# Status of leatherback turtles in Pakistan

By Fehmida Firdous

**1. The legal protection status for leatherback turtles**

1.1. Overview

Marine turtles, including leatherback turtles are declared as protected species under provincial Wildlife Ordinance & Acts - The Sindh Wildlife Protection Ordinance 1972 and the Baluchistan Wildlife Act 1974

*Legislation in Sindh*

- The Sindh Wildlife Protection Ordinance 1972: protects all turtles and eggs in Sindh and dictates steep fines for killing turtles (Frazier 1980; Salm 1975a; Salm 1975b; Mohiuddine 1975)

- Second Schedule of The Sindh Wildlife Protection Ordinance 1972:
  - All marine turtles of the genera *Dermochelys, Chelonia, Caretta, Eretmochelys, Lepidochelys* are listed as "Protected Animals"
  - The definition (as given on page 2 of the Ordinance) of "Protected Animals" means a wild animal specified in the Second Schedule. (See clause (j) of section 2 of SWPO).
  - Ordinance pertains to:
    - Hunting of any protected animal (Subsection (i), (iii) of Section 7 of SWPO.
    - Animals found dead or killed or caught unlawfully:
    - Any protected animal or game animal which is found dead or dying or which has been killed or caught otherwise than in accordance with the provision of this ordinance or any meat or trophy thereof shall be the property of Government (Section 9 of SWPO).
    - Transfer of animals, trophies or meat (Subsection (1), (2) of Section 11 of SWPO).
    - Import and export of animals, trophies or meat (Subsection (1), (2) of Section 12 of SWPO).
  - Penalties: See clauses (i), (ii), (iii) of Subsection 1 under Section 17 of SWPO.
  - First .published on 13th. April, 1972, then some amendments were made up to 1 June 2001 and reprinted in June 2003.
  - This Ordinance can be seen on website www.sindhwildlife.com.pk click on "about us" and then go on SWD Ordinance

*Legislation in Baluchistan*

Third Schedule of The Baluchistan Wildlife Protection Act (BWPA) 1974

- All marine turtles of the genera *Dermochelys, Chelonia, Caretta and Eretmochelys* are listed as "Protected Animals"
- The definition (page 3 of the Act) of "Protected Animals" means all animals, birds, reptiles mentioned in the third schedule appended to the act (clause (l) of section 2 of BWPA).
- Ordinance pertains to:
  - Restrictions on hunting of any protected animal (Subsection (a&b) of Section 8 of BWPA).
  - Animals found dead or killed or caught unlawfully:
  - Any protected animal or game animal which is found dead or dying or which has been killed or caught otherwise than in accordance with the provision of this ordinance or any meat or trophy thereof shall be the property of Government (Section 9 of BWPA).
  - Wild birds, animals that shall not be killed, hunted or captured (Section 10 of BWPA).
  - Transfer of animals, trophies or meat (Subsection (1), (2) of Section 12 of BWPA).
  - Import and export of animals, trophies or meat (Subsection (1&2) of Section 13 of BWPA).
- Penalties: See Clause (i), (ii), (iii) of Subsection 1 under Section 19 of BWPA 1974.
- First published on 21st August 1974, amendments were made on December 13th 1977
  - This Act is not available on Website. If desired, the copy will be sent through post, please send the exact postal address.

1.2 Management agencies responsible for marine turtle conservation

| **Operational level** | **Name and type of agency** |
|---|---|
| **National level** | **-** |
| **State level** | Sindh Wildlife Department, Govt of Sindh, Karachi |

**2. Nesting populations**

2.1 Overview

The leatherback turtle is among five species of marine turtles reported to occur in the territorial waters of Pakistan (Ghalib and Zaidi 1976), but its nesting has not been recorded (Ghalib and Zaidi 1976).

*Historical Evidence*

Following are the past references showing possibilities of leatherback turtle nesting or occurrence along Pakistan coast.

- No specimens of leatherback turtle were examined by Minton from west Pakistan waters but through the kindness of J. A. Anderson he obtained a photograph of an adult specimen that was found stranded at Hawkes Bay beach near Karachi during June of 1958 (Minton 1966).
- If accounts of local fishermen are to be believed, the leatherback occasionally nests on is lands near the month of the Indus (Minton 1966).
- During a survey conducted along Makran coast from 19-22 January 1987, he contacted some one in Ormara who said that leatherbacks *Dermochelys coriacea* (which he identified from photograph) were occasionally caught in nests, (Groombridge 1987).
- *Dermochelys coriacea* (Linn), leather back turtle is included among five other species of marine turtles have so far been reported to occur in the territorial waters of Pakistan (Ghalib and Zaidi 1976), but its nesting was not reported from anywhere in Pakistan by the Ghalib and Zaidi 1976.

*Current Situation*

*Summary*

Leatherback nesting has not been recorded so far from Pakistan. Surveys have been conducted to assess nesting distributions for all marine turtles, but no leatherback turtle nesting has been observed. The following survey methods have been employed:

- Ground Survey Regular Patrolling of nesting beaches on foot along Sindh coast on daily basis covering particularly Hawkes Bay and Sandspit nesting grounds.
- Irregular Patrolling of nesting beaches along Baluctistan beaches on foot.
- Off shore surveys Occasional by hiring a boat along Sindh and Baluctistan.

*Sindh Province*

Ground surveys have been conducted by Sindh Wildlife Department to identify marine turtle nesting species along the beaches of Sindh coast in Pakistan since 1979.

- The beaches surveyed during this period include Korangi Creek, Ibrahim Hydri, Clifton, Kaemari, Manora, Sandspit, Hawkes Bay, Buleji, Paradise Point and Capemonz.
- The beaches of Sandspit and Hawkes Bay are the most suitable nesting grounds of turtles.
- Nesting of leatherback has not been observed along any of the above-mentioned beaches to date.
- However, two dead specimens of male leatherback were observed, one during 1988 at Sandspit beach (Firdous 1989) and the other in 1989 near Paradise Point. (For more information: See section *Foraging Populations* & accompanying photos).

*Baluchistan coast*

Occasional ground surveys have also been conducted along Baluchistan coast by WWF Pakistan since 1998.

- The beaches surveyed included Sonmiani, Ormara, Pusni, Gwadar and Jewani; but leatherback turtles have not been recorded (dead or alive) (Per. Com. with Mr. Attaullah Pandrani, Conservation Officer, WWF Pakistan Field Office, Jewani, Baluchistan).

- A few aerial surveys were conducted along Baluchistan coast (Groombridge, 1988) and by Sindh Wildlife Department during 1997 but evidence of leatherback turtle nesting was not recorded.

**3. Foraging populations**
All data presented in the following sections refer to the two leatherbacks stranded (as reported by Firdous). They are here assumed to be foraging rather than breeding animals.

Summary data pertaining to these two stranded carcasses are provided below, as reported by Fehmida Firdous to J.A. Mortimer (*in litt. 29 November 2005):*

1. Male leatherback at Sandspit (Firdous 1989):
   - *Size:* Curved carapace length = 213.4 cm, curved carapace width = 121.3 cm, Tail length 45.4 cm
   - *Date of observation:* 05 September 1988
   - *Reported Cause of death*:
     A very high level of decomposition indicated that the specimen had died a few days before, perhaps due to shark attack as there was a prominent cut mark seen on ventral side of left rear flipper.

2. Male leatherback at Paradise Point:
   - *Size*: Curved carapace length = 125 cm, curved carapace width = 95 cm
   - *Date of observation:* 25 April 1989
   - *Reported Cause of death:*
     There was a very big hole on the proximal end of right front flipper. Both of the back flippers were also damaged indicating the attack of shark or any big animal.

*Editors note: Given the poor condition of these carcasses when they washed ashore, the injuries which are consistent with shark attack, could have occurred post death. Hence anthropogenic factors cannot be ruled out.*

3.1) Details of leatherback turtle foraging area census or tagging results such as tag recovery data
There have been no studies conducted on foraging populations of leatherback turtles in Pakistan.

3.2) Seasonality of leatherback turtles caught or seen in foraging areas
Data is available for two stranded turtles; one in April and the second in September

3.3) Approximate size range of leatherback turtles caught or seen in foraging areas
The stranded leatherback turtles were 213.4cm in length and 125 cm in length.

3.4) Information on diet of leatherback turtles
No available data

3.5) Other biological studies conducted on leatherback turtles in foraging areas
Not applicable

3.6) Threats to foraging populations of leatherback turtles
No threats to leatherback turtles have been recorded in Pakistan

3.7) Fisheries bycatch of leatherback turtles and the fisheries involved
During a survey conducted by Groombridge (Groombridge 1987) along the Makran coast from 19-22 January 1987, fishermen from Ormara indicated that leatherbacks *Dermochelys coriacea* (which were identified from photograph) were occasionally caught in nets (Groombridge 1987). Fisheries in Pakistan have implemented TEDs and seasonal closures of some fisheries to minimise their impacts on marine turtles (Pakistan National Report to IOSEA 2005)

3.8) Other activities being undertaken to improve the conservation of leatherback turtle foraging areas

There are no other activities underway, or planned to specifically improve the conservation of foraging populations of leatherback turtles in Pakistan. However, a variety of education materials have been developed to raise the awareness of local people of marine turtles such as teachers, school children fishermen and the media (see Firdous 2000 for details). However, regular offshore, ground and aerial surveys should be conducted along Sindh and Baluchistan coast to collect information on leatherback distribution, abundance and threats.

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# Status of the leatherback turtle in Papua New Guinea

By Mark Hamann

**1. The legal protection status for leatherback turtles**

1.1 Overview

The Department of Environment and Conservation is the government agency responsible for administration of legislation directly related to species conservation. Importantly, natural resources such as marine turtles belong to the people themselves, and as such they are the actual regulatory bodies upholding the DEC's legislation. Conservation of PNG's natural resources and environment, including marine environments is enshrined in the fourth goal of the countries constitution. The main legislative acts that cover leatherback turtles and their habitats are taken from Kisokau and Ambio (2005):

Fauna (protection and conservation) 1982
Crocodile trade (protection) Act 1982
Fisheries (Torres Strait Protected Zone) Act 1984
National Seas Act 1977
Prevention of pollution at seas Act 1981
Dumping of wastes at sea Act 1981
Conservation Areas Act 1992
Environmental Planning Act 1978
Fisheries Management Act 1998
Land Act 1996

Another important government agency with jurisdiction over marine species is the National Fisheries Authority (NFA). NFA is responsible for the Fisheries Management Act of 1998 and is mandated to manage all commercial fisheries within PNG's exclusive economic fishing zone (Kisokau and Ambio 2005).

On a local scale, the Kamiali Integrated Conservation Development Group (KIDCG) is the end result of a process that concluded with the designation of Kamiali as a Wildlife Management Area (KWMA) (Kisokau and Ambio 2005).

1.2. Management agencies responsible for marine turtle conservation

| **Operational level** | **Name and type of agency** |
|---|---|
| **National level** | Department of Environment and Conservation |
| **State level** | Morobe Fisheries Management Authority |
| **Local level** | Kamiali Integrated Conservation Development Group<br>Village Development trust<br>Huon Coast Leatherback Monitoring and Conservation Network |

**2. Nesting populations**

2.1 Overview

The nesting locations for leatherback turtles in PNG are shown in Figure 1. According to Spring (1982) leatherback turtle nesting occurred widely along the northern coast of PNG, but in low density. The main nesting areas recorded were; mainland PNG (Bioken to Turubu in East Sepik Province and Aitape in West Sepik Province), Long Island and the mainland coast of Madang Province, Normandy Island in Milne Bay, Tulu and Timonai on Manus Island, Garu, Kimbe Bay and Ganoi in New Britain and the south coast of New Ireland. No information on the numbers of females nesting per year in these locations was given nor were any indications of whether the nesting populations were declining. Quinn and Kojis (1985) [in Hirth et al. 1993] estimated that 10 leatherbacks nested nightly along the southern coast of Morobe Province (near Maus Buang/Piguwa). At a adjacent beach, Bedding and Lockhart (1989) indicate that the nesting population on Labu Tali [spelt Tale by the authors] beach is around 300 nests per year. Hirth et al. (1993) conducted a detailed survey of the Maus Buang/Paiawa nesting beach between December 1 and 15 1989. Each turtle encountered was tagged with conventional metal tags. These authors found on arrival nine old body pits within the turtle reserve (725m long beach adjacent to Paiawa village), 22 body pits between the reserve and Labu Tali and 117 old body pits between the reserve and Buasi. Overall the authors tagged 34 leatherbacks that were ashore nesting between Labu Tali and Buasi, and 76 nests were confirmed. The highest density nesting occurred between the Buang and Buasi Rivers.

Spotila et al. (1996) provide a pers comm. of 50 to 100 nesting females per year along the entire north coast of PNG.

Community based management at Kamiali Wildlife Management Area (WMA)

In 1998 a community based management project began within the Kamiali WMA (Kisokau 2004; Kisokau and Ambio 2005). The sampling methods used from 1999 to 2004 are summarised by Kisokau (2004) and Benson et al. (in press). Briefly, from November to February nightly beach patrols were conducted along the 2km beach within the Kamiali WMA. Female leatherback turtles ashore for nesting were tagged using conventional flipper tags and PIT tags. The results of these annual surveys are presented in Table 1 (Kisokau 2004 and Kisokau 2005).

Table 1. Results of annual monitoring of the leatherback turtle nesting beach at Kamiali

| Nesting season | Remigrants | New turtles | Total turtles |
|---|---|---|---|
| 1999/2000 | 0 | 42 | 42 |
| 2000/2001 | 28 | 20 | 48 |
| 2001/2002 | 41 | 48 | 89 |
| 2002/2003 | 35 | 29 | 64 |
| 2003/2004 | 43 | 21 | 64 |
| 2004/2005 | 53 | 8 | 61 |

Aerial survey of nesting 2004

An aerial survey of leatherback turtle nesting was conducted between January 13 and 20 2004 (Benson et al. in press). The survey covered approximately 2800km of coastline including the north coast of PNG from the Indonesian (West Papuan) border eastward through the provinces of Sanduan, East Sepik, Madang and Morobe. In addition the surveys covered the entire coast of New Britain and the northeast coasts of Goodenough, Fergusson and Normandy Islands. For details of the specific methods see Benson et al. in (press). 415 nests were sighted along 363km of beach. Over 71% of nests were found in the Huon Gulf region and only 29% of nests were recorded outside of the two index beaches (Kamiali and Maus Buang). However these aerial surveys did not cover all of the important nesting sites that were identified through surveys by Spring (1982).

Benson et al. (in press) report that the numbers of turtles recorded by the nightly patrols in the Kamiali WMA and the numbers estimated by the aerial surveys are lower than the estimates of Quinn and Kojis (1985) and Bedding and Lockhart (1989). More systematic long term data is needed to determine population trends.

