



MARINE TURTLES IN THE MEDITERRANEAN EGYPT: THREATS AND CONSERVATION PRIORITIES





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**Marine Turtles in the Mediterranean Egypt:
Threats and Conservation Priorities**

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- Green turtle on sell in the black market (P. Casale).
- Port and vessels in Alexandria (P. Casale).

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Executive summary

Sea turtles have been traded in Egypt for a long time, at least in Alexandria, one of the most important towns along the Mediterranean coast of Egypt. Previous surveys suggested that high numbers of turtles were killed every year, even after legal protection, making this a major threat for the sea turtle populations in the Mediterranean. In recent years, prohibition of trading sea turtles was enforced in Alexandria by authorities and supported by awareness campaigns conducted by NGOs.

The aim of this study was to assess the current status of turtle trade in Alexandria, the occurrence of trade on other areas along the whole of the Mediterranean coast of Egypt, the main drivers, and the results of previous conservation efforts.

Field surveys were carried out in the period June-October 2007 in 15 coastal cities or fishing ports along the Egyptian Mediterranean coast. Interviews were conducted with a total of 445 persons, mostly fishermen and fishmongers.

Results indicate that all the three species of turtles frequenting the Mediterranean occur in Egyptian waters, although with different abundance: loggerhead turtles (*Caretta caretta*) are the most common species, green turtles (*Chelonia mydas*) are found at lower numbers, while leatherback turtles (*Dermochelys coriacea*) are rare.

Interviews indicated that turtles were nesting all along the coast in the past, but nowadays the number of nests is greatly reduced and most clutches are laid in a spot in the eastern region, while nesting is rare in the western region and negligible in the central one. These turtles are mainly loggerheads but in the eastern regions green turtles nest too. Only part of the main nesting area is in a natural reserve and so protected from habitat alteration, and nesting is threatened by human presence, beach development for tourist facilities, and coastal fishing.

On the basis of their direct experience, most fishermen believe that turtles are declining, and that the main reasons are bycatch, intentional killing and pollution.

From the catch rates declared by fishermen and the official statistics on the fishing fleet, over 5000 turtles per year are estimated to be captured by trawlers, longliners and set netters. Since these

fishing gear are known to induce high mortality rates, an important proportion of these turtles, probably many hundreds, may die just as a consequence of the capture. Accordingly, dead turtles are commonly found stranded along the coast.

However, the actual mortality is much higher, because of intentional killing of captured turtles: most fishermen from Alexandria and part of fishermen from other regions declared to kill turtles for their meat. Regulations and enforcement seems not to be much effective. In fact, turtles are usually killed and consumed on board, and if not, usually only the meat is landed, easily escaping police controls. The main consumers are the fishermen themselves, their families and friends, with just some turtles being traded. In Alexandria, turtles are no longer sold publicly in markets where prohibition of selling turtles has been enforced, though an unknown but probably lower number is still sold through the black market. However, turtles are still traded publicly in other Alexandria fish markets.

Although turtle meat can be appreciated as a free meal in poor contexts, the main drivers of turtle consumption are cultural ones. In fact, turtle consumption represents a tradition in Alexandria, but not elsewhere where it is less common or even negligible, depending on the region. Furthermore, fishermen do not feel to have a role in the management of fishery resources and do not trust regulations proposed by authorities, including those concerning protection of natural resources.

Mitigating the identified threats, in particular intentional killing, is deemed as urgent and necessary in the wider context of conservation of Mediterranean loggerhead and green turtle populations. Priority actions should include (a) reduction of sea turtle consumption, especially in Alexandria, by tackling drivers such as culture and fishery management; (b) reduction of turtle bycatch and induced mortality, through modification of fishing gear or practices; (c) reduction of the impact on nesting sites, through legal protection and ecotourism; (d) further research on bycatch, on distribution and origin of turtles at sea, and on nesting activity.

Preface

The aim of this study was to assess the status of marine turtles in the Egyptian Mediterranean coast and to fill some specific gaps of knowledge about the threats to sea turtles along the coast, such as human consumption, fishermen interaction, beach development and pollution. In fact, previous surveys indicated that nesting activity in the Egyptian Mediterranean is low, while Egyptian waters host important foraging areas. Moreover, the mortality induced by turtle consumption was suspected to be high and was listed as one of the most important threats for sea turtle populations by the WWF's Species Action Plan for the conservation of marine turtles in the Mediterranean Sea (WWF, 2005). In order to evaluate the need of conservation actions to tackle this threat, specific information about the current status of turtle trade, geographical occurrence of trade, main drivers, and results of previous conservation efforts were collected.

Particular attention was given to fishermen and sea turtle bycatch, which is the source of the turtles traded.

This report is made by three sections. The first one (Background) summarizes the information available so far on turtle occurrence and threats along the Mediterranean coast of Egypt, as well as the information about fishing fleet, fishery sector, legislation concerning conservation of natural resources, and the potential role of local communities in conservation. The second section (The survey) provides objectives and methods of the survey, and discusses the implications of results for sea turtle conservation. The third section (Conclusions and recommendations) makes a synthesis of the main threats and their importance, highlights conservation perspectives and gaps, and proposes specific conservation priority actions.

1. Background

1.1. Introduction

There is a long history of interaction between turtles and humans in many parts of the world which at least goes back to 7000 years ago, with turtles representing nutritional, economic, and spiritual resources to many human communities (see Frazier, 2003, for a review). Remains of marine turtles have been found in archeological sites in the Mediterranean Middle East, some dating about 5500 years ago, as well as in southeastern United States, Mexico, Central and South America, South Asia, and the Pacific. Turtles are also depicted (or their parts used) in diverse cultural artifacts. The Maya particularly valued turtles: in their cosmology, the appearance of a turtle shell marks the event of creation. Moreover, there are written accounts of turtles, possibly marine species, that date as far back as 5500 years ago. An ancient Greek document from 2300 year ago refer to “turtle eaters”, a group of people in the southern Red Sea hunting marine turtles and using their shells as boats, while an account from 1950 years ago reports a wide-ranging trade in marine turtles, from the Indian Ocean to the Mediterranean (Frazier, 2003).

Among the possible uses of turtles, consumption was certainly a predominant one, and was practiced in many parts of the world (Campbell, 2003; Frazier, 2003), and was associated with the traditional and cultural heritage of different communities (e.g. Clifton et al., 1982; Figueroa et al., 1992). In some cases it was also a delicacy served on ceremonies and special occasions such as weddings, Christmas, Mother’s Day, and Easter (Caldwell, 1963). Internal organs such as kidney and liver were used to prepare soap (Mack et al., 1982), and drinking fresh blood was also perceived to remedy for anemia and asthma in several communities (Caldwell, 1963; Felger and Moser, 1987; Nada, 2001). Egg consumption as an aphrodisiac is also well documented in many parts of the world (Campbell, 2003).

In modern times, the number of marine turtles consumed has increased dramatically due to several interlinked causes, most importantly is the demographic increase of local communities, the improvement of fishing gear, and the expansion of turtles’ commercial trade. Several national legislations and international conventions were drafted to insure that such practices is banned,

however consumption of turtles’ meat and eggs still occur in several parts of the globe (Campbell, 2003).

Although in most Mediterranean countries consumption of turtles’ meat and eggs does not take place, the suspected impact by some countries, especially Egypt, makes this issue being considered a priority by both the Actions Plans for the conservation of sea turtles in the Mediterranean by RAC/SPA (2001) and WWF (2005), and the latter lists the drastic reduction of intentional killing among the top priority conservation targets.

The opportunity to capture turtles for consumption increased with the improvement of fishing gear and the increase of fishing effort. However, although intentional killing is not so spread, interaction with fishing gear alone is a major threat worldwide and the most important one in the Mediterranean.

There is no specific fishery or type of fishing gear that directly targets marine turtles. However, a large number of individuals are captured as by-catch by fishing gear intended to target other species. The three types of fishing gear that are having the greatest impact on Mediterranean turtles are drifting longlines, bottom trawls and set nets. Number of captures are in the order of tens of thousands per year and many turtles die as a consequence of the capture (see Gerosa and Casale, 1999, and WWF, 2005, for a review).

1.2. Marine turtles in the Mediterranean Egypt: occurrence and threats

All the three marine turtle species occurring in the Mediterranean regularly occur along the Egyptian Mediterranean coast too: *Caretta caretta* (loggerhead turtle); *Chelonia mydas* (green turtle); and *Dermochelys coriacea* (leatherback turtle).

In Egypt, marine turtles are under continuous threat as a result of intentional killing and fisheries interaction. In the past few years, the Egyptian government issued several decrees that aim at conserving endangered species, including marine turtles, and several awareness campaigns were conducted.

1.2.1. Nesting and foraging grounds

Two studies investigated turtle nesting in Egypt. The first survey covered the western coast between Alexandria and El Salum (Kasperek, 1993) (Fig. 1), while the second survey covered the entire coast (Clarke et al., 2000). Both surveys concluded that nesting in the coast west to Alexandria does occur but in low numbers compared to other areas in the Mediterranean, with the nests scattered along the coastline. As for

does not host important nesting sites, at least not at present time, but it probably hosts important foraging areas (Margaritoulis et al., 2003), as also suggested by a satellite tracking study in which 5 out of 6 green turtles visited Egyptian waters after nesting in northern Cyprus (Godley et al., 2002).

