

CONSERVATION OF HAWKSBILL TURTLES IN (*ERETMOCHELYS IMBRICATA*) THE REPUBLIC OF SEYCHELLES

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Abstract

Seychelles hosts one of the five most important regional populations of hawksbill turtles remaining in the world today, although much reduced in number from historic levels. Satellite transmitters attached to each of five post-nesting hawksbill turtles at Cousin Island showed their foraging habitats to be within the boundaries of the Seychelles Bank, providing evidence that female hawksbills nesting in the granitic Seychelles may spend their entire adult lives within the territorial waters of Seychelles. This provides incentives for Seychellois to protect the resource. Genetic research, on the other hand, provides evidence that immature hawksbills in the western Indian Ocean may utilize foraging habitats located thousands of kilometers from their natal beaches, and confirms the need for regional cooperation to ensure effective management of hawksbill populations. The Seychelles Government has repeatedly demonstrated its commitment to conserving the critically endangered hawksbill turtle: in 1993-1994, through an artisan compensation and re-training programme that eliminated domestic trade in hawksbill shell; in 1994, by providing complete legal protection for all sea turtles; and in 1998 by publicly burning its stockpile of raw hawksbill shell during the 1998 Miss World Pageant.

Introduction

The Republic of Seychelles comprises some 115 islands spread over an area of 1,300,000 km² in the western Indian Ocean, northeast of Madagascar (Fig. 1). The islands, which were not permanently settled by humans until 1770, are now inhabited by 80,000 people representing a diverse racial mix, with African ancestry predominating.

Seychelles hosts one of only five regional populations of hawksbill turtles (*Eretmochelys imbricata*) remaining in the world today with >1000 females nesting annually. The others occur in Mexico, Indonesia, and Australia (which has two such populations) (Meylan & Donnelly 1999). A unique feature of the Seychelles population is that >85% of nesting occurs in broad daylight (Mortimer & Bresson 1999).

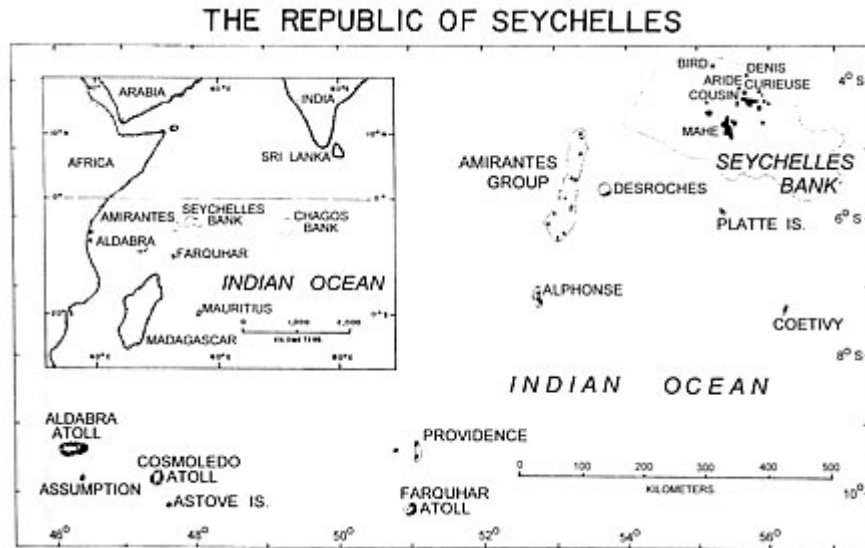


Fig. 1: Map of the Republic of Seychelles.

Unfortunately, the Seychelles population is not as healthy as these statistics suggest. From the late 1960s to the early 1990s most of the nesting females were killed at the nesting beaches, often before laying any eggs (Mortimer 1984). The turtles were slaughtered for their shell, most of which was exported to Japan, and the remainder used for the local curio industry. Due to the over-harvest of adult turtles, little reproduction occurred during that 25-30 year period.

