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The newsletter is distributed free of cost to a network of government and non-government organisations and individuals in the region. All articles are also freely available in PDF and HTML formats on the website. Readers can submit names and addresses of individuals, NGOs, research institutions, schools and colleges, etc. for inclusion in the mailing list.

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**Cover photograph:** A leatherback hatchling approaching the sea in West Bay, Little Andaman  
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## EDITORIAL

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Lalith Ekanayake joins me, as co-editor of IOTN, in presenting this special issue on the Andaman and Nicobar Islands. We would like to thank the authors for their papers describing the results of historical and recent surveys, and an update on current research and conservation efforts in the region. ■

## SEA TURTLE SURVEYS AND RESEARCH IN THE ANDAMAN AND NICOBAR ISLANDS

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There are many historical accounts of sea turtles in the Andaman and Nicobar Islands from the 1800s, mostly accounts of their capture and consumption by the British stationed there, or of hunting by the aboriginal communities. Mouat (1863) cites records of large numbers of turtles in Diamond Bay off the coast of Burma, and of a ship's crew capturing more than 100 turtles (probably green turtles) in 3 days. Later, Alfred Alcock, a naturalist aboard the Royal Indian Marine Survey Ship "Investigator" writes of seeing 'shoals of turtles' near South Sentinel Island, and of seeing hatchlings emerge (Alcock, 1902). Man (1883) and Portman (1899) documented the hunting culture and rituals of the Andaman indigenous tribes, emphasizing their great love of turtle meat. Similarly, Kloss (1902) recorded the presence of turtles in the Nicobars and wrote that skulls were often seen in Nicobari households.

The first surveys of the Andaman and Nicobar Islands for marine turtles were conducted in the late 1970s

by Satish Bhaskar, a pioneer of sea turtle surveys and conservation in India (see IOTN 12: 23 for a special profile of Bhaskar, including a personal account by R. Whitaker, and a compilation of his publications and surveys). Bhaskar visited the Andaman and Nicobar Islands for the first time in 1978–1979, and surveyed most islands during his eight month stint there (Bhaskar, 1979), including much of the Andamans, and Central and Great Nicobar. He returned in 1981 to survey Great Nicobar and Little Andaman Island, and in 1983–84, to visit North Andamans (summarized in Bhaskar 1993). Bhaskar revisited many of these islands during a series of surveys in the 1990s; during his last few years in the islands, he spent a substantial part of his time on South Reef Island, monitoring the hawksbill population there (Bhaskar, 1996). Bhaskar's surveys over two decades were critical in identifying many important nesting sites in the Andaman and Nicobar Islands, many of which are legally protected today (see review by Namboothri et al., this issue).

Other researchers also started surveying the Andaman and Nicobar Islands for sea turtles. In 1991, Manjula Tiwari visited the islands of Little and Great Nicobar and helped identify these sites as the few remaining strongholds for leatherback turtles in the region (Bhaskar and Tiwari, 1992; Tiwari, this issue). Subsequently, Arjun Sivasundar carried out his masters dissertation project from Pondicherry University on nest site selection by leatherback turtles on Little Andaman Island (Sivasundar, 1996). In addition, the Forest Department maintained hatcheries at several sites, but these data have not been published, except for a review of nesting in Cuthbert Bay, Middle Andamans (Fatima et al., 2011).

Though herpetological surveys in the islands had been initiated in the mid 1970s by Romulus Whitaker and Satish Bhaskar, it was only in 1990 that the Andaman and Nicobar Environment Team (ANET) was established as a field research station by the Madras Crocodile Bank Trust (MCBT). In 2000, a Government of India – UNDP sea turtle project funded a survey of the sea turtles in the Andaman and Nicobar Islands by the ANET/MCBT (Andrews et al. 2001). An extensive survey was conducted on most of the Andamans and a substantial part of the Nicobar Islands (Andrews et al. 2006a). Based on Bhaskar and Tiwari's surveys, Galathea Bay, Great Nicobar Island had been identified as an important leatherback nesting site in the Nicobars. Given the presence of a road leading to this site, ANET established a field station at Galathea Bay and initiated a long-term leatherback monitoring programme at this site. The surveys and monitoring were subsequently supported by a UNEP-CMS (Convention on the Conservation of Migratory Species) project during 2003-2004 (Andrews et al., 2006b). During this period, genetic studies were initiated on the islands by the Wildlife Institute of India, and leatherback turtles were sampled intensively at Galathea and other rookeries in Great Nicobar Island during 2001–2002 (Shanker et al., 2011).

