesting activity and conservation, Sirte-Libyan Arab Jamahiriya (2006 season). Final report. The Regional Activity Centre for Specially Protected Areas (UNEP-MAP-RAC/SPA), Tunis, Tunisia. 32 pp.	The first LibSTP technical report on West of Sirte monitoring and training sessions held in 2006.
4.	Saied A., Hamza A., Bourass E., Deryagh S., Bowena E., Eshater M., Dofanni K. & Bashiyah A., 2008. Nesting activity and conservation of marine turtles in three nesting sites west of Sirte (2006-2007 seasons). Poster presentation. The third Mediterranean marine turtle Conference. 23-25 Oct. 2008, Hammamet. Tunisia.	Results showed an increase in nesting density at the three sites since 2005. Al Ghbeba is the most important nesting site in Libya so far, with 8.8 nests/km in 2005, 18.5 nests/km in 2006 and 30.6 nests/km in 2007.
5.	Bentivegna F., Hamza A., Saied A., Elghmati H., Elsharif E., Graeme C. Hays & S. Hochscheid (2008) Movements of juvenile loggerhead turtles accidentally caught by fishermen in the Libyan Sea. The third Mediterranean marine turtle Conference. 23-25 Oct. 2008, Hammamet. Tunisia.	Satellite telemetry to investigate the movements and behaviour of turtles found in neritic Libyan waters. Turtle 1 parted from Tajura, East of Tripoli, and went straight to the north towards Sicily where it remained for one year circling the Ionian sea in deep waters. Turtle 2 remained for one month in the Misurata area and moved then to shallow waters in the offshore area 120 km east of the Gulf of Gabes (Tunisia). Turtle 3 always remained in the Misurata area.
6.	Hamza, A., Swayeb, B., & Deryag, S. (2009). Sea Turtles Tagging in Libya. <i>Marine Turtle Newsletter</i> , (125), 7-9.	Seventeen nesting loggerhead females, and we also tagged other two entangled turtles in fishing nets: one juvenile near Al Ghbeba nesting site of Sirte, and more recently in May 2009, one leatherback sea turtle delivered by a local fisherman near El Khowada beach SE of Misratah.
7.	Hamza A. (2010) Libya. In: Casale P, Margaritoulis D (eds) <i>Sea turtles in the Mediterranean: distribution, threats and conservation priorities</i> . IUCN, Gland, pp 157–170.	Review chapter on marine turtle status in Libya, including nesting areas, density, threats, within IUCN MTSG book on the marine turtles in the Mediterranean.
8.	Haddoud, D. A., & El Gomati, H. M. (2010). A General Assessment of Marine Turtle Nesting Activity on the Libyan Saline Coast. In <i>Sabkha Ecosystems</i> (pp. 53-58). Springer, Dordrecht.	A book chapter summarised 1995-1998 surveys on marine turtles along the Libyan coastline.