1.2.2. Bycatch

The interaction of fisheries with marine turtles in

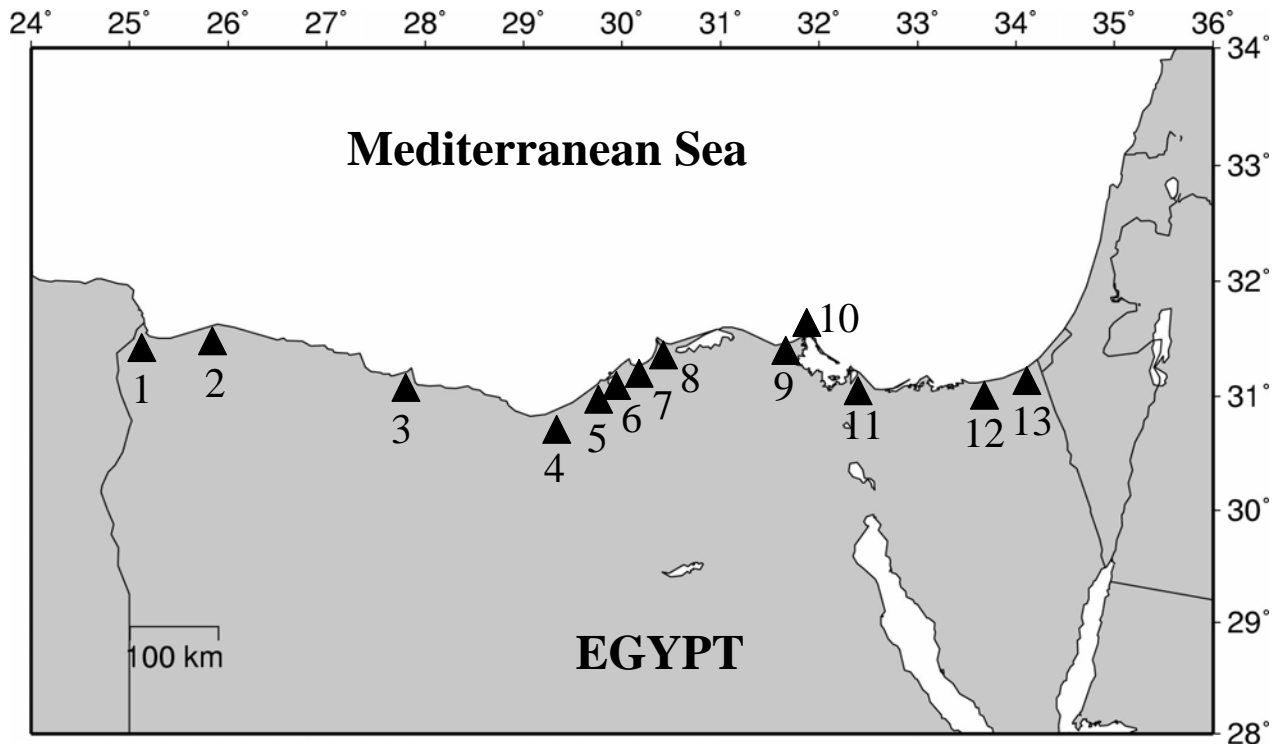


Fig. 1. The Mediterranean coast of Egypt, with places where the survey was carried out: 1 El Salum; 2 Sidi Barani; 3 Marsa Matruh; 4 El Hamam (western region); 5 Alexandria governorate (including El Max, Anfoushi, Abou Keer); 6 El Maadiya; 7 Edco; 8 Rousata; 9 Azzbat El Borg; 10 Domiat (central (Delta) region); 11 Port Said; 12 Areash; 13 Rafah (eastern (Sinai) region).

the area ranging from Alexandria to Port Said, no evidence was found that nesting occur in the area, probably because the soil is made up on high mud/silt content that might have rendered these beaches unsuitable as nesting sites (Clarke et al., 2000). However, in this area large numbers of dead turtles wash ashore, suggesting that marine turtles congregate in the inshore waters to feed (Clarke et al., 2000).

The main nesting beach along the entire Egyptian Mediterranean coast is a 22 km stretch of sandy coastline located west of El-Arish city, of which 8 km of this beach lies within the boundaries of the Zaranik protected area, and were 74 nests were observed in 1998 (Clarke et al., 2000).

Thus, although both loggerhead and green turtles nest in the Egyptian Mediterranean coast, Egypt

has been poorly investigated so far. Perhaps the only research tackling this issue was one focused on trawling only (Laurent et al., 1996). Although Egypt is not an important nesting site, the capture of numerous adult loggerhead and green turtles was reported by interviewed fishermen, and the total number of turtle captures per year in Egypt by trawling alone was estimated to be high, affecting mostly loggerhead turtles and with mortality rate of 0-10% (Laurent et al., 1996).

1.2.3. Intentional killing

Clarke et al. (2000) found evidence of egg consumption in northern Sinai and signs of human

disturbance were found at 10 nests during their survey.

However, eggs apart, Egypt is renowned for being one of the earliest markets to trade in marine turtles, especially in the fish markets of Alexandria. Old reports were reviewed by Laurent et al. (1996) as follows. Sell of both loggerhead and green turtles in the fish markets along the Mediterranean coast (Alexandria, Abou Keer, Brullos, Port Said, Domiat) occurred at least since the beginning of the 20th century (Flower, 1933). Probably most of these turtles were captured in Cyprus, Turkey and Palestine, transported to Egypt and then to Europe. It is not sure if at those times consumption of turtles in Egypt was due to local people or Europeans living in Egypt. However, at least since the 1970s in some places (especially Alexandria) turtle consumption was a tradition.

More recently, turtle consumption was observed in several cities, especially Alexandria (Laurent et al., 1996; Venizelos and Nada, 2000).

Almost all the researches that were conducted to assess the status and threats of marine turtles in Egypt, as well as the advocacy campaigns to stop the illegal trade in Alexandria's fish market, were driven and lead by international academic or non-governmental organizations. However, in the last ten years, some initiatives started to emerge from Egyptian governmental institutions, NGOs and Egyptian universities and research centers. Among these endeavors, three surveys aimed specifically to assess the size of the trade in Alexandria's fish Market (especially Anfoushi fish market) and to document local communities' costumes and traditions associated with turtle consumption (Nada, 2001, 2003, 2005).

The first of these assessments was conducted over a six-month period, from the beginning of December 1998 until the end of May 1999 to estimate the volume of such trade in the Alexandria Fish Market (Nada, 2001). Weekly visits were made to the Fish Market on Saturday and Thursday nights where the sea turtles would be kept to be slaughtered the next morning. Other random visits during the week were conducted and interviews with fishermen, fishmongers were organized to solicit their views regarding marine turtle trade.

Data gathered indicated that sea turtles were mainly slaughtered on Friday and Sunday mornings when enough customers were present. Fishmongers interviewed mentioned that in these two days are known for turtle sell, and customers gather together to be able to share the meat of

turtles among each other. Interviewed customers mentioned that turtle's meat should be cooked in the same day of the slaughter and its taste and odor change rapidly. In rare occasions, slaughtering could happen in other days if one or more clients were available to share all the meat of a turtle. If not enough customers were available during the time of slaughtering, the turtle would remain until the following slaughter time.

In the fish market of Anfoushi, turtles were offered for sale in one shop called El Hag Hosni and Sons. He mentioned that sea turtle trade is considered to be a family tradition, an addition to their normal business, which is dealing in fish and shrimps. In his shop, turtles were placed on their backs directly on the stall counter or on the ground. Some turtles were injured as they bite each other as a result of the stressing conditions. Fish mongers mentioned that in some occasions, some turtles would be kept in the market for more than three weeks. By examining the turtles, it was clear that some of them were facing several dehydration and emaciation.

The turtles were slaughtered from the throat, following the Islamic procedure. The carapace is separated from the plastron by a knife, most of the meat is found in the area around the flippers, the digestive tract is removed and the head is separated. Green turtle meat was more expensive than loggerhead because the consumers prefer its taste. Average price of one kilogram of turtle meat was about 15 Egyptian pounds (nearly 3.5 USD), and varied according to the turtle species and its availability in the market.

Customers seeking turtle's meat were predominantly from the local community (Anfoushi) and resided around the fish market, which basically is the authentic fishermen community of Alexandria. This community is pride to have its own cultural characteristic, distinct accent, customs, traditions, and personality. Among these customs is their distinctive habit of consuming marine turtle meat and blood.

During the interviews with the customers they mentioned that members of the fishermen community are the only ones capable of preparing turtle meat in Alexandria. They mentioned that they have a special way of preparing it; it is served either in soup or cut down to small pieces and cooked with rice in the oven. They mentioned that human hands must not touch the turtle meat because that makes its taste bad. It is believed that the green turtle taste is much better because it feeds on sea grass, while the loggerhead eats crabs, shrimps and jellyfish. One fish monger

mentioned that a leatherback was once captured and brought to the fish market. After slaughtering it, customers reported that its taste was bad.

In addition to meat, blood was consumed too in Anfoushi. During the time of slaughter, blood consumers, who were not necessarily seeking turtle's meat, gathered together in the early morning to get a cup of fresh blood. Most of them were young women who believe that turtle blood will make them gain weight (it is traditional in this area that thin women are not attractive), also some women believed that the blood would make them more fertile. Fewer men drank turtle blood believing it to be an aphrodisiac and general tonic. To overcome the taste of blood, several customers were saw to eat fruits, like orange or banana, while drinking the blood. In some occasions, young girls seemed not very willing to drink the blood but family members encouraged and/or push them to do so. Selling blood was considered as non significant source of income to fishmongers and they were not particularly interested in selling it. The price of a cup of blood was one Egyptian pound (about 0.25 USD).

From the field research, there was no evidence supporting Goodman's argument (in Groombridge, 1990) that consumption of turtle meat was related to Coptic communities. Instead, the interviews and the focus groups discussion with both Muslims and Coptics from the local communities confirmed Kasperek's (1993) finding which stated that both Muslims and Coptic Christians consumed turtles' meat.

Fishmongers and community members of Anfoushi area argued that blood consumption declined rapidly in the past ten years as a result increased education and awareness. Interviews with different stakeholders in Anfoushi area confirmed this and religious leaders added that this topic was covered several times in their weekly preach.

An average of six turtles per week were seen on display for sale, with a total of 135 turtles over the 6 months period. The number tended to increase gradually from December until it reached its maximum in May (Fig. 2).