During the past decade, however, the Government of Seychelles has implemented strong conservation initiatives benefiting hawksbill turtles. In 1989 and 1990 it developed an Environmental Management Plan for Seychelles (EMPS) which addressed sea turtle issues. Funding from the Global Environment Facility (GEF) and from the Government of Seychelles enabled implementation of the EMPS 'Artisan Training and Compensation Program' in 1993-94, and the 'Turtle & Tortoise Conservation' project in 1995-97 (Mortimer & Collie 1998). This paper describes some of the outputs of those projects and other conservation initiatives taken in Seychelles.

Studies of Hawksbill Migration: Determining Responsibility for the Resource

The most important sites for hawksbill nesting in Seychelles include islands on the Seychelles Bank, in the Amirantes Group, and Alphonse, Desroches, Coetivy and Platte islands (Fig. 1). Nesting hawksbills have been tagged systematically at several islands (at Cousin since 1973, Curieuse since 1980, Ste. Anne Marine Park, Aride, and Aldabra since 1981, Cousine since 1994, and Bird since 1995) and opportunistically at other islands since 1981 (Mortimer 1984, 1998).

Flipper tagging more than 1000 nesting hawksbills has provided data about nesting periodicity (Mortimer & Bresson 1999) and nesting site fidelity (Mortimer, Hitchins, Bresson, Cedras, Collie & Roberts, unpub. data). But, it failed to reveal the location of the adult foraging habitat; nor did it provide information about the migrations of immature turtles. These gaps in our knowledge have compromised efforts to effectively manage and conserve both the turtle populations and their foraging habitats.

We employed satellite telemetry in an effort to identify the resident foraging grounds of the breeding females and to track the routes taken to reach them (Mortimer & Balazs in press). In January 1998, we attached five ST14 satellite transmitters (built by Telonics of Mesa, Arizona) to post-nesting hawksbill

turtles at Cousin Island (4°20'S; 55°40'E), using methods patterned after Balazs et al. (1996), and tracked them using the Argos satellite system. Mapping of results (Fig. 2) was accomplished as described by Ellis and Balazs (1998). The study has been extremely successful. As of late August 1999, after 19.3 months, transmitters #4807 and #4809 were still sending good position data for two of the turtles. Three of the transmitters (#4808, #4805 and #4806) had stopped transmitting after 1.5, 2.3 and 13.5 months respectively, but not before the turtles we believed to have completed their migrations back to the foraging grounds. All five turtles displayed similar patterns of movement. After laying her last egg clutch of the season, each turtle travelled for several days in a directed manner to a discrete location on the Seychelles Bank that ranged from 20 to 175 km from the nesting beach. Upon reaching that destination none of the turtles travelled beyond a radius of about 15 km in any direction (Mortimer & Balazs in press). In fact, among those turtles tracked for the longest times, travel appeared more restricted as the months passed. Detailed results of this study will be published separately (Mortimer, Balazs, Hitchins, Constance and Nolin, in prep.).

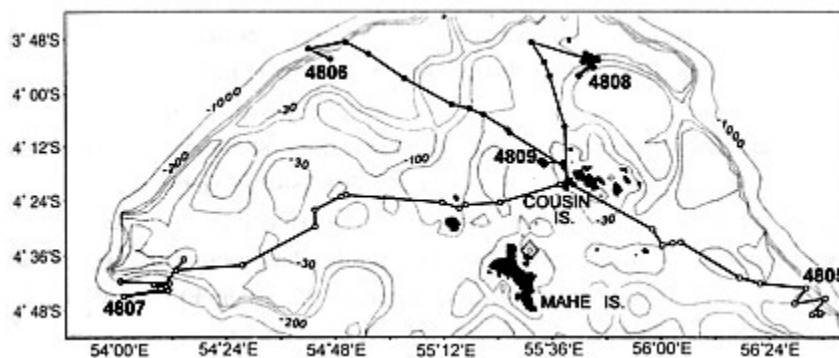


Fig. 2: Movements of five satellite tracked post-nesting hawksbills on the Seychelles Bank. Depths in m.

The findings of the satellite tracking study have assisted efforts to conserve hawksbill turtles in the Seychelles. In the past, some Seychellois complained that it was unfair and futile to expect the people of Seychelles to protect turtles that would only be slaughtered when they migrated from Seychelles to the national waters of other countries. Data from the tracking study, however, indicate that adult hawksbills nesting in Seychelles may remain within the territorial waters of Seychelles throughout their adult lives. As such, they are a resource belonging to the people of Seychelles, whose responsibility it is to ensure their long-term survival.