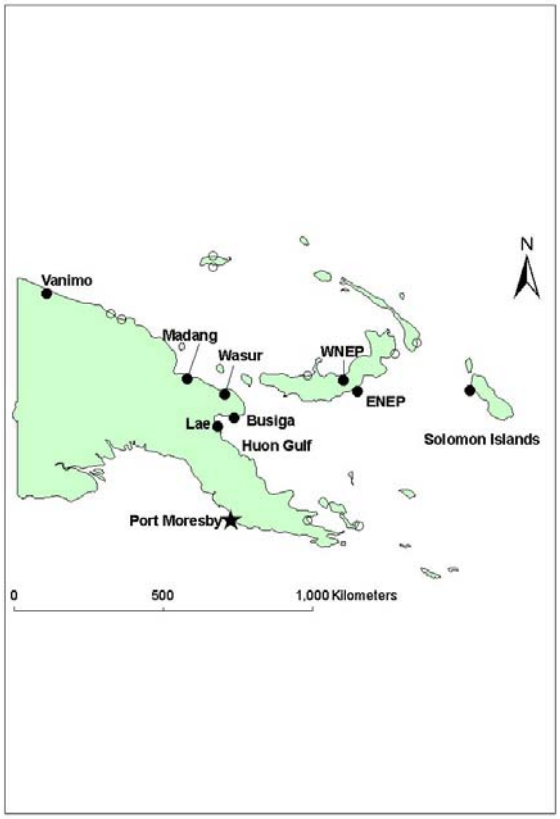


Figure 1. Location of leatherback turtle nesting beaches in Papua New Guinea

2.2) Seasonality of leatherback turtle nesting

The leatherback turtle nesting season occurs during the austral summer (October to March) with peak nesting in December and January (Hirth et al. 1993; Benson et al. in press). However, community based surveys by Rei (2005) indicate that there may also be a sub-population that nest during the mid year period (June to August) along the Wasur and Busiga coast.

2.3 Genetic studies on nesting populations of leatherback turtles

Genetic analysis of skin samples indicates that the leatherback turtles that nest in PNG are part of the western Pacific metapopulation that includes the Solomon Islands, and West Papua (Indonesia) (Dutton et al. 1999; Dutton et al. in press). This metapopulation is estimated to be in the order of 2000 females nesting annually (Dutton et al. in press). The lack of differentiation between rookeries of the south Pacific could reflect high rates of gene flow between rookeries or a lack of power in the analysis that used only mitochondrial markers (Dutton et al. in press).

2.4) Biological parameters

See details in Table 2.

2.5) Pivotal temperature studies

No studies on pivotal temperatures have been conducted for the PNG rookeries

Table 2. Summary of biological data on nesting leatherback turtles from Papua New Guinea

| Category of data | Average & Standard deviation | Range | Sample size |
|---|---|---|---|
| Size of nesting females (cm) | 169.48 (±8.74)* | 155 to 186.1 | 34 |
| | 165.0 [1] | 110 to 190 | - |
| | 163.0 (±16.62)[4] | 67 to 181 | 54 |
| Number of eggs per clutch | 88.2 (20.15)* | 42 to 118 | 37 |
| | 92.3 [1] | 12 to 145 | - |
| | 61[2] | - | - |
| | 94.6 (±27.28)[4] | 16-150 | 44 |
| Clutches per season | 5 | - | - |
| | 2.2 (±1.59)[4] | 1 to 6 | 25 |
| Re-nesting interval (days) | 10[3] | - | 1 |
| | 11[2] | - | - |
| | 14.7 (±10.01)[4] | 2 to 45 | 31 |
| Number of years between breeding seasons (years) | | No data available | |
| Size of eggs (cm) | 52.2 cm (2.34) | 46 to 58 | 340 eggs (17 clutches) |
| Size of hatchlings (cm) | | No data available | |
| Hatchling emergence success (%) | 58%[2] | 5.4 to 88 | 10 nests |

1. Quinn and Kojis (1985)
2. Kisokau and Ambio (2005)
3. Hirth et al. (1993)
4. Kisokau (2005)

2.6) Migration records of nesting leatherback turtles

Data from the satellite telemetry of post nesting females has shown internesting movements, which include a turtle that was initially caught in PNG and then came ashore in the Solomon Islands (Bougainville Island), presumably to lay a subsequent clutch (NOAA and WPRFMC unpublished data). From 2001 to 2004 Benson et al. (in press) attached satellite transmitters to 19 adult female leatherbacks as they were ashore nesting at Kamiali WMA (Benson et al. in press) to map their post nesting migration. For detailed results of this study see (Benson et al. in press). To summarise, these authors found that all tracked turtles spent the majority of time between nesting events within the Huon Gulf region. Nesting was not restricted to a single beach although they did find some site fidelity to Kamiali nesting beach.

Post nesting leatherback turtles initially traveled east and southeast as they moved away from the Huon Gulf and into the Solomon Sea and thereafter into the Coral Sea. Only six transmitters remained active to 20 degrees of latitude. Four of these moved southeast between New Caledonia and Vanuatu and the other two moved south through the Coral Sea. A single female was tracked south into the southern transition zone (adjacent to New Zealand) before heading northwards and ending her track close to Tonga.

2.7) Protection of nesting beaches (e.g. national parks)

The majority of leatherback turtle nesting occurs within the Huon Gulf area. In this area most nesting occurs within the Kamiali WMA, the Buang-Buasi region, at Labu Tale and at Paiawa. Kamiali WMA is a 47 000ha park that includes 11km of coast and coastal wetlands. The leatherback turtle study site is located on the north of Nasau Bay within the KWMA. The nesting beach is around 11km long. The sampling plot within this is now 3km long and it starts just north of the Kamiali village. The collection of turtle eggs or killing of turtles is not permitted in the WMA.

2.8) Use of hatcheries to protect marine turtle nests

Hatcheries are not used to protect nests of leatherback turtles. However bamboo grids are now used to protect nests in situ from dog predation.

2.9) Threats to nesting leatherback turtles
The two main threats for nesting leatherback turtles, the collection of eggs for subsidence or commercial use, although it has occurred for decades it has never been quantified (Spring 1982, Bedding and Lockhart 1989, Hirth et al. 1993, Kisokau and Ambio 2005 and Benson et al. in press) and the depredation of eggs by dogs. Although the collection of eggs is now banned within the 10km nesting area of the Kamiali WMA, it is not yet known what proportion of a female's nests are laid in this area, nor how much site fidelity female leatherback turtles show towards laying multiple clutches in the one season on the same section of beach (as opposed to laying some clutches in and out of the protected zone). Both Benson (2005) and Benson et al. (in press) present results on nesting abundance from aerial surveys. In both papers the author(s) state that 71% of nests are laid within the Huon Gulf and within Huon Gulf 29% of nests were laid outside of Kamiali WMA and Maus Buang. However, the numbers of nests found during the aerial surveys that are presented in tables in the same reports indicate that a larger number of nests are laid outside of protected zones.

In addition, while it has not been empirically linked to increased mortality of PNG leatherback turtles, long line fishing in the Pacific Ocean has been documented as a large threat to multiple stocks of leatherback turtles in the northern and southern Pacific oceans (see Spotila et al. 1996). Leatherback turtles have been caught by fishers in southern Australia, however, genetic stock analysis has not been conducted on these turtles (see Australia report in this section and Col Limpus pers. comm.).

2.10) Impacts of coastal development and/or sand mining on leatherback turtle nesting
Unknown

2.11) Major existing threats to nesting leatherback turtles
Egg collection, fisheries bycatch and egg depredation (Spring 1982, Bedding and Lockhart 1989, Hirth et al. 1993, Spotila et al. 1996, Kinch 2006; Dutton et al. in press).

2.12) Other biological studies conducted on leatherback turtles
Unknown

2.13) Other activities being undertaken to improve the conservation of leatherback turtle nesting populations
The Huon Coast leatherback turtle network has been formed to address general threats to marine ecosystems, provide awareness and education to local communities and integrate local people into conservation activities (Senego 2005). In addition the Western Pacific Regional Fishery Management Coucil employ an anthropologist to work with communities and streamline the link between donors/scientists and the communities. They also employ a sea turtle biologist to strengthen the scientific approach to data collection and help with programme development. They also fund all of the current work going on along the Morobe Coast.

**3. Foraging populations**
3.1) Details on any leatherback turtle census or tagging results such as tag recovery data
There has been no tagging census of leatherback turtles in foraging areas

3.2) Seasonality of leatherback turtles in coastal and offshore waters
Unknown

3.3) Approximate size range of leatherback turtles
Unknown

3.4) Information on the diet of leatherback turtles
Unknown

3.5) Other biological studies conducted on leatherback turtles in foraging areas
Unknown

3.6) Threats to foraging populations of leatherback turtles
Unknown

3.7) Fisheries bycatch of leatherback turtles and the fisheries involved
Unknown, however the National Fisheries Authority is currently implementing a project to expand outreach efforts in mitigating sea turtle fishery interactions in some PNG commercial fisheries (see McCoy 2005 for details).

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Quinn NJ, Kojis BL (1985) Leatherback turtles under threat in Morobe Province, Papua New Guinea. *PLES* **1**, 79-99. Status of leatherback turtles in Philippines.

# Status of the leatherback turtle in the Philippines

By Mark Hamann

No report was received from the Philippines. Nesting populations of marine turtles have been well documented over the last two decades (see De Veyra et al. 1994; Palma 1993; Cruz 2002 for records). One account of leatherback turtle nesting in the Quiniluban Island group in north eastern Palawan exists (Matillano and Ladra 1986). However, since no other authors record the presence of leatherback turtle nesting in the Philippines it is likely that this was a once off occurrence (De Veyra et al. 1994; Palma 1993; Cruz 2002).

Philippine's waters are an important foraging and/or migratory pathway for leatherback turtles that nest in Malaysia and Indonesian West Papua (see Malaysian and Indonesian sections). Isolated records of leatherback turtles being caught as fisheries bycatch exist for several locations (Hinunangan, Southern Leyte and Binuangan, Tubay, Agusan del Norte and the Visayan Islands (Palma 1993; Cruz 2002).

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# Status of leatherback turtles in Qatar

By Nicolas Pilcher

**1. Introduction**
Qatar is approximately 160 km in length and up to 90 km in width, and projects out on the west coast of the Arabian (Persian) Gulf and is bounded by Saudi Arabia, the United Arab Emirates and Oman. Some old, now degraded coral reefs, extensive seagrass beds and small mangrove strands occur all around the coast. Species diversity is low and there are few, if any, endemics. The maritime area of Qatar falls within the Arabian (Persian) Gulf. The Gulf region extends from Shatt Al-Arab and the coastal lowlands in the north to the Strait of Hormuz and the high mountains of Oman in the south. It is a semi enclosed shallow continental water body measuring 1000 km in length and varying in width from a maximum of 340 to 60 km (at the Straits of Hormuz). The average depth is about 35 m and maximum is 100 m. The Gulf is subject to wide climatic fluctuations, with surface water temperatures generally ranging from 12°C in the winter to > 35°C in the summer and salinity from 28-60 p.p.t. The narrow straits of Hormuz restrict water exchange with the Arabian Sea, causing the Gulf to become highly saline because of high evaporation and low inputs of fresh water. Marine ecosystems include mangrove swamps, seagrass beds, coral reefs and small offshore islands.

The Gulf is one of the largest known oil fields in the world. Oil exploitation and other activities lead to pollution input into the marine environment from well blow-outs, oil leakage from pipelines, loading terminals and discharges from refineries. Natural oil seepage is another source of pollution, estimated at about 10% of the overall chronic oil discharges. Up to 35,000 tankers pass through the Straits of Hormuz annually, making the Gulf among the busiest tanker routes in the world.

**2. The legal protection status for leatherback turtles**
2.1 Overview
Qatar has ratified the International Convention for the Prevention of Pollution of the Sea by Oil (1954), the Kuwait Regional Convention for Cooperation on the Protection of the Marine Environment from Pollution (Kuwait Action Plan), and the Convention concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention), the United Nations Convention on Biological Diversity (CBD), and the Convention on International Trade in Endangered Species of Wild Fauna or Flora (CITES). The Gulf Co-operation Council (GCC) takes an active interest in the marine environment and in other aspects of cooperation for environmental management.

A regional institution also takes an oversight position on the status, management and conservation of the marine habitats in the region: The Regional Organisation for the Protection of the Marine Environment (ROPME), which includes Bahrain, Iran, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates.

2.2 Management agencies responsible for marine turtle conservation
The ruling family and concerned industries are the main forces behind wildlife protection, and the main public body concerned with the protected areas system is the Supreme Council for the Environment and Nature Reserves (SCENR). The SCENR has broad environmental powers and responsibilities, including proposing and implementing environmental policy, drafting environmental laws and regulations, undertaking environmental analysis and assessment, coordinating environmental bodies and undertaking education programmes. Other governmental bodies which play limited roles in area protection include the Ministry of Municipal Affairs, Ministry of Finance and Petroleum and the Ministry of Electricity and Water. General fishing restrictions are enforced by the Fisheries Department.

**3. Nesting populations**
There are no historical or contemporary records of leatherback turtles nesting in Qatar.

**4. Foraging populations**

4.1 Overview

There are no records of leatherback turtles having been seen in Qatar's waters.

4.2 Threats to leatherback turtles

Given the physical nature of the Gulf, with its narrow bottle-neck opening and shallow shore approaches, it is unlikely leatherback turtles are anything more than transients or waifs. If leatherback turtles were to be found in Qatar waters, they would be threatened by coastal gillnets if they came close to shore (not a common event for foraging leatherback turtles), or by shipping and petroleum-related accidents/discharges. There are no commercial trawlers or long liners operating in Qatar waters.

4.3 Protection of foraging areas

At present there are no declared MPAs, although the SCENR is in the process of gazetting Khor Al Udeid (the "Inland Sea") in the south, the Al Thakirah mangrove complex south of Ras Laffan, and Fuwairit, one of the most important hawksbill turtle nesting beaches.

4.4. Gaps in capacity and requirements for improved conservation

The SCENR is a young (5 years) agency staffed with young, dedicated staff, but there is still a need for focussed science and conservation input to the SCENR, which typically has to deal with commercial contractors as they do work for the large industrial companies. This has resulted in a 'do as little for as much' work attitude on the part of the consultants, and the SCENR has been left with nothing more than a rehash of past data, year after year. For conservation to be effective, the SCENR needs to be working with the best and most current data sets, which they often do not get. There are plans however to continue with turtle conservation work in the country, sponsored by the SCENR, aimed at hawksbill turtles (Qatar hosts one of the largest nesting aggregations in the region) and green turtles (which forage in Qatar's extensive seagrass beds).

# Status of leatherback turtles in Saudi Arabia

By Nicolas Pilcher

**1. Introduction**

Saudi Arabia's Red Sea coastline extends southward approximately 1,840 km from the Jordan border north of Haql (29°30'N) to the border with Yemen at Oreste Point (16°22'N). The continental shelf extends offshore for distances < 1 km in the Gulf of Aqaba to > 100 km in the Farasan Bank. The Saudi Arabian Gulf extends southward approximately 1072 km from the Kuwaiti border (28°30'N) to the border with Qatar (25°15'N). The climate is extremely arid and much of Saudi Arabia's biological productivity is confined to a narrow coastal strip, where coral reefs, mangroves and seagrass communities predominate.

Over 15 % of the population lives in the Red Sea coastal zone and over 5 % in the Arabian Gulf coastal zone. Urban and industrial development has had severe impacts on the coastal lands and waters, particularly adjacent to the major coastal towns and cities. Much of this development has involved extensive land-filling and dredging which destroyed substantial areas of the intertidal and sub tidal near shore habitats (Chiffings 1989). In addition, an average 25,000 to 30,000 ships are associated each year with the oil production and petrochemical industries on both coasts (Lintner et al. 1995). The Saudi Arabian Gulf coast is much more developed than the Red Sea coast (about 40 % of the Gulf coast has been developed). In the Red Sea a smaller proportion of the coastline has been developed, but in some areas (for instance around Jeddah) impact on the marine environment is severe. The presence of most of Saudi Arabia's oilfields in the Gulf has been a significant factor in attracting development to the region (MEPA/IUCN 1989).

