MANAGEMENT PLAN OF THE COASTAL AND MARINE AREA OF SHASH - GULF OF SIRTE IN LIBYA

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Contents

FOREWORD

The Libyan Ministry of Environment has elaborated, with the support of SPA/RAC, the national strategy for the development of the MPA network along the coast of Libya. This strategy has already listed the Gulf of Sirte as a potential site to be declared as MPA. Following the declaration of the area of Shash (Sirte) by the Minister of Environment as a marine and coastal protected area (MCPA), the Ministry is collaborating with SPA/RAC to elaborate the management plan of the declared area within the framework of the IMAP-MPA project being coordinated by UNEP/MAP Secretariat and implemented by SPA/RAC.

This document is the management plan proposed for the area. It was elaborated using the outcomes of a diagnostic phase during which the key values of the area as well as the main faced challenges were identified using available documentation about the area and a consultation process involving stakeholders at national and local levels.

The draft management plan contained in this document proposes a vision and management objectives for the marine and Coastal environments covered by the MCPA. The document includes also a series of activities aimed at achieving the management objectives during a period of three years.

The proposed objectives and the related activities were reviewed during a workshop organised in Tripoli by the Ministry of Environment (13th of June 2023) with the participation of stakeholders from the area of Sirte and representatives of the relevant national authorities.

1. General description of the area

The Marine and Coastal Protected Area of Shas (Sirte) extends over a strip of about 34 Km located west of Sirte and covering the beaches of Al-Thalatheen, West Al-Thalatheen, Shash, Tamet, Al-Khamseen, and Al-Nakhla. Its marine component encompasses a seabed reaching 32 m depth and 3.7 Nautical Miles from the coast. The terrestrial part covers (i) the beach and dune zone located between the shoreline and the coastal road and (ii) the wetland of Sabkhat Al-Khamseen, located South of the coastal road.

- Surface area of the marine sector: 227 Km^2
- Surface area of the beach/sand dune sector: 33 Km^2
- Surface area of the wetland (Sabkhat Al-Khamseen): 143 Km^2
- Total surface area: 403 Km^2

The total length of the beaches is about 34 km extending from the beach of Thalatheen to Khamseen west of Sirte.

Then access to the beaches of the area is difficult in many places because of the presence of manmade barriers and tunnels that prevent access to the beach except through rugged and complex roads that look like a maze. This makes them semi-protected beaches except for those who have knowledge of those roads (Figure 1).

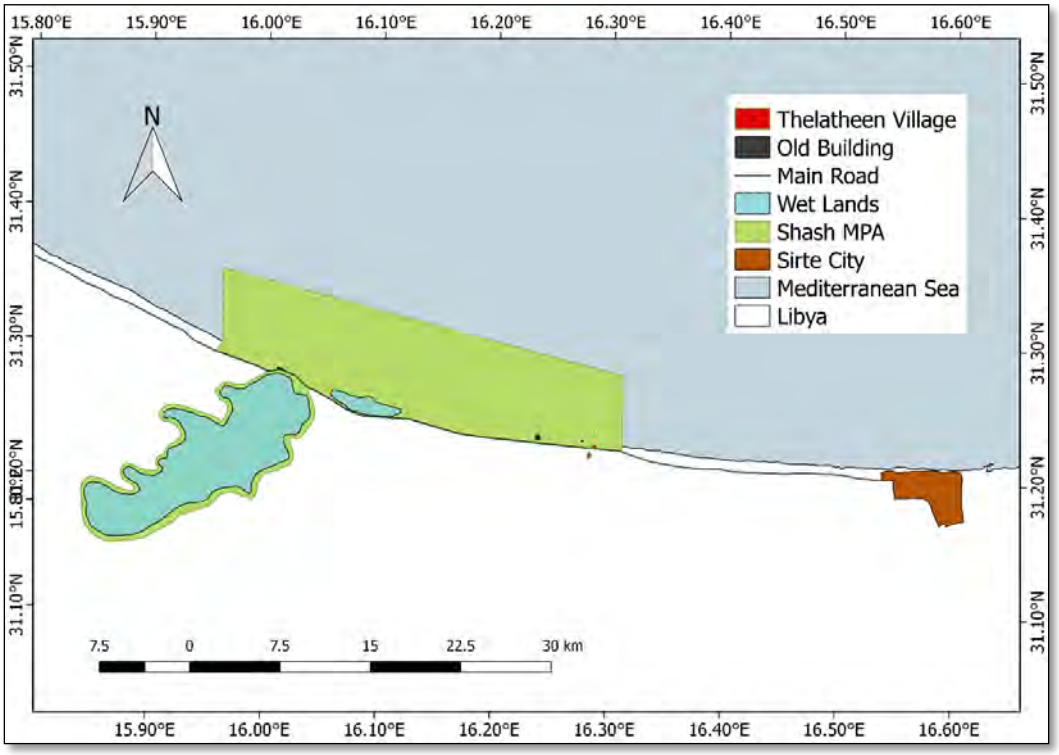

Figure 1: Location and boundaries of the Marine and Coastal Area of Shash

2. Ecological features of the Gulf of Sirte

The synthesis of available knowledge and the gap analysis have been presented and detailed in a separate document (Assessment-diagnosis report) during the first phase. The main findings and conclusion of the assessment phase are presented hereinafter.

2.1 Geophysical, geomorphological and oceanographic features

The geomorphology of the coastline of the Gulf of Sirte is characterized by sandy beaches of different sizes, forming sand dunes in some parts of the coast or interspersed with the rocks.

The coastline topography consists of a mosaic of rock formations, sandy beaches and seasonal wetlands (sabkhas). Libya's central coastal region is dominated by the Gulf of Sirte where the continental shelf extends nearly 200 km offshore and whose shallow waters support, according to Robertson & Essghaier (2001)[1], the second-largest seagrass meadows in the Mediterranean, although maps of seagrass coverage are available for the area.

The coastal strip of the study area is narrow, and the beach includes many salt lakes, bays and valleys, and in general it is a low plain area that contains in many sebkhas below sea level.

Shash Beach is considered semi-protected due to the artificial long berm extending parallel to the beach, which makes access to it very difficult and through maze-like roads. The length of the totally sandy beach is 4.85 km and the extended dunes reach far from the beach for a distance of up to 100 meters in some places[2].

Tides are weak along the Libyan coast, with a maximum amplitude of 40 cm west of Tripoli, where there are areas of mudflats and saltmarsh vegetation in the Bay of BuKammash, in the extreme west of the Libyan coast. Saline marshes (sebkhas) exist in places where seasonal water flows reach depressions behind the coastal dunes. These sebkhas support halophytic vegetation.

In the western coasts, the continental shelf expands, starting from the area located to the northeast of the city of Misrata, to reach its maximum breadth between Misruta and Sirt, where its extension reaches 60 km, for the area located in front of Buirat Al Hassoun.

The seabed is characterized by a wide, gently sloping continental shelf with shoals extending up to 60 km. In the Shash reserve, the bathymetry is quite shallow and the depth generally varies between 0 and 30 m. It reaches 20 m almost 4 km from the coast, which makes the continental shelf, where most marketable fish species live, quite broad.

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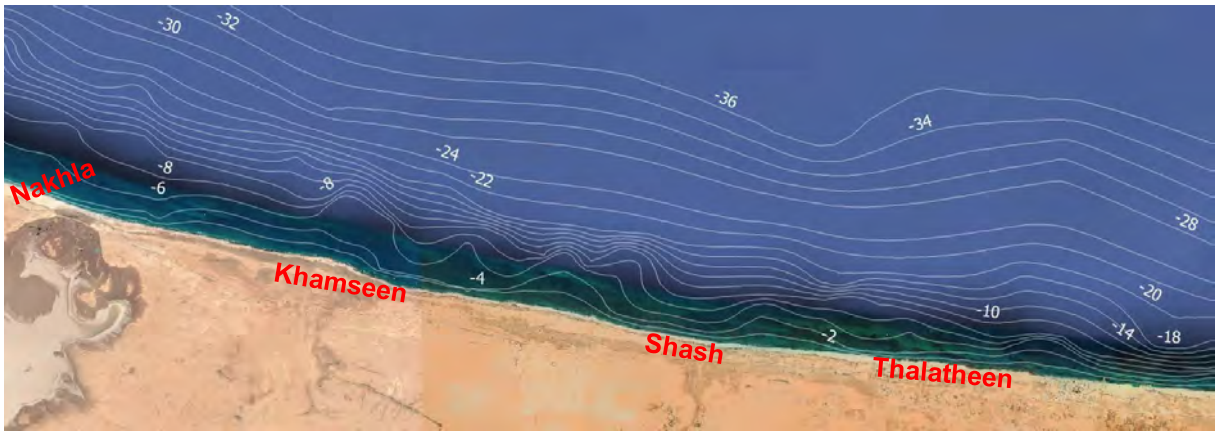
[1] *Libya* by Peter Robertson & Mohamed Essghaier in *Important Bird Areas in Africa and Associated Islands: Priority Sites for Conservation* edited by Lincoln D C Fishpool & Michael I Evans (2001)

[2] Saied & Dreyag, 2019. Project to protect sea turtles in the shores of Libya (Final Report 2019). 69 pages.



Bathymetric chart of the area

Gulf of Sidra: Forward area characteristics, shallow-water environments[3]

Geology

- Bathymetry: shelf, 10-150 km wide, flat
- Sediment type: sand and rock near shore
- Substructure: structural basin composed of thick Cenozoic sedimentary series

Hydrography

- Temperature: surface 15-26°C (winter-summer); isothermal to moderately stratified
- Salinity: surface ~37.5 ppt; low gradients
- Conductivity: surface 45-58 mmho/cm (winter-spring)
- Currents: typically 0.2 m/s
- Tides: semi-diurnal; 0.3-1.3 m range
- Visibility (Secchi): -26 m

Acoustics

- Reverberation: generally low
- Reverberation Variability: low
- Sound Velocity: 1515-1540 m/s (winter-summer)
- Sound Velocity variability: negative gradient in summer

[3] Fleischer, Peter & Lavoie, Dawn. (1996). Ground-Truth Area Selection and Characterization for Mine Countermeasures Tactical Environmental Data System. 107.

