

Human and natural threats to the green turtles, *Chelonia mydas*, at Ra's al Hadd turtle reserve, Arabian Sea, Sultanate of Oman

M. Betânia Ferreira¹, Marisa Garcia¹, and Ali Al-Kiyumi²

¹ University of Algarve, FCMA, Campus Gambelas, 8000-810 Faro, Portugal

² Ministry of Regional Municipalities, Environment and Water Resources, Nature Conservation, Muscat, Sultanate of Oman

The green turtle is ubiquitous in the Sultanate and is the most commonly encountered marine reptile (Salm 1991). An estimated 50,000 to 60,000 green turtle egg clutches are laid each year in the Sultanate – the effort of about 20 000 turtles, or more. This gives Oman probably the greatest number of nesting green turtles, classified as Endangered species worldwide, of any single Indian Ocean nation (Groombridge 1982). The vast majority of nesters are concentrated along a relatively short stretch of coastline between Ra's Al Ru'ays and Ra's Al Hadd. This area is of very high conservation value (Salm and Salm 2001).

Between July and August 2001, 15 dead turtles were found on the beach from Ra's Al Hadd to Ra's Al Ru'ays. When possible, the cause of death was determined. Most of the turtles were found after fishermen holidays in the beginning of the fisheries season. Possible causes of death were accidental drowning in trawl nets, boats collision due to the observed sections of the carapace broken and shark attacks. Most of the female turtles had marks on the carapace due to mating with males.

Of the human pressures, fishery-related threats are particularly severe. Most of Green Turtles in Ra's al Hadd suffer mortality as a result of incidental capture in fishing gear. Additional incidental loss or mortality is caused by, set nets and fish that prevent females from reaching nesting beaches, trapping of hatchlings in gill nets spread over beaches for maintenance and fishermen houses, direct collision of juveniles and adults with fishing boats and vehicles used by fishermen on nesting beaches destroy eggs and also damage vegetation, leading to increased beach erosion.

Other human activities, such as recreation and general coastal development, increasingly threaten turtle populations. Use of bright lights, patrolling of beaches and use of torches and camera flashes by turtle-watchers and group tours and littering of beaches are the most encountered recreation related threats in Ra's Al Hadd. The village of Ra's al Hadd is expanding seaward towards an important nesting beach, and its electrification is a critical problem for nesting turtles and their hatchlings in particular. Other human related threats such as ingestion of litter at sea, pet dogs that dig for eggs and sand mining by Omani workers are also critical to this marine turtle species. Natural threats mostly affect eggs, hatchlings and juveniles. Adult turtles with missing flippers and sections of shell were recorded and also the damage attributed to shark attacks. On nesting beaches eggs and hatchlings are preyed upon by foxes, crabs, gulls and other bird species, ravens, and other predators. The occasional flooding of eggs by high tides, beach erosion, parasites and diseases are also critical natural threats to the green turtles in this area.

Green Turtles in Ra's Al Hadd Turtle Reserve are threatened by an assortment human activity as well as by natural

processes and events. Although these turtles have been the subject of general surveys and a tagging project, which began in 1977, there has been little investigation of their management needs. While there are some general provisions for the protection of turtles at the national level, most specific conservation action has resulted from management issues at specific sites. The turtle beaches in the Ra's Al Hadd area have received most attention (Salm 1989). Clearly, turtles need to be protected from harm during all phases of their lives, and their critical nesting and feeding habitats need to be safeguarded against destruction. Directly related to these goals is need to control predators, accidental capture, and deliberate harvest of turtles. Harvest brings in both national and regional political issues, as it needs to be controlled in Oman, in international waters, and in the seas of nations through which the turtles migrate. Underlying all of these activities is the need for focused research that will provide a sufficient scientific basis for management of the Ra's Al Hadd area turtle population (Salm 1989).

The Ra's Al Hadd – Ra's Al Junayz area is recognized as a valuable national heritage for its archaeological sites, and to be of extreme national, regional and global importance for its nesting turtles. The area requires conservation management to safeguard its valuable resources in the sea and on land, particularly the breeding stocks of turtles, and their nesting and feeding habitats, for the benefit of current and future generations of citizens.

Acknowledgements. We thank to the Directorate General of Nature Conservation, Ministry of Regional Municipalities, Environment and Water Resources of the Sultanate of Oman and its network of Park Rangers at Ra's Al Hadd, for the collaboration carried out at the fieldwork. We also thank the Packard Foundation and Sea Turtle Symposium for the travel support.

LITERATURE CITED

- Groombridge, B. 1982. The IUCN Amphibia-Reptilia Red Data Book. Part I: Testudines, Crocodylia, Rhynchocephalia. IUCN. Gland, Switzerland.
- Salm, R. 1989. Turtle beach management Ra's Al Hadd area: A proposed management plan for the turtle nesting beaches in the Ra's Al Hadd National Scenic Reserve and Ra's Al Junayz National Nature Reserve. Prepared for the Ministry of Commerce and Industry. IUCN. 57 p.
- Salm, R. 1991. Turtles in Oman: Status, threats and management options. Muscat: Manuscript report of IUCN/WCU Project.
- Salm, R. and S. Salm. 2001. Sea turtles in the Sultanate of Oman. 2nd Ed. Revised by Baldwin, R. and Al-Kiyumi, A. The Historical Association of Oman. Sultanate of Oman. 48 p.

Nest predation at a high density leatherback nesting beach

Alexandra Maros, Benoix Viseux, Marc Girondot, and Matthew H. Godfrey

Université Paris XI, CNRS UPRESA 8079, Batiment 362, 91405, Orsay, France

The beach of Awala-Yalimapo in western French Guiana is a high density nesting beach for leatherback sea turtles. In the 2001 nesting season (March through August), we investigated the impact of different predators on leatherback eggs. The main predators of eggs that we identified were dogs, vultures, crabs and mole crickets. Regular surveys along the nesting beach re-

vealed spatio-temporal variation in both predation events and also absolute numbers of predators. Based on our findings in the 2001 nesting season, we make recommendations for management of this nesting beach, and also for future studies related to nest predation.