The Red Sea and Arabian Gulf exhibit markedly different bio-physical conditions, with the Arabian Gulf exhibiting more extreme changes in water temperature, in part related to the comparatively shallow nature of the Gulf, in particular close to shores (over 25 % of the Gulf is only 5 - 10 m deep; MEPA/IUCN 1992). In the Arabian Gulf, wind speeds range between 1 m/s in September to 4 m/s in June and July. Air temperatures range from 12 ºC in January to 37 ºC in August. Average annual maximum temperature is 46.5 ºC and water temperature generally ranges between 15 and 33 ºC, with extremes recorded at 10 ºC and 40 ºC (MEPA/IUCN 1992). The narrow straits of Hormuz restricts water exchange with the Arabian sea, which combined with high evaporation rates creates high-salinity water within the Gulf, with a turnover rate of three to five years (Hunter 1983).

The Red Sea coast and islands support a variety of coastal and marine habitats, related largely to oceanographic regime, degree of exposure, and topographic features, particularly the distribution of suitable antecedent topography for development of coral reefs, mangrove stands and seagrass beds. The area has a complex tectonic history of uplift and subsidence, related to the rift development of the Red Sea from the movements of the Arabian and African tectonic plates.

Saudi Arabia has a relatively long history of being involved with marine turtle research and conservation work, starting with a two-year project sponsored by the Meteorological and Environmental Protection Administration (MEPA) in 1986 and 1987 (Miller 1989), and followed by four continuous years of work by the National Commission for Wildlife Conservation and Development (NCWCD) from 1989 to 2002 (Al-Merghani et al. 2000; Pilcher 1999a,b; Pilcher 2000; Pilcher and Al-Merghani 2000). A synopsis of much of the work carried out in Saudi Arabia is presented in Al-Merghani et al. (2000). Since that time the NCWCD have continued sporadic monitoring on key nesting beaches, but the data are unpublished.

**2. The legal protection status for leatherback turtles**

2.1 Overview

Saudi Arabia is signatory to regional and international agreements which place obligations upon it for prevention of pollution and protection of resources, including coral reefs. Among these are a number of international agreements and memoranda of understanding, and a series of national laws and royal decrees that are pertinent to coral reef conservation. Relevant to marine turtles, the Kingdom is a

signatory to the Kuwait Regional Convention on the Protection and Development of the Marine Environment from Pollution (1978); the Regional Convention for the Conservation of the Red Sea and Gulf of Aden against Pollution from Land-based Sources (1982); the Protocol on Marine Pollution Resulting from Oil Exploration Activities in the Arabian Gulf Region (1989), the ROPME protocol for Protection of Pollution of the Sea from Land-based Sources (1990) and the Declaration of the Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden (1995). The Kingdom is also a signatory to the IOSEA Sea Turtle MoU.

A number of national decrees and laws also affect marine conservation measures in the Kingdom, including the Environmental protection Standards Document No. 1401-01 (1402 H); the Council of ministers Decision no. 271 (23.11.1404) obliging the use of best available technology to reduce pollutant emissions (such as cement dust); the Rules and Regulations for Saudi Arabian Seaports; the draft national Fisheries Regulations (Royal Decree No. 7/505M 28/3/1406); and the establishment of the National Commission for Wildlife Conservation and Development (NCWCD).

2.2 Management agencies responsible for marine turtle conservation

The key to any efforts to reconcile environmental concerns with economic and population expansion in Saudi Arabia will be the establishment of the institutional basis for coordination and implementation of necessary economic expansion in a sustainable manner. Several institutions in the Kingdom are mandated through a variety of mechanisms to carry out conservation tasks that in one way or another impact coral reefs: the National Commission for Wildlife Conservation and Development (NCWCD): NCWCD is responsible for management of protected areas (Royal Decree No. M/22, dated 12/9/1406). The NCWCD's main role is to preserve, protect and develop the wildlife within the Kingdom. Specific objectives are to develop and implement projects to protect wildlife and their habitats conduct surveys and promote research and public interest in environmental issues related to the wildlife in Saudi Arabia; and co-ordinate different ministries, authorities and national and international institutions to accomplish these objectives. The Meteorology and Environmental Protection Administration (MEPA) was established by Council of Ministers decision No. 157, Dated 20/11/1411 and Royal Decree No. 7/505M, dated 28/3/1406, MEPA has jurisdiction for prevention of pollution in the territorial seas. MEPA is the central environmental agency in the Kingdom of Saudi Arabia. However, the Kingdom distinguishes between the establishment of environmental criteria such as standards, and actual operational management. Thus operational agencies such as the Ministry of Petroleum, Ministry of Agriculture and Ministry of Industry and Electricity retain regulatory control over activities carried out under their respective mandates while MEPA sets environmental performance standards, monitors the activities of operational agencies and serves as a central coordinator for environmental management. MEPA is the Kingdom’s central coastal zone management agency. Despite this, institutionalization of authority for centralized coastal zone management has not been achieved, and each individual agency operates under its own specific mandate and numerous overlaps and potential conflicts abound. Day-to-day coordination mechanisms and central planning authority specific to the coastal zone are lacking. MEPA also has jurisdiction for oil spill response (coordination mechanism established under Royal Decree 7/B/13307, dated 22/7/1411), and for prevention of pollution including effluent from land fill ports (Royal Decree No. 7/505M, dated 28/3/1406). MEPA is responsible for setting standards for the environment (Royal Decree No. 7/M/8903, dated 2/14/1401) and for carrying out a program of environmental impact assessment. It is also the designated coastal zone management agency. The Ministry of Agriculture has jurisdiction for fishery activities (Royal Decree No. 7/505M, dated 28/3/1406), and issues permits for extensive filling of submerged lands have been granted in the Eastern Province. Finally, the Saudi Arabian Coast Guard, established by Royal Decree No. 33, dated 27/7/1377, has jurisdiction between the border of the territorial seas (12 miles offshore) and 10 km inland.

**3. Nesting populations**

Coral reefs fringe much of the entire length of the Saudi Arabian Red Sea coastline and the offshore islands, virtually excluding leatherback turtle nesting. Indeed, no records exist of leatherback turtles nesting on any part of the Saudi Arabian Red Sea shoreline, not its shoreline along the Gulf.

**4. Foraging populations**

4.1 Overview

No specific reports exist for leatherback turtles in the Saudi portion of the Red Sea, although Ross (1995) and Gasparetti et al. (1993) both report the presence of the leatherback turtle in the Red Sea. No research has been directed at leatherback turtles throughout Saudi Arabia's long involvement with marine turtles. The geology of the Kingdom's shoreline creates unsuitable nesting grounds, which is where all research efforts have been aimed to date, and aerial surveys have not reported leatherback turtles on any flights.

4.2 Threats to leatherback turtles

Despite turtles and their nesting habitats in Saudi Arabia receiving legal protection (under Article 61 of the hunting status, management and protection of living natural resources in the territorial waters of the Kingdom of Saudi Arabia) there is still illegal catching of marine turtles by locals in the Farasan Islands, although none of this can be attributed to leatherback turtles, as green and hawksbill turtles are the preferred catch. Until 1981, Saudi Arabia's fishery was exploited almost exclusively by artisanal fishermen from small boats and larger Sambouks. Saudi Fisheries, an industrial fishery company, began in 1991 and currently lands around 1,500 metric tons of shrimp and a similar amount of finfish. Despite this, landings remain dominated by the artisanal sector. Reef-based fisheries are distributed along the length of the Red Sea, with the highest proportion of fishing boats being based in the south. It must be noted, however, that the greater number of boats in the south does not represent an increase in fishing pressure on coral reefs; rather it represents the greater number of trawlers that make up the prawn fisheries.

Local threats to Saudi Arabia's marine resources originate primarily through industrial development and maritime transport. With these are associated risks of oil spills, land filling, pollutant discharges, effluents from desalination activities and a number of other major impacts. Most acute damage is localised and restricted to offshore islands (in the Gulf) and around major urban areas (in the Red Sea).

4.3 Protection of foraging areas

Protection of marine habitats in Saudi Arabia has a fairly recent history. In 1977, the small island of Umm al-Qamari was given *de facto* protected area status by the national hunting regulations of 1977. Following this, MEPA identified forty-six coastal areas for inclusion in a system of coastal protected areas (MEPA/IUCN 1987). Under Saudi Arabia's Environmental Protection Coordinating Committee (EPCCOM) these were designated Environmentally Sensitive Areas. In 1987, the National Commission for Wildlife Conservation and Development (NCWCD) was formed with the express mission of handling the Kingdom's wildlife and conservation management issues, and its own classification system. By 1989, this program had placed 2.4 % of Saudi Arabia's total area (51,405 $km^2$) under protected status. In 1990, the NCWCD published its "Plan to Protect Areas in Saudi Arabia" that presented a system of protected areas which, if designated, would place 12.8% of Saudi Arabia's land mass under conservation management.

The Kingdom of Saudi Arabia has established a number of extensive terrestrial protected areas, but lags behind in the development and implementation of marine protected areas. Many areas have been proposed and suggested, dating back to the mid- and late 1980s, and remain that way to date. Actual MPAs include the Yanbu Royal Commission Protected Area which covers an area of ca. 5 $km^2$ and encompasses fringing reefs, mangroves, and seabird nesting sites; Umm al Qamari, established in 1977 and covering an area of only 2 $km^2$, and includes two small islands with surrounding fringing reefs, and is an important habitat for thousands of seabirds; the Farasan Islands, established in 1996 and covering an area of 3310 $km^2$, is a Terrestrial and Coastal Reserve archipelago of small islands at the southern extreme of Saudi Arabia's Red Sea shores. It is an important habitat for mangroves, seagrass, coral reefs, marine mammals, marine turtles, seabirds and endemic gazelle, and is threatened by fishing, development and recreation activities. Finally, the Jubail Wildlife Sanctuary is a *de facto* protected area awaiting Royal declaration. Established in 1994 and covering an area of 2300 $km^2$, research and baseline surveys to identify the main ecosystems were carried out after the Gulf wear. The Sanctuary encompasses important wetlands for seabird migration and nesting areas for birds and sea turtles. The most extensive coral reefs in the Saudi Arabian Gulf are also found within the Sanctuary borders. With the exception of the Farasan islands, protected in 1996, and the Jubail Wildlife Sanctuary which was developed shortly after the Gulf war, there have been no other recent marine protected areas established.

With the resurgence of PERSGA and its Strategic Action Plan this is expected to change, with up to 32 proposals for protected areas being put forward for the Red Sea alone.

4.4. Gaps in capacity and requirements for improved conservation

One of the major gaps in the process of turtle conservation, in particular in the Red Sea, is the lack of established marine protected areas. There is a general lack of funding for marine research activities, and most research is currently funded through GEF, World Bank or UNDP projects. In particular, research needs to be carried out in order to update baseline environmental conditions, and follow-up monitoring should refer to these baselines to detect changes in environmental quality; there is a need to integrate current research into global initiatives such as ICRI and GCRMP, and regionally among PERSGA members; direct use and indirect development activities that affect turtles and their habitats need to be carefully evaluated in the design stages, and be subject to continued monitoring through the implementation stages; there is a need to develop community education programmes that highlight the role of communities in turtle biology and ecology, including at sea stages. The Kingdom needs to take bold steps in the establishment of marine protected areas, and monitor the implementation of legislation concerning these areas with regard to coastal development, fisheries and tourism. The designation of marine protectorates needs to become a priority issue within the country. Finally, a larger proportion of funds need to be allocated to protected areas and environmental research needs to be appropriated for marine conservation efforts. With the NCWCD for instance, this would also require the expansion of the Marine Department which is currently staffed by only three people with limited research funds and equipment.

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# Status of Leatherback turtles in Seychelles

By Randolph C. Bijoux

**1. The legal protection status for leatherback turtles**

1.1. Overview

Leather back is fully protected in the legislation. All marine turtles are dealt with under the Wild Animals and Birds Protection Act (1961), which:

- provides framework for Regulations to be made by Minister for protection of wild animals & birds;
- Defines maximum penalties.

The following regulations under the act pertain to turtles:

a) Turtles Protection Regulations (1994) declares turtles & their eggs protected throughout Seychelles:
   - No person shall disturb, catch, injure, fish for, kill, sell, purchase, receive or possess any turtle or egg
   - No person shall sell, expose for sale, purchase or receive any products derived from any shell of turtle without a permit
   - No person shall export or import a turtle shell or any product of a turtle

b) Wild Animals (Turtles) Protection (Amendment) Regulations (1998) made it illegal to possess raw turtle shell (closing loophole in 1994 regulations)

c) Wild Animals and Birds Protection (Amendment) Act, 2001 deals with penalties:
   - increased maximum penalty: from Rs 1,000 to Rs 500,000 fine; and from 1 year to 2 years prison;
   - Allows police search without warrant & enables confiscation of boats, vehicles or aircraft involved

1.2. Management agencies responsible for marine turtle conservation

| **Operational level** | **Name and type of agency** |
|---|---|
| **National level** | Ministry of Environment and Natural Resources (MENR) |
| **State level** | |
| **Local level** | 1. Government: Ministry of Environment and Natural Resources Marine Conservation Society of Seychelles<br>2. Parastatal Organisations:<br>o Seychelles Islands Foundation (SIF) -- responsible for Aldabra atoll<br>o Seychelles Centre for Marine Research & Technology - Marine Parks Authority (SCMRT/MPA) -- responsible for Marine Parks<br>3. Non-Governmental Organisations (NGOs):<br>o Island Conservation Society (ICS) -- responsible for Aride Island<br>o Marine Conservation Society of Seychelles (MCSS)<br>o Nature Protection Trust of Seychelles (NPTS) -- responsible for Silhouette Island<br>o Nature Seychelles -- responsible for Cousin Island<br>4. Private Sector<br>o Various hotels & private islands conduct turtle conservation activities on beaches adjacent to their property -- i.e., Bird Island, Cousine Island, Denis Island, North Island, etc. |

## 2. Nesting populations

2.1. Overview

*Historical Evidence*

Two possible (but unconfirmed) reports of leatherback nesting include:

a) Photograph taken prior to 1970 of a leatherback that 'beached' at Anse Kerlan, Praslin. and was released the next day (Frazier 1984);
b) An unconfirmed anecdotal report of leatherback nesting on Beau Vallon beach, Mahe, in the 1970s (C. Lorentz pers. comm. to J.A. Mortimer).

*Current Situation*

Virtually all nesting beaches have been monitored with some regularity during the past few decades, and there have been no reports at all of leatherback nesting anywhere in Seychelles during this period (Frazier 1984; Mortimer 1984, 1998).

## 3. Foraging populations

3.1 Details on any leatherback turtle foraging area census or tagging results.

No tagged leatherbacks have been reported in Seychelles (J. Mortimer, pers. comm.). Nor have any tagging studies been conducted on foraging leatherback turtles.

3.2. Seasonality of leatherback turtles in coastal and offshore waters

According to the rather general reports made by fishermen, foraging leatherback turtles occur in Seychelles waters during virtually any month of the year, but they are most easily observed during the calm periods of October through April (based on interviews with various fishermen, pers. comm. J.A. Mortimer). According to unconfirmed reports from fisherman there is no specific pattern in which they occur but they also claimed that these were rare events (based on interviews with various fishermen, pers. comm. R.C. Bijoux).