Nevertheless, the hawksbill populations of Seychelles are a regionally shared resource. This was demonstrated by genetic studies conducted through the 'Turtle & Tortoise Conservation Project' in collaboration with Damien Broderick at the University of Queensland as part of a phylogenetic survey of the Indo-Pacific hawksbills (Broderick, unpublished data). Characteristics of the mtDNA from immature hawksbills foraging in Seychelles (n = 191) and in the Chagos Archipelago (n = 50) were compared with each other and with those of nesting females in Seychelles, Chagos, the Arabian Peninsula, and western Australia (Mortimer & Broderick 1999). The data indicated that immature hawksbills foraging in Chagos were derived largely from rookeries in Seychelles as well as Chagos. The possibility of contributions from Arabian Peninsular and other yet unsampled rookeries in the region could not be excluded, but no Australian haplotypes were present in the samples. Since the genetic composition of populations of immature hawksbills from foraging grounds in Seychelles was indistinguishable from that of populations of immature turtles foraging in Chagos, both populations probably comprise a similar mixture of genetic stocks (Mortimer & Broderick 1999).

These and other sea turtle studies have filled some of the gaps in our knowledge of the life cycle of Indo-Pacific hawksbills. They corroborate the theory that newly emerged hatchlings enter the sea and get caught in oceanic gyres (Can 1987) which, from Seychelles, circulate around the western Indian Ocean. After growing to a carapace length of some 30 cm, presumably in the pelagic habitat of the gyres, the juvenile hawksbills begin a benthic existence in relatively shallow waters. Although an immature hawksbill probably utilizes a series of spatially separated benthic habitats during the 25-40 years it takes to mature, individual tagged juveniles have been observed repeatedly within a small area of reef over periods of more than ten years (Mortimer pers. obs., Limpus pers. comm.). Global population studies have demonstrated the tendency of female sea turtles to return to breed at their natal rookery (Bowen & Karl 1997), even though they may have foraged as juveniles at developmental habitats located hundreds or thousands of kilometers from the natal beach. Our satellite telemetry data suggest that a female hawksbill from Seychelles, upon reaching adulthood, returns to and remains within the vicinity of her natal rookery for the duration of her reproductive life.

Putting an End to the Hawksbill Shell Trade in Seychelles

In 1993 the Seychelles Government made a decision to pass legislation banning the sale of hawksbill shell products. In order to ensure that the local curio artisans did not suffer undue economic hardship, the Government first devised and implemented the 'Artisan Training and Compensation Programme'. The goal of this project, funded jointly by the Seychelles Government and the GEF, was to compensate and retrain artisans who made their living working hawksbill shell. In brief, 21 businesses employing 40 artisans were identified. Negotiations were conducted and the artisans agreed to be compensated at an average rate of US\$15,000 per artisan. The artisans also agreed to sell their remaining stocks of raw shell to the Seychelles Government. A total of 2.5 tons of raw hawksbill shell was purchased at a cost of approximately \$250,000 and placed in a locked container (Collie 1995). In 1994, having ensured the livelihoods of the artisans, the Government passed the 'Wild Animals (Turtles) Protection Regulations of the Wild Animals and Birds Protection Act'. These regulations offered complete legal protection for sea turtles and banned all commercial trade in their products. That ban on the sale of hawksbill shell products has been well-enforced in Seychelles.

Fewer hawksbills are now being killed in Seychelles. Nevertheless, the species is still threatened. Although most Seychellois refuse to eat hawksbill meat, which they traditionally consider poisonous, some people sell it on the black market, claiming it to be green turtle meat (also illegal). Illegal export of raw shell to Asia continues. In December 1997, two suitcases full of raw shell (which the owners admit was bound for sale in Singapore) were confiscated at the Seychelles airport (Anon. 1997). There are also rumors that raw shell is smuggled out of Seychelles aboard Asian fishing vessels.