2.2 Biological features

Generally and according to EGA (2010), Libya has a limited space suitable for the living of species. From a total of 1.7 million described globally, Libya has about 2,135 plant and 4,590 animal species. For fauna, the most important of these taxa in terms of numbers is insects (81%), followed by birds (7%) while estimates of marine animal and plant species are about 1,500. For instance, there are 560 species of marine algae, and three species of endangered seagrass in the Mediterranean Sea, and about 100 species of fish and three species of marine reptiles (turtles). However, species diversity in Libya still needs further taxonomic studies to be well documented.

Data on Libya's biological richness are fragmented, very limited due to lack of literature and field studies. Comprehensive studies of the marine life found for this region are severely lacking, and this region of the Mediterranean remains one of the least known to scientists (Shakman, 2008). However, despite the lack of information describing the Libyan waters, most of the marine areas has been recognized as being of high ecological value.

Terrestrial biodiversity

In the terrestrial part, a recent survey conducted near the city of Sirte pointed out the presence of 75 plant species belonging to 67 genera and 32 families, 5 species of which are considered regionally rare (SPA/RAC–UN Environment/MAP, 2020a). Concerning terrestrial fauna, there are no specific inventories or studies concerning the study area.

Terrestrial flora

Natural vegetation is sparse and generally restricted to drought-resistant plants concentrated in the coastal strip. A recent survey conducted near the city of Sirte pointed out the presence of 75 plant species belonging to 67 genera and 32 families, 5 species of which are considered regionally rare[4]. Among these plant species the most abundant are SalsolaTetrendra, *Ristida pungens*, *Thymelaea hirsuta*, *Atriplx Mollis*, *Arthrocnemum glaucum*, *Limoniastrum monopetalum*, *Artemisia compestris*, *Calycotoma spinosum, Anabasis articulata, Nitraria retusa, Haldxylol salicormisah*, *Mesembryanthemum nodiforum*, *Retama raetam* and other plants that grow and increase in growth after the rainy season. Reeds and other marshgrasses also exist locally. Natural vegetation like small trees can be found in wadis, particularly in Wadi Zamzam and Wadi Soffegin areas. Other plants such as eucalyptus *Eucalyptus camaldulensis*, acacia, several varieties of saltcedar, and tamarisk have been introduced into the country and thrive without irrigation.

Terrestrial fauna

The number of Arachnids classified in the area is about 170 species. Insects are the majority of the Libyan animal diversity. The approximate number is 3,763 species (EGA, 2010). In contrast, amphibians represent the smaller number of species within the Libyan Fauna with only three species occurring in the country. For reptiles, the classified species found in the country are 113 while the same reference (and other sources) stated that there are 356 species of Birds (100 are currently breeding in Libya) found in Libya (Isenmann *et al*., 2016).

[4] EGA, Sirte branch 2009 unpublished data in SPA/RAC–UN Environment/MAP, 2020a. Socio-economic study of the coastal and marine area of the Gulf of Sirte. By Almokhtar Saied, Salih Diryaq and Atef Limam. Ed SPA/RAC. IMAP-MPA Project, Tunis: 74 pages + annexes).

Finally, there are 76 species of mammals found in Libya classified under 25 families and 47 genera. Among these, 12 are threatened and considered critically endangered or vulnerable, and 2 species of endemic gerbils (*Gerbillus grobbeni* and *Gerbillus syrticus)* (EGA, 2010).

The information about the terrestrial fauna in the Gulf of Sirte is insufficient and there is a lack of updated references of its distribution and status in this area.

Alien Terrestrial Species in Libya

According to Mahklouf (2019, 2021), a total of 29 invasive floral species have been documented in Libya. These species belong to 25 genera and 13 families most of them (12 families) are dicots and only one family is of the monocots (three genera with one species in each). The dominant families are Asteraceae with seven species, followed by Amaranthaceae with five species; then the families Solanaceae, Fabaceae, and Poaceae with three species each; while the rest of the families are represented by only one species each. Among these species, 12 were found to be highly invasive.

Marine biodiversity

The Gulf of Sirte consists mostly of sandy beaches interspersed with small rocky areas. It provides suitable habitat for fish species, thereby supporting a wider marine food web including larger pelagic fish species (*e.g*. Bluefin Tuna and sharks), seabirds, marine mammals and reptiles.

Marine flora

The botanical composition of Libyan marine vegetation is still relatively unknown in terms of detailed ecological and botanical surveys. As regards the marine flora, 18 algae species and 02 species of seagrasses (*Posidonia oceanica* and *Cymodocea nodosa*) have been reported in the Gulf of Sirte.

The Gulf of Sirte is known to host meadows of *Posidonia oceanica* as evidenced by the huge accumulating of dead meadows along the coast and even blocking the old harbour of Sirte indicating the richness of the area by seagrasses (SPA/RAC–UN Environment/MAP, 2020b). The accumulation of dead *Posidonia oceanica/ Cymodocea nodosa* leaves were observed all along the study area, however, some of these accumulations were permanent whilst smaller ones were temporally formed and washed away by waves.

Marine fauna

Despite the few and limited references and sources regarding marine fauna, the Libyan faunistic diversity can be considered relatively rich. The deficiency of data on marine fauna in the Gulf of Sirt can be explained by the lack of studies and records in the area. The following information about fauna species are not specific to the Marine and Coastal Protected Area of Shah. This implies that the collection of data about fauna species should be among the priorities of the management plan.

Marine mammals

Marine mammal species occurring or expected to be present in Libya include: the Monk Seal (*Monachus monachus)*, the bottlenose dolphin (*Tursiops truncatus*), common dolphin (*Delphinus delphus*), striped dolphin (*Stenella coeruleoalba*), Risso's dolphin (*Grampus griseus*), rough-toothed dolphin (*Steno bredanensis*), Cuvier's beaked whale (*Ziphius cavirostris*), sperm whale (*Physeter macrocephalus*), and fin whale (*Balaenoptera physalus*) (Boisseau *et al*., 2010; IUCN, 2012).

Elasmobranch species

Fourteen (14) Elasmobranch species can be found along the Sirte gulf representing 24.56% of the total species *reported* in Libya. These Elasmobranch species are known to reproduce in this area and, in contrast, they can be found in most of the seasonal fish landing sites in this area.

Several shark species are targeted by fisheries (Shakman *et al*., 2020); three (03) of them are Critically Endangered (*Carcharodon carcharias, Isurus oxyrinchus, Lamna nasus*), 4 are Endangered (*Cetorhinus maximus, Alopias superciliosus, Alopias vulpinus Mobula mobular*) and one Near Threatened (*Chimaera monstrosa*) following the IUCN categories (SPA/RAC–UN Environment/MAP, 2020b).

Bony Fish Species

A total of 304 bony fishes (Osteichthyes) belonging to 22 orders and 97 families have been reported in the Libyan waters (Elbaraasi *et al.*, 2019). Of these, 28 have been reported in the Gulf of Sirte (Shakman & Kinzelbach, 2007; EGA, 2010).

Ornithological fauna

65 seabird species have been recorded along the Gulf of Sirt in the last three years. According to the results of the waterbirds' monitoring in the gulf between 2017 and 2019, the area is a potential site of national importance for Lesser Black backed Gull (*Larus fuscus*), Dunlin (*Calidris spp.*) and Common Starling (*Sturnus vulgaris*).

In addition, the Libyan Ministry of Environment, with the support of SPA/RAC, has initiated a pilot monitoring of marine biodiversity in relation to the common EcAp indicator for seabirds.

Missions to identify and count the various species occurring in and around the MPA are recommended. This should not be limited to sporadic and time-limited surveys, but should be conducted in all seasons. Such large-scale efforts should be sufficient to update the populations' size status of some breeding and migratory species.

Sea turtles

The shores of the Gulf of Sirte are considered one of the most important nesting sites for the loggerhead sea turtle in Libya and the Mediterranean. The long beaches of the gulf, rarely disturbed, attract a considerable number of turtles every year for nesting. Studies conducted by the Libyan Program for the Protection of Sea Turtles on part of the Gulf, showed that the number of turtle nests exceeds 500 nests in some years.

In fact, sea turtle protection is included in the decree issued by the Secretariat of Agriculture No. 453/1993 stating that ''*All species of sea turtles and terrestrial tortoises are protected by law in Libya*'' furthermore ''*Any use of these species or their products (skin, eggs, flesh) is banned by law in Libya*'' and that "*Any violation of these articles will be prosecuted within the legal system according to Hunting Law No.28 of 1968*''.

Since 2005, the Libyan Sea Turtle Program has started as a national initiative for conservation and awareness of marine turtles implemented under EGA supervision and in collaboration with UNEP-MAP-SPA/RAC at three nesting beaches west of Sirte (Hamza & El Ghmati, 2006). The program was set-up for the first time in Libya to protect marine turtle nests at the selected sites for the whole nesting season. This activity came in the framework

of implementing the national and regional Action plans for conservation of marine turtles adopted by MAP. The nesting density of sea turtles reached 9.69 nest/km in some parts of the gulf while the highest density was recorded in 2006 with 39.4 nest/km in Al Ghbeba site (Saied *et al*., 2008) making this region a very important nesting site in Libya. Loggerhead sea turtles continue its nesting activity till the last week of August and the first week of September every year.

Starting from 2017 until 2020, a regular monitoring program started under the technical supervision of EGA and SPA/RAC and with the financial support of MAVA Foundation covering all the Libyan coasts including our study area.

In 2019, a total of 301 nests were recorded on 5 beaches (Thalatheen, Gharb Al Estiraha, Shash, Tamet and Khamseen) along the Reserve of Shash. 68 of these nests were protected from predation by installing square metal mesh "Hatcheries". the result was the successful hatching of 7566 eggs with an average success rate of 74.75% in these 5 beaches thanks to the conservation efforts (*in situ* and *ex situ*).

Sea turtles in the Gulf of Sirte are facing predation threats from different animals throughout their life stages. There are predators of eggs, hatchlings, young and adult turtles. Predation of eggs and hatchlings are caused by Foxes, Jackals, dogs and Ghost crabs (Hamza & El Ghmati, 2006). Predation on turtles' eggs by the monitor lizard *Varanus* and parasitism of *Dipterans* larvae were reported in the study area in 2005 (Hamza & El Ghmati, 2006).

In Al-Talatheen Beach, poaching of turtle eggs has increased at the same year, as 8 nests (out of 45 nests recorded on the beach, at a rate of 17.78%) were raided and the eggs were collected by humans. At the same time, the number of nests attacked by wild animals was relatively low, amounting to only 4 nests. This may be attributed to continues and intense presence of people on the beach which may deter and reduced the activity of predators. The surveyed beach is located near the village of Al-Thalatheen, which has about 100 houses according to the Libyan Sea Turtle Programme (LibSTP). In summary, for a total of 301 nests, the mean percentage of poached and predated nests in the Marine and Coastal Reserve of Shash were 11.36% and 35.16% respectively.

