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# NATIONAL ACTION PLAN FOR THE CONSERVATION OF MARINE TURTLES ALONG THE EGYPTIAN MEDITERRANEAN COAST

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Marine turtles are highly migratory reptiles that utilize both terrestrial and aquatic environments during their life. As in other regions of the Mediterranean, marine turtles in Egypt are affected by numerous human activities, such as deterioration of critical habitats and migratory routes, incidental capture, boat strikes, pollution and intentional killings. In accordance with the commitment of Egypt to the conservation of marine turtles in its national waters, underlined in national legislation and by way of ratification of related international conventions, the National Action Plan for the Conservation of Marine Turtles (NAP) was developed and adopted with the support of UNEP-MAP Regional Activity Centre for Specially Protected Areas. The participatory approach was applied in the preparation of the NAP, carried out through the concentration meetings with stakeholders. The main goal of the NAP is to achieve favorable conservation status for marine turtle species and their habitats, and enhance their protection along the Egyptian Mediterranean Coast. This goal will be implemented through specific actions and sub-actions, including legislation, management, research, capacity building, and awareness and education.

**Key words:** marine turtles, action plan, Egypt, Mediterranean Sea, critical habitats, marine conservation, policy

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Morske kornjače su vrlo migratorni gmazovi, koji tijekom života koriste i kopnena i vodena staništa. Kao i u drugim dijelovima Sredozemlja, morske kornjače u Egiptu pod utjecajem su brojnih ljudskih aktivnosti, kao što su uništavanje značajnih staništa i migratornih ruta, slučajni ulovi, sudari s plovilima, zagađenje i namjerno ubijanje. U skladu s obvezama Egipta prema zaštiti morskih kornjača u nacionalnim vodama, što je naglašeno i u nacionalnom zakonodavstvu i ratifikacijom odgovarajućih međunarodnih konvencija, razvijen je i usvojen Nacionalni akcijski plan za zaštitu morskih kornjača (NAP), uz potporu UNEP-MAP Regionalnog akcijskog centra za posebno zaštićena područja. U pripremi NAP-a primijenjen je participatorni sustav, uz sastanke sa svim stranama u postupku. Glavni cilj NAP-a je postizanje povoljnog konzervacijskog statusa morskih kornjača i njihovih staništa, te poboljšanje njihove zaštite duž egipatske obale Sredozemlja. Taj cilj bit će implementiran kroz specifične akcije i podakcije, uključujući zakonodavstvo, upravljanje, istraživanje, podizanje svijesti i edukaciju.

**Ključne riječi:** morske kornjače, akcijski plan, Egipt, Sredozemno more, značajna staništa, zaštita mora, politika

## INTRODUCTION

The Mediterranean Sea is inhabited by a rich biota the biodiversity of which is disproportionate to its dimensions. Within less than 1% of the surface area of the world's oceans, the Mediterranean hosts approximately 17,000 species representing 4–18% of the world's marine biodiversity, with 20–30% of marine species considered endemic to the basin (Bianchi & Morri, 2000; Boudouresque, 2004; Coll *et al*., 2010; Mannino *et al*., 2017). Three species of marine turtles inhabit the Mediterranean Sea: the most common loggerhead turtle *Caretta caretta* (Linnaeus, 1758), the green turtle *Chelonia mydas* (Linnaeus, 1758), and the leatherback turtle *Dermochelys coriacea* (Vandelli, 1761). While loggerhead and green turtles reproduce in the region, the leatherback turtles regularly enter Mediterranean from the Atlantic Ocean to feed. All three species are globally listed under the IUCN Red List of Threatened Species: the green turtle as Endangered [EN], whilst loggerhead and leatherback turtles are classified as Vulnerable [VU] (IUCN, 2020).

The Mediterranean Egyptian waters host foraging grounds and migratory corridors from/to multiple nesting areas for both the loggerhead and the green turtle (Laurent *et al*., 1996; Clarke *et al*., 2000; Campbell *et al*., 2001; Broderick *et al*., 2007; Rees *et al*., 2008; Nada & Casale, 2011; Nada *et al*., 2013; Schofield *et al*., 2013; Stokes *et al*., 2015; Snape *et al*., 2016), while strandings and bycatch also indicate the presence of the leatherback turtle (Clarke *et al*., 2000; Nada & Casale 2008; Nada *et al*., 2013; Rabia & Attum 2015). In addition, loggerhead and green turtles are known to nest along the Egyptian Mediterranean coast. The highest nesting activity is documented at the beaches of North Sinai, low nesting occurs in the western coast of Alexandria, while no nesting activity has been documented in the area from Alexandria to Port Said (Rabia & Attum, 2015). Overall, nesting on the Egyptian Mediterranean coasts is considered to be low (Casale *et al*., 2018), despite the presence of several hundred kilometers of potentially suitable nesting beaches.

