

SEA TURTLE CONSERVATION AND EDUCATION IN KARACHI, PAKISTAN

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ABSTRACT

The present paper provides information about sea turtle conservation and education activities carried out at Sandspit and Hawkes bay, Karachi, Pakistan. A review of published and unpublished data regarding green and Olive ridley turtle conservation and protection of their eggs and hatchlings is given. Particular conservation emphasis is given to the protection of nesting beaches, elimination of predators, transplantation of nests from open beach to protected enclosures, release of hatchlings, tagging of turtles and tag recoveries. From October 1979 to December 1997 over 1,500,000 eggs were transplanted to enclosures to protect them from predators, from which over 450,000 hatchlings have been released to the sea. Education and public awareness is a necessity in the conservation of endangered species such as marine turtles, and attempts have been made to spread the message through all sorts of means and media of communication. It is believed that successful conservation can best be achieved through effective implementation of national and international legislation.

INTRODUCTION

The most important nesting beaches for marine turtles are located in tropical and subtropical waters, from the Caribbean and the Atlantic, across the Indian Ocean, and the great Barrier Reef across to Hawaii and the western coasts of the Americas, and include Pakistani beaches, particularly Sandspit and Hawkes Bay near Karachi. The presence of turtles in Pakistani waters was first reported by Minton (1966). Of seven species of marine turtles in the world, two nest at Sandspit and Hawkes Bay (Kabraji & Firdous 1984, Firdous 1985, 1988), the green turtle (*Chelonia mydas*), and the Olive ridley (*Lepidochelys olivacea*).

Both species, like other marine turtles in the world, are threatened by a number of factors, largely man-made. In Pakistan, sea turtles are not part of the local diet due to religious customs and as a result, except for occasional poachers and curious tourists, the main cause of destruction is feral dogs that dig up the nests for food. Other factors that threaten sea turtles are the destruction of nesting habitat due to construction of houses/beach huts all along the beaches, pollution, and disturbance on the beach by tourists, all of which interfere with the nesting cycle of the turtles. The beaches provide one of the few recreational spots for Karachi residents, and conservation measures are necessary if turtles are to continue to breed there.

In 1972, due to growing environmental concern, the Sindh Wildlife Management Board took a pioneering step and drafted the Sindh Wildlife Protection Ordinance of 1972, amended in 1993 as the Sindh Wildlife Protection Act, which makes it an offence punishable by law to harass or hurt any adult or hatchling turtle or to steal eggs or disturb nests. Commercial export of turtle

meat and eggs to foreign countries ceased in 1976 when Pakistan became a signatory to the Convention of International Trade in Endangered Species of Fauna and Flora (CITES), which lists all sea turtles on its Appendix 1, which includes species prohibited from international trade from or to signatory countries.

In 1979, the Sindh Wildlife Department in collaboration with WWF-Pakistan started a small program for the protection of marine turtles, and in 1980, a three year pilot project was approved by WWF/IUCN for conservation and protection of endangered turtles at Sandspit and Hawkes Bay, which was included in the global protection program 'The Seas Must Live'. In 1983, the project was taken over by the provincial government as a five-year development program, and since 1988 the project has been included in regular on-going schemes funded through the provincial budget.

MATERIALS AND METHODS

The Sandspit and Hawkes beaches are located on the southern limits of Karachi at 24°48'N; 66°58'E (Fig. 1). Turtles nest on sandy coves and open stretches from Manora, at the beginning of Sandspit, to the Sindh / Baluchistan border. Brief surveys reported that the coastline of Baluchistan is also important for turtle nesting (Groombridge 1988). The highest nesting density was observed at Sandspit and Hawkes Bay, through counts of nests and turtle tracks, and are the areas where protective enclosures have been constructed. Beyond Hawkes Bay there are rocky inlets and small sandy areas where occasional nesting is observed. At Cape Monz the coast contains sandy bays where turtle tracks are sometimes observed, except during the monsoon when it is entirely submerged. After Cape Monz the rocky coastline continues to the provincial border of Baluchistan (Kabraji & Firdous 1984). Sandspit and Hawkes Bay beaches have open sandy shores, which are high enough to protect nest at all tide heights except during the May to August monsoon, when the beaches are inundated at high tide.