There have been several well documented observations of leatherback turtles in Seychelles waters, for which dates have been recorded. These indicate that leatherbacks can occur throughout the year, and include the following:

a) Reports of free swimming leatherbacks:
   - August 2001. South Mahe, near Pt. Capucin. (pers. comm. G. Rosine to J.A. Mortimer).
   - May 2005. Amirantes group, north of St. Joseph atoll, deep water near shore. (pers. comm. A. Jean-Baptiste to J.A. Mortimer).

b) Stranded leatherback carcasses:
   - May 2002. North Mahe, North East Point beach (unpublished data J.A. Mortimer & Seychelles Ministry of Environment).
   - November 2003. North Mahe, Union Vale (unpublished data J.A. Mortimer & Seychelles Ministry of Environment).

3.3. Approximate size range of leatherbacks caught or seen in Foraging Areas

Measurements are available from the two leatherback strandings reported in section 3.2. The over-curve carapace measured for both turtles was 165 cm (MENR Stranded Turtle Network Data files; unpublished data J.A. Mortimer).

3.4. Information on Diet of Leatherback Turtles

Unconfirmed reports from fishermen suggest that they may be feeding on jellyfish (based on interviews with various fishermen, pers. comm. J.A. Mortimer & pers. comm. R.C. Bijoux).

3.5. Other Biological Studies Conducted on Leatherbacks in Foraging Areas

Genetic samples were retrieved from the two dead turtles washed ashore at Mahe in 2002 and 2003, and sent to Peter Dutton at the NMFS in the USA in effort to determine rookery of origin but to date, no results have been obtained (pers. comm. J.A. Mortimer).

3.6. Threats to foraging populations of leatherback turtles

Threats to foraging leatherback turtles in Seychelles are summarised in Table 1.

Table 1. Summary of threats to foraging populations of leatherback turtles in Seychelles

| **Threats at this site/area** | **Current occurrence** | | | **Historical occurrence** | | | |
|---|---|---|---|---|---|---|---|
| | **Low** | **Med** | **High** | **Unknown** | **Low** | **Med** | **High** |
| Directed take of leatherback turtles at sea | N/A | | | | | | |
| Trawl fisheries | N/A | | | | | | |
| Gillnet fisheries | | Yes? | | | | | |
| Longline fisheries | | Yes | | | | | |
| Other fisheries (state which ones) | N/A | | | | | | |
| Boat strikes | N/A | | | | | | |
| Plastics and other debris (at sea) | N/A | | | | | | |
| Industrial effluent | N/A | | | | | | |
| Inshore oil pollution | N/A | | | | | | |
| Natural threats/predation | N/A | | | | | | |
| Other (please describe) | N/A | | | | | | |

3.7. Fisheries Bycatch of Leatherback Turtles

*Hooked by long lines.*

According to reports made during interviews with several commercial fishermen (pers. comm. J.A. Mortimer) who have worked on long lining vessels, leatherback turtles regularly, but infrequently, suffer accidental entanglement in fishing gears. Typically they are accidentally hooked through the skin of various parts of their body including the neck, shoulders and flippers; and released as quickly as possible (see Table 2).

*Net Entanglement.*

One anecdotal report of a leatherback trapped in a fishing net on the boundaries of the Ste. Anne Marine National Park in the 1990′s but the rangers could not locate the animal to release it (pers. comm. J.A. Mortimer).

Cause of death of the two stranded leatherback carcasses is unknown, as there were no marks on the turtles. But, fishermen who were on site said that they thought it was likely the turtles had been entangled in fishing gear (pers. comm., J.A. Mortimer.)

Table 2. Summary of fisheries based threats to leatherback turtles in Seychelles

| **Type of fishery** | **Months of operation** | **Number of boats** | **Impact –** low, medium, high or unknown | **Reference** |
|---|---|---|---|---|
| Commercial Long Liners | | | Medium | J.A. Mortimer, Unpublished data based on interviews with fishermen |

3.8. Other activities being undertaken to improve conservation of leatherback turtles

Not applicable

## 4. Concluding Remarks

Given the relatively small size of the nesting leatherback population in the Indian Ocean, the incidental entanglement of leatherbacks in fishing gear - i.e., long liners & nets needs to be taken seriously and addressed accordingly (J.A. Mortimer Pers. Comm.).

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# Status of the leatherback turtle in Singapore

By C. H. Diong

**1. The legal protection status for leatherback turtles**

1.1 Overview

No specific laws have been enacted to protect marine turtles or marine life as an entire ecosystem. Laws to protect Singapore's wildlife were enacted in 1884. Today, all wildlife is protected by the Wild Animals and Birds Act, enforced in 1965. The Fisheries Act regulates the fishing industry, requiring persons who use fishing gear to obtain a license; the trapping of fish by explosives or poisons and the use of trawl nets are prohibited. Singapore became a signatory of CITES in 1986 and passed the Endangered Species (Import and Export) Act to implement the Convention. The Agri-Food and Veterinary Authority (AVA) Singapore is the Management Authority responsible for the implementation and enforcement of CITES in Singapore. All CITES violations pertaining to marine turtles or their products are managed by AVA Singapore. AVA have, in the past, intercepted several illegal consignments of green turtle and hawksbill turtle eggs (but not leatherback turtle eggs) by smugglers.

1.2 Management agencies responsible for marine turtle conservation

| **Operational level** | **Name and type of agency** |
|---|---|
| **National level** | National Parks Board Singapore |
| **State level** | **-** |
| **Local level** | **-** |

**2. Nesting populations**

2.1 Overview

There are no marine turtle nesting beaches in Singapore. No surveys for nesting marine turtles have been conducted in the past. Singapore however has its only leatherback turtle specimen, caught in 1883 in Singapore territorial waters, kept at the Raffles Museum of Biodiversity Research, National University of Singapore (Hanitsch 1908). No leatherback turtle had been sighted since.

**3. Foraging populations**

3.1) Details on any leatherback turtle census or tagging results such as tag recovery data

No studies on foraging leatherback turtles have been conducted in Singapore's waters. There is only one record of a leatherback turtle being sighted or caught in Singapore (Hanitsch 1908); on page 37, Hanitsch wrote: "The specimen in the Museum measures 5feet 9inches in its entire length. It was caught at Siglap, Singapore, in 1883 and presented by the Honourable A.M. Skinner".

3.2) Seasonality of leatherback turtles in coastal and offshore waters

No data available

3.3) Approximate size range of leatherback turtles

The leatherback turtle reported by Hanitsch in 1908 measured "5 feet 9 inches in its entire length"

3.4) Information on the diet of leatherback turtles

No data available

3.5) Other biological studies conducted on leatherback turtles in foraging areas

No biological studies have been conducted on leatherback turtles in Singapore

3.6) Threats to foraging populations of leatherback turtles

No threats have been identified or quantified

3.7) Fisheries bycatch of leatherback turtles and the fisheries involved
No fisheries bycatch of leatherback turtles by Singaporean fleets has been reported

3.8) Other activities being undertaken to improve the conservation of leatherback turtle foraging populations
No other activities have been planned to improve the conservation of leatherback turtles

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# Status of leatherback turtles in Somalia

By Rudy v.d Elst

**1. The legal protection status for leatherback turtles**

1.1) Overview

Somaliland - Protected.

Rest - protected under an old conservation act that is not implemented

1.2) Management agency responsible for marine turtle conservation in Somalia.

| | | |
|---|---|---|
| **Name of agency:** | Fisheries Department | Not Functional |
| **Type of agency:** | Ministry | (fisheries) |

**2. Nesting populations**

2.1) Overview

According to Nini (1937 [cited in Frazier (1982)] green turtle nesting occurred along much of Somalia's Indian Ocean coast. While Márquez (1990) stated that occasional nesting for leatherback turtles occurred in Somalia, there have been no recent records and the species is currently thought not to nest in Somalia.

2.2) Seasonality of leatherback turtle nesting

Seasonality of nesting by leatherback turtles in Somalia is unknown

2.3) Genetic studies on nesting populations of leatherback turtles

There have been no studies on population genetics of leatherback turtles in Somalia

2.4) Biological parameters

No biological parameters for leatherback turtles have been quantified in Somalia.

2.5) Pivotal temperature studies

There have been no studies pivotal temperatures or hatchling sex ratios of leatherback turtles in Somalia

2.6) Migration records of nesting leatherback turtles

There have been no recoveries of tags from leatherback turtles, however, turtle tag recoveries from green turtles tagged while nesting in South Africa have been recorded in fisheries by catch in Somalia (Frazier 1982).

2.7) Protection of nesting beaches (e.g. national parks)

There are no marine turtle nesting beaches that are protected. There is a protected zone around the Saardin Islands, and marine turtles are possibly turtles harvested here.

2.8) Use of hatcheries to protect marine turtle nests

There are no hatcheries used to protect marine turtle nests in Somalia

2.9) Threats to nesting marine turtles

The threats to marine turtles in Somalia are shown in Table 1.

2.10) Impacts of coastal development and/or sand mining on leatherback turtle nesting

There are no current impacts of coastal development, including sand mining on leatherback turtles in Somalia,

Table 1. Summary of threats to nesting marine turtles in Somalia (not necessarily for leatherback turtles).

| Threats at this site/area | Current occurrence | Historical occurrence & year of records |
|---|---|---|
| Exploitation of nesting females | Yes | Yes |
| Egg collection | Yes | Yes |
| Agricultural/urban/tourism development | No | No |
| Artificial lighting | No | No |
| Coastal erosion | No | No |
| Vehicles | No | No |
| Sand mining | No | No |
| Natural threats/predation | Storms | - |

2.11) Major existing threats to nesting leatherback turtles
Marine turtles, including leatherback turtles have been used as an important food source by coastal peoples.

2.12) Other biological studies on marine turtles
There have been no other biological studies on marine turtles in Somalia

2.13) Activities underway to improve the conservation of the nesting populations of marine turtles
There have been periodic studies and projects such as through IUCN/ORI.

**3. Foraging populations**

3.1) Details of leatherback turtle census or tagging results such as tag recovery data
There have been no leatherback turtle tagging projects in Somalia, nor have any leatherback turtles tagged elsewhere been caught in Somalia.

3.2) Seasonality of leatherback turtles in coastal and offshore waters
Unknown

3.3) Approximate size range of leatherback turtles occurring in your country
Unknown

3.4) Information on the diet of leatherback turtles
No information on the diet of leatherback turtles in Somalia is known

3.5) Other biological studies conducted on leatherback turtles in foraging areas
There have been non other biological studies on marine turtles in Somalia

3.6) Threats to foraging populations of marine turtles in Somalia
Fisheries bycatch is the main threat to marine turtles, including leatherback turtles in Somalia (Table 2). In particular foreign vessels (from neighbouring nations) fishing in Somalia's waters, artisanal gillnet fishery and the destruction of critical habitat by trawlers (Coffen-Smout 1998).

Table 2. Summary of the threats to foraging leatherback turtles in Somalia

| **Threats at this site/area** | **Current occurrence** | **Historical occurrence & year** |
|---|---|---|
| Exploitation of live animals at sea | Yes | Yes |
| Incidental capture in fisheries ”Targeted” using shark gill nets | Yes | Yes |
| Boat strikes | No | Mo |
| Plastics (at sea) | No | No |
| Industrial effluent | No | No |
| Inshore oil pollution | No | No |
| Natural threats/predation | None known | |
| Other (type in): | None known | |

3.7) Fisheries bycatch of leatherback turtles and the fisheries involved

| **Type of fishery** | **Season of operation** | **Approx number of boats/operators** | **Impact –** low, medium or high |
|---|---|---|---|
| Shark gill netting | All year - especially in March & November | Unknown but at around several hundred km of nets | Very high on all marine turtle species |

3.8) Other activities being undertaken to improve the conservation of leatherback turtle foraging populations

No other activities are currently being undertaken

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# Status of Leatherback turtles in Sri Lanka

By Thushan Kapurusinghe

**1. The legal protection status for leatherback turtles**

1.1. Overview

In Sri Lanka, marine turtles are legally protected under the Fauna and Flora Protection Ordinance, No 2 of 1937 and the Fisheries and Aquatic Resources Act, No 2 of 1996. In 1979, Sri Lanka entered into the CITES agreement which prohibits member nations from export or import of turtles and their parts and products. All five species of marine turtles and their eggs, both on land and sea, are completely protected by amendments to the Fauna and Flora Protection Ordinance in 1970 (for the Leatherback turtle) and by regulation in 1972 (for the other four turtle species). The punishments meted out to offenders have been increased by the Fauna and Flora Protection (Amendment) Act No 49 of 1993) (Parliament of the Democratic Socialist Republic of Sri Lanka, 1993).

Under Section 30 of the Fauna and Flora Ordinance (as amended), it is an offence to kill, wound, harm or take a turtle, or to use a noose, net, trap, explosive or any other device for those purposes, to keep in possession a turtle (dead or a alive) or any part of a turtle, to sell or expose for sale a turtle or part of a turtle, or to destroy or take turtle eggs. A person who commits any of these offences is liable to a fine of Rs 10,000 – 30,000 or to imprisonment of 2-5 years or to both.
Section 40 of the Fauna and Flora Protection Act prohibits export of a turtle, any part of a turtle or turtle eggs from Sri Lanka, except with the authority of a permit issued by the DWLC. Such a permit can be issued only for scientific purposes and not for trade in turtles or parts (which includes tortoise shell ornaments as well). Violation of this section carries a fine of Rs 20,000 – Rs 50,000 and/or a jail term of 5-10 years. Import of a turtle, any part of a turtle or turtle eggs, without a permit issued by the DWLC is an offence under Section 37 of the Fauna and Flora Protection Act, and if found guilty, liable to a fine of Rs 5,000 – Rs 10,000 and/or a jail term of 2-5 years (Parliament of the Democratic Socialist Republic of Sri Lanka, 1993).

In terms of Section 29 of the Fisheries and Aquatic Resources Act, regulations can be made to ban the capturing, landing, transportation, selling, buying, receiving or keeping in possession of any prohibited species of fish. The definition of “fish” in this Act is broad enough to include every aquatic animal, from mammals to invertebrates. An offence under this Section is punishable with a fine not exceeding Rs 3,000 and/or a jail term not exceeding 6 months. Section 30 (1) of this Act also empowers the minister in charge of the subject of Fisheries and Aquatic Resources to make regulations to prohibit or regulate the export from or import into Sri Lanka, of turtles or their derivatives (Parliament of the Democratic Socialist Republic of Sri Lanka, 1993).

1.2. Management agencies responsible for marine turtle conservation

| Operational level | Name and type of agency |
|---|---|
| **National level** | Department of Wildlife Conservation, National Zoological Department, Coast Conservation Department, Sri Lanka Customs, National Aquatic Resources and Development Agency, Marine Pollution Prevention Authority, Central Environmental Authority |
| **State level** | |
| **Local level** | |

**2. Nesting populations**

2.1) Overview

*Summary of historical evidence*

There is no historical evidence about the numbers of nesting females in various places. For the entire country, there is no leatherback turtle assessment done by any one. However some data can be found from the eggs collected in turtle hatcheries (Wickramasinghe 1982), as follows:

- Kosgoda turtle hatchery: Between the period of 10 Dec 1981 and 4 April 1982 this hatchery released 249 leatherback turtle hatchlings (4.8% from the total hatchlings they produced which represented other species)

- Bentota turtle hatchery: Between the period of 14 December 1981 and 4 April 1982 this hatchery reburied 275 leatherback turtle eggs (5.65% from the total eggs reburied which represented other species)

*Summary of current situation*
The locations of leatherback turtle nesting sites are shown in Figure 1. Recent leatherback turtle nesting numbers are shown in Table 1. Both TCP and NARA have done some data collection from various nesting beaches in Sri Lanka (TCP beach survey 1999). During the period of July 1995 and August 1996, NARA surveyed the beaches between Karathivu and Yala and stated that no nesting beaches remain in the Puttalam and Gampaha Districts. Some beaches of the Colombo, Kalutara and Matara districts are still occasionally visited by turtles including Leatherback turtles. Most of the important nesting beaches are located in the districts of Galle and Hambantota (Amarasooriya and Gunawardana1997). NARA has also classified the nesting beaches based on nesting frequencies (Amarasooriya 2000). According to the TCP data, Godawaya beach has the largest Leatherback nesting population. 333 Leatherback nests were reported between March 2001 and November 2001 and it was estimated 170 adult females of total nesting population use on the Godawaya beach (Ekanayake et al. 2002). For the entire season of 2005 only two leatherback turtle nests were recorded at Godawaya Beach which is abnormal. While it is too early to link it to the effects of the tsunami a lot of sand erosion has occurred due to the tsunami in Godawaya Beach. IUCN Sri Lanka has surveyed the beaches between Tangalle and Yala between the period of 2004 and 2005 and final report yet to be published.