Hawksbills are highly vulnerable at the nesting beach. The average female lays about four egg clutches per season (often making multiple trial emergences prior to laying eggs), and displays strong nesting site fidelity during those emergences. Thus, a female is likely to emerge 8-10 times, at predictable intervals, onto the same stretch of beach during a given nesting season. With determination, one or two turtle hunters can kill all the nesting females (perhaps 30-50 animals each year) at a small island. Because hawksbills mature slowly (taking some 25-40 years to reach adulthood) such over-harvest can continue for decades before it manifests itself as a decline in numbers of nesting turtles (Mortimer 1995). By the time a decline is apparent, however, it may be too late to save the population. Likewise, on the foraging grounds hawksbills are easily approached and captured. Fishermen report the numbers of hawksbills on the reef flats of Seychelles to be much reduced from previous levels (Mortimer 1988). My research assistant, now more than 60 years old, is an excellent hunter of turtles large and small, and in his lifetime has personally killed thousands of sea turtles. He now considers himself a turtle conservationist and no

longer kills turtles; but he provides an example of how much damage one person can do if given the motivation and the opportunity.

Fortunately, Seychelles also provides evidence that protection at the nesting beach can effectively reverse population decline. Since 1970, Cousin Island has been managed as a nature reserve by BirdLife (formerly the International Council for Bird Preservation). During three decades of protection, hawksbill nesting activity at Cousin has more than tripled, increasing from some 30 females per year to 70-100 (Mortimer & Bresson 1994). Although Cousin nesting activity has increased significantly since 1970, it has declined at many other islands in Seychelles during the same period. Cousin is but one small island whose turtle population in the early 1980s comprised only about 5 % of the total hawksbills nesting annually throughout the country (Mortimer 1984). Nevertheless, the Cousin data are encouraging, and give resource managers and politicians in Seychelles and elsewhere a reason to enforce laws protecting hawksbill rookeries.

During the past decade, the Government of Seychelles has re-ordered its national priorities and put environmental conservation near the head of the list. The government leaders of Seychelles are interested in the economy and realize the importance of a healthy environment to tourism, which is the primary source of foreign exchange for the country. They have also become aware that foreign tourists enjoy watching live sea turtles.

In November 1998, in conjunction with the 'Miss World Pageant' which was held in Seychelles, the Seychelles Government publicly burned its stockpile of 2.5 tons of raw turtle shell (Mortimer 1999). The fire was lit by the Vice-President of Seychelles, Mr. James Michel (who is also Minister of Environment). The event was televised worldwide to more than 140 countries as part of the 'Miss World 1998' show. This was important for sea turtle conservation in Seychelles.

The stockpile had been held in a sealed container for almost five years. By holding on to this shell (and not selling it) Seychelles was honouring its commitment to CITES (Convention on International Trade in Endangered Species) not to export the shell. But, Seychelles was unintentionally and inadvertently sending a subliminal message to her citizens that the shell was still valuable and might eventually be sold. Thus, citizens could infer that whatever shell they had in their own possessions, *or could acquire*, might also be saleable in the future.

In fact, although all international trade in hawksbill shell is now illegal worldwide, stockpiles of raw hawksbill shell are still maintained in several countries in the hope that some day the trade will re-open. The accumulation of turtle shell in Indonesian stockpiles provides an incentive for continued slaughter of hawksbills in that country (A. Suárez, K. Dethmers pers. comm).

By destroying its stockpile of turtle shell, the Seychelles Government sent a message that it considers the trade in dead hawksbills to be finished, that live hawksbills will bring more revenue to Seychelles (as a tourist attraction) than dead ones, and that poaching of hawksbills would not be tolerated.

Some people may feel that burning the stockpile was wasteful, but I would argue to the contrary. Destroying the stockpile was simply another form of utilization. The GEF (through the World Bank) provided 50 % of the funds used to purchase the stockpile. Although the World Bank acknowledged the stockpile to be the property of the Seychelles Government to dispose of as it saw fit, the Bank made clear that it would prefer to see the stockpile destroyed. The other 50 % of the funding came from the Seychelles Government, which purchased the raw shell from the artisans as part of an effort to eliminate the domestic trade in hawksbill shell. To that end they were very successful. By burning the shell on international television, Seychelles also hoped to enhance its image as an international leader in

environmental conservation. In that sense, destruction of the stockpile might be considered a form of advertising for the Seychelles tourism industry.