Andrews and Shanker (2002) used this information to estimate that about 1000 leatherback turtles nested on Great and Little Nicobar Islands, making it one of the largest rookeries in the Indian Ocean. Unfortunately, the 2004 earthquake and the subsequent tsunami destroyed the nesting beach of Galathea Bay along with the survey camp, leading to the tragic death of the researcher working on the project, Ambika Tripathy, but also the extraordinary survival of ANET's field assistant, Saw Agu (see account by Chandi, 2009). The impact of the tsunami on the islands was devastating and large stretches of coastlines were permanently

altered. Post-tsunami rapid surveys of nesting beaches in the Andamans revealed that beaches had reformed in some areas with evidence of nesting at these sites (Andrews et al., 2006c). Recent surveys also indicate that beaches have formed again in Galathea as well as on the west coast of Great Nicobar Island, and that substantial leatherback nesting occurs at these sites (N. Namboothri, pers. obs.; M. Chandi, pers. comm.).

A survey of Little Andaman Island in 2007 (by M. Chandi and K. Shanker) suggested that there was significant nesting of leatherback turtles at both South Bay and West Bay beaches. In December 2007, with funds from the National Ocean and Atmospheric Administration (NOAA), the Centre for Ecological Sciences (CES), Indian Institute of Science, in partnership with ANET, initiated a long-term leatherback monitoring programme at South Bay Beach (Swaminathan et al., 2011). Monitoring was also initiated at West Bay beach in 2010. The programme involved monitoring nesting and predation, as well as beach temperatures. Leatherback turtles were tagged with PIT tags to monitor re-nesting and re-migration intervals. In 2010, CES initiated satellite telemetry of leatherback turtles of West Bay beach (Namboothri et al., this issue). CES, Dakshin Foundation and ANET plan to support long term monitoring at this site, and start monitoring sea turtles at Great Nicobar Island again when infrastructure and logistics make it feasible.

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# A COMPILATION OF DATA FROM SATISH BHASKAR'S SEA TURTLE SURVEYS OF THE ANDAMAN AND NICOBAR ISLANDS

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Information arising from extensive surveys undertaken by Satish Bhaskar have contributed to the majority of our understanding of sea turtles in the Andaman and Nicobar Islands. Between 1978 and 1995, Bhaskar visited most of the islands in the Andaman and Nicobar archipelago, recording information on turtle nesting, tagging a substantial number of turtles, and collecting

insightful information on the potential threats to marine turtles in the region. Bhaskar's work may not have been conducted within a conventional scientific framework, but the significance of the information that his surveys generated cannot be understated. Though there was a lack of continuity and inconsistencies in protocols, his baseline data laid the foundation for sea turtle conservation and research initiatives in the region. Thanks to his efforts, many of the remote beaches of the Andaman and Nicobar Islands are now recognized as important sites for protection.

Bhaskar's visits to the islands can be sorted into numerous phases. During the first, a preliminary exploratory phase from 1978-1979, he surveyed most islands of the Andaman group (Figure 1), the central Nicobar Group, and Great Nicobar Island (Figure 2). The second phase occurred in 1981 when he visited Great Nicobar Island and Little Andaman Island (Figure 3); during the third phase of 1983-1984, he surveyed most of the Andaman Islands. The fourth phase comprised a better organised and continuous survey of South Reef Island from late-1991 to late-1995. By this time, Bhaskar had visited most islands of the Andaman and Nicobar archipelago and collected substantial data on marine turtles of the region.