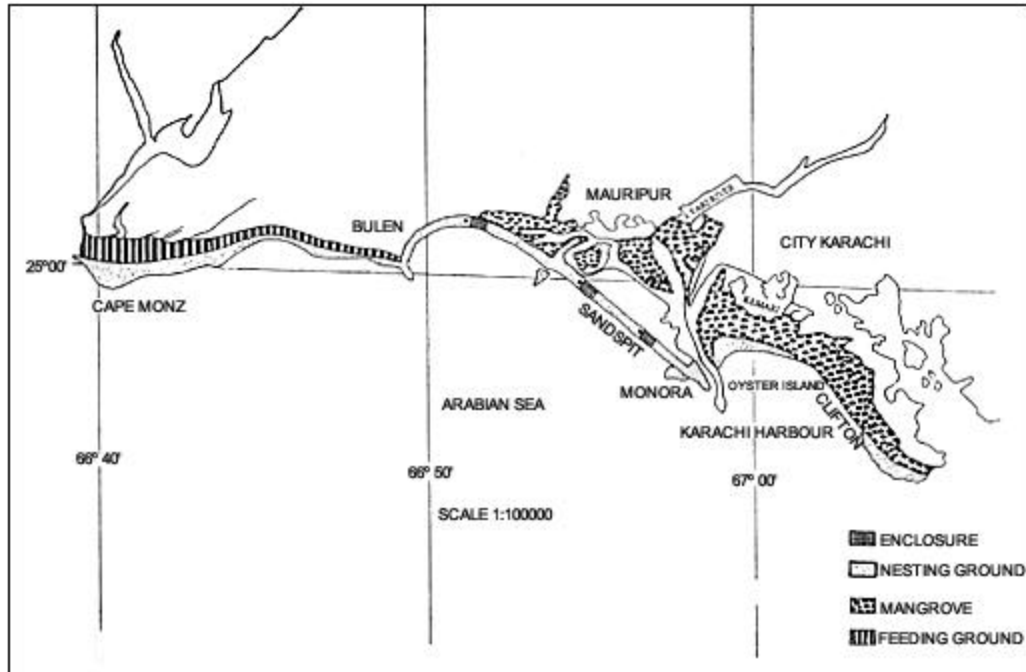


Fig. 1: Distribution of nesting beaches in Pakistan

Three enclosures of 24 x 24 m² were constructed at Sandspit and Hawkes Bay to protect eggs and hatchlings. Each enclosure has a capacity of 300 nests (45cm high, 90 cm circumference and 2.5 cm mesh covered with wire material on the top to protect hatchlings from birds). The hatcheries were similar to those used in other areas such as Heron Island, Australia (Bustard 1972). Surveys are conducted each night to locate nesting and non-nesting turtles, collect eggs and stray hatchlings, rescue stranded turtles, count dead turtles and check for poachers and predators. Adults were tagged with Monel tags (Size 19, Style 49) on the trailing edge of both front flippers, as these areas are less frequently damaged (Harrison 1962, Carr 1967) Tags were applied after egg laying following methods by Balasingam (1966) and Bustard (1972). Tag returns were received from local areas and a few records of long distance migrations were also reported. Dead specimens were dissected to examine the gut content and check for parasites.

Eggs were collected and transported to the hatchery. Incubation period and hatching success were monitored in each nest. Unhatched eggs were removed from the nest and examined after excavation. Hatchlings were collected, identified, counted, measured, and weighed before being released to the sea.

RESULTS AND DISCUSSION

Nesting season - Green turtles nest in Bioko, West Africa between November and March (Castroviejo et al. 1994, 1999). In Surinam they nest from February to July with peak in April and May (Schulz 1975). But in Karachi, green turtles nested throughout the year with a peak

during September (Table 1). During April, May and June the nesting frequency was the lowest, possibly as a result of monsoon period (Fig. 2).

In Surinam Olive ridleys nest from mid May to the end of July with a peak in July (Schulz 1975). In Karachi, they nested later, from July to September with a peak during August (Table 1, Fig. 2), and mass nesting, or *arribadas*, were not observed. The number of Olive ridleys nesting at Sandspit and Hawkes Bay was the lowest during 1996-1997 (Firdous 1999).

From October 1979 to December 1997, a total of 1,531,980 eggs from 17,702 nests were protected. Of these, 1,453,966 were green turtle eggs from 17,048 and 78,014 were Olive ridley eggs from 654 nests (Table II).