It is very important that efforts to monitor sea turtles at key beaches along the coast of the study area continue throughout the season in order to obtain data on annual nest variability and to predict future nest densities. In addition, we strongly recommend continued monitoring of sex ratios and collection of genetic and tracking data.

Finally, the establishment of national strategy or plan to promote the knowledge and awareness of specific stakeholders (fishermen, schools, national and local decision makers) is also recommended as an important step to protect Gulf sea turtles.

Other marine fauna species

According to Bek Benghazi *et al*. (2020), the gulf of Sirte has a percentage of 31.98% (110 mollusc species) from a total of 344 molluscs species distributed along the Libyan coast.

Alien Marine Species in Libya

The recent trend of increasing discovery of alien species is largely associated with increasing scientific interest in monitoring studies and the presence of a number of different relevant projects,

which have recently been carried out along the Libyan coast to identify exotic species. In addition, there is no monitoring plan implemented for inventory and tracking the introduction and spread of invasive species despite its interesting geographical location in the central and warm part of the Mediterranean Sea allowing it to host both tropical species arriving from the east (Indo-Pacific origin) and extending from the west (tropical Atlantic origin).

A total of 87 alien marine species have been recorded in the country according to few recent studies inventorying Invasive Alien Species in Libya. Fish constituted the highest percentage, with more than 32.56%, followed by macrophytes and molluscs with 21.92%, crustaceans 12.79%, alien parasites 8.14%, and finally Bryozoa, Ascidia, Sponges, Cnidaria and Echinodermata with 1,16%.

The blacklist of the most invasive marine species reported in the area includes 23 species among them 4 algae taxa (*Lophocladia lallemandii, Caulerpa cylindracea, Caulerpa taxifolia, Codium fragile*); 1 Angiosperm (*Halophila stipulacea*); 3 crustaceans (*Callinectes sapidus, Percnon gibbesi, Portunus segnis*); 3 mollusca (*Pinctada imbricata radiate, Bursatella leachii, Cerithium scabridum*) and 12 invasive fishes.

There is a strong competition between *Siganus luridus* and *S. rivulatus* in the central and eastern coast of Libya which seems to decrease towards the western coast (Shakman, 2008; Al-Razagi, 2017). Besides, among several venomous and toxic species recorded in Libya, the booming increase of *Lagocephalus sceleratus* which is starting to change the biodiversity and bio-composition in this area (Shakman *et al*., 2019). This species is often caught by fishers due to its large body and unknowingly consumed and led to several cases of poisoning (Shakman *et al*., 2019).

Lastly, it is important to continue research to identify invasive species in the area and analyse their abundance and temporal trends. This is especially important for invasive species in the Shash Reserve. It would then be appropriate to propose a monitoring protocol for invasive alien species to future managers of this reserve.

Local Ecological Knowledge, especially fishers' knowledge, was proved to be a cost-effective, reliable and resourceful approach to establish large scale monitoring based on standard protocols and need to be considered to gather information on non-indigenous species in the area and their historical trends.

Habitat and biodiversity in the marine and coastal area

A variety of habitats and ecosystems can be observed in the study area. Marine vegetation beds, hard rocky bottoms, sandy and rocky beaches, sand dunes, and various wetlands that offer high economic, biological, historical, social, and environmental value. The reserve is considered an important sanctuary for water birds and sea turtle nesting sites. Historically, it's also a site with monk seal presence. The reserve of Shash is also considered a cartilaginous fish nursery and fishing area.

Identifying the most important eco-biological elements for conservation purposes is a crucial step towards the proper management and sustainable utilisation of this area. For this purpose, various biocenoses and associations (categorization by UNEP/MAP-RAC/SPA, 2019) found in the reserve of Shash. The presence of *P. oceanica* meadows, coastal habitat for sea turtles nesting and cartilaginous fish nursery need to be highlighted, because these are priority habitats under the the Barcelona Convention (UNEP-MAP-RAC/SPA, 2019).

The following habitats in the protected area deserve a specific attention:

Habitat of ecological interest	Justification	State of knowledge and monitoring	Recommendations
Posidonia oceanica meadows	The Gulf of Sirte is known to host meadows of *P. oceanica* as evidenced by the huge accumulating of dead meadows along the coast and even blocking the old harbour of Sirte indicating the richness of the area by seagrass.	Lack of specific updated references on Posidonia distribution and status along the coast.	Mapping of the distribution of Posidonia meadows and setting up a monitoring network in the reserve of Shash
Sea turtles nesting beaches	The Shash Reserve is considered one of the highest areas of nesting density of this species which exceeds sometimes 500 nests of loggerhead sea turtles annually. Presence of predators, poaching; ransacking and looting of sea turtle nests and eggs.	The Libyan Sea Turtle Program has started as a national initiative for conservation and awareness of marine turtles implemented under EGA supervision and in collaboration with UNEP-MAP-SPA/RAC since 2005	Ensure the long-term protection of sea turtles and their nests in the area
Essential cartilaginous fishes habitat	14 Elasmobranch species can be found along the Sirte gulf representing 24.56% of the total species reported in Libya. These species are known to reproduce in this area and, in contrast, they can be found in most of the seasonal fish landing sites in this area. In Libya, some artisanal fisheries using fixed gillnets, bottom set nets and drifting longlines still target endangered and little known cartilaginous sharks such as requiem sharks , mackerel or white sharks, guitarfishes and angelsharks. Insufficient knowledge. 03 species listed in the Annex II of the Protocol SPA/BD (list of endangered or threatened species) 03 species listed in the Annex III of the Protocol SPA/BD (list of species whose exploitation is regulated)	Few specific fishery data on cartilaginous fishes exists Lack of awareness about the importance of these species	Encourage research focused not only on the biological characteristics of species to support the setting of science-based catch limits but also socio-economic research that considers approaches to implementing catch limits in nations and communities where sharks are integral to food security and livelihoods Conduct multiple studies and awareness campaigns on the ecology and biology of these species to inform communities about these animals.
Bird species areas	65 seabird species have been recorded along the Gulf of Sirt in the last three years.	The Libyan Ministry of Environment,	Missions to identify and count the various species occurring in

	The area is a potential site of national importance for Lesser Black backed Gull (*Larus fuscus*), Dunlin (*Calidris spp.*) and Common Starling (*Sturnus vulgaris*). Insufficient knowledge. Presence of 04 species listed in the Annex II of the Protocol SPA/BD (list of endangered or threatened species) Presence of 05 species Aythya nyroca Circus macrourus, Limosa limosa, Numenius arquata and Larus audouinii Near Threatened IUCN category (IUCN Red List).	with the support of SPA/RAC, has initiated a pilot monitoring of marine biodiversity in relation to the common EcAp indicator for seabirds.	and around the MPA conducted in all seasons. Need to update the populations' size status of some breeding and migratory species. A comprehensive and detailed study of hunting and bycatch, is recommended as priority for the conservation of birds not only in the Gulf of Sirte, but in all of Libya
Coastal wetlands	Presence of marshes of different sizes fed by rainwater through valleys. Two (02) wetlands (salt lakes) are included in the Shash Reserve : Sebkha of Wadi El Kebir a coastal salt marsh fed by a dense and temporary river Bey El Kebir and Sebkha Wadi Thamet a small coastal marsh fueled by several dry riverbeds and watercourse, that occasionally fill with water during rare precipitation events mainly Thamet River. These wetlands highly productive and biologically diverse systems that enhance water quality, control erosion, maintain stream flows, sequester carbon, and provide a home to at least one third of all threatened and endangered species. This wetland is an important site for wintering and migrating birds, and also for other elements of the wetland fauna[5].	Lack of information concerning assessment of biological diversity in coastal wetlands	Inventories and biodiversity assessments
Coastal sand dunes ecosystem	Presence of coastal dunes of varying heights. Coastal sand dunes ensure the braking of dune erosion and the retreat of the beach, the	There is a knowledge gap regarding the coastal dunes and their role in	Need of comprehensive studies on geomorphology, community dynamics,

[5] Hughes, R. H., & Hughes, J. S. (1992). A Directory of African Wetlands., UNEP, and WCMC, Gland, Nairobi and Cambridge.

	maintenance of the natural state of the site, and the preservation of biological diversity. Insufficient knowledge.	the whole ecosystem, moreover, many aspects of evolution and dynamics of coastal dunes are still widely known.	ecophysiology, biotic interactions, environmental problems, and conservation of dunes. Study and monitor the sedimentary dynamics of coastal dunes Preserve this dune ecosystem through the planting of dune-fixing species and the reduction of pressures exerted on them.
Biocenosis of the photophilous algae	The populations of photophilous algae are rich and dominated by species of high heritage interest such as *Cystoseira* (listed in Appendix II of the Barcelona Convention). Lack of scientific data.	There is no information available on marine vegetation in the area.	Need of comprehensive studies on algae

3. Economic values /Current land and sea uses

Economic activities are diversified in Sirte. However, they remain marked by the predominance of their agricultural component.

3.1 Fisheries

The Sirte region and its surroundings boasted 28 landing sites, most of them are seasonal and artisanal landing sites. There are also 8 ports and marinas which are permanent landing sites.

The fleet is mainly composed of artisanal vessels which use fixed nets (demersal and gillnets) or hooks (longlines and handlines). According to data from 2000, around 23% of the total number of boats was found in the Gulf of Sirte. The target species to catch are both cartilaginous and bony fishes using traditional fishing gear. Among 422 boats operated along the coastal area of Sirte, the most important fishing gear used was Trammel nets (Haliq) using Flouka (211 boats) in water level of one meter to fifty meters depth, and are operated by mator (192 boats) in water of more than thirty meters depth. There were few Lamparas used to catch small pelagic fish in the Gulf of Sirte (only 19 boats).

The socioeconomic survey conducted in 2020 in the area stressed the importance of recreational fishing activity that targets in particular the species of high market value. It also pointed out the presence of diving fishermen that operate in the area targeting mainly Dusky Grouper.

3.2 Aquaculture

In Sirte, the only aquaculture activity is the Sultan's farm project which is under construction (Shtawee, 2021). This project plans to build 15 concrete ponds, 8 salt water wells, 1 water collection tank. It seems that there are technical errors in the design of the basins and well water has not been analysed to test its quality. However, the service buildings of the project have been partially completed (Shtawee, 2021).