During this period, both loggerhead and green turtles were seen in the fish market, with the majority 85% being loggerhead. The number for females exceeded that of males. It should be noted that this number did not include turtles that were slaughtered during the non official slaughtering time. It also did not include number of turtles that was slaughtered on board or outside of the fish market. It was estimated that the overall number

of turtles slaughtered during this period would range from 350 to 500 turtles.

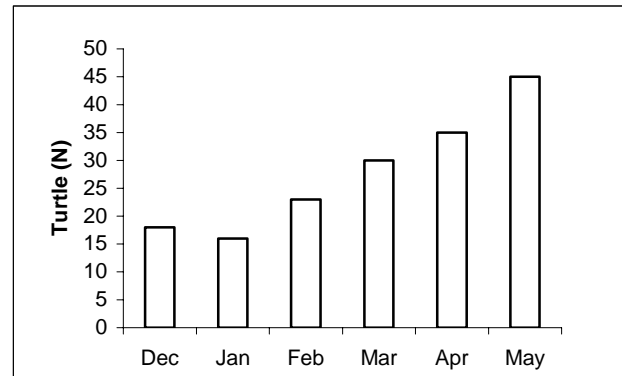


Fig. 2. Sea turtles trades in the fish market of Anfoushi, Alexandria (1998-1999) (from Nada, 2001).

Fishmongers and fishermen indicated that the number of turtles captured increased dramatically during summer time. Consequently, the number offered for sale in the fish market could reach 18 to 25 turtles per week during that time.

A second research (Nada, 2005) assessed the difference in knowledge and attitude of three major groups. The first group was made by fishermen and fishmongers of the fish market of Anfoushi. The second group was made by members of the local community who are illiterate or have not completed their primary education. Finally, the third group was made by educated citizens residing within the local community in Anfoushi, which included university students, teachers and school students.

The main findings of this research were that: when asked if they would crave for consuming marine turtles meat, 81.3% of the first group, 39.7% of the second group, and 6% of the third group responded that they would; when asked if they knew that marine turtles were considered as an endangered species, 25% of the first group, 8.8% of the second group and 46.2% knew that; when asked about their knowledge about the illegality of trading marine turtles 26.6% of the first group, 8.8% of the second and 14.9% the third group knew that the trade was illegal.

As for their knowledge about the Islamic religion, 20.3% of the first group, 13.2% of the second group and 65.7% of the third group were aware that consuming marine turtles blood is prohibited by religion; when asked about the relationship between marine turtles and jellyfish, 51.6% of the first group, 5.9% of the second group and 31.4% of the third groups knew that turtles feed on jellyfish; when asked about their perception

regarding the importance of conserving marine turtles, 73.4% of the first group, 26.5% of the second group and 85% of the third group stated that they would think it is important to conserving them.

Reviewing these data, it could be argued that the main consumers of turtle meat were fishermen, fishmongers and uneducated members. The data emphasized that education plays an important role in people's knowledge regarding the status of marine turtles as being an endangered species, as well as turtle predation on jellyfish. During the interviews, fishermen and fishmongers believed that it is important to save marine turtles from extinction because they were a source of income to some of them and provided a free meal to fishermen during their fishing trips. On the other side, most of the educated people believed that conserving marine turtles will contribute to the preservation of the balance between different species in the food chain and thus insuring a better environmental health in their surrounding ecosystem.

A third complementing research was conducted to determine the willingness of fishermen and fishmongers; turtle meat consumers; and children to stop consuming marine turtles' meat and document their rationale for change (Nada, 2003). This research examined the effectiveness of five messages of the different target groups. These messages were: the importance of saving the sea turtles to biodiversity; the legislations preventing sea turtle trade; Islamic and Christian stand point related to killing an endangered species and the Islamic region point of view with respect of blood consumption; the relationship between the sea turtles and jellyfish, and its effect on tourism; and the hazards of drinking blood on human health.

Findings from the research illustrated that 53.3% of the fishermen and the fishmongers 66% of the turtle consumers and 85.7% of the children was willing to stop consuming marine turtles. As for the fishermen and fishmongers who stated that they will be willing to change their attitude towards turtle meat and blood consumption, they were convinced by the religious point of view and/or the consequences of illegal trading. On the other side, the reason behind the unwilling to change revolved mainly around their dependence on it as source of income and considering it as a traditional meal.

As for the motivation to change by those who consumed turtles' meat and blood it was to a great extent resulting from religion and to some extent the hazards that might result from blood

consumption. On the other side, those who were unwilling to change argued that its meat is palatable to them and they also see it as part of their local traditions.

With respect to the motivation of school children, their motivation was driven by the importance of the marine turtles to biodiversity, the religious point of view, and the relation between the jellyfish and the sea turtle. Those who were unwilling to change their attitude argued that the taste of turtle meat is good.

1.2.4. Pollution and Marine Debris

A survey along the Egyptian Mediterranean coast (Clarke et al., 2000) concluded that the entire coast is polluted, and the most polluted areas were in the western region were the classification of these beaches ranked between 'moderately', 'heavily' or 'very heavily' polluted. None of the nesting beaches on the eastern Sinai were as severely polluted as those in the western region. Beaches were polluted with non-biodegradable debris, such as plastic, rubber and nylon. Also most beaches were also found to be polluted to a variable degree with oil and tar.

1.2.5. Beach Development and Tourism

According to Clarke et al. (2000), the main nesting beach along the entire Egyptian Mediterranean coast is a 22 km stretch of sandy coastline located west of Areash city, and 8 km of this beach are within the boundaries of the Zaranik protected area, a biosphere reserve. This survey noted that beach development and tourism is a major threat to this beach as a result of the rapidly expanding resort of Areash, which has already engulfed part of the most important nesting area recorded.

As for the western region of the Egyptian Mediterranean coast, the rapid beach development that is undergoing during the past decade does not constitute a major threat as there is very limited evidence of nesting along the western coast and these incidences were scattered and not confined to specific beaches.

1.3. The Egyptian Mediterranean fishing fleet

Official statistics for the year 2004 (source: The Egyptian Fisheries Statistics 2004. The General Authority for Fish Resources Development. The Egyptian Ministry of Agriculture) reported 3027

fishing vessels with license registered in ports of the Mediterranean coast (Table 1). However, no data were available about the western area. So, the real number of vessels is higher.

Vessels are typically small (Fig. 3, 4, 5, 6, 7, 8, 9), with exception of trawlers (Fig. 10)

During the interviews with artisanal fishermen in the western and eastern regions, they stated that they set the nets perpendicularly to the beach. The length of the net might range 80 to 400 meters. The net is left in the water from 8 hours to 2-3 days.

Table 1. Number of vessels by fishing gear in 2004.

Region	Fishing Community	Trawlers	Longliners	Purse Seiners	Set net	Others	Total
Western	El Salum						
	Marsa Matruh						
	Sidi Barani						
	El Hamam						
No licenses were given in the year 2004							
Alexandria	El Max	42	192	8	48	1	291
	Anfoushi						
	Abou Keer	48	209	15	140	-	412
	Total	90	401	23	188	1	703
Central	El Maadiya	115	87	36	101	-	339
	Edco	-	-	-	-	-	0
	Rousata	107	69	28	75	-	279
	Borg el El Brolos	16	190	22	1	-	229
	Azzbat El Borg	614	207	16	9	5	851
	Domiat	-	-	-	-	-	0
	Total	852	553	102	186	5	1698
Eastern (Sinai)	Port Said	208	155	39	-	-	402
	Lake Bardawil	-	-	-	-	-	0
	Areash	-	11	56	-	157	224
	Total	208	166	95	0	157	626
Total		1150	1120	220	374	163	3027



Fig. 3. Fishing vessels at El Max (P. Casale).



Fig. 4. Fishing vessels at Alexandria (P. Casale).



Fig. 5. Fishing vessel at Alexandria (P. Casale).



Fig. 6. Fishing vessels at El Salum (P. Casale).



Fig. 7. Fishing vessels at Ezbet El Borg (M. Nada).



Fig. 8. Fishing vessels at Abou Keer (M. Nada).



Fig. 9. Fishing vessels at Rousata (M. Nada).



Fig. 10. Fishing vessels (trawlers) at El Maadia (M. Nada).

1.4. Fisheries production from the Egyptian Mediterranean: status and strategy

The General Authority for Fish Resources Development (GAFRD) (Ministry of Agriculture) is the state agency responsible managing and controlling Egyptian fisheries. One of the key goals of the GAFRD is to increase the fisheries production in Egypt exponentially to respond to the increasing demand of the Egyptian market.

Overall, the fishery production increased dramatically during the past decade, when it increased from 407,032 tons in the year 1995 to reach 865,029 tons in year 2004 (source: The Egyptian Fisheries Statistics 2004. The General Authority for Fish Resources Development. The Egyptian Ministry of Agriculture). The government's plan is to further double this amount to reach 1,362,000 tons in 2012.

By assessing the trends in fisheries production from the different sources, it was found that the production from the Mediterranean Sea only contributes with about 1% of this increase (3,774 tons). On the other hand, private aquaculture was found to be the major contributor to this increase, as the increase in its production constitute about 79% of the total increase (361,355 tons), followed by about 10% increase in the production from the Nile (47,127 tons), and 3.6% from the Red Sea (16,657 tons).

Political and economic decision-makers are becoming increasingly aware of the fundamental economic role that fisheries and related activities play in Egypt. The next ten-year plan has a number of fisheries-related elements.

Objectives of the GAFRD are (FAO, 2003):

1. Encourage fisheries products exports and increase domestic consumption of fishery products.
2. Enlarge and modernize offshore fishing in the Egyptian EEZ and international waters.
3. Pay greater attention to development of the northern lakes through a special committee for each lake comprising various stakeholders and representatives of government agencies. These committees will be responsible for carrying out periodical clearing of lagoon inlets to prevent silting, controlling vegetation growth and opening deep channels crossing the water bodies.
4. Develop and enhance the Western Desert water bodies.
5. Introduce new technology and support innovation in commercial activities.