Much of this data has been published as reports to donors, and a small proportion has appeared in journal publications. The objective of this paper is to synthesise data from the reports that Bhaskar produced between 1978-1995, in a format that can

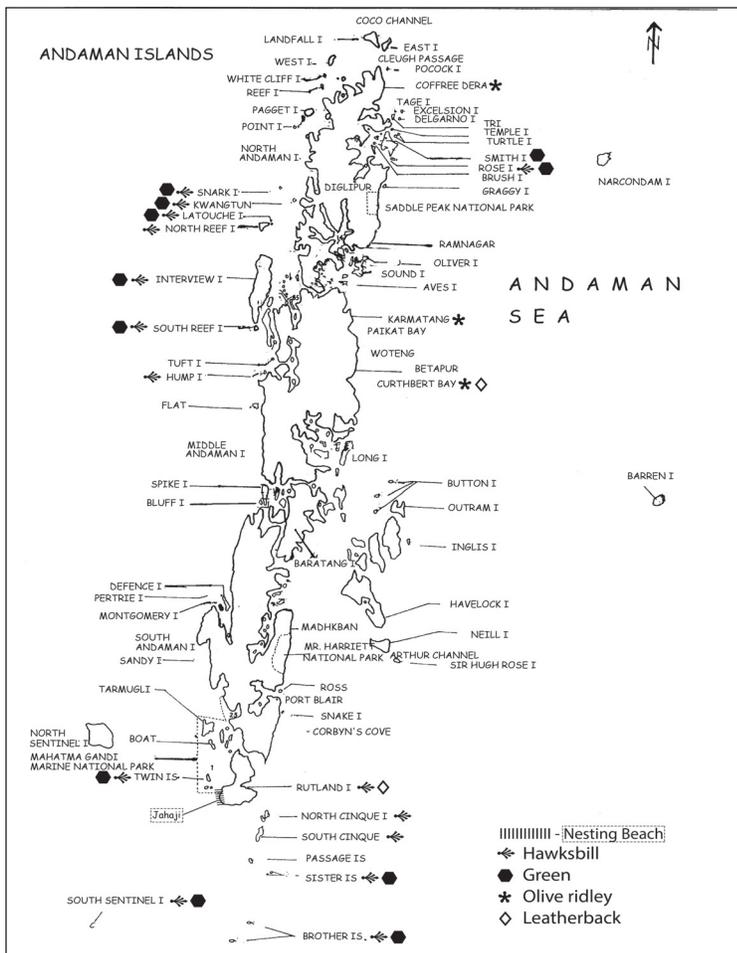


Figure 1. The Andaman Islands

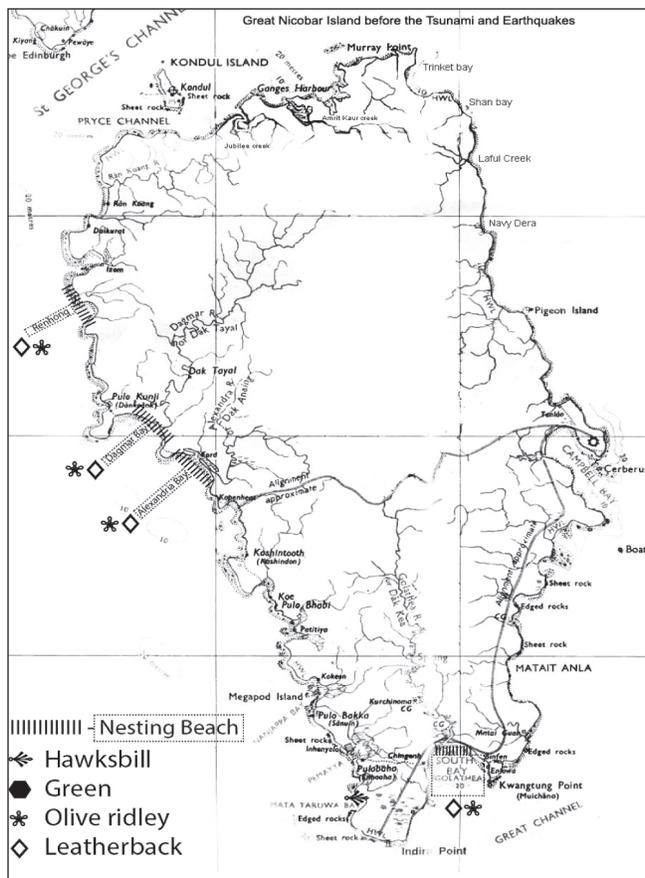


Figure 2. Great Nicobar Islands

be used as a reference for future surveys and research and conservation interventions. The data is extracted from his reports submitted to the Wildlife Fund for Nature (WWF), India and the Madras Crocodile Bank Trust (MCBT) (citations listed at the end). For convenience, the data has been sorted at the species level and the spatio-temporal information for each species is grouped.