Hatching: After a 40-60 day incubation period, hatchlings emerged usually at night, and were taken to the beach and released. From October 1979 to December 1997 a total of 391,556 hatchlings were released to the sea. Out of these 370,414 were green hatchlings and 21,142 were Olive ridley hatchlings (Table II). In addition, 88,108 hatchlings that were collected from outside the enclosures were released to the sea. In total, 479,664 hatchlings were safely released to the sea. Green turtle hatchling emergence occurred throughout the year with a peak during October, and a low from January to August. Olive ridleys hatched from August to December with peak during September, and no hatching from January to July (Table I).

Table I: Monthly number of Chelonia mydas (G. T) and Lepidochelys olivacea (O.R) nests, eggs and hatchlings from Karachi during October 1979 to December 1997

Month	No. of nests			No. of eggs			No. of hatchlings		
	G.T.	O.R.	Total	G.T.	O.R.	Total	G.T.	O.R.	Total
January	48	0	48	3752	0	3752	785	0	785
February	32	0	32	2621	0	2621	295	0	295
March	27	1	27	2137	119	2143	227	0	227
April	18	0	18	1411	0	1411	658	0	658
May	13	1	13	1072	137	1080	924	0	924
June	28	2	29	2496	173	2564	341	0	341
July	99	15	111	8780	1676	10176	172	0	172
August	174	19	192	15096	2340	17306	319	67	355
September	197	7	202	17142	867	17768	3220	669	3740
October	126	2	126	10914	177	10961	5981	524	6476
November	103	0	103	8618	0	8618	4833	264	4944
December	67	0	67	5486	0	5486	2608	56	2619
Total	897	36	932	76525	4334	80631	19495	1244	20608

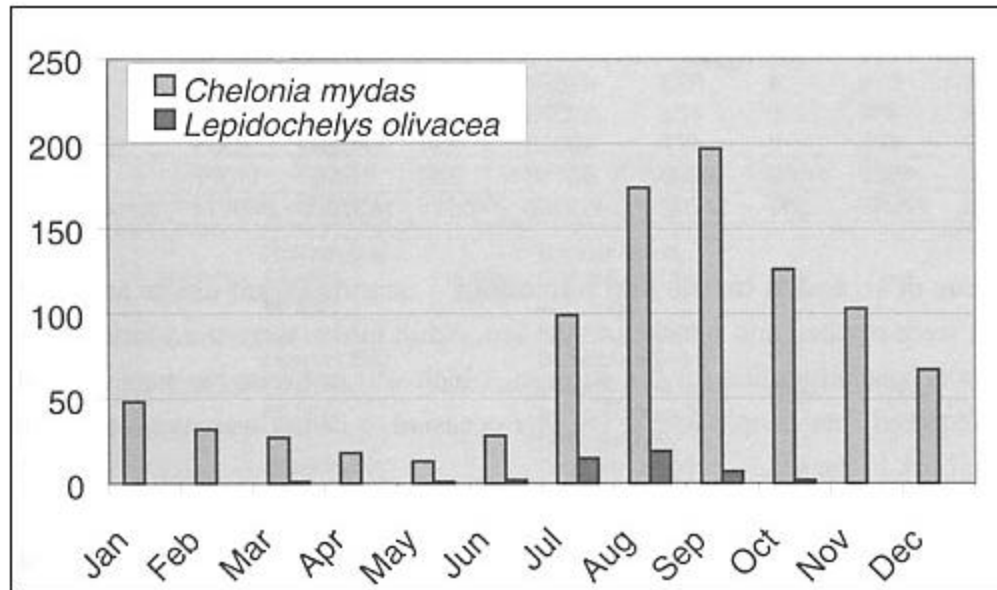


Fig 2. Seasonal variation in turtle nesting between 1979 and 1997.

Tagging and Tag recoveries - A total of 3,136 turtles (3,093 green and 43 Olive ridley) were tagged from August 1982 to December 1997 (Table III). Out of these 576 (564 green and 12 Olive ridleys) were recaptured locally. Three long distance tag recoveries of green turtles have been reported, one each from India, Africa and Iran (Table IV).

Rescue of stranded turtles and hatchlings - Stranded adult turtles and hatchlings were rescued and returned to the sea. Adult turtles were transported in nylon nets specially made for the purpose, which was not found to hurt the turtle but required four people to lift. On one occasion, a camel was used to pull the turtle back to the sea.