Incidental catch in fisheries (bycatch), coastal development and non-human predation are the main threats to sea turtles in the Mediterranean, followed by beach restructuring and erosion, exploitation (direct take of eggs and nesting females), and pollution by plastic and biomagnifying contaminants (Casale & Margaritoulis, 2010). A high bycatch of loggerhead turtles has been observed in the easternmost part of the Levantine Basin, off the coast of Turkey, Syria, and Egypt (Casale, 2011; Casale *et al*., 2012). Incidental catch, direct use of turtles for meat and blood, and coastal development have been recognized as the main threats to sea turtles in Egypt (Clarke *et al*., 2000; Nada & Casale, 2008).

Due to decades of conservation efforts on nesting beaches in the form of national regulations and active protection of clutches, coupled with the cessation of exploitation, nest counts at some major nesting sites have recently indicated positive population trends for Mediterranean loggerhead and green turtles. Implementation of on-board recovery techniques for reduction of bycatch mortality have also been introduced as a conservation measure in some regions, but mitigation of incidental catch in fisheries is still in its infancy (Casale *et al*., 2018). The recovery of the Mediterranean subpopulation of loggerhead turtles resulted in its regional delisting from the Endangered [EN] to the Least Concern [LC] category, but such status is highly dependent on the continued implementation of conservation measures (IUCN, 2020).

Because they are highly migratory organisms that utilize different habitats throughout their life cycle, the conservation of sea turtles is dependent upon the cooperation of countries sharing their critical habitats and the inclusion of stakeholders in conservation decision-making, such as fishers, the tourism industry, conservationists, researchers and different sea-users, as well as local and national decision-makers (Camiñas *et al*., 2020). This is particularly true for the semi-enclosed Mediterranean Sea, surrounded by 21 countries (UNEP/ MAP 2012). The international commitment of Egypt to the conservation of marine turtles was underlined by the ratification of the Barcelona Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean in 1976 and its amendments in 2000, including the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean. Egypt also adopted the updated Action Plan for the Conservation of Marine turtles in the Mediterranean (UNEP-MAP RAC/SPA, 2007). Many other regional and international conventions were ratified, such as the Convention of Biological Diversity (CBD), Convention on Migratory Species (CMS), Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and RAMSAR Convention on Wetlands. In addition, the commitment of Egypt to the conservation of marine turtles in its national waters was underlined within national legislation in the field of environmental (the Law of Environment 9/2009 and its executive regulation), biodiversity (the Law of protected areas and biodiversity 102/1983), and fisheries regulation (the Law regarding fishing, aquaculture and fish farms regulations 124/1983).

The National Action Plan (NAP) for the conservation of marine turtles was prepared in order to implement national and international legislation directed at the conservation of marine turtles in Egypt, and address the continuous and increasing impacts of human activities along the Egyptian Mediterranean coast that are likely to negatively affect marine turtles inhabiting Egyptian Mediterranean waters.

## DEVELOPMENT OF THE NATIONAL ACTION PLAN

The following rationale for the development of the NAP were identified: (i) Egyptian territorial waters host habitats for marine turtles, but there is a lack of knowledge on the biology of the species in the Egyptian waters; (ii) marine turtles are under increasing pressure due to the direct and indirect effects of human activities which impact both nesting and feeding habitats in Egypt; (iii) enforcement of existing national legislation alone, without an increase in public awareness and shifts in attitudes towards the need for conservation of marine turtles, would not guarantee efficient protection since illegal takes would still exist; (iv) Egypt is bound by national and international legislation to protect marine turtles.

The National Action Plan was developed by a team of experts formed in 2017 with the support of the UNEP/MAP Regional Activity Centre for Specially Protected Areas (RAC/SPA) and in collaboration with the Egyptian Environmental Affairs Agency (EEAA). The expert team initially reviewed published information and "grey literature" (e.g. national surveys reports), and collected additional information through surveys and interviews in markets and in areas known to host important habitats for marine turtles in Egypt. The participatory, bottom-up approach was implemented in the preparation of the NAP, enabling the inclusion of different stakeholder groups. The National Action plan was finalized through concentration meetings with relevant national governmental and management institutions (the Nature Conservation Sector of

EEAA, General Authority for Fish Resources Development, managers of the relevant protected areas, environmental offices in coastal governorates), research bodies (the National Institute of Oceanography and Fisheries and the Arab Academy of Technology and Maritime Transport), civil society organizations (fishermen societies) and others.