3.3 Oil exploration and production

The Gulf of Sirte region contains most of the oil and gas fields in Libya. There are five important sedimentary basins in Libya, two of which are in the planning Gulf region. These two basins Sirte and Kufra are the two basins most in oil and gas exploration. The production of Crude Oil according to Operating Companies was 19.8 Millions of Barrels in 2015 against 31.7 Millions of Barrels in 2010 according to the Central Bank of Libya. Eight international companies operate in the Sirte Basin, and the National Oil Company owns most of the shares in these companies. Oil discoveries changed the regional role of Sirte, as it is close to major oil fields in the East and to its exporting ports of As Sidr (190 km) and Ras Lanuf (216 km) that are included in the Sirte administrative region (governorate).

3.4 Agriculture and water sources

33% of the surface of the municipality of Sirt is still reserved for agriculture, 17% for mixed agriculture and housing and 1% for green spaces (UN-Habitat, 2018). The biggest part area of land was allocated for agriculture in the city of Sirte with about 3295 hectares, corresponding to a rate of 33.3% of total land in Sirte. Agricultural activities in the Gulf of Sirte limits cultivated areas for grains (wheat, barley), vegetables (tomatoes, potatoes, onions, carrots, turnips), fruits (olives, dates, plums, sloes, watermelon, grapes, and oranges), and fodder crops.

Drinking water in Sirte was historically from wells as shallow as 5 meters. The first drinking water network was developed in 1964, with water collected in Abu Hadi, 20 km south of the city. Then a desalination plant was constructed in 1976 in Za'afaran, delivering up to 7 million cubic meters per year. In 1993, it was connected to the Great Man-Made River (GMMR) network providing today most of the water to the city and its region. It uses to deliver around 35,000 m^3/day, while the consumption reached in some periods around 2006 up to 60,000 m^3/d, especially in the summer, creating complex water scarcity issues[6].

3.5 Industry

The industrial activities of the city of Sirte are old, where the traditional industries such as hand-made shoes, making wool, and netting baskets, leather dyeing, and simple metal industries represented in drawing and hammering metals, in addition to repairing machines and equipment, and mostly the raw materials are agricultural, or animal, which is from the region adjacent to the city of Sirte. The city of Sirte did not witness the modern industry until the beginning of the second half of the twentieth century, which is the industry of freezing and marketing fish (Sebi'ei, 2009). The size of land occupied

[6] السبيعي، بشير عبدالله بشير، و محمد المبروك المدوى. "تأثير التغير الوظيفي على موارد المياه من سرت 1988 م - 2006 م: دراسة في جغرافية المدن" رسالة ماجستير. جامعة سرت، سرت، 2009. تم الرجوع من http://search.mandumah.com/Record/766687

by the industry has reached 5.4 hectares in 1966 and increased to 303 ha in 2018 (Sebi'ei, 2009; UN-Habitat, 2018).

3.6 Energy, Electricity and water desalination

The first power plant in Sirte was built in 1960, a second in 1966, and then a seawater desalination plant and the production of electric power were installed in 1976. The total capacity was 42 MW in 2008 along with the desalination plant used for residential, commercial and industrial purposes. The desalination is considered a better supply option than water transfer at least in terms of cost, since importing water requires a great amount of energy.

3.7 Tourism

The structure of the tourism sector in Sirte is relatively undeveloped due to the security situation and the repeated civil unrest that the city has witnessed, as the number of hotels in the city of Sirte decreased from 11 hotels in 2007 to only two hotels in 2020 (SPA/RAC–UN Environment/MAP, 2020a).

According to the General Authority for Tourism, 700.000 hectares in Sirte have been identified as tourism areas in 2015 and 979.000 hectares have been mapped in the same year.

It is crucial to promote and organize sustainable tourism on the site, in particular by preparing and building up the necessary facilities and taking in consideration the protection of the cultural and historical heritage of the region.

4. Policy and Legislative Framework

4.1 At international level

Libya has ratified a number of international conventions, protocols and action plans which include recommendations for the protection of certain plant species and also Appendices listing a number of marine species. Libya is a Contracting Party to international biological diversity concerned conventions, including, CITES, Biological Diversity, Barcelona Convention and Ramsar convention, Bonn Convention on Migratory Species (CMS), and AEWA (the Afro-Eurasian Waterbird Agreement of the Convention on Migratory Species).

4.2 At National level

A summary list of key laws and decisions that have been issued since the establishing of Marine wealth sector is given below:

- Law No. 14 of 1989 is the basic legislation concerning the regulation of the use and conservation of marine wealth. It deals with the type of equipment, both local and imported, allowed for marine fishing, the sizes of fish/species and other marine organisms allowed to be caught, and issues relating to the supervision and control of the industry regarding safety issues.
- Secretariat of Marine Wealth (SMW) Decision No. 71 of 1990, which elaborates the provisions of Law No. 14 and the procedures governing its application, SMW Decision No. 80 of 1991, which provides technical explanations and specifications for the implementation of Law No. 14.

- Law No. 15 of 2003, which replaced Law No. 7 of 1982, concerning environmental protection. In this Law, Chapter 3 contains 21 articles, comprehensively covering marine fisheries and marine wealth conservation, identifying the means and procedures necessary for the protection of fish stock, and banning the dumping of oils and other pollutants from vessels into the sea and the discharge of land-based sewage and industrial water into the marine environment. It also prohibits the use of explosives, radioactive and other poisonous substances for fishing, and bans dredging for sponges. It also provides for the demarcation of marine reservations for the preservation of threatened marine organisms.

In addition, the following laws, regulations, legal frameworks and strategies are of importance to the conservation of marine biodiversity:

- SMW Decision No. 97 of 1993, relating to prohibitions on trawling in specific areas during the July and August spawning period for certain species. This decision was replaced by the General People's Committee Decision No. 271 of 2004 which defines those areas in which trawl fishing is banned. In brief, this decision prohibits trawlers from fishing in the defined areas during the months of May, June, July, and specifies the areas within which the trawlers are permitted to fish other than these areas ;
- Sea turtle protection is included in the decree issued by the Secretariat of Agriculture No. 453/1993 stating that ''All species of turtles and tortoises are protected by law in Libya'' furthermore stating that ''Any use of these species or its products (skin, eggs, flesh) is banned by law in Libya'' and that "Any violation of these articles will be prosecuted within the legal system according to Hunting Law No.28 of 1968'' ;
- The General People's Committee Decision No. 37 of 2005, which declares a protected fishing zone along the Libyan coastline, prohibiting all methods of fishing in the declared permitted zones without advance permission issued by an official authority to be determined by the GPC.
- Law No. 81 of 1971 regarding seaports. This Law includes 155 articles, covering rules concerned with vessels, loading and unloading of explosives and dangerous material, and rules covering for oil loading and unloading, together with the penalties applicable on the violation of its provisions with regard to the set of obligations and prohibition stipulated by this law.
- Law No. 8 of 1973 with respect to the prevention of oil pollution to sea waters. This law includes a set of rules and provisions for its application, derived from the 1954 London Convention, which is considered an integral part of this law. The provisions of this law are limited to oil pollution sources, excluding other sources.
- Act number 205 / 2001 issued by General People's Committee regarding the establishment of Animal Wealth General Authority and one of its tasks to take care of the protectorates and national parks.
- Libyan National Action Plan on Proposed New Marine and Coastal Protected Areas and National Parks (2002).
- Action Plan for the conservation of Marine and Coastal birds in Libya.
- Action Plan for the conservation of marine turtles and their habitats in Libya.

The development of protected areas is regulated through the Law No 14 with Articles 75- 78 concerning MPAs. This Law was outlined in 1991 and came into force in 1992.

Based (i) on the articles of Law No. 15 - 2003 regarding the protection and improvement of the environment, (ii) on the national strategy for the establishment and management of coastal and marine protected areas in Libya, and (iii) on a set of data derived from field and research studies carried out by the Ministry of Environment and several national and international bodies; a ministerial decision No. 272 of 2021 regarding the establishment of 22 marine and coastal reserves in Libya was published on 21/12/2021 by the Libyan Minister of Environment.

A national consultation workshop on the draft law of protected areas in Libya was organised by UNEP/MAP-SPA/RAC and the ministry of Environment of Libya in 2022 to present and discuss the draft law and to come up with relevant recommendations with regards the declaration of new protected areas.

5. Conservation interest, history and current efforts for the site

5.1 Strengths and opportunities of the site

Exceptional terrestrial and coastal ecosystem diversity

The site supports a variety of ecosystem such as dunes, sandy and rocky beaches, hard bottoms, marine vegetation beds, salt marches, etc. and has an ecological significance as a wetland. The site is also of Mediterranean importance for seagrass communities and for nesting of the sea turtle *Caretta caretta* and spawning of elasmobranchs. It's considered as a suitable habitat for different endangered species such as large pelagic fish species (e.g. Bluefin Tuna, and elasmobranch species) and marine mammals (historical habitat for the monk seal). The area is likewise important for resting and feeding of migratory birds.

More than 25 species listed in Annexes II and III of the Protocol SPA/BD are recorded in the Gulf of Sirt.

Artisanal fishing area

The site is an important economic centre for fishing activities contributing to the regeneration of jobs and investments. It contributes to the overall catch of Libya and to the viability of the fishing activity at the regional level, with a rate of 23% of total of national artisanal fishing boats in the Gulf of Sirt. The site is appreciated due to fish abundance.

Potential site for ecotourism development

The site is considered a tourist-oriented region with a national and local will to promote ecotourism.

Existence of a legislative framework

The area of Shash was declared as a Marine and Coastal Reserve by the Libyan Minister of the Environment within the Decision n°218 of 2022. Moreover, several legal frameworks to conserve biodiversity, directly and indirectly, through the regulation of human activities have been set up.

National outreach

The site has significant seaside, scientific, educational, historical and cultural potential in the region. Several awareness activities and several planned conservation and ecological monitoring programmes have been/are being implemented in the Sirt gulf.

5.2 Human impacts and potential threats

The most important threats facing the Shash Marine Reserve likely to impair the ecological, biological, aesthetic or cultural value of the area are:

Illegal fisheries

Illegal fishing methods (explosives and dredges) are very active in recent times, especially in the absence of law and law reinforcement in the country due to the frequent crises it is going through. This is also triggered by the spread of ammunition and explosives from which some fishermen extract gunpowder in order to make home-made fishing explosive charge (known locally as Gelatena). Although most of the artisanal fishers in the Sirte region are trying to address this issue, and according to what was shown by the socio-economic study in the Gulf of Sirte that was conducted in 2021, the activity of explosive fishing led to an impact on the abundance of fish species and their habitats in a way that was noticed by most of fishers in comparison to 10 years before. Capture of cartilaginous fish during their breeding season which critically impacting certain species of sharks.