Education / Public awareness - This project is the first of its kind in the Sindh province on the basis of its education and public awareness programs. Marine turtle protection and conservation messages are broadcast through print and electronic media. Various publicity materials have been prepared for this purpose, including:

Booklets - A booklet entitled 'The Little VIP' focuses on the green turtle and was published by the Book Group of Karachi in collaboration with Sindh Wildlife Department in 1994, and it was included in many school's Integrated Curriculum (Class I).

Brochures - 'Marine Turtles of Karachi Beaches' was published by the Sindh Wildlife Department in 1989, and 'Marine Turtles of Pakistan' was printed in collaboration with WWF Pakistan in 1993.

Greeting cards - Greeting cards depicting green and Olive ridley turtles have been issued by the Sindh Wildlife Department with the help of IUCN Pakistan.

Table II: Annual number of nests, transplanted eggs and hatchlings from protected enclosures of *Chelonia mydas* (G.T) and *Lepidochelys olivacea* (O.R) at Karachi during 1979 to 1997.

Year	No. of nests			No. of eggs			No. of hatchlings		
	G.T.	O.R.	Total	G.T.	O.R.	Total	G.T.	O.R.	Total
1979	44	0	44	4610	0	0 4610	922	0	922
1980	799	16	815	77976	1558	79564	32797	967	33764
1981	1168	11	1179	98700	1330	100030	21753	403	22156
1982	1405	95	1500	126220	10719	126196	22587	2314	24901
1983	1457	25	1482	122927	3215	126142	19872	577	20449
1984	1339	120	1495	111505	14299	125804	40652	4766	45418
1985	1549	57	1606	127337	6841	134178	47479	2448	49927
1986	1457	61	1518	120173	7433	127606	45788	3648	49436
1987	704	113	817	67688	14294	75982	14402	2608	17011
1988	866	31	897	72440	3796	76236	13680	161	13841
1989	717	43	760	63632	4968	68600	19121	1062	20183
1990	839	29	868	70257	3254	73509	23643	1022	24665
1991	1031	13	1044	87979	1398	89377	14543	303	14846
1992	785	20	805	67439	2424	69863	11844	621	12465
1993	802	4	806	66771	474	67245	7870	54	7924
1994	519	4	523	42686	473	43159	7805	11	7816
1995	464	8	472	39373	1014	40387	5243	11	5254
1996	475	2	477	40065	234	40299	9335	166	9501
1997	628	2	630	52188	262	52450	11077	0	11077
Total	17048	654	17702	1453966	78014	1531980	370414	21142	391556

Table III: Number of *Chelonia mydas* (G. T) and *Lepidochelys olivacea* (O.R) turtles tagged and recovered at Karachi from 1982 to 1997

Year	No. of Turtles Tagged			No. of Turtles Recovered		
	G.T.	O.R.	Total	G.T.	O.R.	Total
1982	20	0	20	0	0	0
1983	121	2	123	9	0	9
1984	99	5	104	60	0	60
1985	175	2	177	47	1	48
1986	210	6	216	33	2	35
1987	211	15	226	99	3	102
1988	156	0	156	34	3	37
1989	187	7	194	32	1	33
1990	192	-	192	33	0	33
1991	190	2	192	50	2	52
1992	115	0	115	32	0	32
1993	217	0	217	31	0	31
1994	51	1	52	6	0	6

1995	404	3	407	37	0	37
1996	436	0	436	43	0	43
1997	309	0	309	18	0	18
Total	309	43	3136	564	12	576

Table IV: Long range recoveries of green turtles tagged at Hawkes Bay, Karachi

Tag No.	Date tagged	Location tagged	Date of recovery	Place of recovery	Distance (km)	Time (days)	Average speed (km/day)
W2242 Rt. W2243 Lt.	24/09/89	Hawkes Bay 24 48'N; 66 58'E	11/05/90	Bhaidar Island, Gulf of Kutch Gu jarat, India. 22 27'N; 69 17'E	506	199	2.5
W4801 Rt. W4802 Lt	12/12/95	Hawkes Bay 24 48'N; 66 58'E	12/12/96	Beraisole Village South Central Eri trea N.E.Africa 13 39'N; 42 08'E	3240	365	8.9
W3807 Rt. W3808 Lt	31/08/95	Hawkes Bay. 24 48'N; 66 58'E	12/12/97	Between Lengeh and Dayyer Persian Gulf. Iran. 27 45'N	1470	742	2

Stickers - Green and Olive ridley turtle stickers were sponsored by MNJ, the Rotary Club, WWF Pakistan and the Sindh Wildlife Department.