	Article/ Report	Main findings
9.	Hochscheid, S., Bentivegna, F., Hamza, A., & Hays, G. C. (2010). When surfacers do not dive: multiple significance of extended surface times in marine turtles. <i>Journal of Experimental Biology</i> , 213(8), 1328-1337.	Investigated the location, timing and duration of extended surface times (ESTs) in 10 free-ranging loggerhead turtles (<i>Caretta caretta</i>) and the possible relationship to water temperature and diving activity recorded via satellite relay data loggers for 101–450 days. This is the first evidence that loggerhead turtles may refrain from diving for at least two reasons: absorb solar radiation or recover from anaerobic activity.
10.	Saied, A., Maffucci, F., Hochscheid, S., Dryag, S., Swayeb, B., Borra, M., Ouerghi, A., Procaccini, G. and Bentivegna, F., (2012). Loggerhead turtles nesting in Libya: an important management unit for the Mediterranean stock. <i>Marine Ecology Progress Series</i> , 450, pp.207-218.	This research found that the genetic structure of Libyan loggerhead turtles qualifies for an independent management unit.
11.	Jribi, I., Hamza, A., Saied, A., & Ouergui, A. (2013). Sex ratio estimations of loggerhead marine turtle hatchlings by incubation duration and nest temperature at Sirte beaches (Libya). <i>Scientia Marina</i> , 77(4), 617-624.	The results showed a female-dominated sex ratio at 85.4% based on incubation duration and 70.4% based on mean temperature. These findings support the reported highly female-skewed sex ratios in the Mediterranean and elsewhere.
12.	Cardona, L., Clusa, M., Eder, E., Demetropoulos, A., Margaritoulis, D., Rees, A.F., Hamza, A.A., Khalil, M., Levy, Y., Türkozan, O. and Marín, I., 2014. Distribution patterns and foraging ground productivity determine clutch size in Mediterranean loggerhead turtles. <i>Marine Ecology Progress Series</i> , 497, pp.229-241.	Tested whether differences in clutch size among rookeries in the Mediterranean Sea are related to differential use of foraging grounds of contrasting productivity. Stable isotope ratios of carbon and nitrogen of turtle hatchlings from 8 Mediterranean rookeries were used to characterise their mothers' foraging grounds. Average clutch size in each rookery was positively correlated to the proportion of females accessing highly productive areas such as the Adriatic/Northern Ionian Sea
13.	Monsinjon, J., Jribi, I., Hamza, A., Ouerghi, A., Kaska, Y., & Girondot, M. (2017). Embryonic growth rate thermal reaction norm of Mediterranean <i>Caretta caretta</i> embryos from two different thermal habitats, Turkey and Libya. <i>Chelonian conservation and biology</i> , 16(2), 172-179.	The loggerhead marine turtle (<i>Caretta caretta</i>) nests regularly in the Oriental Basin of the Mediterranean Sea. The different populations are separated because of time (< 12,000 yrs) and very different thermal habitats; it is hotter on the southern coast (Libya) than on the northern ones (Cyprus, Greece, and Turkey), both populations have similar thermal reaction norms for embryonic growth rate.
14.	Clusa, M., Carreras, C., Cardona, L., Demetropoulos, A., Margaritoulis, D., Rees, A.F., Hamza, A.A., Khalil, M., Levy, Y., Turkozan, O. and Aguilar, A., 2018. Philopatry in loggerhead turtles <i>Caretta caretta</i> : beyond the gender paradigm. <i>Marine Ecology Progress Series</i> , 588, pp.201-213.	Five management units identified within the Mediterranean (Libya and Cyprus) is one of them. The genetic similarity between distant nesting areas (i.e. Libya and Cyprus) suggests a more complex breeding behaviour pattern.

1.1.3. Regulatory legislations for protection of marine turtles

On the National level:

The Libyan legislator has specified marine turtles in a special decree of Secretary of Peoples committee of Agricultural Reclamation and Animal wealth; the decree No.453/1993, stated at its first paragraph that "*hunting and catching of marine turtles and tortoises of different species, by any means, are banned in the State of Libya, nor trade and export are forbidden*" (see annexe 2). This decree is considered as the clearest regulation concerning sea turtles. Another act No.6/1996 was issued by the Minister of Agriculture and marine wealth, which prohibited the hunting activities for terrestrial animals and some marine animals in Libya after the relevant authorities noted the fast decrease in biodiversity elements of the Libyan habitats.

A draft law on Marine Protected areas was drafted in 2014, with cooperation with SPA/RAC. The draft law was revised through but still pending adoption by the Libyan legislative authorities.

There are other laws, which includes articles on conservation and protection of wildlife and endangered species, this is:

1. Law No.15/2003 on Environment Protection and Enhancement, section 9 articles 60 and 61 stated, "*All animal species (aquatic and terrestrial) must be protected from extinction*"; this section includes other recommendations on establishing nature reserves and protected areas.
2. Law No. 14/1989 on the utilisation of marine wealth, section 6 on marine protected areas there are four articles concerning:
 - *Definition of marine protected areas (MPAs).*
 - *The management of MPA.*
 - *Marine Biology Research Centre is the responsible body for identification, studying, and technical management of MPA's.*
 - *Implementing plans and programs to conserve marine endangered species, and follow-up collaboration efforts with regional and international organisations.*

On the regional/international level:

The State of Libya is a contracting party to the following relevant regional and international conventions:

1. Convention on Biological Diversity (CBD).
2. Convention on Migratory Species of Wild Animals (Bonn Convention).
3. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

4. The Barcelona Convention on the Protection of Mediterranean Sea against pollution. And the Protocol concerning Specially Protected Areas and Biodiversity in the Mediterranean.
5. The African Convention of Nature conservatorium (Algiers Convention).