Bycatch

Since 2011 due to many conflicts, there is no longer any control over fishing activities in Libya which is probably still growing significantly, particularly in the form of illegal foreign fishing (Khalfallah *et al*., 2015; Manach *et al*., 2015). Elasmobranchs and sea turtles constitute part of the bycatch in most local artisanal fisheries in the study area. Different elasmobranchs species have been caught in the spawning period in the gulf (SPA/RAC–UN Environment/MAP, 2020b) and stranded adult loggerhead turtles showed clear signs of entanglement and interaction with longline fisheries (Hamza & El Ghmati, 2006). In 2019 the death of 29 sea turtles and 3 dolphins was recorded in this area (Saied & Dreyag, 2019). A comprehensive study on the bycatch and discarded species in the Gulf of Sirte is very urgent and should be a priority at this stage.

Pollution

Oil pollution on the Libyan coast is caused by frequent discard of oil and oil products from localised sources such as ports, coastal refineries, and municipal sewage discharge.

The Gulf of Sirte in general is considered an oil port area, which makes it threatened at all times by oil leaks and spills from both tankers and refineries. this issue requires the development of emergency and mitigation plans to deal with any possible leaks. Coastal habitats are affected considerably by deposition of oil. The rocky shores are particularly vulnerable to oil pollution due to the accumulation of tar that may take long time to recover in comparison with the sandy beaches (Guidetti *et al*., 2000).

Tar balls resulted from past oil spills and from exchange of Oil Tankers' ballast water, ranged from 5-50 different size balls/m^2 were observed in various densities at the beaches in the Reserve of Shash (Hamza & El Ghmati, 2006).

The collection of solid wastes from urban areas in Sirte is still traditional with unsafe dumping. Anthropogenic pollutants were the most obvious types; i.e. plastic bags, containers, old nets, fishing lines, cans, used tires. Some cans and containers were driven by currents from as far as Italy and Greece. Natural debris including wood, reed stalks, Posidonia leaves, discarded sponges were also observed to in some parts of the three beaches according to the Libyan Sea Turtle Programme reports.

Measures to minimize this pollution should be applied, especially that the area is now declared as a Marine and Coastal Reserve. Moreover, pollution accidents from oil tankers discharges, if it happens, will change coastal habitats near the reserve of Shash, and thus need to be monitored frequently.

Hunting of migratory birds

Libya is one of the 10 highest Mediterranean nations in terms of birds illegally killed every year. approximately 503,000 birds are annually hunted in Libya according to a scientific review carried out by BirdLife International in 2015[7]. According to this study, among Mediterranean countries, Libya is the only one currently without any legal framework to regulate hunting and trapping to prevent illegal killing. Libya is also among the three highest countries in hunting and killing the Houbara bustard (*Chlamydotis undulata*), which is listed as 'Vulnerable' on the IUCN Red List. The number of individual birds illegally killed is estimated to have increased substantially in Libya in the last 10 years, mainly due the recent revolution, which have made weapons and ammunition readily available. The primary reason for illegal killing of birds in this country is for food. Shooting of birds is more frequent in Libya than live trapping.

Recently, the phenomenon of hunting migratory birds has been intensely active, especially in the western shores of the city of Sirte, where there are the salty marshes of Shash and Sabkhat Al-Khamseen.

Activities of the local population

The site is used for local picnics and beach visits in summer. The residents of the Al-Thalatheen and Garf regions are active in the area from Al-Thalatheen to Shash through the summertime which coincides with the breeding season of sea turtles. Accordingly, activities of poaching all along the reserve of Shash are known to take place during this period.

Driving on sandy beaches and dunes: The use of four-wheel drive vehicles during camping and summer significantly affects the intensity of sea turtles nesting in the area (Saied & Dreyag, 2019).

In addition, increased amounts of urban solid waste drifting by the sea and left by the beach visitors are also observed. Therefore, more efforts to raise awareness of the local population and involve them in the marine conservation efforts are strongly recommended.

The effect of the Gulf Steam power station

Al-Khaleej Steam Station, an oil and natural gas power station, is located on Al-Qubeiba Beach, which is adjacent to Al-Thalatheen Beach from the east. Its effect is not limited to changing the sea water temperature through the discarded water used for cooling, but rather has a direct impact on the marine organisms. The station's filters are often disposed of without first processing or rehabilitation procedures, which call for more efforts and building a partnership with station personnel to reduce the negative impact of the station on marine ecosystems.

5.3 Conservation initiatives before MCPA designation

The Libyan Seaturtle Program LibSTP is a national program for the monitoring of nesting activity and conservation of loggerhead sea turtles and coordinated through the Environment General Authority

[7] Birdlife International (2015). The Killing. https://www.birdlife.org/sites/default/files/attachments/01-28_low.pdf

(EGA) of Libya which started on the beaches of Sirte since 2005. This ambitious conservation programme of marine turtles includes capacity building of national and local actors and monitoring and research actions to better understand the nesting of marine turtles and their critical habitats.

The Gulf of Sirte is one of the beneficiary sites of the IMAP-MPA project that is being coordinated by UNEP/MAP Secretariat and implemented by SPA/RAC in order to develop the integrated monitoring of the sea and coasts and to improve Marine Protected Areas (MPAs) management in Southern and Eastern Mediterranean countries.

An environmental and socioeconomic assessment of the Gulf of Sirte, elaborated by UNEP/MAP-SPA/RAC in collaboration with the Libyan experts within the EU funded IMAP-MPA project, highlights the need to further protect selected sites within the Gulf and secure fisheries sustainability.

The socioeconomic survey conducted in the Gulf showed that about 66% of the fishers interviewed were very positive towards the creation of marine protected areas in the region. They say, reported the experts, that the Gulf includes zones such as Shash area, Lewaija and Ras Al-Ghara, which "are rich in abundance and excellent diversity, but need to be protected from unsustainable practices such as illegal fishing".

In fact, 45.8% of interviewed fishermen highlighted the importance of the area extending from Al-Thalatheen to Khamseen beaches west of Sirte, including the shores west of Al-Thalatheen, and Shash and Tammt Al-Khamseen beaches, which have a total length of about 20 km. Group interviews were conducted with the local community in the Al-Thalatheen area and they welcomed the proposed reserve and the idea of including Al-Talatheen area in the proposed protected area “Reserve of Shash”. The Shash area is considered a hotspot area due to its rich biodiversity characterized by the presence of sea turtle (*Caretta caretta*) that nest densely on these beaches, the presence of *Posidonia oceanica*, some species of cartilaginous, important species of molluscs such as *Tonna galea*, in addition to the presence of species of dolphins, and the beach in many parts of it is naturally protected due to the presence of barriers and tunnels that prevent access to the beach.

5.4 Shash MCPA Establishment

Following a technical workshop regarding the ecological and socioeconomic assessments of the marine and coastal area of the Gulf of Sirte in Libya organized in 2021 by SPA/RAC in collaboration with the Ministry of Environment of Libya, priority was given to the Shash area, one of the 3 Hotspot areas in the Gulf of Sirte, as a marine and coastal reserve which is the area west of Sirte, at a distance of 30 km, due to its importance in terms of biodiversity and the presence of endangered species.

In 2022, the area of Shash was declared as a Marine and Coastal Reserve by the Libyan Minister of the Environment by the Decision n°218 of 2022. This Ministerial Decision states that (i) all types of hunting and fishing activities are prohibited in this reserve and (ii) the Ministry of Environment, in coordination with the relevant authorities, is responsible for marking the boundaries of the reserve as well as providing needed means for the enforcement of the Decision.

دولة ليبيا
State of Libya

حكومة الوحدة الوطنية
Government of National Unity

وزارة البيئة
Ministry of Environment

قرار وزير البيئة رقم (28) لسنة 2022 ميلادية
بشأن اعلان منطقة شاش (سرت) منطقة محمية بحرية ساحلية

وزير البيئـــــة

بعد الاطلاع على: -

- الإعـــلان الـدستوري الصـــادر بتـاريـــخ 3 أغسطس 2011 ميلادية وتعـــديلاتـــه
- الاتـفاق السياســـي الليبـــي المـوقـع بتاريـــخ 17 ديسمبـــر 2015 ميـــلادية
- مخرجات الحوار السياســي الليبي المنعقد بتاريـخ 9 نوفمبـر 2020 ميـلاديـــــة
- القانـــون المالي للدولـــة ولائحـــة الميزانيـــة والحسابات والمخـازن وتعـديلاتهما
- القانون رقم (15) لسنة 2003 ميلاديـــة بشأن حماية وتحسين البيئة ولائحته التنفيذيـــة
- القانـون رقـــم (12) لسنـة 2010ميلاديـــة بشأن عـــلاقات العمل ولائحته التنفيذيـــة
- قرار مجلس النواب رقـم (1) لسنـــة 2021 ميلادية بشأن منح الثقة لحكومة الوحدة الوطنيـة
- قـــرار رئيس مجلس الـــوزراء رقـــم (67) لسنـــة 2021ميلاديـــة بشأن تقريـــر حكـــم
- قـرار مجلس وزراء حكومة الوحدة الوطنيـــة رقـــم (300) لسنة 2021 ميلادية بشأن اعتماد الهيكل التنظيمي واختصاصات وزارة البيئة وتنظيـم جهازها الإداري
- قرار معالي وزير البيئة رقم(167) لسنة 2021م بشأن التنظيم الداخلي لوزارة البيئة وتقسيماتها التنظيمية.
- وعلى تأشيرة السيد الوزير علي كتاب السيد مدير إدارة البيئة الطبيعية بتاريخ 2022/5/10م
- وعلى مانقتضية المصلحة العامة

قـــــرر

مادة (1)

تعلن منطقة شاش بسرت منطقة محمية بحرية ساحلية ويحظر ممارسة الصيد بمختلف انوعه بهذه المحمية.

مادة (2)

تتولى وزارة البيئة بالتنسيق مع الجهات ذات العلاقة وضع الحدود والعلامات البحرية لموقع المحمية وكذلك الوسائل الكفيلة بوضع هذا الإعلان موضع التنفيذ.