Between 2000 and 2004 leatherback turtle eggs laid at Rekawa Beach and Bundala National Park were collected and reburied by the wildlife department but their data has not been analysed and published. There are occasional leatherback turtle clutches laid along beaches on the south western coast (around Kosgoda). However the entire beach is 4km in length and TCP monitors only 1km. Since 2003 TCP recorded only one leatherback turtle clutch in their 1km of beach, however there could have been more leatherback turtle nests laid along the other 3km of the beach and purchased by the hatchery owners.

Leatherback turtles mostly found to be nested on beaches located in dry zone of southern coastal line. Leatherback turtles nest in Godawaya in reasonable numbers and Kosgoda, Rekawa, Ussangoda, Kalametiya, Bundala, Yala are some of the other known nesting areas for Leatherback turtles. Numbers of nesting females have not been recorded accurately for many beaches. Groombridge (1985) estimated the nesting population to be several dozen but probably less than 100. However, Salm (1976) found 173 Leatherback nest excavations at Yala National Park between 9-13 June 1975 and 333 nests were estimated by TCP in 2001 at Godawaya (Ekanayake et al. 2002). IUCN's regional conservation strategy recognizes the Sri Lanka and the Andaman and Nicobar Islands of India as the last three areas in the region that have substantial nesting populations of Leatherback turtles (IUCN 2001).

Table 1. Results of the annual monitoring of leatherback nesting populations.

| Beach name | Latitude of beach | Longitude of beach | Year of survey | Annual number | Type of data (e.g. turtles, nests, eggs) | Reference |
|---|---|---|---|---|---|---|
| Duwemodara 0.5 km | | | 1997-1998 | NA | eggs | Ref 3. |
| Bandarawatta 1 km | | | 1997-1998 | NA | eggs | Ref 3. |
| Kosgoda 1.25 km | | | 1997-1998 | NA | eggs | Ref 3. |
| Rekawa 3.5 km | 06° 02' 36.0N to 06 ° 02' 39.5N | 80° 49' 53.7E to 80° 51' 33.0E | 1996 1997 1998 1999 2000 | 3♀&3N 7♀&10N 10♀&17N 11♀&13N 8♀&12N | Turtles and nests | Ref 3 & Ref 4. |
| Kahandamodara – Gurupokuna beach 3 km | 06° 03' 47.4N to 06° 04' 17.6N | 80° 53' 04.6E to 80° 55' 07.0E | 1997 1998 1999 | NA | Eggs & nests | Ref 3 & Ref 4. |
| Godawaya 3 km | 06° 06' 19.6N to 06 ° 06' 36.0N | 81° 01' 36.1E to 81° 03' 11.9E | 1997 1998 1999 2001 | 333 nests 170 females | nests | Ref 2, Ref 3 & Ref 4. |
| Ussangoda - welipatanwila 2 km | 06° 05' 24.1N to 06° 05' 59.6N | 80° 58' 53.5E to 80°59' 46.1E | 1997 1998 1999 2001 | NA | nests | Ref 2, Ref 3 & Ref 4. |
| Bundala 12 km | 06° 09' 28.9N to 06° 11' 46.3N | 81° 10' 59.2E to 81° 17' 45.6E | 1997 1998 | NA | nests | Ref 3 |
| Amadoova to Mahaseelava (in Yala NP) 4 km | 06° 17' 12.9N to 06° 18' 18.0N | 81° 25' 55.0E to 81° 27' 53.8E | 1982 | NA | eggs | Ref 5 |
| Gonalehebba to Kalliya Kalapuwa (in Yala NP) 3 km | 06° 21' 21.0N to 06° 21' 50.3N | 81° 30' 31.0E to 81° 32' 50.1E | 1982 | NA | eggs | Ref 5 |

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3. Amarasooriya (2000).
4. TCP Beach survey report (1999)
5. Wickramasinghe (1982).

2.2. Seasonality of leatherback turtle nesting

April to August (unpublished TCP data)

2.3. Population Genetic Studies of Nesting Leatherbacks

No genetics projects have been conducted on leatherback turtles in Sri Lanka

2.4. Biological parameters

Curved carapace length (CCL) and curved carapace width (CCW) were measured from all nesting leatherback turtles in Rekawa between 1996 and 2000 (Table 2). A sample of ten eggs was measured from each clutch. A sample of ten hatchlings was measured from each hatching emergence. Nesting behaviour was observed and recorded. Leatherback turtles were tagged in Rekawa.

Table 2. Summary of biological data collected from leatherback turtles in Sri Lanka

| Category of data | Average | Standard deviation | Range | Sample size | References |
|---|---|---|---|---|---|
| Size of nesting females | CCL:151.9cm<br>CCW:109.7cm | | | | TCP Unpubl. Data |
| Number of eggs per clutch | 100.5<br>82.8 | | | 30 nests<br>55 nests* | TCP. U.D |
| Clutches per season | No available data | | | | |
| Re-nesting interval (days) | No available data | | | | |
| Number of years between breeding seasons (years) | No available data | | | | |
| Size of eggs (cm) | 53.2 mm | | | 34 nests | TCP. U.D |
| Egg weight | 79.6 g<br>41.3 g | | | 33 nests<br>55 nests* | TCP. U.D |
| Size of hatchlings (cm) | Lth: 5.35 cm<br>Wth: 3.27cm | | | 55 nests* | TCP. U.D |
| Incubation success (%) | No available data | | | | |
| Incubation period | 59.6 days | | | 55 nests* | TCP. U.D |
| Average nest depth | 89.5 cm | | | 55 nests* | TCP. U.D |

Nesting times: Emergence: 14.8 Minutes, Body pit digging: 14.8 Minutes, Nest chamber digging: 21.2 Minutes, Egg laying: 11.6 Minutes, Egg chamber cover: 11.1Minutes, Body pit cover: 34.1Minutes, Return to water: 8 Minutes

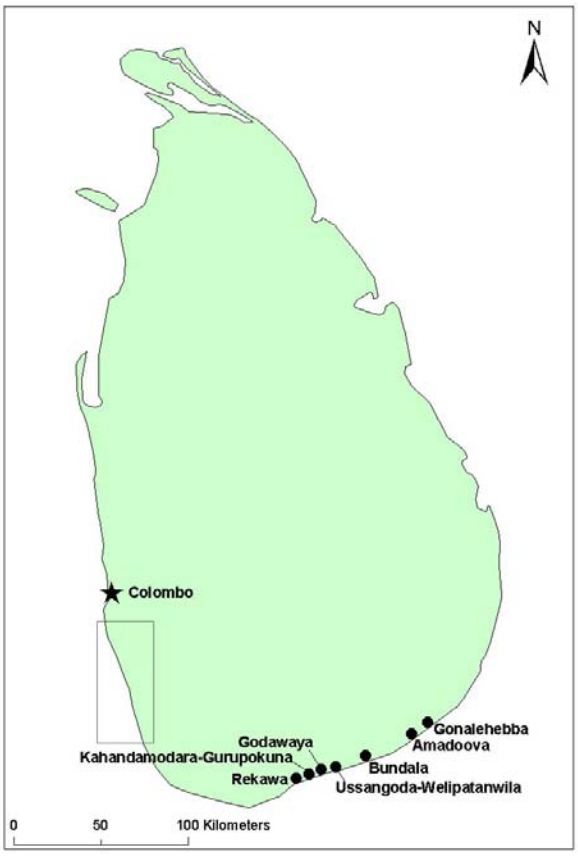


Figure 1. Locations of leatherback turtle nesting sites in Sri Lanka

* TCP unpublished data from Rekawa beach September 1996-July 2000.

2.5. Pivotal temperature studies
Data not available for Leatherbacks

2.6. Migration records for tagged nesting leatherback turtles
Data not available for leatherback turtles in Sri Lanka. No recaptures of tagged turtles other than returning to the same beach for laying eggs.

2.7. Protection of nesting beaches (e.g. National Parks)
*Existing protected nesting beaches*

| **Name of the beach(s)** | **Name of the National Park** |
|---|---|
| Bundala | Bundala National Park |
| Yala | Yala National Park |
| Wilpattu | Wilpattu National Park |

*Planned protection for nesting beaches*

| **Name of the beach(s)** | **Name of the planned National Park** |
|---|---|
| Rekawa | "Rekawa Marine Turtle Sanctuary" will be declared as a turtle sanctuary by the Department of Wildlife Conservation |

2.8. Use of hatcheries to protect leatherback turtle nests
Hatcheries are used to protect leatherback turtle nests.

*Summary*
Turtle hatcheries are mainly located in Bentota, Induruwa and Kosgoda areas. In 1994 the Turtle Conservation Project (TCP) surveyed 16 marine turtle hatcheries in Sri Lanka (Richardson 1996). In agreement with Hewavisenthi (1993), the subsequent report concluded that hatchery management practices were not contributing to the conservation of marine turtles effectively. The TCP report also included a draft proposal for the establishment of a hatchery licensing scheme to be implemented by the Department of Wildlife Conservation (DWLC) and the Ceylon Tourist Board (Richardson 1996).

Status of the existing turtle hatcheries along the West, South-West and Southern region has been investigated by NARA between the period of July 1995 and June 1996. The report says that the main reason or aim of all these hatcheries except two was income generation through tourist attraction (Amarasooriya 1996).

2.9. Threats to nesting leatherback turtles
*Summary of threats*
*Killing for meat*
The slaughter of marine turtles has been widely reported (Dattari and Samarajeewa 1982). Currey and Mathew (1995), report that reliable sources informed them about the slaughter of marine turtles in Beruwela, Trincomalee, Negambo, Chilaw and Kalpitiya areas.

*Egg collection*
The most widespread form of marine turtle exploitation is the illegal poaching of turtle eggs. Almost all marine turtle nests on Sri Lankan beaches are robbed of their eggs (Kapurusinghe 2000). The eggs are either sold at markets for consumption or to hatcheries. This means that few, if any, hatchlings return to the sea under natural conditions. Salm (1976), reported that the turtle nests are dug during the day time in full view of the public at Bentota in 1976.

*Beach erosion*
In many areas the coast is under the serious erosion. These result in the destruction of nesting habitats of marine turtles. Examples for sand mining can be given from Panadura, Lunawa, Angulana and Palliyawatta (CCD 1992).

*Incidental & intentional catch of turtles*
TCP has conducted a survey on turtle by-catch between 1999 and 2000. According to the results, of the 5241 turtles recorded as by-catch (entangled), 431 were Leatherback entanglements (Kapurusinghe and Cooray, 2002).

*Predators*
Feral dogs, water monitors, land monitors, jackals, wild boars, mongooses, some species of ants, crabs can be considered as natural predators for marine turtle eggs and hatchlings on nesting beaches in Sri Lanka (Kapurusinghe and Ekanayake 2000).

*Habitat loss*
Most of the nesting habitats in western province have either been developed for tourism, resulting in the beaches being floodlit at night, or have been subject to the construction of beach armoring which have rendered the beaches totally unsuitable for marine turtle nesting. Large hotels and restaurants adjacent to the beach create a lot of noise and light.

A summary of threats to leatherback turtles in Sri Lanka and their historical and current occurrence is presented in Table 3.

Table 3. Summary of the threats to nesting leatherback turtles in Sri Lanka

| **Threats at this site/area** | **Current occurrence** | | | **Historical occurrence** | | | |
|---|---|---|---|---|---|---|---|
| | **Low** | **Med** | **High** | **Unknown** | **Low** | **Med** | **High** |
| Exploitation of nesting females | | x | | | | | x |
| Egg collection | | x | | | | | x |
| Agricultural development | x | | | | x | | |
| Tourist development | | | x | | | | x |
| Urban development | | | x | | | | x |
| Industrial development | | | x | | | x | |
| Artificial lighting | | | x | | | x | |
| Coastal erosion | | | x | | | x | |
| Vehicles on the beach | x | | | | x | | |
| Sand mining | | x | | | | | x |
| Unregulated hatchery practices | | | x | | | | x |
| Natural threats/predation | | x | | | | x | |
| Other (please describe): | | | | | | | |

2.10. Impacts of coastal developments and/or sand mining on leatherback turtle nesting
Most of the beaches between Beruwala and Hikkaduwa have either been developed for tourism, resulting in the beaches being floodlit at night, or have been subject to the construction of beach armouring which have rendered the beaches totally unsuitable for marine turtle nesting. Large hotels and restaurants adjacent to the beach create a lot of noise and light. This disturbs nesting female turtles and disorients hatchlings when they emerge.

2.11. Major existing threats to marine turtles
See Table 4.

2.12. Other biological studies conducted on leatherback turtles
No other biological studies have been conducted except those mentioned earlier.

Table 4: Main threats to leatherback turtles in Sri Lanka

| | |
|---|---|
| **Priority 1** | Turtle by-catch in fishing gear |
| **Priority 2** | Turtle egg collection |
| **Priority 3** | Habitat loss |
| **Priority 4** | Nesting female exploitation |
| **Priority 5** | Coastal Development (Including tourism industry) |

## 3. Foraging populations

3.1. Details of any leatherback turtle foraging census or tagging results.

There have been no tagging studies or population census work conducted in Sri Lanka on leatherback turtles.

3.2. Seasonality of leatherback turtles in coastal and offshore waters

Data not available

3.3. Approximate size ranges of leatherback turtles

Data not available

3.4. Information on diet of leatherback turtles

Data not available

3.5. Other biological studies conducted on leatherback turtles in foraging areas

No other studies have been conducted.

3.6). Threats to foraging populations of leatherback turtles

The main documented threat is the by-catch in fishing gear (Kapurusinghe and Cooray 2002)

A summary of existing and historical threats to foraging populations of leatherback turtles in Sri Lanka is presented in Table 4.

Table 4. Summary of threats to foraging leatherback turtles in Sri Lanka

| **Threats at this site/area** | **Current occurrence** | | | **Historical occurrence** | | | |
|---|---|---|---|---|---|---|---|
| | **Low** | **Med** | **High** | **Unknown** | **Low** | **Med** | **High** |
| Directed take of leatherback turtles at sea | x | | | | | | x |
| Trawl fisheries | | | | | | | |
| Gillnet fisheries | | | x | | | x | |
| Longline fisheries | x | | | | x | | |
| Other fisheries (state which ones) | | | | | | | |
| Boat strikes | x | | | x | | | |
| Plastics and other debris (at sea) | | x | | | x | | |
| Industrial effluent | | x | | | x | | |
| Inshore oil pollution | x | | | | x | | |
| Natural threats/predation | | | x | | | x | |

3.7. Fisheries bycatch of leatherback turtles and the fisheries involved

Between 1999 and 2000 a bycatch survey was conducted in 16 main fishing ports in Sri Lanka. A total of 13 760 interviews were conducted with the aim of quantifying fisheries related bycatch. In total 5241

turtles were recorded as being caught by fishers. This comprised 431 leatherback turtles (8% of all bycatch) (Table 2 and 3; Kapurusinghe and Cooray 2002).