**HAWKSBILL TURTLES**

Bhaskar’s surveys in the Andaman group of islands concentrated strongly on hawksbill turtles, resulting in a substantial amount of information on the spatio-temporal patterns in their nesting. These serve as valuable baseline data.

**Nesting hawksbill turtle data during 1978-1995 (Bhaskar, 1979b, 1984, 1993a, 1983b, 1983c, 1994a, 1994c, 1995a, 1995b, 1995c)**

Bhaskar surveyed most islands of the Andaman group during his visits in 1978-79 and later in 1983-84 (some islands were visited again in 1993-94 and 1995). The

1978-1979 survey was preliminary in nature wherein he identifies critical sites to be monitored/surveyed in detail and detailed surveys were carried out from 1983-1995. A summary of the nesting hawksbill turtle data collected during these surveys is provided in Table 1.

**Hawksbill turtle nesting data from South Reef Island, 09 July to 18 December 1992 (Bhaskar, 1993b)**

During his surveys in 1978-79 and 1983-84, Bhaskar identified South Reef Island as one of the most important sites for hawksbill turtles in the region; North Reef Island and Snark Island were also significant sites. In 1992, Bhaskar tagged and measured hawksbill turtles, and monitored their nesting parameters for a period of approximately 4 months at South Reef Island. A summary of the data is provided below and in Table 2.

- Total number of nests counted = 116 (9th July to 12th December, 1992)
- Total number of turtles tagged= 27 (15 September to 12 December, 1992)
- Average number of nests per hawksbill turtle (calculated as number of nests laid after tagging

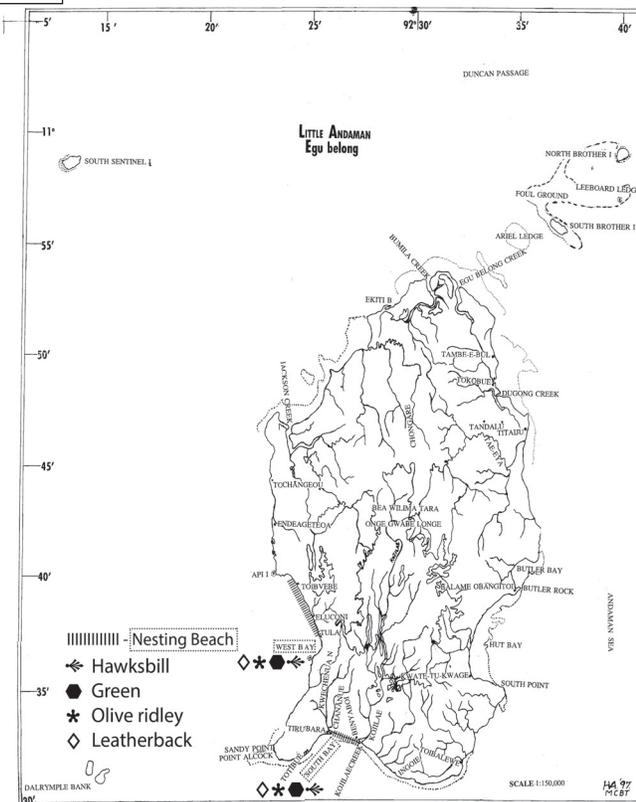


Figure 3. Little Andaman Island

commenced/ number of hawksbills tagged= 77 nests/27 tagged turtles = 2.85 nests/turtle.

- Estimated number of nesting females= 41
- Hatchling emergence= 21,000 hatchlings (based on eggshell counts).