6. Promote the assimilation of scientific and technical knowledge for the sustainable development of fisheries.

7. Promote and enhance the environmental, economic and social integration of fisheries sectors.

1.5. The Egyptian legislative framework: conservation of natural resources

In most parts of the globe, environmental degradation and threats facing biodiversity and endangered species were seen as falling within the scope and interest of national governments around the beginning of the 1970s. The emergence of international environmental policy and the need for international action reflects the increased understanding of the complexity and interdependence of environmental issues, especially when dealing with the 'global commons' (Connelly and Smith, 2003; Karkkainen, 2004), of which marine turtles could be seen as an excellent example.

During the late 1960s and 1970s, the Egyptian government was very much inline with this international movement towards formulating an international environmental policy. This was evident in the international conventions that Egypt became signatory to, and at least four of them were explicitly targeting marine turtles among other endangered species::

- "The African convention on the Conservation of Nature and Natural Resources" (Algeria, 1968). All marine turtles are listed in class A of the Annex to this Convention for total protection.
- The "Migratory Species Convention" (Bonn, 1979), all Mediterranean marine turtle species are included in both Appendix I and II. According to Article III of the Convention, parties, including Egypt, are obliged to prohibit the taking of animals listed in Appendix I. Parties to this Convention also have the obligation to endeavor to conclude agreements for the conservation of migratory species listed in Appendix II, including marine turtles.
- In the "Convention of International Trade in Endangered Species of Wild Fauna and Flora" (Washington, 1973), known as CITES, all marine turtles found in the Mediterranean are listed in Appendix I. Accordingly, taking the

turtles from the sea without a permit is banned. Furthermore, all domestic trade of species listed in the CITES Appendix I, and therefore the marine turtles and their products, is prohibited.

- The framework of the “Barcelona Convention” (Barcelona, 1976), in Genoa during 9-13 September 1985, parties, including Egypt, agreed to protect Mediterranean marine turtles as a “priority target”. (The Genoa Declaration).
- Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean (SPA and Biodiversity Protocol) Date adopted: 10 June 1995 (Barcelona, Spain). Date entered into force: 12 December 1999 - replacing the Protocol concerning Mediterranean Specially Protected Areas adopted on 3 April 1982 (Geneva, Switzerland), entered into force on 23 March 1986.

Along the lines of this international commitment for conserving marine turtles, a series of national legislations were issued during the 1980s and the early 1990s to demonstrate the importance of conserving this species. Among these laws:

- Law 53/1966: the Agricultural law. This law was not the first law with provisions for the protection of wildlife; however it superseded previous laws that addressed the matter. The law provided provisions that aim at protecting endangered reptiles, mammals and birds.
- Law 102/1983 for Natural protectorates, establishing the legal framework for the

creation and management of protected areas. The law specified conditions under which a protected area, either inland or marine, could be established. The law designated the EEAA as the governmental body responsible for the selection and management of protected areas.

- Law 124/1983 on catching fish and other marine creatures. The law regulates harvesting of fish and other aquatic organisms in marine and inland waters, as well as aquaculture. It specifies standards for fishing methods, bans certain illegal techniques, and establishes a licensing system for fishing and aquaculture. The provisions of this law are implemented by the General Authority for the Development of Fisheries Resources of the Ministry of Agriculture.
- Minister of Agriculture Decree 1403/1990 which provides protection of 14 reptiles including turtles (the green turtles only).
- Environmental Law # 4/ 1994: this law is the most significant law of all the legislations concerned with the conservation of the environment in Egypt. Although the law was largely devoted to pollution issues, article # 28 addresses the hunting of wildlife. This article states that “killing, capturing, transportation, selling, nest destruction and display of an endangered species either dead or alive is prohibited when Egypt is signatory to an International Convention”. The Egyptian Environmental Affairs Agency was designated as the governmental body concerned with the implementation of this law.

2. The survey

2.1. Objectives

The general objective of this research is to provide an assessment of the current threats to sea turtles in the Mediterranean coast of Egypt, especially those identified by previous reports, and to indicate future conservation steps.

The specific objectives are:

- 1) Assess the current sea turtle trade in the Alexandria fish market in comparison to the past;
- 2) Assess sea turtle killing in Alexandria other than the one occurring at fish markets;
- 3) Assess sea turtle killing or egg harvest all along the Mediterranean coast of Egypt (other than Alexandria), and identify the local communities involved;
- 4) Identify the drivers of turtle killing;
- 5) Identify the stakeholders affected by, or involved in, the turtle killing or trade;
- 6) Understand the potential consequences of the application of different conservation measures on these stakeholders;
- 7) Estimate the magnitude of sea turtle bycatch in the Mediterranean coast of Egypt and the main fishing gear involved;
- 8) Understand the effectiveness of current laws, enforcement, and in general of the conservation initiatives carried out so far;
- 9) Propose approaches and actions for mitigating the threats to sea turtles along the Mediterranean coast of Egypt.

2.2. Methods

Field surveys were carried out in the period June-October 2007 in the 15 coastal cities and fishing ports residing along the Egyptian Mediterranean coast. The Egypt's Mediterranean coast was divided into four regions (Fig. 1):

- the western region (El Salum, Sidi Barani, Marsa Matruh, El Hamam);
- the Alexandria governorate region (El Max, Anfoushi, Abou Keer);
- the central (Delta) region (El Maadiya, Edco, Rousata, Azzbat El Borg, Domiat);
- the eastern (Sinai) region (Port Said, Areash, Rafah)

Interviews were conducted with a total of 445 persons (Table 2).

One set of interviews included 219 fishermen (Table 3), 88 fishmongers, and also 92 members (61 male and 31 female) from the local communities, mainly in Anfoushi and Areash communities. The main questions asked (directly or indirectly) through these interviews were:

- Which type of fishing gear do you use?
- Do you capture turtles?
- Do you kill turtles?
- If yes, why?
- Do you trade turtles to someone else?
- Are you aware that killing turtles is illegal? How do you deal with this?
- On average, how many turtles do you capture per year?
- With which fishing gear?
- On the basis of your experience, turtles are increasing, stable or decreasing over the years?
- Do you know of any turtle nesting event in your area?
- If yes, do you know if eggs are harvested?

In several instances, fishermen were unable to provide information about turtles nesting as a result of their minimal presence at the beaches in the evening. This was mainly resulting from government regulation preventing fishing in tourist beaches and military zones.

Another set of in-depth interviews were conducted with key stakeholders in different governmental and non-governmental institutions. These interviews included informants at the national level, as well as others residing in the communities included in this study. The total number of these interviews was 32 interviews with governmental officials (4 at the national level and 28 at the community level) and 14 interviews with representatives of non-governmental institutions (3 at the national level and 11 at community level).

These interviews included meetings with the head of the protected areas in the Egyptian Environmental Affairs Agency; the head of the Environmental Department in Alexandria Governorate; the vice chairman of the General Authority for Fish Resources Development in Alexandria; the heads of the Fishermen

Cooperatives in Marsa Matruh, Alexandria, Domiat and Port Said.

In addition to the in-depth interviews, focus groups and RRA (Rapid Rural Appraisal) exercises, such as transect walks and life history exercises, were conducted with the local communities. During the discussions, participants were encouraged to openly voice their opinion. Prepared focus group guidelines were prepared to guide the discussion and keep it within the boundaries of the topic.

A total of 14 focus groups discussion were conducted with different groups, which included 7 with fishermen; 2 with fishmongers; 4 with

members from the local communities; and one with the police officers mandated to oversee the conservation of marine turtles in Alexandria fishing port.

The data gathered from these activities allowed to assess the perception of different key stakeholders of the local communities regarding marine turtle conservation, as well as the socio-economic and political impacts of conservation efforts on local communities. The data also allowed to assess the implication of existing conservation policies regarding conservation endeavors targeting marine turtles.

Table 2. Number of persons interviewed per stakeholder group and community.

Region	Fishing Community	Fishermen	Fishmongers	Community Members	Governmental Officials	NGO's Representatives	Total
Western	El Salum	8	-	1	1	-	10
	Marsa Matruh	9	9	2	1	1	22
	Sidi Barani	6	2	-	-	-	8
	El Hamam	-	2	2	-	-	4
Alexandria	El Max	23	9	4	2	-	38
	Anfoushi	42	16	38	7	4	107
	Abou Keer	27	12	9	4	2	54
Central	El Maadiya	13	6	3	1	-	23
	Edco	12	4	4	-	-	20
	Rousata	16	8	3	1	2	30
	Azzbat El Borg	14	2	2	1	-	19
	Domiat	10	7	3	1	-	21
Eastern (Sinai)	Port Said	16	8	4	2	2	32
	Lake Bardawil	12	-	6	5	-	23
	Areash	11	3	11	2	-	27
National level					4	3	
Total		219	88	92	32	14	445

Table 3. Number of fishermen interviewed, per fishing gear and community.

Region	Fishing Community	Trawl	Longline	Purse Seine	Drift net	Total
Western	El Salum	2	5		1	8
	Marsa Matruh	3	4		2	9
	Sidi Barani				6	6
	El Hamam					0
Alexandria	El Max	4	6	7	6	23
	Anfoushi	6	13	11	12	42
	Abou Keer	3	8	7	9	27
Central	El Maadiya	-	4	2	7	13
	Edco	2	4	-	6	12
	Rousata	4	5	2	5	16
	Azzbat El Borg	3	5	-	6	14
	Domiat	4	4	-	2	10
Eastern (Sinai)	Port Said	5	7	-	4	16
	Lake Bardawil	-	-	-	12	12
	Areash	-	3	-	8	11
Total		36	68	29	86	219

2.4. Results

2.4.1. Occurrence

Western Region

Of the 23 fishermen interviewed, 87% mentioned that they observed at least one turtle nesting in the past ten years, while 56 % in the last 3 years. As for the last nesting season (summer 2006), only two fishermen observed turtles nesting in the western region. One mentioned that he saw a loggerhead nesting in July near the Sidi Barrani city, while the second saw another loggerhead nesting about 5 kilometers west to El Salum.