مادة (3)

يعمل بهذا القرار من تاريخ صدوره وعلى الجهات المختصة تنفيذه.

د. إبراهيم العزابي منير
وزير البيئة

صدر في ديوان وزارة البيئة طرابلس
في يوم الثلاثاء الموافق 31 / 5 / 2022 م

6. Conservation and management Challenges

The following issues were identified as key challenges by the diagnostic survey undertaken within the framework of the elaboration of this management plan, as well as the consultation process with the relevant authorities and other stakeholders, including local population representatives such as users of the area and civil society.

The lack of comprehensive baseline data

Significant lack of historic data, especially concerning the main protected species and habitats at Mediterranean level and lack of studies on biological indicators due to a deficiency of expertise.

The lack of monitoring programmes for endangered and threatened species

Despite the significant efforts made on inventorying and monitoring of sea turtles, there is no other monitoring of other endangered species in the area. The main difficulties hindering this are mainly lack of financial and technical capacities, in particular lack of specialists in some fields. There is an immediate need to identify adequate biological and socioeconomic indicators harmonised with the Ecological Objectives of the EcAp to assess the ecological health of fragile habitats and species.

Need to update and enforce legislation to conserve biodiversity

Beside the absence of a national list of protected species and habitats in Libya, there has been no update to the regulations on hunting and fishing activities at national level. The coordination between different organizations and institutions to implement these legislations is almost absent.

Uncontrolled pollution

The availability of field data on the effects of industrial activity on the surrounding marine environment, where artisanal fisheries and ecosystem have to be preserved, is very scant. Most of the Libyan oil industry ports are in the Gulf of Sirte which is probably the most affected are by the release of ballast water (Magazzu & Angot, 1981) particularly the coastal area. Therefore, a comprehensive assessment on the impacts of ballast water in this region is urgently needed.

Negative impact of fisheries and hunting on biodiversity

Unsustainable practices particularly capture of cartilaginous fish species during their breeding season and illegal fishing activities are noticed in the region. This is mainly through the use of shark gill nets, dredges and explosives which have negative impact on endangered species such as large pelagic species (e.g. Bluefin Tuna, and elasmobranch species) and on the fish stocks in general. Harvesting of species for commercial purposes, poaching and disruption of the reproduction of the various protected and economically valuable species by human action also reported in the region. The impacts on biodiversity are compounded by a lack of human activity management and difficulties in law enforcement (control of by-catch and IUU).

Alien and invasive species

Available knowledge on NIS is still poor and fragmented, especially in relation to their ecological and socio-economic consequences.

Lack of capacity building and training opportunities in the field of environment protection

Capacity building is very important, therefore, it needs to be considered regularly through training and workshops in the fields of the Marine and Coastal Reserve for stakeholders in the region.

Impacts of the local population's activities

It has been noticed that there is increasing anthropic pressures on the dune belt, agricultural land and green spaces (Urbanization, coastal development and tourism) near the city of Sirte. Mismanagement of waste and sand plunder are also reported in the region. Indeed, given the increasing demand for water and the scarcity of this natural resource, desalination of seawater is a growing activity to support the development of water demanding sectors. However, despite the fact that even desalinisation plants require going through an Environmental Impact Assessment, there is a deficiency of policy and guidelines for this activity and a strong need to study and then mitigate its impacts on biodiversity.

Lack of financial and human resources.

Considering the political circumstances prevailing since about one decade in Libya, the allocation of national financial resources to nature conservation is not among the country's priorities. Mobilising financial and human resources for the management of this newly established protected area is therefore among the challenges faced, at least for the short term. However, there are opportunities for external funding that could be used.

Considering these challenges, the following elements were identified as essential needs for the proper management of the area:

- Develop research programmes to compile and gather data and fill knowledge gaps on biodiversity;
- Create Inventories, maps and monitoring of coastal and marine biodiversity;
- Assess identify and then mitigate the impacts of threats to biodiversity;
- Safeguard sensitive habitats, species and sites;
- Coordinate and implement capacity building and technical support through various capacity building activities;
- Encourage the exchange of resources, experience and information among all stakeholders and partners as well as guiding decision-makers to maintain successful conservation of habitats and species at national level;
- Establish a monitoring plan for NIS, and implement adaptive management to mitigate their possible ecological and socio-economic impacts.
- Socio-economic studies are essential for the sustainable development of industrial installations, artisanal fisheries and tourist activity;
- Enhance public awareness and education on the need for conservation of species and habitats.

7. Management Planning

In preparation for the development of this management plan, several public consultations and meetings were held with key stakeholder representatives between September 2022 to June 2023 to identify issues of concern and means of addressing those concerns. A review of available and relevant literature related to the Gulf of Sirte was also undertaken to get a better understanding of the current environmental and socio-economic situation and information gaps. The consultations and literature review provided background information on a range of aspects related to the resources of the area and main challenges and issues. These are described in the previous Phase (Phase 1- Assessment-diagnosis report). The following management framework stems from the consultation process conducted by the Ministry of Environment of Libya with the support of SPA/RAC with national and local stakeholders taking into account the main findings of Phase 1.

7.1 Proposed Management Framework for the Shash Marine Reserve

Vision

The vision for the next 10 years that guided the elaboration of this first management plan is as follows: "The Marine and Coastal environments of Shash (Gulf of Sirte) are preserved and contribute to the wellbeing of populations and the socioeconomic development of the area through sustainable income generation activities".

Management Objectives

The management objectives proposed to achieve the desired vision for the MCPA of Shash (Gulf of Sirte) are defined considering the need for balancing conservation goals with the sustainable use of resources and engaging local communities and stakeholders in the decision-making process, and where possible in monitoring and evaluating the effectiveness of the management plan.

Important remark: considering the non-availability of data about the main components of the biodiversity of the protected area, this first management plan is mainly oriented towards improving knowledge about species and habitats during a three-year period. The collected data will be then used to elaborate a new management plan.

Objective 1: Improve the knowledge about the area's key habitats and species: Posidonia meadows, wetlands, elasmobranch and bird species.

The lack of data about the key habitats and species of the MCPA of Shah (Gulf of Sirte) constitutes a major hindrance for decision-making in relation to the protection and management measures. For the marine environment of the area, the first step should be the organisation of baseline surveys to identify the key habitats and their respective distribution and extent in the area. This will involve field surveys, biodiversity assessments, habitat mapping, and species inventories. The objective being to collect data that will be used to (i) identify the most urgent needs in terms of protection and management measures and (ii) serve as a reference state for the monitoring and assessment of the efficiency of the implemented measures. According to the available information, the seagrass meadows and the elasmobranch species are among the most remarkable biodiversity elements in the area, and they should be therefore considered as a priority for the data collection activities to be undertaken within the framework of this management plan. Turtles are the flag species of the MCPA of Shash. The monitoring of turtles started many years ago in the area and allowed to document the nesting activity and provide valuable data for the protection of the nesting sites in the area. The

monitoring of the avifauna frequenting the wetlands of the MCPA of Shash should also be among the priority data collection activities of this management plan. In this context, seasonal census as well as tagging and tracking techniques are among the recommended approaches.

Data collection for other components of the area's biodiversity may be envisaged if related resources will be available. This will allow to gain a deeper understanding of key habitats and species. It could involve studies on ecological processes, population dynamics, habitat connectivity, and species interactions. Research methods may include underwater surveys, tagging and tracking of species, genetic studies, and ecological modelling.

For the data collection activities, collaboration with scientific and research institutions as well as experts with experience in Mediterranean marine ecosystems is highly recommended. To this end, partnerships and research collaborations to leverage expertise and resources are recommended (Engage with universities, government research agencies, and NGOs that specialize in marine research and conservation).

Objective 2: Ensure the long-term protection of sea turtles and their nests in the area.

As documented by the Libyan Program for the Protection of Sea Turtle, the area of Shash is a hotspot for turtle nesting. The monitoring of turtle nesting initiated many years ago in the area should be pursued and where necessary reinforced. Indeed, Monitoring turtle nesting is a critical component of efforts to conserve these endangered species and should be therefore one of the pillars of the management activities of the marine reserve of Shash. It should include in particular:

- Nesting Beach Surveys through regularly patrolling during the nesting season to locate nets;
- Data collection about the nest, including key parameters such as depth, number of eggs, temperature (using data loggers where needed and available;
- Protection Measures to prevent predation and human disturbance. Relocation to a safer place may be envisaged where necessary;
- Where necessary, help the hatchlings reach the sea safely and protect them from threats such as predators and artificial light that can disorient them and lead them away from the sea;
- Tagging and/or tracking some individual turtles to track them and collect information about their migration patterns and behaviour;
- DNA sampling to contribute to the effort for better understanding genetic diversity of turtle populations and their relatedness to other populations.

Objective 3: Establish close and trusty relationship between the management unit and the key users of the area.

One of the crucial issues facing the creation and management of protected areas relates to the poor ownership of its objectives by the stakeholders. Furthermore, the protection and management measures may contradict or affect certain human activities which leads to the opposition of the local communities or certain stakeholders to the conservation effort. It is therefore important that the local population and in particular the users of the area are informed about the values of the protected areas and what it can provide to them in terms of benefits. This require a specific strategy of communication and consultation whose ultimate objective is to establish a close and trusty relationship between the management unit and the key users of the area.

Objective 4: Adequate visibility of the protected area

Among the first activities to be implemented to ensure the local visibility of the protected area of Shash is the setting of a network of visible landmarks and buoys (where possible at sea) to inform the public and the users about its limits and boundaries. The visibility of the protected areas could be also enhanced through panels/signs installed along the boundaries, inside the MPA and nearby ports and urban areas as well as posters, leaflets and brochures providing information about the MPA, its cultural and natural values, conservation goals, legal information or limitations for certain activities (hunting, using certain fishing gear, lighting fires...etc.).

Actions to be undertaken to achieve the Management Objectives

To achieve the four objectives of this management plan the following actions were adopted by the final consultation workshop organised in June 2023. Details for each of the actions proposed in this management plan to achieve its four objectives are presented in **Annex 1** of this document. A timetable for these actions is presented in **Annex 2**.

Objective 1: Improve the knowledge about the area's key habitats and species: Posidonia meadows, wetlands, elasmobranch and bird species.

A.1.1. Improve the knowledge about the area's key habitats and species (Bird Species)

A.1.2. Improve the knowledge about the Elasmobranchs species in the area

A.1.3. Improve the knowledge about the Posidonia Meadows and their associate species and assemblages

Objective 2: Ensure the long-term protection of sea turtles and their nests in the area.