Posters - 'Save Wildlife' and 'Important Reptiles of Sindh' were prepared by the Sindh Wildlife Department. 'Marine Turtles of Pakistan (Life cycle)' was prepared by the Sindh Wildlife Department with financial assistance from WWF Pakistan.

Stamps - 'Green Turtle' was issued by the Pakistan Postal Service in 1981, and 'Olive Ridley' is in the printing process.

T-Shirts - 'Save the Sea Turtles' was prepared by Sindh Wildlife Department and 'Sabz and Zaitooni' Forever Friends was sponsored by Shell Pakistan Ltd.

Tea Mugs - 'Sabz and Zaitooni' Forever Friends was sponsored by Shell Pakistan Ltd.

Calenders - 'Marine Turtles of Pakistan' was issued by Pakistan Cables Ltd. 'Wildlife of Sindh', with marine turtles as an important endangered species, is issued by the Sindh Wildlife Department from time to time.

Documentary films - 'Green Turtle' was prepared by the Sindh Wildlife Department with the help of Sindh Information Department. 'Marine Turtle' was prepared by the Sindh Wildlife Department and Sindh Information Department in Urdu, Sindhi and English versions. 'Wildlife of Pakistan' was prepared by the Federal Information Department. 'Wildlife of Sindh' was prepared by PTV and the Sindh Wildlife Department

Transparencies and Photographs - The life cycle sequence of the green and Olive ridley turtles, hatchlings and eggs, nests and protected enclosures, have been preserved on transparencies and photographs for historical records and for lectures.

Signboards - Various signboards depicting different stages of the turtle life cycle and tagging information have been installed in the project area for public awareness. In 1997, most of them were funded through donations collected from school students and a few multinational companies. The names of donors were acknowledged on the signs. These signs are particularly helpful at night in guiding tourists and visitors to find the turtle project and enclosures along the beach. They also provide information and introductions to the protection of marine turtles.

Guided Tours and Excursions - Every year guided tours are organised, with a peak during the best nesting and hatching season from September to November. Students and teachers of various local schools have been taken to the project area to watch turtles and egg laying in the natural environment and are fascinated by the sequence of events.

Seminars, Lectures and Workshops - Seminars organised by various NGO's and Government departments were also attended. Lectures on turtle conservation have been delivered to educational and cultural organisations to promote conservation in public, supported slides and films.

Newspapers and Magazines - Articles, essays, news-items, reports, research papers and reviews have been published in different newspapers, magazines and journals of national and international standard. National and local languages (Urdu and Sindhi) are used along with English as an international language, to reach the broadest audience.

Radio and TV - Public awareness to promote education for conservation of endangered species particularly marine turtles can be carried out by Radio Pakistan through special transmission and PTV, NTM & STN through documentary films in their morning and evening programs.

Exhibition/Competition - Photographs, posters, models and museum specimens have been used for display during exhibitions to create awareness among the public. Photographic competitions are also being organised for students and naturalists

Reward for Tag Returns - Rewards in the form of turtle brochures, stickers, greeting cards and T-shirts have been offered to those who send any information about tagged turtles from areas within and outside of Pakistan.

CONCLUSION

Green and Olive ridley turtles are legally protected in Pakistan, and because they are not consumed due to religious customs, conservation issues are restricted to habitat degradation, predation and pollution. There are some major gaps in the understanding of life history stages and habitat requirements for the Olive ridley. Surveys to study nesting and hatching frequency along the entire coastline is urgently required, and long-term research is needed to understand the effect of pollution on nesting and feeding grounds, for example oil spills and industrial sewerage containing heavy metals and lethal organic and inorganic substances. It is necessary to determine the migratory routes of turtles by tagging or satellite tracking, and implement TED use by shrimp trawlers and study their effect on turtle populations. It is also crucial to standardise data collection regarding turtle nests, nesting seasons, clutch sizes, hatching seasons, tagging and tag recoveries, etc. Finally, mass education and extension programs regarding turtle conservation should be strengthened and reserves for marine turtle need to be set up along the beaches of Karachi.

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