All the fishermen interviewed stated that only loggerhead turtles nest in this area, no green or leatherback turtles have ever seen nesting. However, they found all the three species entangled in their nets, although loggerhead turtles are the most common and leatherback turtles are rare. This suggests that all the three species frequent this area, probably for trophic reasons or as migratory route.

Several fishermen stated that sometimes they find turtles dead and washed ashore. According to them, most turtles found are adults and in very few occasions they are immatures. Although

fishermen may not be able to assess maturity, this suggests that most turtles found were large. During the survey a decomposed leatherback turtle was found about 3 kilometers from Sidi Barani (Fig. 11).



Fig. 11. Decomposed leatherback turtle. 3 kilometers from Sidi Barani (P. Casale).

Alexandria and Central region

All fishermen interviewed were able to recognize the major morphological differences between loggerhead and green turtles. They even have

several names which are either associated with their morphology or taste. For loggerheads, they are called “*El Solhafa El Safra*” meaning the yellow turtle in Arabic and they are also called “*Gashawy*” meaning the fake turtle as it look similar to the green turtles, in terms of size, but it’s taste is not as good. As for the green turtle, they call it “*El Solhafa El Khadra*” which means the green turtle and they also call it “*Balady*”, which literally means national species, referring by this to its authentic taste.

All the fishermen interviewed (n=157) stated that they have not seen any nesting in the central region in the past ten years. It is worth mentioning that the geographic range of fishing activities by the vast majority of the fishermen interviewed exceeded the area between Alexandria and Port Said and many of them said to have seen nesting activities in the eastern and western regions.

While it seems that no nesting occur at present time in Alexandria and the central regions, three fishermen in Alexandria stated that few turtles used to nest in Alexandria beaches more than thirty years ago. One of the fishermen stated “*I remember a loggerhead turtle nesting in El Shatbe beach in Alexandria, also another one [loggerhead] near Abou Keer. Turtles stopped to nest in Alexandria as a result of the noise, tourism and the rapid expansion of the city, from the east and the west*”

While nesting does not occur currently in this area, all fishermen stated that they frequently catch turtles entangled in their nets.

Fishermen stated that most abundant species is the loggerhead, followed by the green turtles, while leatherback is rare.

Eastern region

Nesting in the eastern zone is still concentrated in the beach identified by Clarke et al. (2000). In an interview with the rangers in El Zarankek protected area, they stated that the beach extends for about 21 km, but only seven km are in the protected area. One of the rangers added “*nesting still occurs in the beach every year and we were able to record 15 successful nesting events this year and 17 in the year before. Both loggerhead*

and green turtles nest along the beach, but loggerhead is more abundant”. Another ranger said that, “*green turtles in particular need a very quite beach to be able to nest. Last year, the government banned fishing for a month to allow the fish stock to regenerate... this happened during the turtles nesting season and it had a very positive impact on green turtle nesting.*”

Almost all (97.4%) the fishermen interviewed (n=39) mentioned that they observed at least one turtles nesting in the past ten years, while 89.7 % mentioned they observed turtles nesting in the last 3 years. As for the last nesting season (summer 2006), 64.1% of the fishermen were able to witness nesting. Fishermen said that both loggerhead and green turtles nest, although the former is more common.

A fisherman stated “*the rangers do lots of effort to conserve the turtles nest but we are not sure that they will be able to succeed... the rapid expansion of the tourist facilities along the beaches scare turtles and prevent them from nesting*”.

A senior governmental official added “*there was some pressure to limit the expansion of the tourist facilities and to expand the zone of the protected areas to include the entire nesting beach, but the power of the money defeated the will to conserve nature...the challenge now will be to what extent the Egyptian Environmental Affairs Agency [EEAA] will be able to come up with a strategy to conserve this species and set up guidelines for the tourist facilities to conserve this species which addresses issues of noise, light, protection of nests, among other issues... the nest challenge, and probably the most difficult one, is to what extent the EEAA will be able to use its power to force the tourist facilities to comply and to what extent the owners of these facilities will be willing to comply with these regulations*”

Several fishermen noted that they found sea turtles washed ashore frequently suggesting that they are either drowned after being entangled in fishermen nets or from pollution.

During the survey, a stranded male loggerhead that was found near Areash.

Table 4. Percentage of fishermen (n= 219) perceiving different trends of turtle abundance.

Region	Decreasing	Stable	Increasing	Fishermen
Western	78.3%	17.4%	4.3%	23
Central/Alexandria	94.9%	3.8%	1.3%	157
Eastern	71.8%	20.5%	7.7%	39
Total	89.0%	8.2%	2.7%	219

2.4.2. Trends and threats perceived by fishermen

Most fishermen (89%; n=219) stated that the number of turtles is decreasing; 8.2% stated they do not notice any change; and only 2.7% stated that they are increasing (Table 4). Those in the western region attributed this mainly to the over fishing (mainly by large fleets from Alexandria or

other Mediterranean counties) and by-catch, while those in Alexandria stated that the reasons are mainly pollution, killing for consumption and by-catch. As for the central region, fishermen argued that the decline is mainly due to pollution and by-catch. In the eastern region they stated that destruction of nesting sites, consumption, and pollution are the main reasons (Table 5).

Table 5. Percentage of fishermen (n= 219) perceiving different threats as the main one for sea turtles.

Region	Fishing Community	Bycatch	Pollution	Human consumption	Beach development	Fishermen
Western	El Salum	75.0%	12.5%	-	12.5%	8
	Marsa Matruh	77.8%	22.2%	-	-	9
	Sidi Barani	83.3%	16.7%	-	-	6
	El Hamam	-	-	-	-	-
	Total	78.3%	17.4%	-	4.3%	23
Alexandria	El Max	30.4%	13.0%	56.5%	-	23
	Anfoushi	28.6%	19.0%	52.4%	-	42
	Abou Keer	25.9%	22.2%	51.9%	-	27
	Total	28.3%	18.5%	53.3%	0.0%	92
Central	El Maadiya	76.9%	23.1%	-	-	13
	Edco	75.0%	25.0%	-	-	12
	Rousata	68.8%	31.3%	-	-	16
	Azzbat El Borg	71.4%	28.6%	-	-	14
	Domiat	60.0%	40.0%	-	-	10
	Total	70.8%	29.2%	-	-	65
Easter (Sinai)	Port Said	68.8%	25.0%	6.3%	-	16
	Lake Bardawil	25.0%	16.7%	41.7%	25.0%	12
	Areash	18.2%	18.2%	45.5%	18.2%	11
	Total	41.0%	20.5%	28.2%	12.8%	39
Total		48.4%	21.9%	27.4%	2.7%	219

2.4.3. Bycatch

Almost all fishermen interviewed stated that they do not intentionally aim for sea turtles and they just found them in their nets or hooks accidentally. In few cases, fishermen in Alexandria region argued that if a turtle was spotted swimming near the surface, they might consider jumping from their boats to catch it.

Most fishermen (75% among those using trawlers, 68% using long lines, and 59% using purse seines) reported that they have captured sea turtles (predominantly loggerhead) at least once in the past twelve months. The relative importance of different fishing gear should be regarded with caution because many fishermen use a mix of

methods (in particular longlines and set nets) during the same year depending on the season and the species they are targeting, and so they might not be able to remember exactly with which fishing gear they captured a turtle.

Table 6 shows the number of turtles reported to be caught by the fishermen, aggregated by fishing gear and communities.

During the interviews, fishermen noted that they found sea turtles washed ashore frequently suggesting that they are either drowned after being entangled in fishermen nets or as a result of pollution.

Fishermen reported that some of the caught turtles are found dead and the incidence of mortality is

much higher in longliners and gillnet nets, and in rare occasions by trawlers. Some fishermen stated that in very rare occasions, turtles might be found died while using purse seines. Artisanal fishermen using small gillnet also reported cases of by-catch and mortality. The mortality is very much linked

to the duration of the gillnet usage (the more the net is used, the higher mortality rate would be expected).

Total numbers of captures by different fishing gear (Table 7) was estimated on the basis of fleet data (§ 1.3.) and catch rates (Table 6).

Table 6. Catch rates (turtles/year) declared by fishermen, by fishing gear.

	Turtles/fisherman-year			
	Trawl	Longline	Purse Seine	Set Net
Western	1.6	1.3		1.9
Alexandria	1.4	2.1	0.5	1.7
Central	2.1	2.0	0.3	2.3
Eastern	1.8	1.6		1.2
Total	1.7	1.9	0.5	1.7
Fishermen	36	68	29	81

Table 7. Total number of captures per year by the Egyptian fishing fleet in the Mediterranean.

	Turtles/year				
	Bottom Trawl	Longline	Purse Seine	Set Net	Total
Western	n/a	n/a	n/a	n/a	n/a
Alexandria	125	847	12	320	1303
Central	1770	1106	26	434	3335
Eastern	374	266			640
Tot. turtles	2269	2218	37	754	5278

	Number of vessels				
	Bottom Trawl	Longline	Purse Seine	Set Net	Total
Tot. vessels	1150	1120	220	374	3027

2.4.4. Intentional killing and consumption

The attitude of consuming sea turtles differed dramatically among regions (Table 8). In Alexandria, 77% of the fishermen interviewed reported that they have eaten sea turtle at least once in their life; 38% have feed on sea turtles meat at least once in past 6 months; 86% of these fishermen have consumed sea turtles while they are in their boats, while the remaining 14% have bought it from the black market.

On the other hand, fishermen in the other regions were not very interested in eating sea turtles meat. More specifically, 100% of the fishermen in the western region, 94% in the central and 85 % in the eastern region reported that they have never eaten sea turtles in their life. Reasons for not getting interested in eating sea turtles differed from one individual to another and from one community to the other.

All fishmongers in the western, central and eastern regions mentioned that sea turtles are not traditionally offered as a commodity in their markets. On the other hand, almost all

fishmongers in Anfoshi, Abou Keer, El max fish markets argued that sea turtles were traditionally offered as a commodity, but it is not offered anymore for the past 3-5 years.