Table 2. Results of TCP turtle By-catch survey conducted in Sri Lanka between 1999 and 2000; Numbers of each species caught per each fish landing site (to see the full dataset see Kapurusinghe and Cooray 2002)

| ***Survey site*** | ***No. ?*** | ***Dc*** | ***Total*** |
|---|---|---|---|
| 1 Beruwala | *699* | 36 | 120 |
| 2 Chilaw | *591* | 1 | 29 |
| 3 Colombo | *881* | 9 | 142 |
| 4 Dondra | *481* | 6 | 51 |
| 5 Galle | *1421* | 40 | 2055 |
| 6 Hambantota | *1395* | 2 | 8 |
| 7 Kandakkuliya | *608* | | 107 |
| 8 Kirinda | *655* | 32 | 629 |
| 9 Kottegoda | *1176* | 115 | 213 |
| 10 Mirissa | *922* | 106 | 501 |
| 11 Morogalla | *885* | | 9 |
| 12 Negombo | *1429* | 1 | 654 |
| 13 Panadura | *350* | 14 | 27 |
| 14 Tangalle | *1030* | 24 | 192 |
| 15 Wadduwa | *229* | 1 | 16 |
| 16 Weligama | *1008* | 44 | 488 |
| **Total** | ***13760*** | **431** | **5241** |

Table 3. Summary of the fisheries based threats to leatherback turtles in Sri Lanka

| **Type of fishery** | **Months of operation** | **Number of boats** | **Impact –** low, medium, high or unknown | **Reference** |
|---|---|---|---|---|
| Gillnet fishery | Seasons vary according to locations | Over 100,000 | Very high | (Kapurusinghe and Cooray 2002) |

3.8. Other activities being undertaken to improve the conservation of leatherback turtle foraging populations

Turtle Conservation Project (TCP) has conducted a turtle by-catch reduction educational programme for fishermen and produced a by-catch reduction educational poster.

## 4. Conservation Actions

Summary of conservation actions being undertaken to address threats to leatherback turtles in Sri Lanka

| **Areas of change** | **Summary including report references** |
|---|---|
| Action/recovery plans | National action plan will be published soon |
| Awareness raising programmes | TCP will continue its educational programmes |
| Research activities | Wildlife Department, NARA, TCP, IUCN will conduct more research |
| Managed turtle based tourism | TCP continues conducting managed turtle night watch programmes in Rekawa and Kosgoda |
| Annual nesting beach surveys | TCP will conduct more beach surveys in Kahandamodara area |
| Managed hatcheries | After the action plan |
| Planned protected areas | Rekawa beach will be declared as a turtle sanctuary |

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# Status of leatherback turtles in South Africa

By Ronel Nel

**1. The legal protection status for leatherback turtles**

1.1 Overview

Regulation 58(7) of the MLRA (1998) exercise control over turtles as a marine living resource providing full protection of turtles and their products in South Africa namely; specifying that: *No person shall, except on the authority of a permit, engage in fishing, collecting, killing, attempting to kill, disturbing, harassing, keeping or controlling of, or be in possession of, any turtle or any part or product thereof at any time.*

1.2 Management agency responsible for marine turtle conservation in South Africa

**Name of agency:** Legislative Responsibility – Marine & Coastal Management*

**Type of agency:** Government Department

* MoU with Ezemvelo KwaZulu-Natal Wildlife to perform tasks in the province, although not yet a specific MoU for turtles, EKZNW has been the almost exclusively involved in marine turtle conservation activities for the last four decades.

**2. Nesting populations**

2.1) Overview

The South African leatherback turtle nesting population and beaches have been described by Hughes (1974a, b and 1996). Briefly, the leatherback turtle nesting beaches in South Africa stretch for nearly 200km south from the Mozambique border. The beaches are mostly silica sand beaches rising steeply and reaching heights of 100m above sea level (Hughes 1996). The methods used in the annual nesting beach census have been standardised and a 56km section of beach (north and south of Bhanga Nek) is used as a standard index beach and this index beach is monitored nightly by EKZNW staff (see Figure 1 for example of the index beach and its relative numbers of nests). A combination of foot and vehicle patrols is used each night to collect data on nesting turtles. The leatherback turtle population in South Africa was reviewed in 1996 including data up to the 1994/1995 nesting season and then by Hughes in 1998 (Hughes 1996 and Figure 2). Results from the 32 years of monitoring reported in 1996 show a steady increase in the number of leatherback turtles nesting annually along the 56km index beach (Hughes 1996). Data from 1995 until 2004 was obtained from Nel and Papillion (2005) to update this figure.

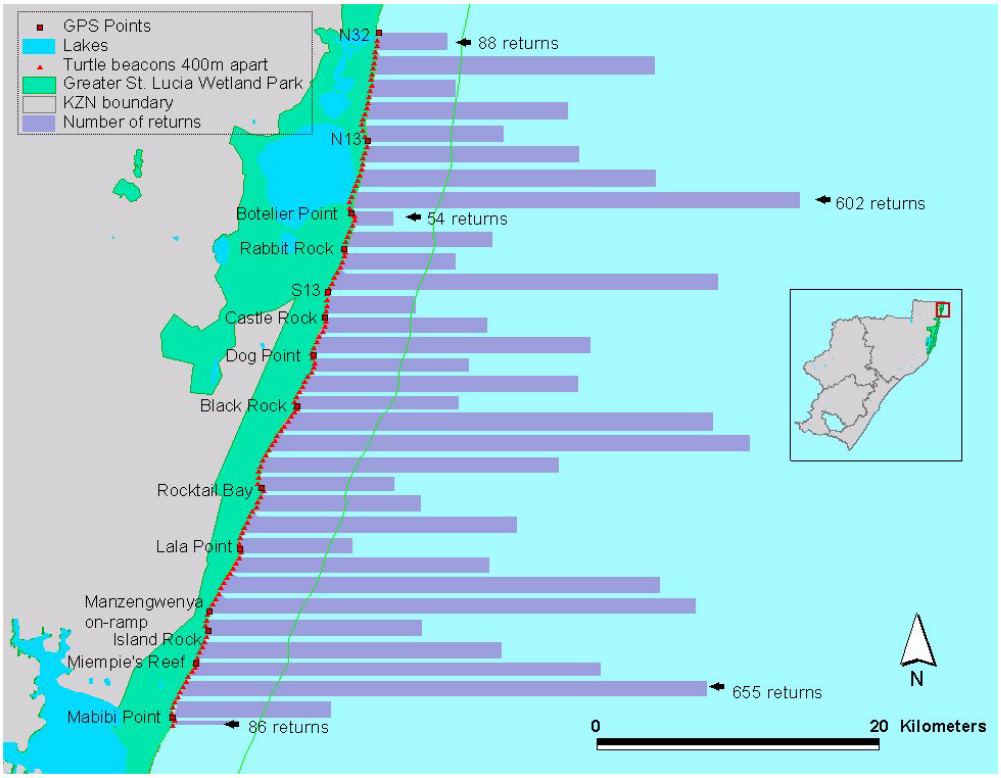


Figure 1. Summed distribution of leatherback turtles between 1965 – 2003. The distance from north to south is ~ 65km with each bar indicating number per 1mile (1.6km).

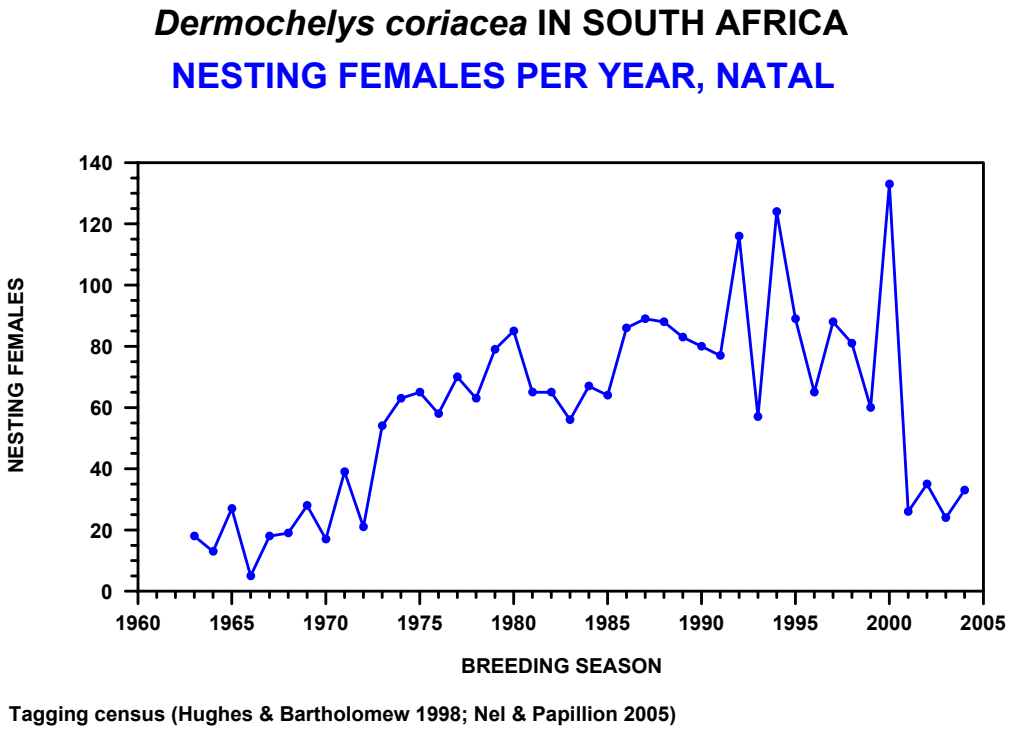


Figure 2. Number of nesting females recorded from the KwaZulu-Natal Wildlife index beach from 1963 until 2004

2.2) Seasonality of leatherback turtle nesting

The nesting season for leatherback turtles in South Africa occurs from October to mid February. Hatching occurs through until the end of March (Hughes 1996).

2.3) Population genetic studies on leatherback turtles

No genetic studies have been conducted on leatherback turtles in South Africa

2.4) Biological parameters

*Curved carapace length*

Hughes (1996) reports that average size of nesting leatherback turtles declined from 1964 to 1968 compared with 1995 and 1995, and speculates that this decline could reflect more smaller and younger females in the population.

*Remigration*

Remigration intervals (n = 513) recorded from 1969/1970 through until 1993/1994 range from 1 to 12 years (Hughes 1996). The remigration intervals are dominated by two (44.8%) and three (29.2%) year periods, with a small number of females breed in consecutive years (1.9%) (Hughes 1996). Furthermore, Hughes (1996) also present data on the variability of remigration intervals for 123 nesting leatherback turtles that were recorded between 1969/1970 and 1993/1994, it is clear from this data that leatherback turtles show considerable variation in reproductive periodicity.

2.5) Pivotal temperature studies

No studies on pivotal temperatures or sex ratio have been conducted on leatherback turtles in South Africa

2.6) Migration records

Tag returns for leatherback turtles are scarce, Hughes (1996) report six tag returns for Tongaland leatherback turtles away from the nesting beaches. Two of these returns are in Mozambique, one from Madagascar and three in South Africa (Indian Ocean Coast). All recaptures were within the breeding season for leatherback turtles and were caught at distances between 250km and 2600km away from the nesting beach (Hughes 1996). Satellite telemetry of three leatherback turtles tagged while nesting at Maputaland Marine Reserve was conducted between 1996 and 1999 in collaboration with Paolo Luschi at Piza University (Figure 2; Hughes et al. 1998; Luschi et al. 2003).

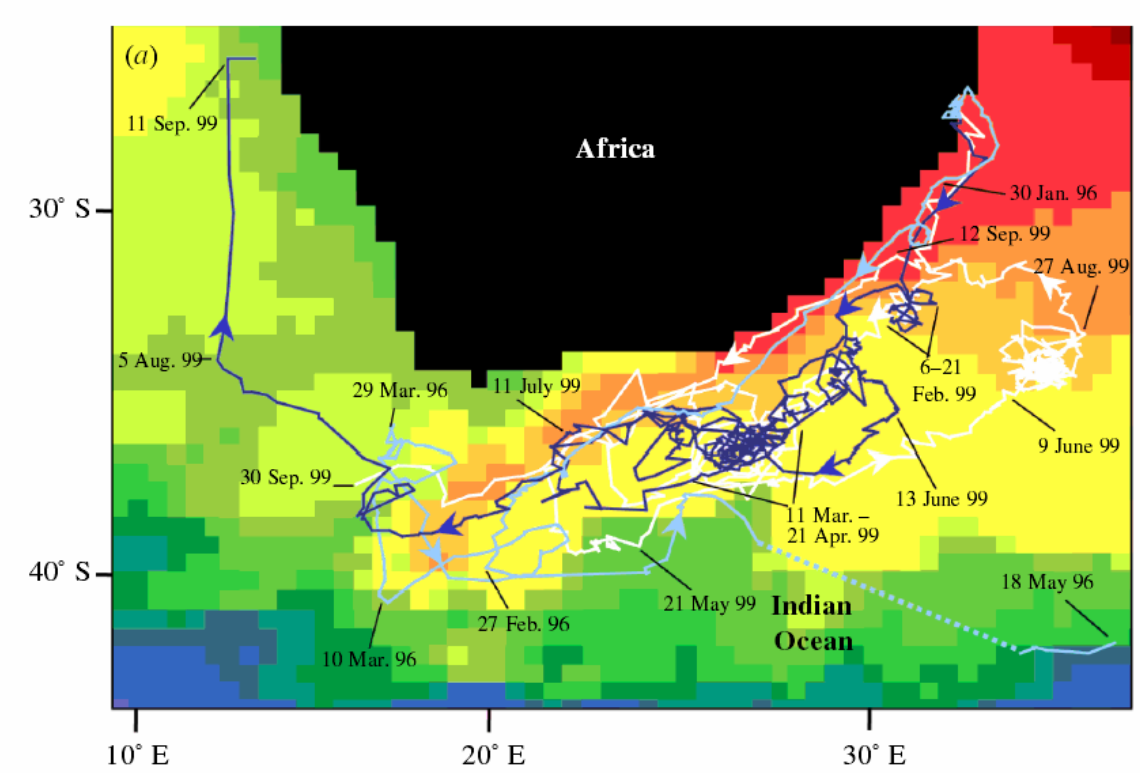


Figure 2. Reconstructed migration paths and low resolution sea surface temperatures of post nesting leatherback turtles tracked via satellite telemetry (Figure from Luschi et al. 2003 Proc. Roy. Soc. Lon.)

2.7) Protection of nesting beaches (e.g. national parks)
The entire nesting area for leatherback turtles (~ 200 km of nesting area) is within a World Heritage Site (Greater St Lucia Wetland Park) of which ~ 50km is currently within Sanctuary areas. Occasional nesting ~ 6-15 individuals per year have been recorded nesting outside of the Park.

2.8) Use of hatcheries to protect marine turtle nests
No hatcheries are used in South Africa to protect leatherback turtle nests

2.9) Threats to nesting leatherback turtles
A summary of the threats to nesting leatherback turtles is presented in Table 2.