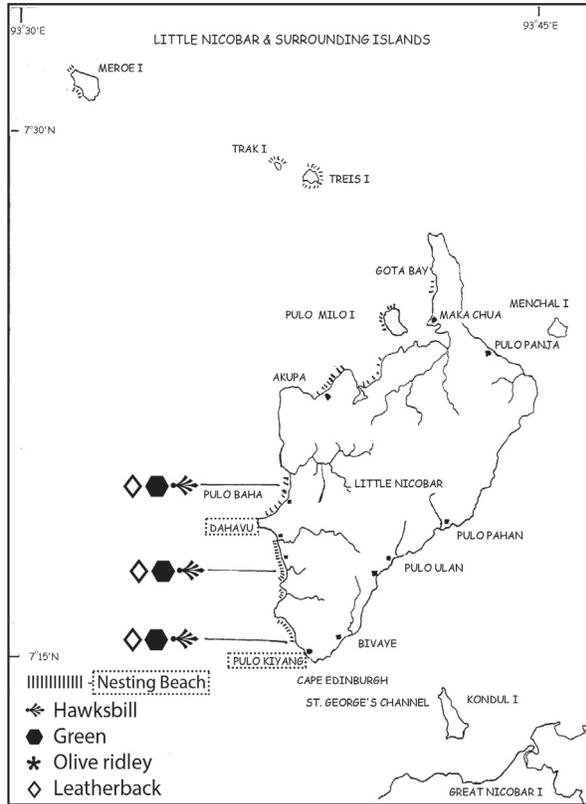


Figure 4. Little Nicobar Islands

**Hawksbill turtle surveys 5th February to 15th April 1993 (Bhaskar, 1993c)**

Bhaskar surveyed 37 islands of the Andaman group during this period, recording 536 hawksbill nests. Hump Island was surveyed for the first time and 48 hawksbill nests were found.

**Hawksbill turtle surveys, 8th July 1993 to 3rd December 1993 (Bhaskar, 1994a)**

A total of 128 hawksbill nests were recorded on South Reef Island between 8th of July and 22nd November 1993. Bhaskar estimated 46 turtles to have nested during this period, marginally more than the previous season (09th July 1992 to 18th December 1992).

**Combined hawksbill survey data 1992-1993 (Bhaskar, 1994a)**

Bhaskar calculated inter-nesting intervals for 50 turtles

during the 1992 and 1993 nesting seasons at South Reef Island. Approximately 92% of the turtles had an interesting period of 12-15 days (see Table 3).

**Table 1. A summary of Satish Bhaskar's nesting hawksbill turtle records and observations from the Andaman Islands.**

Location	Number of nests encountered and other observations		
	1983-1984	1993-1994	1995
South Reef Island	Number of nests not mentioned but 4 turtles reported to have nested in 1983	120	-
Interview Island	17	-	-
Ross Island	1 carapace	-	-
Snark/Shark Island	27	30	-
Kwangtung Island	27	57	-
North Reef Island	19	6	-
Sister Islands	4 nests on East Sister	-	13
North Brother Island	78	-	14
South Brother Island	34	-	40

Bhaskar also surveyed Latouche Island (12 nests), Rutland Island (2), Western Twin (12), Eastern Twin (13), Northern Cinque (18), Southern Cinque (24) and Little Andaman Islands (7) in 1983-84, and South Sentinel (0) in 1995.

**Table 2. Summary of the nesting parameters for hawksbill turtles at South Reef Island.**

Nesting Parameter	No. of Nests Examined	Average	Range
Clutch size	58	131.2	46-213
# eggshell in hatched nests	55	114.95	33-190
Hatch success (%)*	55	88.07	--
Unhatched eggs*	56	15.71	1-96
Infertile eggs as proportion of clutch	55	3.574	0-16.41
Hatchling emergence period (days)	15	61.47	55-73
Beach sand control temp (°C)**	15 locations	28.76	27.0-30.1

\*excluding data from unhatched and eroded nests

\*\*measured after emergence of first hatchlings, 1m from the emerged nest at a depth 35cm

**Table 3. Inter-nesting intervals for hawksbill turtles at South Reef Island (1992-1993).**

Inter-nesting interval (days)	No. of turtles in 1992 (total=15)	No. of turtles in 1993 (total=35)	Total no. of turtles 1992-1993	Proportion of total turtles % (n=50)
11	0	0	0	0
12	1	6	7	14
13	5	11	16	32
14	3	9	12	24
15	4	7	11	22
16	1	2	3	6
17	1	0	1	2
18	0	0	0	0

Clutch size was calculated for hawksbill turtles nesting at South Reef Island between 1992 and 1993 (n=114); ~90% of turtles laid between 80-180 eggs per clutch, with ~50% of turtles producing between 100-

140 eggs per clutch (see Table 4). Bhaskar recorded a hawksbill clutch with 215 eggs, which he thought to be the largest recorded for any sea turtle in India.