A.2.1. Sea Turtle Monitoring and Protection

Objective 3: Establish close and trusty relationship between the management unit and the key users of the area.

A.3.1. Advocacy and Awareness Raising Targeting Decision-makers and Other Stakeholders

Objective 4: Adequate visibility of the protected area

A.4.1. Visibility of Shash MPA on the Ground

A.4.2. Elaboration and Implementation of an Educational Programme Targeting Schools

A.4.3. Establish a Visitors Centre

7.2 Proposed Administrative (Governance) structure

The proposed governance structure for the protected area of Shash includes:

- The management Unit
- The steering committee
- Scientific Committee

The management Unit

During the period covered by this management plan, the Management Unit will be composed by at least five permanent staff members: the Director of the protected area, three rangers and one administrative assistant.

The Director of the Protected Area is responsible for overseeing all aspects of the PA's management and operations. This includes conservation efforts, research initiatives, stakeholder engagement, and ensuring compliance with relevant laws and regulations. Details about the duties of the Protected Area Director are presented in Anne1 to this management plan.

The three rangers will undertake patrolling activities and will be responsible for the implementation of the management plan activities under the supervision of the Protected Area Director. They shall report to the Director who will assign the exact duties to each of them. It is essential that the raggers work in close collaboration with each other.

The competent authority may grant to the Director and the rangers the status of judicial police officer in accordance with the provisions of the national Code of Criminal Procedure. They may therefore carry out judicial investigation duties for acts committed in violation of the provisions of the regulations applicable to the PA.

The Steering Committee

The relevant authorities, relevant local bodies and organizations will be represented in the Steering Committee, in particular representatives from various stakeholder groups, including government agencies, local communities, scientific experts, non-governmental organizations (NGOs), and other relevant entities. The role of the steering committee is to provide guidance to the Management Unit on ways to implement and improve the management of the PA. The Exact role of the Steering Committee and its internal procedure should be defined by the Ministry of Environment. The Secretariat of the Steering Committee is ensured by the Director of the PA.

The Scientific Board

The scientific board typically consists of scientists and experts from relevant fields, such as marine biology, ecology, fisheries science, socioeconomics, oceanography, and conservation biology. The members of the Scientific Board shall be designated by the Ministry of Environment after consultation with the Steering Committee of the PA.

The role of a Scientific Board is to provide scientific expertise and advice to support evidence-based decision-making and effective management of the protected area. In this context It provides expert advice to the MPA management team and the broader decision-making bodies. They offer recommendations based on scientific evidence and best practices to guide the development of management plans, policies, and regulations. This advice may cover topics such as fishing quotas, habitat protection, species conservation, climate change impacts, and restoration efforts.

The scientific board should foster collaboration with other research institutions, universities, and scientific networks to access additional expertise, resources, and funding opportunities. They may establish partnerships, in close consultation with the Steering Committee and the Director of the PA, to conduct joint research projects, share data, and collaborate on scientific publications to enhance knowledge sharing and contribute to broader scientific advancements.

7.3 Zoning

Given the shortage in scientific data on the biodiversity components of the PA of Shash, it was not possible to propose zoning options within the framework of the elaboration of this management plan. It is expected that the activities planned to achieve the objectives 1 and 2 of this management plan will provide the needed data

and information that allow to investigate zoning options and conduct consultation with stakeholders to select the most suitable zoning for the PA.

The zoning should consider in particular (i) the ecosystems and their biodiversity or the part of them that is exposed to risks or threats, (ii) thez habitats, especially those that are necessary for reproduction, reproduction, and growth, or those that are threatened by decline or extinction, the striking features of the PA in terms of scientific, cultural or aesthetic importance and (iii) the uses made of the PA territory and the needs of the local population and other stakeholders.

It is recommended that the zoning of the PA of Shash includes the following:

- The Central Zone(s): It (they) include(s) habitats of importance for species of special importance for the area such as Posidonia meadows, habitats of importance for elasmobranch species, turtles and birds. Strict protection regime should be declared for the central zone.
- The Buffer Zone(s): it (they) surround(s) or adjoin(s) the central zone(s) and is (are) allocated for organized and controlled activities such as educational and recreational activities.
- The Sustainable Use Zone(s) including sectors of the PA territory that shall be managed for long-term sustainable use of the natural resources for the benefit of local population or the national economy, and improvement of livelihood of local communities. Development and use of the natural resources should not involve damages the essential functions of ecosystems.

7.4 Monitoring the implementation of the Management Plan review

Progress in implementing the management plan should be assessed quarterly or at least twice a year. To this end the Director of the Management Unit shall prepare an assessment report using the indicators set for each action as defined in the action sheets (Annex1). The assessment report shall be examined by the Scientific Board and the Steering Committee with the view of providing guidance to the Management about the possible required corrective measures.

Three months before the end of the 3-year period of implementation of this Management Plan, a final evaluation report shall be prepared by an independent expert (or a group of independent experts) selected by the Steering Committee and contracted by the Management Unit. The Terms of Reference of the final evaluation shall be defined by the Steering Committee.

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Annex 1: Actions to achieve the four management objectives of the Management Plan

Objective 1: Improve the knowledge about the area's key habitats and species: Posidonia meadows, wetlands, elasmobranch and bird species.

A.1.1. Improve the knowledge about the area's key habitats and species (Bird Species)

A.1.2. Improve the knowledge about the Elasmobranchs species in the area

A.1.3. Improve the knowledge about the Posidonia Meadows and their associate species and assemblages

Objective 2: Ensure the long-term protection of sea turtles and their nests in the area.

A.2.1. Sea Turtle Monitoring and Protection

Objective 3: Establish close and trusty relationship between the management unit and the key users of the area.

A.3.1. Advocacy and Awareness Raising Targeting Decision-makers and Other Stakeholders

Objective 4: Adequate visibility of the protected area

A.4.1. Visibility of Shash MPA on the Ground

A.4.2. Elaboration and Implementation of an Educational Programme Targeting Schools

A.4.3. Establish a Visitors Centre

2023	2024	2025

Action Code: A.3.1	Advocacy and Awareness Raising Targeting Decision-makers and Other Stakeholders

Management Objective:

This action falls within the framework of the following objective(s) of the Management Plan:

3. Establish close and trusty relationship between the management unit and the key users of the area.

Background and Rationale:

The protection of an area or a species will most likely contradict or affect a certain human activity or stakeholder operating within that area. This is one of the big issues facing the creation and management of protected areas which if not solved, will lead to the opposition of the local communities or certain stakeholders to the conservation effort. Therefore, a good starting point for management is to have a leading authority such as the Ministry of Environment which will handle the governance aspect (policy, legislation and authority) while the management can be done in consultation with all the stakeholders involved in the area. This can on a later stage lead to a co-management approach which is more complex and require more participation and awareness by the stakeholders. There are two approaches for the management which are the Top-Down or Bottom-Up approaches and the Ministry should decide on what system should be adapted and would be in line with the Libyan legal framework.

Description of Action(s):

Several actions can be implemented as part of this strategic goal: **(i).** A committee containing individuals representing each stakeholder should be created and consulted in management decisions related to the protected area. This **Stakeholder Committee** can organise regular meetings to discuss relevant subjects and management issues and can invite external experts or consultants to assist in any scientific, legal or authoritative issues. The committee and the managers of the protected area should also organise an open forum event regularly to allow larger representation of the local community and stakeholders to voice their thoughts and ideas about the conservation effort in the area. **(ii).** tailored and specific capacity building and awareness activities should be planned and implemented regularly as part of the management programme of Shash. The programme should target and include all stakeholders in the vicinity of Shash including decision makers. **(iii).** A suitable communication and emergency contact method should be identified and established to inform the stakeholders about any immediate news or emergency and to call and announce the meetings. This can vary from official letters to establishing a social media page and an emergency contact group.

Requirements for Implementation

- A local that can be used or rented regularly to hold the meetings of the stakeholders.
- Stationary, camera and a projector to assist in the capacity building, training programme.
- Educational material and conservation-oriented booklets and leaflets.
- Moderate funds to organise meals, consumables, accommodation and travelling of consultants or certain stakeholders to attend meetings and events.

Expected Result(s):

- Established and increased trust between management and the stakeholders, reduce conflict and insure a smoother implementation of the management plan.
- The stakeholders will carry on their use of the area with minimum impacts to the environment and the conservation effort.
- Along with their sensibilization and education value, the capacity building and public awareness activities should also act as ice breakers and bring the different stakeholders together and increase communication and dialogue for the benefit of the management of Shash MPA.

Output(s)

- Meeting minutes showing the result of interaction and discussion among the stakeholders.
- Training manuals, posters and educational materials.

Success Indicator(s):

- Representatives of most/all stakeholders are present during the meetings and are actively engaged in the discussion and the management process.
- Members of the **Stakeholders Committee** has gone through the capacity building and sensibilization programme.

Leading Party(s): The Ministry of the Environment and all stakeholders in Shash area.
Collaborating Partner(s): SPA/RAC, NGOs, universities and relevant research institutions.
Implementation Period: During the year.
Link with other actions:

References:

- Kelleher G., & Kenchington R., (1992), Guidelines for Establishing Marine Protected Areas, A Marine Conservation and Development Report. IUCN, Gland, Switzerland. vii+ 79 pp.
- Kersting D, Gallon S., (2022), Co-management in Mediterranean MPAs: the way forward. MedPAN. Marseille, France. Link: https://b.link/csdg6d
- López Ornat A,. (Editor), (2006), Guidelines for the Establishment and Management of Mediterranean Marine and Coastal Protected Areas, MedMPA project. Ed: UNEP-MAP RAC\SPA.Tunis.
- The MPA Guide (https://mpa-guide.protectedplanet.net/)

Notes/Checklist

2023	2024	2025

Action Code: A.4.1	Visibility of Shash MAP on the Ground

Management Objective:

This action falls within the framework of the following objective(s) of the Management Plan:

4. Adequate visibility of the protected area

Description of Action(s):

Several actions can be implemented to increase the visibility of the MPA: (i). The boundaries of the protected area must be made clear by installing visible landmarks and buoys in the sea to indicate the limits and boundaries of the different zones inside the MPA. The identification and setting of the boundaries of the MPA should be done in close communication with the different stakeholders and the **Stakeholders Committee**. The presence of a legal consultant is also recommended during this stage. Setting hard boundaries such as a fence is another option but should be considered carefully by the management of the MPA since it is known to exclude certain stakeholders and can generate conflict and opposition by them. (ii). Clear posters, panels and signs should also be installed along the boundaries, inside the MPA and nearby ports and urban areas. These panels should provide information about the MPA, its cultural and natural values, conservation goals, legal information or limitations for certain activities (hunting, using certain fishing gear, lighting fires...etc.). The information in the posters should be clear, strait forward and avoid any dense scientific or legal context or jargon. Another option to consider is to have some of the posters prepared in different language such as English (in the Urban areas) or in the Libyan dialect.