Despite the popularity of consuming turtle meat and drinking turtle blood, religious views from both of the Muslim and Coptic Christian leaders were against the continuation of these practices. In an interview with the Mofti¹ of Alexandria, he stated:

“prophet Mohamed, peace be upon him, stated that all Muslims are prevented from consuming blood, pork, and dead animals. All dead animals or the ones which were not slaughtered according to the Islamic law are considered to be not

¹ The Mofti is a very senior religious leader who is mandated to provide clear cut opinions regarding issues that Muslims are confused or not certain about. Muslims in general deal with El Mofti opinions with great respect and appreciation. There is one Mofti for each governorate as well as one very senior Mofti for all of Egypt.

suitable for consumption - not Halal -. The exception that would be made for this is for creatures coming from the sea, e.g. fishes, squid, shrimps and the like, that will not be slaughtered from the throat to release their blood out. Because of this, some Muslims get confused and believe that since marine turtles are aquatic creatures then their blood should be seen as an exception, which is defiantly not true. I have issued a Fatwa [documented opinion] that stated that turtle's blood is forbidden on Muslims and I have urged

the local community in El- Anphoshy to stop this incorrect tradition”

In several interviews conducted with community leaders, they argued that the consumption of marine turtles is ingrained in the cultural heritage of some communities and it is difficult to change it.

In the following sections, more in-depth findings will be presented to highlight the difference and/or similarities in fishermen and members of the local communities' views with respect to human consumption on marine turtles.

Table 8. Percentage of persons declaring turtle consumption among fishermen, fishmongers, and community members.

Region	Fishing Community	Fishermen		Fishmongers		Community Members	
		%	N	%	N	%	N
Western	El Salum	0.0	8		0	0.0	1
	Marsa Matruh	0.0	9	0.0	9	0.0	2
	Sidi Barani	0.0	6	0.0	2		-
	El Hamam		0	0.0	2	0.0	2
	Total	0.0	23	0.0	13	0.0	5
Alexandria	El Max	60.9	23	33.3	9	25.0	4
	Anfoushi	92.9	42	68.8	16	47.4	38
	Abou Keer	66.7	27	33.3	12	33.3	9
	Total	77.2	92	48.6	37	43.1	51
Central	El Maadiya	15.4	13	0.0	6	0.0	3
	Edco	8.3	12	0.0	4	0.0	4
	Rousata	6.3	16	0.0	8	0.0	3
	Azzbat El Borg	0.0	14	0.0	2	0.0	2
	Domiat	0.0	10	0.0	7	0.0	3
	Total	6.2	65	0.0	27	0.0	15
Eastern (Sinai)	Port Said	0.0	16	12.5	8	0.0	4
	Lake Bardawil	25.0	12		-	33.3	6
	Areash	27.3	11	33.3	3	36.4	11
	Total	15.4	39	18.2	11	28.6	21
Total		37.0	219	22.7	88	30.4	92

Western region.

Turtles are not seen as a commodity throughout the western region. This could be attributed to different reasons.

First, the tradition of consuming turtle meat and blood is seen as a weird and bizarre tradition to both of the Bedouin communities and to the settlers from the Nile delta. 100% of the fishermen interviewed stated that they have never consumed turtle meat or blood in their life. However, 69.5% of the fishermen interviewed

knew that this practice does exist in some areas in Egyptian coast.

Second, fishermen in the western region showed very high respect to the importance of conserving the ecosystem, especially those from Sidi Barani to El Salum. This respect stems from their feeling that they are part of the ecosystem and it is their responsibility to conserve it. One of the fishermen stated “we were brought up to make the best use of existing resources and never to exploit them... we will never kill an animal if we will not

consume it and we will never kill a turtle even if it might harm our fishing nets”

Another artisanal fisherman added: *“we feel that all creatures living in the sea belongs to all of us and therefore we should not be exploiting them... it is very unlikely for a fishermen to use nets with narrow openings and any other illegal fishing methods”*

In some interviews, it was clear that fishermen appreciation to the environment is very much influenced by the Islamic religion norms. One of the artisanal fishermen using shore gillnet in Sidi Barani mentioned *“sometime I found turtles entangled in my net and caused much damage to it.... I try to remove it from my net gently to do not cause more harm to my net or the turtle’s body.... When I release it back to the sea, I feel very happy that I have saved a creature...I feel that God will be happy from me... we all get entangled in life and it is a great deed to help each other out”*.

In addition to the religious motivation, artisanal fishermen belonging to the Bedouin community, have a high level of trust among each other and there is an advanced informal mechanisms to tackle any issue related to dispute on natural resources. One of the fishermen mentioned, *“we do not very much follow the state laws but our Urf [the Bedouin informal law] when tackling any problem that might emerge between us... out community leaders do implement the Urf fairly and we have absolute respect to their decisions.... Even if I do not agree with the community leader judgments, we have to obey it and it is unheard to do otherwise... the Urf is also respected by the new settlers from the delta and they know that by following it, they will be treated fairly by our leaders, though they are strangers”*

In an other interview with one of the settlers from the delta who work in Marsa Matrouh, he confirmed the aforementioned statement and added *“while many people may say that the role of the Bedouin leaders in resolving conflicts is decreasing, I still believe they are the most efficient way to resolve problems until this day ... Bedouin leaders gain their status in the community by acting fairly and justly, not the other way around, therefore their decisions are always treated with respect... the state do acknowledge the role of the community leaders and they depend on them in tackling many issues, specially in remote areas”*

The survey in the market in Marsa Matrouh confirmed the insignificance of consumption and trade of marine turtles in the area. Fishmongers argued that turtles are not seen as a commodity and both Bedouins and settlers from the delta are

not interested in turtle meat or blood. One of the fishmongers told that they brought a turtle to the market five years ago but it remained unsold for more than a month. They then gave it as a gift to one of the fish restaurants in the town for decorative purposes.

Most of the fishmongers however knew that their peers in Alexandria are involved in trading of marine turtles; however they do not sell turtles to them because it not financially feasible to bring them to Alexandria.

Alexandria

Almost all fishmongers in El Max and Anfoushi fish markets (Fig. 12 and 13) told that sea turtles were traditionally offered as a commodity, but they are not offered anymore in the past 3-5 years.



Fig. 12. The fish market of El Max. (M. Nada).



Fig. 13. The fish market of Anfoushi, Alexandria. (P. Casale).

However, 71% of the fishmongers interviewed argued that a black market still exists and smuggling sea turtles is still taking place. During the survey, three sea turtles were observed on sale in the black market. One was an adult female green turtle found in El Max (Fig. 14), the second was an adult female loggerhead found in Anfoushi and the third was a sub adult male loggerhead found in Anfoushi too.



Fig. 14. Green turtle on sell in the black market in El Max (Photo: P. Casale).

In addition to the black market, a green turtle was found in display in one of the fish restaurants in the Anfoushi fish market area. The owners of the restaurants explained that they do not offer turtles in their menu and that the purpose of displaying this turtle is only for entertaining the restaurant's clients and tourists (Fig. 15).



Fig. 15. Green turtle displayed in front of a fish restaurants in the Anfoushi area (M. Nada).

In the fish market of Abou Keer (Fig. 16), the level of awareness of fish mongers regarding the illegality of trading of marine turtles was much lower. Fish mongers reported that trade of marine turtles is still occurring publicly and turtles are offered all over the year. Very few fish mongers are involved in the trade of marine turtles and they are known to the local members of the community as the only source for marine turtles. Figure 17 shows a loggerhead turtle offered in the fish market of Abou Keer.



Fig. 16. The fish market of Abou Keer, Alexandria. (M. Nada).

The difference between Anfoushi and Abou Keer could be due to the fact that the vast majority of awareness and lobbying campaign led by the Friends of Environment association and MEDASSET was focusing on Anfoushi only. In addition, Anfoushi fish market was given increasing attention during the past five years by Alexandria governorate as it is situated in the Center of Anfoushi area, which is recognized as one of the main tourist attraction destinations in Alexandria.

The views and perception of the fishermen, the fish mongers and the member of the local communities in Abou Keer is very much similar to those documented in Anfoushi. Both green and loggerhead turtles are offered but green turtles are favored. Drinking fresh blood is also documented and both women and men consume it. Just like Anfoushi, women believe it will help them with to overcome anemia while men think it is general tonic and aphrodisiac.



Fig. 17. Loggerhead turtle on sell in the fish market of Abou Keer (M. Nada).

While it is very difficult to estimate the number of sea turtles offered for trade in the black markets, it might range 100-180 turtles per year in Anfoushi and even 400 turtles in Alexandria region as a whole.

The key alarming finding of this survey is the very high number of fishermen who reported that they still consume sea turtles on their ships. They stated that when they catch a sea turtle, they slaughter and consume it during their fishing trip. One of fishermen from Anfoushi mentioned “we do not aim for sea turtles but when we get one in our nets we slaughter it and eat it on board... who would turn down a free and good meal like this... in the old days we used to eat at least once a week... now their number is decreasing a lot and the police officers are preventing us to bring them back to our families or to sell them... most of the time we just eat on board but sometimes we put the meat in plastic bags and through its carapace and bones in the sea so that the police officers would not be able to identify it”. This practice was confirmed by 68.4% fishermen interviewed in Alexandria region (n=92).

Central region

The main reason that makes fishermen in the central region to be not interested in trading in or consuming sea turtles is that consuming sea turtles is not seen as part of their culture and they are not used to consume turtles as those in Alexandria. For this reason, fishermen are not even interested in trading, as turtles do not have a significant market price in their communities

Visits made to the fish markets in Rousata (Fig. 18) and Domiat showed that the trade in marine turtles does not exist in this area. All fishmongers stated that they have not traded in marine turtles previously. However, it was found out that in few fish restaurants, four turtles, one in Rousata and three in Domiat, were displayed in a big water tank to attract clients to the restaurant. In interviews conducted with customers shopping in the fish market to solicit their views regarding marine turtle’s consumption, it was clear that marine turtle is not of any significant importance to the local community.