2. The National Action Plan

2.1. Objectives

5. Improve and update existing legal protection,
6. Monitoring of known nesting beaches and new less known nesting areas. The monitoring should be in line with the National monitoring programme for marine Biodiversity in Libya.
7. Appropriate protection, conservation and management of the marine turtle habitats including nesting, feeding, and wintering areas and migration routes, in coordination with other Mediterranean efforts.
8. Scientific knowledge improvement with research and monitoring.

2.2. Priorities

1. protection and management of known nesting, feeding (benthic and pelagic) and wintering areas and migration routes;
2. banning of exploitation and minimisation of incidental catches;
3. identification of feeding and wintering areas and migration routes
4. Investigation of new nesting areas; and monitor known sites in particular the beaches between Sirte and Benghazi as a priority, due to limited data, then the areas to the East of Benghazi, the scattered small beaches in Aljabal Alakhdar region and finally the area East of Derna to the Egyptian border.

2.3. Implementation of the Plan

This Action Plan lists specific actions and measures to be taken to promote favourable status for marine turtles in Libya. The choice of actions is based on considerations of **priority** and **feasibility**; i.e., the actions proposed are those considered to (a) have the highest priority, and (b) be feasible within a period of **FIVE** years. At the end of this period, a review process should be conducted to assess each of the activities, problems, and limitations, review and restructure a new set of actions for the future. What is important is to develop a mechanism for evaluating the success of each action. A two-year national workshop could be a fair assessment

meeting among all sea turtle conservation players in Libya to review and assess the action plan implementation.

This revised Action Plan is based on five significant activity categories:

- A. Legislative actions
- B. Management actions
- C. Research
- D. Capacity building
- E. Awareness and education

Owing to its expertise, personnel, facilities and mandate, the Environment General Authority (EGA) and its Libyan Seaturtle Program (LibSTP) , should be the leading force to implement this Action Plan. The recent involvement of several NGO's along the Libyan coast in Seaturtle conservation should be taken as an asset under the coordination of EGA and its LibSTP. A LibSTP affiliation program can include these NGO's as local partners to the program. LibSTP and the NGO's should also include the following to be effectively active under the Action Plan. These include fisheries, tourism, and media (TVs, Radios, Social media, websites ..etc.), government, enforcement officials, and educators).

When all the actions highlighted here are implemented, **within five years** of its initiation, Libya will have:

- developed regulations (laws) related to marine habitats protection and management (adoption of the draft law on MPAs),
- Monitored all known nesting beaches in addition to new less known nesting areas to obtain a better estimate of the nesting activity (which will have regional importance for the whole Mediterranean basin, as an accurate population estimation in Libya is lacking);
- Established a partnership between the public sector and NGOs to conduct monitoring, stranding network activity and marine litter monitoring using the marine turtle as a model taxon for marine litter pollution along the Libyan waters.
- Assessed the interactions between marine turtles and fisheries and implemented mitigation measures tested in other Mediterranean fisheries;
- It has established a national network of marine turtle rescue centres in coordination with both the Marine Biology Research Centre, its branches along the coastline and Universities.
- Established and implement an awareness strategy of marine conservation in Libya, targeting all stakeholders involved in the conservation for marine endangered taxa and habitats in the framework of Ecosystem Approach guidelines implementation.

2.1. Legal actions

2.1.1. Issuing the Law on MPAs in Libya

An effort should be made to ensure that national legislations are in full accordance with the Barcelona convention, particularly its SPA/BD Protocol obligations and provisions. This first phase will be limited to the acquiring of information and a study with proposals.

Action: Revisiting the Law on MPAs of 2014 in Libya and start the necessary work for its adoption by the parliament

Timetable: years 1 and 2.

Actors: Legal offices of EGA (LibSTP), MBRC, support via advocacy by related NGOs

Indicator of success: Law of MPAs adopted and issued in the official gazette.