Requirements for Implementation

- Budget to contract a land surveyor or a land surveying company to identify and mark the boundaries and the different zones of the MPA in preparation of setting the boundaries.
- Budget to buy and install the border markers and buoys that will mark the boundaries of the MPA.
- Budget to contract an advertising company to prepare the different posters and the panels.
- Budget to hire or install and maintain the different panels and posters across the MPA and in the nearby urban areas and ports.

Expected Result(s):

- The boarders of the MPA will be clearly marked and easy to be noticed by the different visitors and stakeholders in the area.
- The posters and panels should clearly communicate the various message related to a certain area or activity to the different users and visitors of the MPA.

Output(s)

- A detailed map of the MPA with its different zones. The map should clearly show the areas where the markers and posters are installed.
- Posters and panels pdf files that can also be circulated or printed as handouts and leaflets.

Success Indicator(s):

- Markers identifying the borders of the MPA are all installed and maintained by the management of the MPA.
- Posters, panels and signs are all installed and maintained by the management of the MPA.

Leading Party(s): The Ministry of the Environment in consultancy with the Stakeholders Committee.

Collaborating Partner(s): SPA/RAC.

Implementation Period: During the year.

Link with other actions:

References:

- Kelleher G., & Kenchington R., (1992), Guidelines for Establishing Marine Protected Areas, A Marine Conservation and Development Report. IUCN, Gland, Switzerland. vii+ 79 pp.
- Kersting D, Gallon S., (2022), Co-management in Mediterranean MPAs: the way forward. MedPAN. Marseille, France. Link: https://b.link/csdg6d
- López Ornat A,. (Editor), (2006), Guidelines for the Establishment and Management of Mediterranean Marine and Coastal Protected Areas, MedMPA project. Ed: UNEP-MAP RAC\SPA.Tunis.
- The MPA Guide (https://mpa-guide.protectedplanet.net/)

Notes/Checklist

2023	2024	2025

Action Code: A.4.2	Elaboration and Implementation of an Educational Programme Targeting Schools

Management Objective:

This action falls within the framework of the following objective(s) of the Management Plan:

4. Adequate visibility of the protected area

Description of Action(s):

Educational actions that can be implemented as part of this strategic goal are: **(i).** Look into the existing environment-related teaching models and select the most suitable for the needs of the MPA. Along with general environmental topics such as biodiversity, ecology, pollution. The models should be aimed toward topics relevant to Shash MPA such as sea turtles, birds, invasive species and elasmobranchs. A good place to start is in the **UNESCO-UNEP International Environmental Education Programme** (can be accessed here), and the various regional educational programmes by SPA/RAC, MedPAN, WWF and others. **(ii).** The selected modules need to be translated to Arabic and to be integrated in the schooling programme in Shash area (and later in all of Libya). Capacity building should be provided to the teachers in order to be capable to teach these models. **(iii).** Certain school events such as the Cultural Week or the Open week (usually take place around April-May time) can be targeted to teach these short modules before they are integrated as a year-around models. Another approaches to teach these models is through dedicated visits by experts or members from the MPA management to local schools to give lectures and arrange group activities in classes.

Requirements for Implementation

- A consultant that will take on the task of selection and elaboration of the models taking in consideration the socio-economic aspect of Shash.
- Fund to contract a translator to translate the different models into Arabic.
- Funds for printing of text books or booklets of the models and to prepare the activity tools associated with the model.
- Training workshops for the teachers to increase their capacity to teach the model. Including manuals and other assisting tools.

Expected Result(s):

- Suitable models are made ready for teaching.
- Environmental education programmes is established in Shash area to educate the younger audience about the importance of the MPA and the conservation effort.

Output(s)

- Teaching models in Arabic that can be taught in local schools in Shash and nearby urban areas.
- Activity tools and packages to assist in the teaching models.
- Manuals and assisting materials for the teachers to help in teaching the models.

Success Indicator(s):

- Suitable models are selected, translated and made ready for teaching.
- Teachers' capacity and ability to teach the course are increased and developed.
- Class-books, activity materials were made available and distributed in schools.
- The models are taught in several schools in the vicinity of Shash and the nearby Urban areas.

Leading Party(s): Co-Management between the Ministry of the Environment and all stakeholders in Shash area.

Collaborating Partner(s): SPA/RAC, NGOs, Local schools.

Implementation Period: During the year.

Link with other actions:

References:

- López Ornat A,. (Editor), (2006), Guidelines for the Establishment and Management of Mediterranean Marine and Coastal Protected Areas, MedMPA project. Ed: UNEP-MAP RAC\SPA.Tunis.
- UNESCO, (2002), Education for sustainability – from Rio to Johannesburg: lessons learnt from a decade of commitment. Paris.
- Yeung S., (2002), Teaching approaches and the development of responsible environmental behaviour: the case of Hong Kong. Ethics, Place and Environment, 5 (3), 239 –259.

Notes/Checklist

2023	2024	2025

Action Code: A.4.3	Establish a Visitors Centre

Management Objective:

This action falls within the framework of the following objective(s) of the Management Plan:

4. **Adequate visibility of the protected area**

Background and Rationale:

Awareness and education are some of the important tools utilized by MPAs to promote awareness and education about the importance of the implemented conservation effort. The creatin of a **visitors' center** in the MPA will assist in this process through providing an attracting point to implement awareness and educational programmes for the visitors of the MPA. The centre will present Information about the MPA, its creation, the important species and habitat found in the area, limits and uses inside the reserve in the form of activities and exhibitions. The local of the centre can be acquired by refurbishing an already existing building in the vicinity of the MPA or by constructing a new one.

Description of Action(s):

Potential activities related to the creation of the centre can be as following: **(i).** Locate an existing building that can be refurbished to be used as the centre, or, construct a new building in a suitable location within the MPA. If time and funds are available, the refurbishing can utilise recycled materials from the area such as drift wood and plastic collected from the beaches in Shash. The building should hold an office room (that can double as the headquarter for the management of the MPA), a small conference room, an exhibition room, and open-air classroom and storerooms. Finally, it is recommended that all stakeholders should be consulted about the location and the dedication of the building (or land) to be used as the centre to avoid any conflict with the local communities. **(ii).** Prepare the exhibition of the vesting centre which should contain plates and posters with information about the MPA and the existing important species and habitats plus some samples and life-size modules. **(iii).** Establish a tour system for the visitors to take in the MPA starting from the visiting centre. The tour can also include both terrestrial and marine trails or tracks that the visitors can follow. **(iv).** Elaborate education and awareness activities such as games, drawing and painting activities, workshops and seminars for the visitors. These should be linked to the species, habitats and the pressures impacting or influencing the MPA.

Expected Result(s):

- The visitors centre will operate as an educational platform to increase awareness abut the MPA and its goals.
- The tracks and trails will attract visitors to undertake them during the tour to learn more about the biodiversity and habitats found in Shash.

Output(s)

- Exhibition with posters and plates that provide information about the MPA, the species and habitat dowelling in it.
- Activity tools and packages to be used with school visits and the younger audience visiting the centre.
- Sensibilization materials such as leaflets, handouts, T-shits and caps.

Requirements for Implementation

- An agreement between the management and the stakeholders at Shash to dedicate a land to build the centre or to donate an existing building.
- Sufficient funds to refurbish the existing building or build the new one.
- Funds to prepare and establish the exhibition and the activities of the centre. As a side step, funds can also be located to establish and maintain the trails.
- Contract with a design and publishing company to prepare leaflets, caps, T-shirts and other sensibilization materials for the MPA.

Success Indicator(s):

- The visitors' centre is established and built with the consent and approval of all the stakeholders in the area.
- Regular visits by schools and other targeted audience (the Scouts movement) are underway to the centre and the awareness activities are implemented with the satisfaction of the visitors and the management of the MPA.

Leading Party(s): Co-Management between the Ministry of the Environment and all stakeholders in Shash area.

Collaborating Partner(s): SPA/RAC, NGOs, Local schools and the Scouts movement.

Implementation Period: During the year.

Link with other actions:

References:

- López Ornat A,. (Editor), (2006), Guidelines for the Establishment and Management of Mediterranean Marine and Coastal Protected Areas, MedMPA project. Ed: UNEP-MAP RAC\SPA.Tunis.
- UNESCO, (2002), Education for sustainability – from Rio to Johannesburg: lessons learnt from a decade of commitment. Paris.
- Yeung S., (2002), Teaching approaches and the development of responsible environmental behaviour: the case of Hong Kong. Ethics, Place and Environment, 5 (3), 239 –259.

Notes/Checklist

Annex 2: Timetable for the implementation of the Management Plan

The timetable below presents a summary timeline for all actions for the next three years of the management plan (The 3 Years Operational Plan)

Code	Action	Year 1		Year 2		Year 3	
Improve the knowledge about the area's key habitats and species: Posidonia meadows, wetlands, elasmobranchs and bird species							
A.1.1.	Improve the knowledge of bird species in the area						
A.1.2.	Improve the knowledge of the Elasmobranchs species in the area						
A.1.3.	Improve the knowledge of the Posidonia Meadows and their associate species and assemblages						
Ensure the long-term protection of sea turtles and their nests in the area							
A.2.1.	Sea Turtle Monitoring and Protection						
Establish close and trusty relationship between the management unit and the key users of the area							
A.3.1.	Advocacy and Awareness Raising Targeting Decision-makers and Other Stakeholders						
Adequate visibility of the protected area							
A.4.1.	Visibility of Shash MPA on the ground						
A.4.2.	Elaboration and Implementation of an Educational Programme Targeting Schools						
A.4.3.	Establish a Visitors Centre						

Remark: the data and information to be collected during Years 1 and 2 within the framework of Actions A.1.1, A.1.2 and A.1.3 shall be used for the elaboration of zoning scenarios (options) to be submitted for consultation in order the have the have the zoning of the PA od Shash defined not later than the end of Year 3.

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