2.10) Impacts of coastal development and/or sand mining on leatherback turtle nesting
There are no coastal developments or sand mining impacts to nesting populations of leatherback turtles in South Africa.

2.11) Major existing threats to nesting leatherback turtles
The main threats to nesting populations of leatherback turtles in South Africa are boat strikes, shark nets and long-line fishing (see section 3.6/3.7).

2.12) Other biological studies conducted on leatherback turtles
Long term monitoring of the dive behaviour of two leatherback turtles was investigated by Sale et al. (2006).

2.13) Other activities underway to improve the conservation of nesting populations of marine turtles
Annual tagging projects are conducted by the EKZNW throughout the index section of the beach to monitor the nesting populations of leatherback and loggerhead turtles. See section 3.8

Table 2. Summary of threats to nesting populations of leatherback turtles in South Africa

| Threats at this site/area | Current occurrence | Historical occurrence & year of records |
|---|---|---|
| Exploitation of nesting females | Incidental <1pa[1] | Substantial until ~1960. No quantitative data*. |
| Egg collection | Incidental <5 nests pa[1] | Assumed substantial. |
| Agricultural/urban/tourism development | Tourism developments | |
| Artificial lighting | Four areas (< 100m each) | |
| Coastal erosion | High-energy coastline; varies seasonally. | High-energy coastline; varies seasonally. |
| Vehicles | < 10 Vehicles per night: concession, management & media. Single recreational use are (1.5 km where there is impact) | Very heavy use of vehicles between ~ 1970 – 2000 (e.g. Figure 3). |
| Sand mining | No | No |
| Natural threats/predation | Relatively low: honey badgers, ghost crabs & feral dogs, side striped jackals (*Canis adjustus*)[#]. | Relatively low: honey badgers, ghost crabs & feral dogs. |

*The original monitoring area (1963-1967) and current monitoring area do not correspond in size. Numbers of nests are therefore not directly comparable.
[#] Side striped jackals (*Canis adjustus*) were first noticed depredating turtle nests in 1994/1995 (Hughes 1996).
[1.] Nel and Papillion (2005)

Figure 3. Picture of vehicle use during peak holiday season. Historically it was an extended area, now it is restricted to ~ a few kilometres out of the entire 200km stretch.

**3. Foraging populations**

3.1) Details of leatherback turtle foraging area census or tagging results such as tag recovery data

No foraging population census has been conducted on leatherback turtles in South Africa. However, it is suspected that the Atlantic coast of South Africa is a foraging area for both the east coast population (see Figure 2) as well as central and northern African leatherback turtles.

3.2) Seasonality of leatherback turtles in coastal and offshore waters

Leatherback turtles are most often seen during October to April in both the Atlantic and Indian Ocean coasts of South Africa.

3.3) Approximate size range of leatherback turtles caught or seen in foraging areas
The size range of leatherback turtles in South Africa is between 120 – 200 cm curved carapace length (CCL) (Hughes 1996)

3.4) Information on the diet of leatherback turtles
No new information since Hughes (1972).

3.5) Other biological studies conducted on leatherback turtles in foraging areas
No other biological studies have been conducted on leatherback turtles in South Africa

3.6 & 3.7) Fisheries bycatch of leatherback turtles and the fisheries involved.

| **Type of fishery** | **Season of operation** | **Approx number of boats/operators** | **Impact –** low, medium or high |
|---|---|---|---|
| Bather protection (shark-nets) | Year-round | 27 km of gill-nets along 62 beaches, 39 localities | Low: between 2- 11 turtles per annum ( 1993 to 2004) with approx. 50% mortality rates (Nel and Papillion 2005) |
| Pelagic Long-lining | Year-round (?) | 23 SA Operators | 60-90 leatherbacks pa* |

* Some turtles are released alive with the hooks still in it; no idea about the survival rates afterwards.

3.8) Other activities being undertaken to improve the conservation of leatherback turtle foraging populations

- Experimentation in the long-lining fishery with circle hooks is soon to start.
- Shark protection nets are serviced daily to release live trapped animals.

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# Status of leatherback turtles in Sudan

By Nicolas Pilcher

**1. Introduction**
The Sudanese Red Sea coast is approximately 750 km long, inclusive of bays and inlets, extending from 18ºN at the Eritrean border to 22ºN at the Egyptian border. In most parts of the Sudanese Red Sea water transparency is very high, reaching up to 70 m. Surface temperatures range between 26.2 and 30.5 °C, and salinity is high (39 - 41 p.p.t.). From May to October, surface currents flow in a southerly direction, and for the rest of the year they flow northwards.

Most of the coast is bordered by fringing reefs 1 - 3 km wide, and not favourable nesting habitat for leatherback turtles, even though the reefs are separated by deep channels from a barrier reef of 1 - 14 km offshore, and the outer barrier drops steeply to several hundred meters depth. Port Sudan is the largest coastal city with a population of ca. 390,000. At present Sudan's natural resources of the Red Sea are under-exploited due to a lack of marketing, transport facilities and cold storage. There is no offshore oil exploitation and the contribution of fisheries and tourism to the GNP is < 3 %, and subsistence fisheries are only locally important. The primary industries are maritime shipping and port-related activities. Fisheries play a minor role in the economy at the national level, but are important at a subsistence level along the coastal area.

**2. The legal protection status for leatherback turtles**
2.1 Overview
Sudan is a signatory to a number of international conventions and agreements that promote marine conservation. National legislation in Sudan is not believed to address turtles *per se*, but indirectly supports pollution control measures and navigation.

Sudan has ratified the following Conventions and Protocols relevant to marine turtles: Convention Concerning the Protection of the World Cultural and Natural Heritage (1974); Convention on Biological Diversity (1995); Convention on International Trade in Endangered Species of Wild Fauna and Flora (1982); Regional Convention for the Conservation of the Red Sea and Gulf of Aden Environment (1984); United Nations Convention on the Law of the Sea (1985).

Several national legislative frameworks are in place that relate indirectly to turtles: the Sudanese Fishery Ordinances and Regulations (1937, amended in 1975 and 1978); the Environmental Health Act (1975); the Marine Fisheries Ordinance (date unknown to the author). Al-Mansi et al. (2003) suggest all turtles receive legal protection, but do not cite it specifically. A new Maritime Law has been drafted by the Maritime Administration and is awaiting approval and implementation, and the Comprehensive National Strategy commits Sudan to the pursuit of sustainable development and environmentally sound resource management.

2.2 Management agencies responsible for marine turtle conservation
Sudan has much of the infrastructure needed for regular monitoring and effective management of marine resources. There exist research organisations (based at the universities) that have carried out brief research on turtles in the past, and government agencies (such as the Navy) which provide a limited degree of enforcement. Many of the present problems faced by turtles can be attributed to a widespread lack of law enforcement, a lack of awareness among law enforcement authorities, a weak legal framework, and the absence of surveillance. Recently, power was transferred from the central government to federal states. The new system is not yet well established, resulting in an unsatisfactory legal situation and inadequate enforcement of existing regulations.

The Sudan Marine Conservation Committee (SMCC) is an institution with representatives from all government institutions, the private sector, and NGOs concerned with the Red Sea environment. It played

an important role in raising awareness and in formulating regulations on marine conservation, particularly in the 1970s.

The following institutions are involved in management of coastal and marine areas and resources:

1. The Ministry of Environment and Tourism, established in 1994 with the mandate of co-ordinating environmental conservation and promoting tourism (under its umbrella it includes the Higher Council for the Environment and Natural Resources (HCENR), which is the technical branch in charge of co-ordination, policy making, and international co-operation; the National Tourism Corporation, which is responsible for planning and promotion of tourism; the General Administration for Wildlife Conservation, which is charged with the protection and management of wildlife, including protected areas)
2. The Ministry of Animal Wealth: In charge of animal production and fisheries, and includes the Marine Fisheries Administration, which manages fisheries resources and controls the observation of fisheries regulations; the Marine Fisheries Research Centre, which provides scientific information for the management of fisheries resources; and the Wildlife Research Centre, in charge of providing the scientific background for wildlife conservation and management.
3. The Ministry of Defence is in charge of the Naval Forces in the Red Sea area. The Navy is responsible for the security in the coastal and marine areas. The Navy has a boat and two soldiers stationed at Sanganeb Marine National Park.
4. The Ministry of Interior is in charge of the Police Forces. The Wildlife Force is under administrative supervision of this Ministry.

**3. Nesting populations**

The results of a questionnaire in 2003 which targeted fisherman, coastal villagers, maintenance workers at the light house at Hindy Qider Island, shell collectors and the Sudanese Army suggested that green turtles *Chelonia mydas*, hawksbill turtles *Eretmochelys imbricata*, loggerhead turtles *Caretta caretta* and leatherback turtles *Dermochelys coriacea* can be found at sea, but only the first three nest on the offshore islands (Al-Mansi et al. 2003).

**4. Foraging populations**

4.1 Overview

Leatherback turtles are known to occur in the Red Sea (e.g. Frazier et al. 1987), but no nesting has yet been recorded on any Red Sea-bordering nation. The fact that they are seen in Sudan's waters is evidenced by their having a distinct local name, *Abo-Herab*, but no quantitative records are available of the frequency of sightings at sea. No studies of any kind have been carried out on nesting or foraging leatherback turtles in Sudan. There are no known sanctioned sea turtle hatchery programmes of any kind, or any focussed conservation actions aimed at the leatherback turtle in Sudan.

4.2 Threats to leatherback turtles

Due to the limited industrial development along the Sudanese coastline, threats are localised at the few urban centres. Turtles are threatened by maritime shipping, dredging and artisanal fishing. The most severe threats to turtles come from accidental capture by the limited fisheries. The large-scale shark fisheries by foreign vessels produce large amounts of bycatch, including turtles, which are discarded, invariably dead. Turtles are not reported as being commercially landed (Sanders and Kedidi, 1981; Mishrigi, 1993). Illegal take of marine turtles by fisherman and egg poaching continues at a low rate (Al-Mansi et al. 2003).

4.3 Protection of foraging areas

The only marine protected area in Sudan is the Sanganeb Marine National Park (19°45'N 37°25'E), established in 1990. This is a 12 $km^2$ atoll with highly diverse and complex coral reefs, diverse reef-associated fauna. There are five proposed marine protected areas, of which four contain coral reefs: Shuab Rami, which covers ca. 4 $km^2$ and contains coral reefs and unique associated fauna including sharks and marine mammals; Mukkawar Island and Dungonab Bay, which cover ca. 300 $km^2$ and are home to coral reefs, whale sharks, and the largest aggregations of manta rays in the Red Sea; Suakin

archipelago, which contains coral reefs with a diverse fish fauna, and is nesting site for marine turtles and sea birds, and Abu Hashish, which covers ca. 5 $km^2$ and also contains coral reefs and associated fauna.

4.4. Gaps in capacity and requirements for improved conservation

A major problem in conservation of turtles is funding for research and management efforts. The recent revival of PERSGA (PERSGA 1997; 1998) and the injection of GEF funding have meant there was some research and training, but enforcement will remain at its present state. Additionally there are political obstacles within the government: the General Administration for Wildlife Conservation is charged with the protection and management of wildlife, including protected areas. However, it is still lacking experience in marine issues, and its efficiency is hampered by the fact that it is technically under the Ministry of Environment and Tourism, but administratively under the Ministry of Interior (employees are part of the police force). Finally, there are a few logistical constraints which combine to make turtle conservation ineffective. For instance, a number of important legal instruments still await ratification (the National Maritime Law and the marine conservation laws drafted by the Sudan Marine Conservation Committee); and the Faculty of Marine Science and Fisheries of the Red Sea University and the Suakin Marine Laboratory have conducted small and limited research on a few selected nesting beaches, but these projects are limited in scope and intermittent. No temporal studies take place in Sudan, providing little indication of changes to populations over time.

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# Status of leatherback turtles in Thailand

By Maitree Duangsawasdi

**1. The legal protection status for leatherback turtles**

1.1 Overview

The legislation and regulation items that protect leatherback turtles in Thailand are listed as follows

1. Fisheries Acts, B.E.2490 (1947).
2. National Park Acts, B.E.2504 (1961).
3. Acts on Export and Import for trade, B.E.2522 (1979).
4. The acts on Protection and Preservation of wild fauna, B.E.2535 (1992).
5. Treaties on Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

*Fisheries Acts, B.E.2490 (1947)*

1. Section 2 (7), declared by the Ministry of Agriculture and Cooperatives on the 14 April (1947), states that catching, entrapping, luring, harming, or killing of every species of marine turtle and hawksbill turtles are strictly forbidden. If those turtles were caught as by-catch or accidentally trapped with any kinds of fishing equipment, they must be released immediately. Moreover, collecting and harming of marine turtle eggs of all species on all beaches are forbidden.
2. According to section 60, declared by the Ministry of Agriculture and Cooperatives on the 16 April (1996), all shrimp trawls in the fishery areas have to be equipped with Turtle Exclusion Devices (TED). This is for all fishermen using trawls in areas where marine turtles are residing, the attachment of TED or similar apparatus could potentially reduce marine turtle mortality.

*National Park Acts, B.E.2504 (1961)*

A Royal Decree has been declared to announce that 14 groups of islands have become National Parks. Thus, protecting marine turtles and their habitats. Sections 16 and 18 are good references for the decree, which raise several important points:

Section 16 (2): Collecting or taking away resources by all means that could potentially harm or degrade qualities of wood, amber, rubber oil, pine oil, mineral, and other resources.
Section 16 (3): Taking away or harming animals in any way.
Section 16 (13): Permission from National Park officers must be sought prior to entering areas for all purposes, such as tourist business, which could effect turtle habitats and nesting beaches.
Section 16 (16): Shooting or exploding devices that harm marine turtles and their habitats is banned.
Section 16 (18): Disposing of rubbish and waste materials is forbidden outside provided areas.
Section 18: While staying in the National Parks patrons or users must obey the officers, who in turn abide by the rules Park's which are written and approved by a director-general and a minister, respectively.

*Acts on Export and Import for trade, B.E.2522 (1979)*

1. The Ministry of Commerce wrote and approved article 14(B.E.2526 (1983)) which announces that official permission must be given before international trade hawksbill turtle, green turtle, loggerhead turtle, leatherback turtle, and olive ridley turtle can occur.
2. Similarly, Article 24(B. E.2526 (1983)), written by the Ministry of Commerce, announces that carcasses of olive ridley turtle are protected and permission must be sought and provided before trading into or out of the country can occur.
3. The Ministry of Commerce has also approved article 58(B.E.2534 (1991)), which is an act for protecting and conserving wild animals from extinction according to CITES Convention on International Trade in Endangered Species of Wild Fauna and Flora. As mentioned in section 5 of the Act on international trade of green turtle, hawksbill turtle, and olive ridley turtle are classified as products that need permission before exporting.

*The Acts on Protection and Preservation of wild fauna, B.E.2535 (1992)*
These Acts aim to protect and preserve wild fauna species by announcing that owning, trading, hunting, breeding, and importing-exporting of wild fauna and their extractions are forbidden.

Wild fauna are divided into 4 categories
1. Preserved species
2. Protected species
3. Protected species that could be traded
4. Wild fauna species under CITES lists

Hawksbill turtle, green turtle, leatherback turtle, olive ridley turtle, and loggerhead turtle are categorized as protected species.