## RESULTS AND DISCUSSION

The Action Plan aims to achieve a favorable conservation status for marine turtle species and their habitats in the Mediterranean Sea, and enhance their protection in the Egyptian Mediterranean area through legislative and management actions, research, capacity building, and awareness-raising and education (Tab. 1). In order to reach these conservation goals, the following targets were set: (i) Identifying anthropogenic impacts on marine turtles and their habitats, and undertaking mitigation measures; (ii) ensuring that human activities are managed, so that human-induced mortalities are reduced; (iii) monitoring, protecting and restoring marine turtle habitats, if needed; (iv) enhancing the governance and capacity framework for marine turtle conservation, and (v) enhancing cooperation and coordination at national and regional levels. The National Action Plan was adopted at national level in consultation with

**Tab. 1.** Structure of the National Action Plan (NAP) for the conservation of marine turtles

| Categories / Actions | Sub-actions |
|---|---|
| 1. Legislative actions | |
| | 1.1 Harmonizing national legislation with the SPA/BD Protocol, ratified conventions, obligations and provisions |
| | (a) Analyzis of the current relevant national legislation concerning marine turtles' conservation |
| | (b) Harmonization of the legislation with the National Action Plan, if needed |
| 2.2 Management actions | |
| | 2.1 Launching national stranding network |
| | (a) The preparation of a stranding programme |
| | (b) The establishment of a tissue bank |
| | (c) Periodical publication of an Egyptian Mediterranean Coast stranding report |
| | 2.2 Implementation of nesting monitoring programme |
| | (a) Preparation of a national monitoring programme |
| | (b) Training of Egyptian personnel into on-beach monitoring techniques |
| | (c) Implementation of the national monitoring programme |
| | (d) Annual publication of the activities carried out by the programme |
| | 2.3 Establishing a tagging programme |
| | (a) Launch of a national tagging programme |
| | (b) Organization of a training course on tagging techniques, nesting monitoring, fishing interaction assessment and strandings |
| | 2.4 Establishment of Marine Turtle First Aid Centre |
| | (a) Search for an appropriate local for the center |
| | (b) Acquisition of materials and necessary equipment |

**Tab. 1.** Continued

| Categories / Actions | | Sub-actions |
|---|---|---|
| | | (c) Training of veterinary personnel into sea turtle medical care |
| | | (d) Selection of personnel for training on running and managing the rehabilitation center |
| | 2.5 Establishing specially protected areas for marine turtles | |
| | | (a) Identification of hot-spots for marine turtles' in Egyptian Mediterranean waters |
| | | (b) Evaluation of the existing and potential threats to marine turtles in identified critical habitats |
| | | (c) Establishing of specially protected areas, if needed |
| 3. Research | | |
| | 3.1 Investigating turtle biology and mortality based on strandings cases including pathology, mortality, biology and genetics | |
| | | (a) Creation of a tissue bank for pathological, toxicological and genetic studies |
| | | (b) Necroscopical analysis of all possible stranded turtles for the determination of the cause of death |
| | | (c) Promot of studies by Egyptian specialists on the pathology, mortality, biology, and genetics of marine turtles |
| | 3.2 Sudying marine turtles – fishery interactions | |
| | | (a) Conduct interview-based surveys with the local fishing community along the entire Mediterranean coastline of Egypt |
| | 3.3 Studying nesting activity | |
| | | (a) Assignment of a national coordinator to oversee the teams, gather the data and prepare annual nesting reports |
| | | (b) Tagging programme underway and operating |
| 4. Capacity building | | |
| | 4.1 Institutional capacity building | |
| | | Aimed at public administration, management bodies of existing protected areas, research and teaching intitutions, and advocacy organizations |
| | 4.2 Individual capacity building | |
| | | Aimed at law enforcers, researchers and media |
| 5. Awareness and education | | |
| | | Aimed at decision makers, fishing communities, schools and general public |

relevant stakeholders at the validation workshop held in Cairo in October 2017, for the period of five years.