I sincerely hope that other nations fortunate enough to host populations of hawksbill turtles will follow the lead of Seychelles and take constructive action appropriate to their own situations to maximize protection for this critically endangered species.

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References

- Anon., 1997. Police seize over 45 kg of turtle shells at airport. *Seychelles Nation*, 17 December 1997, 1.
- Balazs, G.H., R.K. Miya & S.C. Beavers, 1996. Procedures to attach a satellite transmitter to the carapace of an adult green turtle, *Chelonia mydas*. Proceedings of the 15th Annual Symposium on Sea Turtle Biology and Conservation. U.S. Dep. Commer., *NOAA Tech. Memo. NMFS-SEFSC-37*: 21-26.
- Bowen, B. W. & S.A. Karl, 1997. Population genetics, phylogeography, and molecular evolution. In: *The Biology of Sea Turtles*. (Lutz, P.L. & J.A. Musick eds). CRC Press, New York: 29-50.
- Can, A., 1987. New perspectives on the pelagic stage of sea turtle development. *Conserv. Biol.*1(2):103.
- Collie, J., 1995. Protection of endangered marine turtles in the Republic of Seychelles. Mawson Graduate Centre for Environmental Studies, University of Adelaide, unpubl. Report: 65pp.
- Ellis, D.M. & G.H. Balazs, 1998. Use of the generic mapping tools program to plot Argos tracking data for sea turtles. In: Proc. 17th Ann. Symp. Sea Turtle Biol. Conserv. (Epperly, S.P. & J. Braun, Compilers). *NOAA Tech. Mem. NMFS-SEFSC-415*: 166-168.
- Meylan, A.B. & M. Donnelly, 1999. Status justification for listing the hawksbill turtle (*Eretmochelys imbricata*) as critically endangered on the 1996 *IUCN Red List of Threatened Animals*. *Chelonian Conservation and Biology* 3(2): 200- 224.
- Mortimer, J.A., 1984. *Marine Turtles in the Republic of Seychelles: Status and Management*. Gland: IUCN, 80pp.

- Mortimer, J.A., 1995. Teaching critical concepts for the conservation of sea turtles. *Marine Turtle Newsletter* 71: 1-4.
- Mortimer, J.A., 1998. Turtle and Tortoise Conservation. Project J1: Environment Management Plan of the Seychelles. Final Report submitted to the Seychelles Ministry of Environment and the Global Environment Facility (GEF). Volume 1: 82pp.
- Mortimer, J.A., 1999. World's first turtle shell stockpile to go up in flames as Miss World 1998 contestants look on. *Chelonian Conservation and Biology* 3(2): 376-377.
- Mortimer, J.A. & G.H. Balazs, in press. Post-nesting migrations of hawksbill turtles in the granitic Seychelles and implications for conservation. Proc. 19th Ann. Symp. Sea Turtle Biol. Conserv.
- Mortimer, J.A. & R. Bresson, 1994. The hawksbill nesting population at Cousin Island, Republic of Seychelles: 1971-72 to 1991-92. In: Proc. 13th Ann. Symp. Sea Turtle Biol. Conserv. (Schroeder, B.A. & B.E. Witherington, Compilers). *NOAA Tech. Mem. NMFS-SEFSC-341*:115-117.
- Mortimer, J.A. & R. Bresson, 1999. Temporal distribution and periodicity in hawks- bill turtles (*Eretmochelys imbricata*) nesting at Cousin Island, Republic of Seychelles, 1971-1997. *Chelonian Conservation and Biology* 3(2): 3 18-325.
- Mortimer, J.A. & D. Broderick, 1999. Population genetic structure and developmental migrations of sea turtles in the Chagos Archipelago and adjacent regions inferred from mtDNA sequence variation. In: The Chagos Archipelago (Sheppard, C.R.C. & M.R.D. Seaward, eds) *Linnaean Society Occasional Publications*.
- Mortimer, I.A. & J. Collie, 1998. Status and conservation of sea turtles in the Republic of Seychelles. In: Proc. 17th Ann. Symp. Sea Turtle Biol. Conserv. (Epperly, S.P. & I. Braun, Compilers). *NOAA Tech. Mem. NMFS-SEFSC-415*: 70- 72.

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