1.2) Management agencies responsible for marine turtle conservation

| **Operational level** | **Name and type of agency** |
|---|---|
| **National level** | Department of Marine and Coastal Resources**,** Department of National parks , Department of Fisheries |
| **State level** | |
| **Local level** | Maikhao Marine Turtle foundation, Phuket Province |

**2. Nesting populations**
2.1 Overview
*Historical nesting by leatherback turtles*
The important areas of leatherback turtle's nesting were along the west coast of Phrathong Island, Thaimuang beach and the west coast of Phuket Island.
- Kata beach, Patong beach, Phuket Province
- Niyang beach, Suanmaprow beach, Maikhao beach, Phuket Province
- Tanun beach, Natoi beach, Phanga province
- Thaimuang beach and Phrathong beach, Phanga Province

At these locations beach patrols and survey were conducted between October and March each year between 1977 and 1983 (Chantrapornsyl 1987; Chantrapornsyl 1996; Chantrapornsyl et al. 1997).

*Current nesting by leatherback turtles*
The important areas of leatherback turtle's nesting are along the west coast of Phuket and Phanga Province (see Figure 1).
- Niyang beach, Suanmaprow beach, Maikhoa beach, Phuket province
- Thaimuang beach and Phrathong beach, Phanga Province

Beaches are monitored during nesting season (November-February) by the Maikhao Marine Turtle foundation, Phuket Province (Chuntrapornsyl 2001).

Table 1. Nesting records of leatherback turtles in Thailand. * refers to unpublished records from the Phuket marine biological centre.

| Beach name | Latitude of beach | Longitude of beach | Year of survey | Annual number | Type of data (e.g. turtles, nests, eggs) | Reference |
|---|---|---|---|---|---|---|
| Mai Khao beach, Phuket Province | 8.133N | 98.288E | 1996 | 17 | Nests | PMBC* |
| | | | 1997 | 3 | | |
| | | | 1998 | 3 | | |
| | | | 1999 | 3 | | |
| | | | 2000 | 16 | | |
| | | | 2001 | 13 | | |
| | | | 2004 | 14 | | |
| | | | 2005 | 1 | | |
| Naiyang beach, Phuket Province | 8.142N | 98.298E | 1993 | 2 | Nests | PMBC |
| | | | 1994 | 4 | | |
| | | | 1996 | 1 | | |
| Thai Muang beach, Phanga Province | 8.354N | 98.259E | 1989 | 3 | Nests | PMBC |
| | | | 1990 | 11 | | |
| | | | 1991 | 5 | | |
| | | | 1992 | 11 | | |
| | | | 1993 | 15 | | |
| | | | 1996 | 5 | | |
| | | | 1997 | 6 | | |
| | | | 1998 | 18 | | |
| | | | 1999 | 4 | | |
| | | | 2000 | 2 | | |
| | | | 2001 | 8 | | |
| | | | 2002 | 1 | | |
| | | | 2004 | 4 | | |
| | | | 2005 | 2 | | |
| Phrathong beach, Phanga Province | 8.956N | 98.265E | 1993 | 3 | Nests | PMBC |
| | | | 1996 | 1 | | |
| | | | 1997 | 3 | | |
| | | | 1999 | 7 | | |

2.2) Seasonality of leatherback turtle nesting
October to March (Phasuk 1992)

2.3) Genetic studies on nesting populations of leatherback turtles
No genetic studies have been conducted on the nesting leatherback turtles in Thailand.

2.4) Biological parameters
No biological data have been published for the nesting population of leatherback turtles in Thailand

2.5). Pivotal temperature studies
No studies on pivotal temperatures have been conducted in Thailand

2.6) Migration records of nesting leatherback turtles
There are no records of migration for leatherback turtles that were tagged while nesting in Thailand. Nor have any females tagged elsewhere been recorded nesting in Thailand.

2.7) Protection of nesting beaches
Two beaches are currently protected as National Parks; Thaimuang Beach which is within the Thaimuang-Koalumpee National Park, Phanga Province and Niyang, Maikhoa Beach which is within the Sirinat

National Park, Phuket Province. There are no planned national parks in any of the other leatherback turtle nesting locations.

2.8) Use of hatcheries to protect marine turtle nests
Hatcheries are not used to protect leatherback turtle nests

2.9) Threats to nesting leatherback turtles
The main threats to nesting populations of leatherback turtles that have been documented are; tourist infrastructure development, incidental catch fisheries, degradation of nesting beach and foraging habitats and the illegal trade on eggs and meat (see Table 2; Chantrapornsyl et al. 1997; Adulyanukosol and Ruangkaew 2002).

Table 2. Summary of the threats to nesting leatherback turtles in Thailand

| **Threats at this site/area** | **Current occurrence** | | | **Historical occurrence** | | | |
|---|---|---|---|---|---|---|---|
| | **Low** | **Med** | **High** | **Unknown** | **Low** | **Med** | **High** |
| Exploitation of nesting females | Yes | | | | Yes | | |
| Egg collection | | Yes | | | | Yes | |
| Agricultural development | Yes | | | | Yes | | |
| Tourist development | | | Yes | | | | Yes |
| Urban development | | Yes | | | | Yes | |
| Industrial development | Yes | | | | Yes | | |
| Artificial lighting | Yes | | | | Yes | | |
| Coastal erosion | Yes | | | | Yes | | |
| Vehicles on the beach | Yes | | | | Yes | | |
| Sand mining | Yes | | | | Yes | | |
| Unregulated hatchery practices | | Yes | | | Yes | | |
| Natural threats/predation | Yes | | | | Yes | | |
| Other (please describe): | | | | | | | |

2.10) Impacts of coastal development and/or sand mining on leatherback turtle nesting
Not applicable

2.11) Major existing threats to nesting leatherback turtles
The main two threats are the rapid increase in tourist related development along coastal areas and incidental catch in fisheries.

2.12) Other biological studies conducted on leatherback turtles
No other studies have been conducted on leatherback turtles in Thailand

**3. Foraging populations**
3.1) Details of any leatherback turtle census or tagging results such as tag recovery data
There have been no studies on foraging populations of leatherback turtles, and no leatherback turtles caught as bycatch have been tagged and released. Four leatherback turtles have stranded on Thailand's beaches since 1991, and one female leatherback turtle died after becoming entangled in a crab trap line at Thaimuang beach, Phanga province.

3.2) Seasonality of leatherback turtles in coastal and offshore water
There is no available data

3.3) Approximate size range of leatherback turtles
There is no available data

3.4) Information on the diet of leatherback turtles
No studies on diet or incidental records are available

3.6) Threats to foraging populations of leatherback turtles
Incidental capture in fishing gear has been reported but not quantified in Thailand (see Table 3 for a summary of threats to foraging leatherback turtles in Thailand).

Table 3. Summary of the threats to foraging leatherback turtles in Thailand

| **Threats at this site/area** | **Current occurrence** | | | **Historical occurrence** | | | |
|---|---|---|---|---|---|---|---|
| | **Low** | **Med** | **High** | **Unknown** | **Low** | **Med** | **High** |
| Directed take of leatherback turtles at sea | Yes | | | | Yes | | |
| Trawl fisheries | | Yes | | | | Yes | |
| Gillnet fisheries | | | Yes | | | | Yes |
| Longline fisheries | Yes | | | | Yes | | |
| Other fisheries (state which ones) | Yes | | | | Yes | | |
| Boat strikes | Yes | | | | Yes | | |
| Plastics and other debris (at sea) | Yes | | | | Yes | | |
| Industrial effluent | Yes | | | | Yes | | |
| Inshore oil pollution | Yes | | | | Yes | | |
| Natural threats/predation | Yes | | | | Yes | | |
| Other (please describe) | | | | | | | |

3.7) Fisheries bycatch of leatherback turtles and the fisheries involved

| **Type of fishery** | **Months of operation** | **Number of boats** | **Impact –** low, medium, high or unknown | **Reference** |
|---|---|---|---|---|
| Gillnet fisheries | Throughout the year | N.A. | high | |
| Trawl fisheries | October - May | N.A. | medium | |

3.8) Other activities being undertaken to improve the conservation of leatherback turtles

| **Areas of change** | **Summary including report references** |
|---|---|
| Legislation changes | Done by Department of Marine and Coastal Resources |
| Action/recovery plans | Done by Research Centres of Department of Marine and Coastal Resources |
| Awareness raising programmes | Done by NGO and Research centres |
| Research activities | Done by research centres of Department of Marine and Coastal Resources |
| Physical interventions | |
| Fishery controls | Done by Fishery patrol vessels |
| Managed turtle based tourism | Done by Maikhoa Marine Turtle Foundation |
| Annual nesting beach surveys | Done in part by Maikhoa Marine Turtle Foundation |
| Managed hatcheries | Done by Maikhoa Marine turtle foundation – but not for leatherback turtles |
| Planned protected areas | Undertaken by National Parks Department |
| Other (please describe) | |

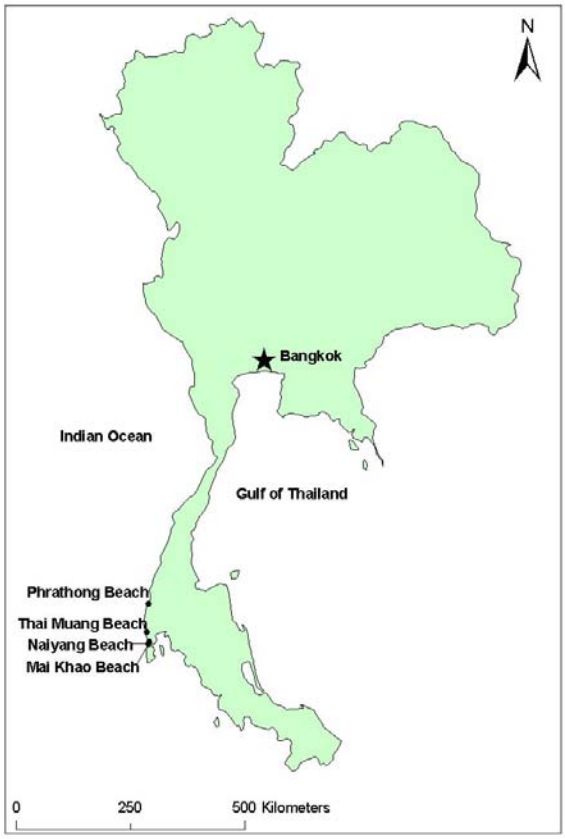


Figure 1. Locations of leatherback turtle nesting sites in Thailand

### 4. References

Phasuk B (1992) Biology of sea turtles in Thailand. *Thai Fisheries gazette* **45**, 603-650.

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# Status of leatherback turtles in Timor Leste

By Mark Hamann

No report was received from Timor Leste. However, there are no known records of leatherback turtles nesting in Timor Leste, and it is unknown whether the Timorese waters are an important habitat for leatherback turtle. No fisheries based interactions are known. However, given that leatherback turtles are known from the waters of neighbouring countries (Indonesia and Australia) when assessments are completed it is likely that their presence in Timor Leste's waters will be confirmed.

# Status of leatherback turtles in Tanzania

By Catharine Muir

**1. The legal protection status for leatherback turtles**

1.1 Overview

All species of marine turtles occurring in Tanzania (green, hawksbill, leatherback, loggerhead and olive ridley turtles) are protected under section 57 of the Fisheries Act of 2003. Under section 12 (1) (9) of the Fisheries Regulation Act it states that *no person shall kill or fish sea turtles or possess a sea turtle shell or deal in sea turtle shells or any other species listed as endangered in any International Convention, which the United Republic is a party to.* In the case of a first offence, the fine is TSh 200,000 (approx $200USD) or a 3 month sentence, and in the case of a second and subsequent offence, the offender is fined TSh 300,000, a 6 month sentence, or both.

1.2 Management agency responsible for marine turtle conservation in Tanzania

**Name of agency:** Fisheries Division, Ministry of Natural Resources & Tourism

**Type of agency:** Government Agency

**2. Nesting populations**

2.1) Overview

Leatherback turtles do not currently nest in Tanzania, and there are no records of historical nesting by the species in Tanzania. Nesting for green, hawksbill and olive ridley turtles have been recorded by beach surveys (Frazier 1982). Marine turtle surveys have been conducted on Maziwi Island (olive ridley, hawksbill and green turtle nesting), Mafia Island (green turtle nesting) and Ras Dege (green turtle nesting) (Frazier 1982).

2.2) Seasonality of leatherback nesting

Not applicable for leatherback turtles and other species of marine turtle nest between June and October (Frazier 1982).

**3. Foraging populations**

3.1) Details on any leatherback turtle census or tagging results such as tag recovery data

Infrequent sightings of leatherback turtles have been reported by Frazier (1982). There has been no census of foraging populations of leatherback turtles in Tanzania, or tag returns in Tanzania from turtles tagged elsewhere. However, several leatherback turtles have been caught in nets off Mafia Island, Pemba Island and Madete (Saadani National Park) (Muir 2002, 2005 and see section 3.2 and Figure 1).

In addition, tagged recoveries from loggerheads tagged while nesting in Tongaland and Natal (South Africa), and from green turtles tagged while nesting in Seychelles, Comoros, Mayotte, South Africa and Kenya.

3.2) Seasonality of leatherback turtles in coastal and offshore waters

- Two leatherback turtles were caught and drowned off Pemba Island in gillnets in1997 (months not specified).
- Four leatherbacks were caught and drowned off the west coast of Mafia Island in gillnets (November 2001, September 2002, December 2003 and December 2004.
- One leatherback was caught in a gill net at Madete in April 2005 and returned to the sea alive.

3.3) Approximate size range of leatherback turtles

Two of the leatherback turtles that were caught in Tanzania were measured; the curved carapace lengths (CCL) were 192cm and 130cm (sex was not determined for either of the turtles) (Tanzania Turtle and Dugong Conservation Programme unpublished data)

3.4) Information on the diet of leatherback turtles
Unknown

3.5) Other biological studies conducted on leatherback turtles in foraging areas
No other biological work has been conducted on leatherback turtles in Tanzania.

3.6) Threats to foraging populations of leatherback turtles
The threats to turtles in Tanzania are outlined in (Muir 2004) which was prepared for the Tanzania Committee on the Conservation of Marine Turtles and their Habitats. However, there is nothing mentioned specifically about leatherbacks. Historical threats to leatherback turtles and marine turtles in general are not known. Current threats include gillnets, and may include plastics, industrial effluent and inshore oil pollution.

3.7) Fisheries bycatch of leatherback turtles and the fisheries involved

| **Type of fishery** | **Season of operation** | **Approx number of boats/operators** | Impact – low, medium or high |
|---|---|---|---|
| Artisanal gillnets | Throughout year, during neap tides | Unknown | Low – medium |
| Commercial prawn trawlers | March - November | 30 | Low – medium |

3.8) Other activities being undertaken to improve the conservation of leatherback turtle foraging populations
Awareness raising activities by the Tanzania Turtle and Dugong Conservation Programme occur along the coast of Tanzania (all species of marine turtles). The Tanzania Turtle & Dugong Conservation Programme is now registered as a local NGO called "SEA SENSE") and works in five coastal districts in mainland Tanzania – i.e. about 25 villages. Activities conducted by SEA SENSE include regular fisher meetings, school competitions, and the distribution of posters, T-shirts, videos. There is an Action Plan for Zanzibar although I don't think it is being implemented. Nothing is yet available for mainland Tanzania. There are two marine parks (Mafia and Mtwara) which are zoned and where fishing is regulated. There are also a number of marine reserves where fishing is illegal.

**4. References**

Frazier JG (1982) Status of sea turtles in the central western Indian Ocean. In 'The Biology and Conservation of Sea Turtles'. (Ed. KA Bjorndal) pp. 385-389. (Smithsonian Institution Press: Washington, D.C).
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