Due to its geographic location, and ecological and oceanographic characteristics, Egypt is known to contain critical terrestrial and marine habitats for Mediterranean marine turtles (Rabia & Attum, 2015; Casale *et al*., 2018). However, there are significant gaps in our knowledge related to fundamental aspects of biology, such as total number of clutches laid annually, population trends, mortality and predation rates, at-sea distribution, natal origin, movements and habitat use. Collection of missing, key biological information through research and monitoring actions set by NAP (Tab. 1) is hence critical for implementation of science-based conservation actions and evaluation of their efficiency. The continuous increase in human activities along the Egyptian coast and in the sea affects nesting and feeding grounds of marine turtles. Quantitative assessment of threats, fisheries interactions in particular, is also crucial for the guiding of the national conservation management, and is also addressed by NAP actions.

Egypt is bound by both national and international legislation to protect marine turtles and to maintain populations in a 'favorable conservation status'. However, merely enforcing and abiding by these regulations will not be sufficient to ensure adequate conservation given the level and nature of threats affecting them nationally. A particular problem is presented by illegal killings and use of marine turtle meat and blood for consumption and religious purposes (Clarke *et al*., 2000; Nada & Casale, 2008). Changing attitudes towards sea turtles will therefore present a major conservation challenge, and can be achieved only by an adequate long-term public awareness-raising programme focused on specific target groups. Therefore, education and awareness actions, together with capacity building, are integral parts of the adopted NAP.

The Egyptian NAP outlines actions according to their priority and feasibility, with different activities mutually reinforcing and acting synergistically (Fig. 1). It is consistent with activities proposed by Nada & Casale (2008) and Casale & Margaritoulis (2010), which included reduction of sea turtle killing in Alexandria and in other areas, introduction of turtle-based ecotourism, implementation of education campaigns aimed at fishermen and stakeholders, reduction of bycatch and minimization of anthropogenic impacts on nesting beaches through legal protection, law enforcement, and long-term population monitoring.

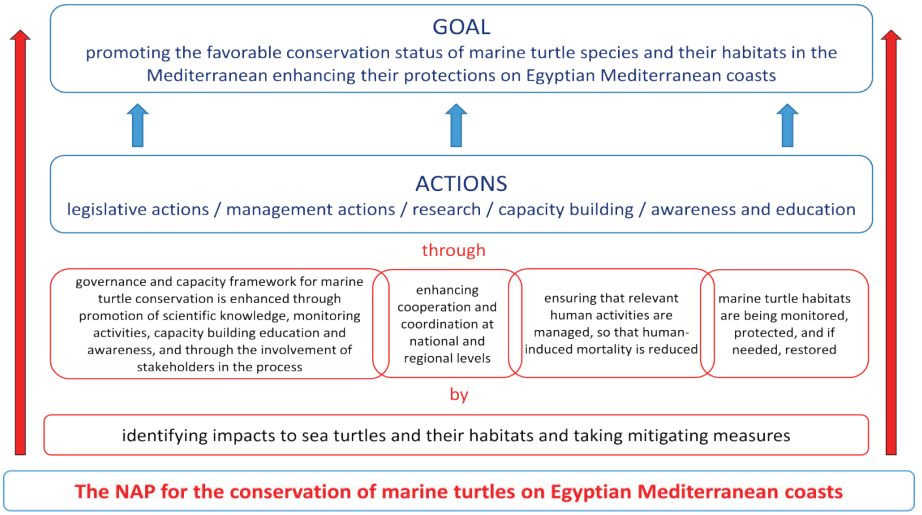


**Fig. 1.** The Egyptian NAP actions diagramme, according to their priority and feasibility, with different activities synergistically taking place.

As large-bodied, highly migratory, keystone species, marine turtles play an important role in shaping the biodiversity, structure and functions of marine ecosystems (Estes *et al*., 2016; Hammerschlag *et al*., 2019). Protection and monitoring of nesting areas, assessment and mitigation of interactions with fisheries, and management of foraging grounds are some of the key conservation actions defined by NAP. Such a science-based strategy is crucial for achieving 'a favorable conservation status' for marine turtles in Egyptian Mediterranean waters, and if successful, it has the potential to enhance the biodiversity and resilience of the ecosystems marine turtles use. Estab-

lishment of a collaborative network of stakeholders, capacity building and increased public awareness will furthermore enhance national marine conservation and contribute to building a more conservation-orientated society. Moreover, the NAP will practically implement national and regional conservation commitments of Egypt, contributing to the restoration of sea turtle populations in the Mediterranean basin. In addition, it has the potential to enhance regional cooperation between UNEP MAP-RAC/SPA and EEAA aimed at conservation of marine biodiversity. At the end of 5 years, the period proposed for the implementation of NAP, a review process will critically evaluate accomplishments, problems and shortcomings in order to redirect and reformulate a new set of actions for the future.

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