2.2. Management actions

2.2.1. Monitored all known nesting beaches in addition to new less known nesting areas

Action 1: A collaborative work to monitor nesting areas by LibSTP along the Libyan coastline. Use of Ecosystem Approach guidelines, Protocols is recommended to collect harmonised, and quality assured data.

Action 2: coordinated monitoring of strandings through networking and tagging by LibSTP and its partners along the Libyan coastline

Action 3: Establish a national database for the collection of data concerning nesting, stranding and tagging

Timetable: years 1-5.

Actors: LibSTP, MBRC, Partner NGO's

Indicators of success: An annual report on nesting activity estimates in selected areas to cover all known and less-known nesting areas along the Libyan coastline. Stranding report, a national database established and available online.

2.2.2. Monitoring of marine litter impacts

Action: Conduct monitoring of marine litter³. Use of Ecosystem Approach guidelines, Protocols is recommended to collect harmonised, and quality assured data.

Timetable: years 1-5.

Actors: EGA -LibSTP, Partner NGO's, MBRC, Universities, coastal municipalities,

Indicators of success: NGOs partner of LibSTP trained to obtain funds to conduct monitoring activities for marine litter pollution, following the Ecosystem Approach guidelines and its IMAP.

2.2.3. Assessment and minimise interactions between marine turtles and fisheries

Bycatch or incidental capture of marine turtles in fishing gear is a growing concern in the Mediterranean, about 132000 marine turtles mortality due to that annually (Casale 2011), 7.36% of this figure (about 9715 turtles) are believed to be lost due to Libyan fishing activities. This number was calculated using some models and do not represent the actual figure. Therefore there is a need to estimate the actual mortality rates in Libyan waters and work with relevant stakeholders to minimise this impact.

Actions:

- (a) Update national census of fishing fleet (the last census was in Lamboeuf et al., 2000)
- (b) training of on-board bycatch observers
- (c) conduct national consultation with fishing sector to minimise bycatch of marine turtles and other non-target species
- (d) study the present bycatch in different regions and at different fishing gears
- (e) Test and implement bycatch mitigation measures.

Timetable: years 1, 2 (a & b), 3-5 (c & d), 5 (e).

Actors: MBRC, LibSTP, Department of Fisheries, Fishing cooperatives, Private fishing companies, coastal municipalities fishing offices, Universities (Research and observers).

Indicators of success: national census of fishing fleet updated, on-board bycatch observers trained, bycatch in different regions and at different fishing gears studied

2.2.4. Establishment of Marine Turtle Rescue Centre

The rescue centre's main task is the conservation and Rehabilitation of marine turtles who are injured or sick. In Libya, marine turtles (and other non-target species) are sometimes caught accidentally or

³ Marine litter is any persistent, manufactured or processed solid material discarded, disposed for abandoned in the marine and coastal environment

confiscated in markets. In the best cases, they are released into the water but sometimes into a life-threatening state (injured or with hooks in their digestive tube or buoyancy problems... etc.). The Guidelines⁴ to improve marine rescue centres' involvement for marine turtles adopted by the Contracting Parties to Barcelona Convention should be used.

There is a need to establish 3-4 first aid centres near main nesting areas

Actions: (a) Establish three first Aid centres in the nesting area between Misratah and Tobruk. (b) Establish two marine life rescue centres (advanced) in Sirte and Benghazi

Timetable: years 2-3 (a), 3-5 (b).

Actors: MBRC, LibSTP, Veterinary faculties within coastal Universities

Indicators of success: Vets and technical staff trained; (b) centres equipped with appropriate facilities established.

2.2.5. 2.3.5 Elaboration of marine conservation awareness strategy in Libya

Awareness campaigns and activities targeting marine turtle conservation and its habitats should include other marine life forms to avoid effort duplications. Awareness activities should aim to disseminate monitoring efforts and the importance of saving marine turtles (and other taxa/habitats) for the sustainability of coastal area natural resources in Libya.