Eastern region

Clarke et al. (2000) reported egg collection in northern Sinai, and the present survey found that this practice is still undergoing. Local people do not depend on the eggs as a source of income and they do not trade in eggs, but they consider them as a free meal. Some stated that they eat eggs as

they think that eggs are a general tonic and aphrodisiac.



Fig. 18. The fish market of Rousata. (M. Nada).

During an interview with a community member that have been poaching turtles nests for some years, he stated “ we have been consuming turtles eggs for years and it is a family tradition and I have been doing that since I was eight years old”. Another member also stated that “we used to walk early in the morning to search for turtles nests. Sometime we were not able to locate the nest early and we found that the eggs have changed into an embryo, and thus not suitable for human consumption.”

Rangers in the Zaranik protected area mentioned that they consider this issue as a top priority. They stated “we have been undertaking public awareness campaign to the local communities for more than four years now and we are witnessing some improvement. However, the poaching still exists and we frequently found disturbed nests”. Another ranger mentioned that “as soon as we were able to find a nest, we try to remove the traces of the turtle’s tracks so that the local community will not be able to locate the egg chambers”

Interviews revealed that in some occasions members of the local community kill and consume adult turtles as well. However, this practice is not very common if compared to the situation in Alexandria. This is mainly because consuming the turtle’s meat is not seen as a very palatable meal or a cultural issue.

2.4.5. Pollution and anthropogenic debris

Marine debris are known to have an impact on the physical health and mortality of marine turtles (e.g. National Research Council, 1990; Tomas et al., 2002; and references therein). During the survey, a great amount of pollution was observed over the entire coast, mainly plastic bags and oil. Several interviewed fishermen mentioned that

pollution is among the causes that threaten marine turtles, and they believe that pollution is affecting the entire marine system and its health. One of the fishermen stated that *“I have been eating marine turtles for the past fifty years. In the past twenty years, things are getting much worse and even the taste of fish and turtles became much worse. In the old days the taste of the turtle was like eating veal, but now it is smelly and stinking”*

Fishermen and fishmongers in Alexandria, often said that plastic bags were found in turtles' stomach and digestive track. Most of the fishermen indicated that this phenomenon is mainly associated with loggerhead, while it is rare in green turtles. Some of them attributed this to the different foraging behavior of loggerhead and green turtles. One of them stated *“loggerhead are not selective in their food... they eat grasses, fishes, shrimps ... they just eat anything in their way... sometime we even find metal parts in their stomachs.... As for the green turtles, they are very selective and they eat only grasses”*. Another fisherman stated *“because green turtles are very selective in its diet and relay mainly on green weeds, we do prefer its meat than the loggerhead.... The price of green turtles is higher than loggerhead... and usually Hag Hosni [the fishmonger who sell turtles in Anfoushi fish market] keep the green turtles to his special clients... turtles are just like cattle, if you feed them with natural food, you will have a great taste, but if the forage is polluted, what are you going to expect?”*

One of the fishermen stated *“in most of the loggerhead that I slaughtered, I found plastic bags... in one of the turtles I slaughtered recently, I was able to find more than 2 kilograms of plastic bags in its stomach.... When I first saw this turtle, I knew it was sick.”*

2.4.6. Beach Development and Tourism

According to Clarke et al. (2000), the main nesting beach along the entire Egyptian Mediterranean coast is a 22 km stretch of sandy coastline located west of Areash city, of which 8 km of this beach lies within the boundaries of the Zaranik protected area, a biosphere reserve. By visiting this nesting site, it was obvious that the situation is not any better and that beach development is expanding and continuing. This finding was mentioned by all the stakeholders met during the fieldwork.

A ranger from El Zaranik protected area stated: *“beach development is one of the main challenges facing us while aiming at conserving sea turtles.*

The rapid expansion of tourist facilities during the past ten years is having a negative impact on turtle nesting. This is mainly because of noise, light and the unintentional destruction of the egg chambers by the tourists. Fisheries interaction is also a major challenge facing turtle's population. For instance we had very good nesting rates last year because the government panned fishing during summer to revive the fishery resources, this period coincided with turtles nesting season.” He added that *“it is very difficult to protect turtles nests while they are outside of the protected area, however we [the Egyptian Environmental Affairs Agency] are very much aware of the challenges facing the marine turtles as a result of beach development and we are currently developing a guidelines for tourist facilities that reside in the nesting area outside the protected area to explain how to conserve marine turtles. Our role will also extend to insure that these regulations will be closely followed and applied”*

The owner of one of the resorts said: *“conserving marine turtles would be nice as it might attract customers to our hotels; however I am not sure that the owners of most hotels will be willing to comply with regulations that aim at conserving turtles on the expenses of their business.... One of the rangers told us about the importance of having a quiet environment for the successful nesting of marine turtles, but this will be impossible to apply in the hotels. If the government was not very firm about enforcing conservation measures, I do not think any progress will be materialized”*

The policy of the Egyptian government in conserving the nesting beaches in El Arish is mainly focusing on setting up protected areas to conserve endangered species but at the same time exclude local communities from accessing the protected area and punishing those who violate with a fin. It was clear that there are several challenges facing the Egyptian government in adopting this approach. From one side, the financial and human resources needed to implement and enforce conservation measures within the protected areas are not adequate, thus failing to provide meaningful protection to El Zaranik protected area. From the other side, it fails to capture the potential of the increasing role of the private sector outside the protected area to conserve marine turtles.

2.4.7. Implementation of regulations and conservation results

While the legislative commitment from the Egyptian government at the international and national level to conserve marine turtle could be seen as a positive move towards conserving this endangered species, in reality very little have been done on the ground and threats to marine turtles continue to persist.

A senior government officer in the Egyptian Environmental Affairs Agency stated *“In many cases the government was dealing with the conventions signed to be an acknowledgement of the status of an endangered species rather than an agreement on and a commitment to a clear conservation strategy and mechanisms to implement. At best, these conventions in several cases were seen by the government as a non-legally binding agreements to guide actions.”*

Another governmental officer added that some policy makers and decision makers were not interested to implement the international conventions arguing that they are jeopardizing the Egyptian state sovereignty. He stated *“after signing these conventions we noticed that several international organizations in Europe were referring to them and arguing us to take action to conserve marine turtles. Our focus as a developing country is to develop economically and our priority is to assist fishermen community in sustaining their livelihood. What these organizations do not understand is that sometimes countries in the developing world are facing difficult choices, and the case of marine turtle conservation or any other endangered species is a losing one when attempting to trade off the long terms benefit of conservation outcomes with the short-term benefits of enhancing economic development and sustaining the livelihoods of fishermen communities”*. He added that *“If these organizations would like us to conserve marine turtles they should understand that they have to partner with us by providing adequate financial resources and technical expertise, not to lobby against us.”*

Another officer mentioned *“we were stunned to receive letters from European organizations that argues us to take action towards conserving marine turtles and their countries were among the most threatening states to the habitat of marine turtles. If these developed states were not able to adopt sound measure to conserve marine turtles and they focused on protecting the livelihood of their fishermen communities or the interest of the tourism industry, why they would be expecting us to act differently while we are a developing state”*

The government attitude towards marine turtle conservation continued to ignore the importance of applying conservation measures to protect sea turtles until the past five years. In recent years a significant attention was paid to the turtle trade in Anfoushi fish market and to enforce laws and regulations when inspecting turtle landing at the official landing sites. In addition, sudden inspection visits were made to the fish market and the Egyptian authority dealt firmly when violation was assessed. However, as noted above, the situation in Abou Keer Fish Market did not improve significantly and turtle trade is still occurring publicly.

In 1999, only 17 fishermen and fishmongers in the Alexandria fish market out of a sample of 64 individuals (26.6%) were aware that the trade in marine turtles is illegal (Nada, 2001). During the field work of this research, it was found out that the percentage of fishermen and fishmongers who are aware of the illegality of trading in marine turtles have increased significantly to 79% of the fishermen and 85% of the fishmongers. In addition, most of the fishermen and the fishmongers in Alexandria stated that the law is being enforced and they would not risk bringing caught sea turtles to the landing sites, trading it in the fish market or in public.

Similarly, a high number (89%) of police officers inspecting the landing sites were aware that the Egyptian law is prohibiting the trade and consumption of sea turtles. They also affirmed that they received strict instructions from the Egyptian government that these laws should be enforced.

During interviews with several governmental officials, it was clear that the recent focus on conserving the marine turtles could be attributed to a diverse set of factors that are mutually reinforcing. These factors included establishment of Egyptian Environmental Affairs Agency and its branch in Alexandria; international pressures on Egypt to conserve these species; pressures from national non governmental organizations; and enhanced capacity of a group of governmental officials regarding the importance of conserving marine turtles who were involved in the Darwin initiative funded survey which was implemented by Queen Mary university in association with Suez university and the EEAA.

While some governmental officers expected that the firm reinforcement of the law would end the illegal trade in Alexandria fish market, it was found, sadly, that the illegal trade persisted and a

black market was created. Under these new circumstances, assessing the trade by counting the number of turtles being available in the black market is unfeasible.

Despite the general increase in fishermen's knowledge regarding the illegality of consumption and trade of marine turtles, most fishermen reacted towards the government enforcement of environmental laws by not conforming, either by consuming turtles during fishing trips or selling them in the black market. To explain fishermen behaviour, it is important to distinguish between (a) fishermen knowledge and perceptions regarding the status of marine turtles' population and the laws and regulations aiming at conserving them, and (b) their willingness to act and comply with these regulations (i.e. the former does not necessarily lead to the latter). Different pros and cons were noted that explain the potential gap between their knowledge and behaviour.