Actions:

- (a) Establish a national program to increase awareness efforts to specific stakeholders (fishermen, schools, decision-makers on national and local levels).
- (b) Conduct Public awareness and Information campaigns for fishers. The use of Sea Turtle handling Guidebook for fishers could be an excellent tool to provide simple procedures for handling any marine turtle caught in a fishing net or hooked
- (c) Coordinate the awareness activity along with the coastal municipalities and assign more role to NGOs and schools' environmental clubs.

Timetable: years 1-2 (a), 3-5 (b).

Actors: Partner national NGOs, MBRC, LibSTP, Universities, school clubs, and Media outlets, including social media.

Indicators of success: A clear strategy for marine turtle (and marine life) conservation in Libya (b) active involvement of all actors.

⁴ http://www.rac-spa.org/sites/default/files/doc_turtles/glrs.pdf

The National Action Plan Table of Implementation

Field	Action	Deadline (years from this AP adoption)	Actor	Indicator of success
Legislations	1. Revisiting the Law on MPAs of 2014 in Libya and start the necessary work for the adoption its adoption by the parliament	1-2 years	Legal offices of EGA and MBRC Inputs from relevant NGOs.	Law of MPAs issued
Monitoring	2. Coordinated work to monitor nesting areas by LibSTP along the Libyan coastline. Use of Ecosystem Approach guidelines, Protocols is recommended to collect harmonised and quality assured data.	1-5 years	LibSTP, MBRC, NGOs	All suitable nesting beaches monitored on systematic manner.
	3. coordinated monitoring of stranding through networking and tagging by LibSTP along the Libyan coastline	1-5 years	LibSTP, MBRC, NGOs	Stranding network established
	4. Establish an online national data base for the collection of data concerning nesting, stranding and tagging	Year 1	LibSTP, MBRC	National turtle tags database established
Marine Litter	5. Conduct monitoring, of marine litter using EcApp guidelines	Years 2-5	LibSTP, Universities, MBRC, NGOs, Schools	Data on marine litter collected and processed
Fisheries interaction	6. Update national census of fishing fleet	Year1-2	MBRC, Municipal Fisheries department, Universities	An updated report on fishing fleet census.
	7. Training of on-board bycatch observers	Year 2-3	MBRC, NGOs	National team of observes formed
	8. National consultation with fishing sector to minimise bycatch of marine turtles	Year 1-2	MBRC, EGA, Fishing cooperatives, Municipal Fisheries department	Agreed agenda of collaboration to minimise bycatch
	9. Study the present bycatch in different regions and at different fishing gears	Year 3-5	MBRC, EGA, NGOs	A national study on status of bycatch

					along the Libyan coastal waters.
	10.	Test and implement bycatch mitigation measures	Year 5	MBRC, EGA, NGOs	First results of mitigation measure report
First Aid/ Rescue Centre	11.	Establish three first Aid centers in the nesting area between Misratah and Tobruq	Years 2-3	MBRC, EGA, Veterinary faculties within coastal Universities	first Aid centers realised
	12.	Establish two marine life rescue centers (advanced) in Sirte and Benghazi	Year 3-5	MBRC, EGA, Veterinary faculties within coastal Universities	marine life rescue centers realised
marine conservation awareness in Libya	13.	Establish a national program to increase awareness efforts to specific stakeholders (fishermen, schools, decision makers on national and local levels)	Year 1-2	Partner national NGOs, MBRC, LibSTP, Universities, school clubs, and Media outlets including the use of social media.	National program to increase awareness efforts established with clear actions
	14.	Conduct Public awareness and Information campaigns for fishermen	Year 2-5	Partner national NGOs, MBRC, LibSTP, Universities, school clubs,	Use of Sea Turtle handling Guidebook for fishermen (Arabic)
	15.	Coordinate the awareness activity along the coastal municipalities and assign more role to NGOs and environmental clubs in schools.	Years 2-5	LibSTP, Partner national NGOs, school clubs	Awareness plan of the national program agreed and implemented
	16.	Organising Libyan Symposium on marine turtles to update information and scientific research results (every 5 years).	Year 5	LibSTP, MBRC, national NGOs,	Book of Abstracts and publication of research presented in a national scientific Journal.
	17.	Revision of the present Acton Plan	After 5 years of the adoption	Independent Expert consultation, in collaboration with UNEP MAP RACSPA.	A revised version to replace the present version of the Action Plan.

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