The most important factor is the strength of the link between turtle consumption and culture and identity. Fishermen in Alexandria explained clearly that consuming marine turtles is ingrained in their culture for decades and no quick fixes could rapidly change this. Equally important, is the level of trust and cooperation between fishermen and the governmental institutions controlling the governance of fisheries. Several examples were given highlighting the level by which fishermen were disconnected from the decision making process related to fisheries management and conservation. Fishermen argued that the Egyptian government approach in managing fisheries is technocratic and centralized, which in turns leads to a profound mistrust between them and governmental institutions and a feeling of lack of ownership over the control and suitability of these resources and therefore willingness to conserve it, which leads to a classical case of the 'tragedy of the commons'.

Following this line of argument, and while the focus of this research was not directed towards exploring governance of fisheries and natural

management and its relationship with marine turtles conservation, enough evidence is in place that highlights the importance of understanding turtles conservation within the wider context of fisheries and natural resources governance.

To this end, further research is needed to explore the role of different institutions, formal and informal, on the management of fisheries and natural resources. It is also important to understand the decision making process and to what extent it is perceived to be transparent and inclusive by the fishermen and other stakeholders. And finally the level of trust between the different institutions, governmental and non governmental, controlling fisheries management from one side and the fishermen from the other side.

2.4.8. Miscellanea

Tagged turtles

In the Alexandria, central and western regions, several fishermen stated that some of the turtles they found had metal or plastic tags on their limbs. Fishermen from a village in the western region reported that at least some tags were from Cyprus and that in their opinion plastic tags make turtles more subject to get entangled in set nets.

Fibropapilloma

During the field work, the research team conducted a rapid assessment to assess the status and presence of fibropapilloma (George, 1997) in the Egyptian Mediterranean. This was conducted through interviews with 37 fishermen, mainly in Alexandria and the central regions. A background about the disease, its morphology and its impact on turtles' health were carefully explained and pictures of the lesions in different parts of turtles' body were illustrated. None of the fishermen were able to recognize this disease and they stated they have never encountered it, either in green or loggerhead turtles.

3. Conclusions and recommendations

3.1. Bycatch

This survey collected information about the magnitude of sea turtle catches by different fishing gear, through one-time interviews and official fishery statistics. In this respect, it should be taken into account that: (i) catch rates declared by fishermen might be low-biased, while the opposite is unlikely; (ii) fishery statistics for the whole of the western region were not available for this study; (iii) official fishery statistics for available regions might underestimate the real number of fishing vessels.

For these reasons, the estimation of captures from catch rates and fishing fleet may well be an underestimation. So, it is likely that the total number of captures by the Egyptian Mediterranean fishing fleet exceeds 5000 per year, with more than 1300 captures in Alexandria alone. It should be taken into account that strictly speaking these figures represent captures and not necessarily individual turtles, because theoretically the same turtle can be caught more than one time .

From the interviews, the most relevant fishing gear in this respect are bottom trawl and longline (Table 7). However, since fishermen can use different gear during the year, this indication should be considered with caution.

Mortality induced by bottom trawl basically depends on the tow duration, which could not be assessed in this survey. However, through interviews Laurent et al. (1996) reported an average tow duration of 3.1 hours, and this suggests a high mortality rate. In fact, Sasso and Epperly (2006) estimated a mortality rate below 1% for tow durations shorter than 10 minutes, but rapidly increasing to 50-100% for tows longer than 60 minutes.

Mortality induced by drifting longline has been estimated at more than 30% (Casale et al., 2007), while mortality induced by bottom longline could be even higher, because this gear is anchored to the sea bottom and captured turtles may drown (see also § 2.4.3.). For the same reason, set nets are known to induce a very high mortality, 50% or higher (Casale et al., 2005), because they are usually left on the sea for long periods, as reported by Egyptian fishermen (§1.3.) (see also § 2.4.3.).

Hence, it is likely that several hundreds of turtles die every year just as a consequence of capture by

fishing gear used along the Mediterranean coast of Egypt.

3.2. Intentional killing

Turtles have been sold in the Alexandria markets for long, although in recent times it became illegal (§1.2.3). The present survey revealed that the enforcement of laws in the past few years made the open sell of turtles in the Anfoushi market in Alexandria stop. However, in this area turtles are still traded through the black market while in another market (Abou Keer, Alexandria) sea turtles are still openly traded. So, although the recent enforcement probably decreased the total number of turtles traded, it did not stop the trade.

Moreover, the survey also revealed that the most important cause of turtle death is fishermen killing turtles directly on board. These turtles are usually consumed on board too, and if not, only the meat is landed (to fishermen families or black market), so easily escaping police controls.

Hence, it is evident that laws and their enforcement produced only apparent positive results (i.e. if only open trade in some markets is considered) but the main factors of turtle killing were unaffected and sea turtles are still slaughtered in large numbers. This habit is particularly common in Alexandria, with 77% of fishermen declaring turtle consumption (Table 8), but occurs also in other regions (0-15%) (Table 8). Given the high number of turtles caught in Egypt and in particular in Alexandria (§ 3.1.), it is likely that several hundreds of turtles are slaughtered every year.

Although fishermen appreciate turtles as a free meal in a context of general poverty, cultural factors are the main drivers for turtle consumption. While in regions like Alexandria, the central and the eastern, tradition plays an important role favoring consumption or no consumption, in the western region some additional reasons for not consuming turtles exist, like respect to the ecosystem and life, and trust in community (non-governmental) authorities (§ 2.4.4.). Probably for this reason in this region 0% fishermen declared turtle consumption.

Hence, possible future disruption of current culture and traditions might result in increasing turtle consumption, especially in the western region.

On the other hand, the current problem of turtle consumption in Alexandria should be tackled through its cultural drivers. In fact, the top-down approach of laws and enforcement undertaken so far, though providing the necessary protection context, seems ineffective for solving the problem.

3.3. Impact on nesting beaches

The main threats to turtle nesting (basically in the eastern region) are (i) coastal development due to tourism, (ii) disturbance by existing structures (hotels), (iii) fishing near the nesting beaches.

The El Zaranik protected area covers only part of the beaches used for nesting (§ 2.4.6.).

In this case, stakeholders are basically rich investors (hotels) rather than local communities, and the drivers are basically economic ones. Some stakeholders recognize that nesting beaches can attract tourists. So governmental protection or regulation is needed, preferably involving stakeholders in management plans including ecotourism.

3.4. Overall conservation status and assumptions

As already suspected (e.g. Margaritoulis et al., 2003; WWF, 2005), the high number of captures referred by fishermen (§ 2.4.3.) indicate that Egyptian coastal waters host very important foraging grounds for both loggerhead (*Caretta caretta*) and green sea turtles (*Chelonia mydas*). At present, many hundreds of turtles (possibly more than one thousand) are killed every year either directly by the fishing gear or by fishermen for meat. Many of these turtles are large individuals (§ 2.4.1.), with high reproductive value and important for the growth of their populations.

On the basis of interviews, both nesting activity and turtles at sea have decreased from the past. Although it cannot be excluded that this decrease is due to threats outside Egypt, it is likely that it is not the case and under a precautionary approach it should be assumed that the above mortality is unsustainable for the concerned turtle populations. With this assumption, reducing the number of turtles dieing in Egypt should be a priority for the conservation of Mediterranean sea turtle populations, and all the three issues identified should be urgently tackled: (i) intentional killing, (ii) mortality induced by incidental catch, (iii) disturbance of nesting.

In conclusion, present conservation measures are not adequate and both additional effort and different measures are urgently needed.

3.5. Recommendations

The threats and drivers identified by this survey lead to the following conservation objectives:

Reduce sea turtle killing in Alexandria.

It is necessary to change the present sea turtle position and role in the local communities culture. This should be done in collaboration with these communities.

Turtles should no longer be seen as a good resource for meat, but as a valuable resource to preserve for several reasons. Turtles should be preferred alive than dead because: (i) it is the “right thing” to do; (ii) they are familiar and nice; (iii) they have an important role in the marine ecosystem, that includes fish and ourselves; (iv) to save a turtle is considered as a good action by the other community members; (v) a turtle population can represent a source of income for the community. In addition, turtles should not be killed for consumption because (vi) eating turtle meat can be dangerous for health.

Possible actions may include:

- Set up an ecotourism based on turtles, managed by the local community, and preferably by the fishermen community. Lessons from ecotourism on nesting beaches (Troeng and Drews, 2004) could be exported to turtle at sea or to rescue/display/information centers. This should provide income to the community from national and international tourists visiting Alexandria, with turtles as secondary or even primary attraction. Linkage between Alexandria and turtles should be pursued.
- Carry out education campaigns to the community, about sea turtles, their life history, their characteristics, that can make them appealing and familiar. Children, young people, schools should be specifically targeted. Information should also be given on the danger of eating turtle meat. Satellite tracking could help as an appealing communication tool.
- Improve the role of fishermen and local communities in the management of marine resources. Active participation in decisions are desirable to increase their responsibility on natural resources and

their long-term preservation to sustain the local community in the future. As a first step, an assessment of the role of different institutions, formal and informal, on the management of fisheries and natural resources, and of the current involvement of fishermen is needed.

- Enforce regulations in all Alexandria markets, also by informing stakeholders and people that trading turtles is illegal.

Reduce sea turtle killing in other areas.

Experience in Alexandria (actions above) could be exported in other areas where turtle consumption occurs.

Reduce sea turtle bycatch.

Measures such as gear modifications developed in other areas to reduce turtle catch rates, should be tested to assess whether they are applicable in the Egyptian fishery.

Reduce the impact on turtle nesting.

Legal protection should be extended (and

enforced) to the nesting area not protected at present (§ 2.4.6.).

Stakeholders should be informed about the potential resource for tourism represented by nesting turtles and involved in a management plan of the nesting areas.

Monitor turtle occurrence and threats

Long-term research projects focused on conservation-related aspects should be set up. Important issues to investigate, among others, are: (a) better assessment of turtle bycatch and associated factors like fishing gear parameters and fishing practices; (b) spatio-temporal distribution and habitat use of loggerhead and green turtles; (c) origin of turtles frequenting Egyptian waters and populations impacted; (d) nesting activity.

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