**Table 4. Clutch sizes of hawksbill turtles nesting at South Reef Island, 1992-1993.**

Clutch size (no. of eggs)	No. of clutches in 1992 (total=58)	No. of clutches in 1993 (total=56)	Total no. of clutches 1992-1993	Proportion of total clutches % (n=114)
40-60	1	0	1	0.9
61-80	0	1	1	0.9
81-100	7	4	11	9.6
101-120	11	14	25	21.9
121-140	21	14	35	30.7
141-160	9	10	19	16.7
161-180	6	7	13	11.4
181-200	1	5	6	5.3
201-220	2	1	3	2.6
221-240	0	0	0	0.0

#### **Carapace size of nesting hawksbill turtles on South Reef Island, 1992-1995 (Bhaskar, 1995c)**

Bhaskar's measurements of 94 nesting hawksbill turtles indicated that the curved carapace length (CCL) ranged from 64-87cm (mean=77.35cm) and the curved carapace width (CCW) ranged from 58.5-81cm (mean=69.04 cm) (see Table 5).

#### **Hawksbill turtle surveys in 1994 (Bhaskar, 1994c)**

In early 1994, Bhaskar surveyed the islands of both the Andaman as well as the Nicobar groups. Hawksbill turtles nested in small numbers at Great Nicobar and several other islands of the South and Central

Nicobars. Twenty-six hawksbills were tagged at South Reef Island. No tagged turtles (from 1992 and 1993) were encountered, suggesting that the remigration interval for hawksbill turtles at this location is greater than 2 years. The average inter-nesting interval over the period of study (12th September 1992 -8th September 1994) was 14 days (n=79, range 12-17 days).

#### **Hawksbill turtle surveys in 1995 (Bhaskar, 1995c)**

The main aim of this monitoring in this year was to establish remigration intervals for hawksbills nesting on South Reef Island. Only one previously marked turtle, first tagged in 1992, was encountered during this survey. Bhaskar recorded the Inter-nesting

**Table 5. Curved carapace length (CCL) and curved carapace width (CCW) of hawksbill turtles nesting at South Reef Island, 1992-1995.**

Carapace Parameter		1992 (n=27)	1993 (n=28)	1994 (n=26)	1995 (n=13)
CCL (cm)	Average	77.7	77.1	76.7	77.9
	Range	71.0-85.3	64.0-86.5	68.8-86.8	69.5-87.0
	Sample S.D.	4.3	4.7	4.4	5.8
CCW (cm)	Average	68.5	69.1	68.3	70.3
	Range	58.5-79.3	58.5-79.0	59.0-76.8	63.0-81.0
	Sample S.D.	4.7	5.3	4.7	5.8

interval of hawksbill turtles nesting at this location to be 12-17 days, with an average of 14 days (based on 25 encounters). When compared with the hawksbill turtle nesting data from southern islands of the Andamans between 1983-84 to 1995, no decrease was observed in the total number of nests (see Table 1).

**Table 6. Number of hawksbill turtle nests laid at South Reef Island, 1992-1995.**

Year	Survey Period	No. of nests counted
1992	8th July – 11th December	116
1993	12th July – 21st November	128
1994	28th June – 7th December	120
1995	24th May – 3rd November	108

**Summary of hawksbill turtle data**

Bhaskar identified more than 17 islands in the Andaman group as critical nesting sites for hawksbill turtles, including Snark, Latouche, North Reef, Kwangtung and Interview Islands in the North Andaman islands group, Hump Island and South Reef Island in the Middle Andamans, and the Brother Islands, Twin Islands and North and South Cinque Islands in the Southern Andamans. His four year monitoring of nesting hawksbill turtles at South Reef Island provided insight into nesting patterns of the species. Bhaskar found little variation in the number of hawksbills nests (between 108-128, Table 6) and nesting females each year, estimating a total of 41, 46, 32 and 35 turtles respectively during the four year study period from 1992-1995, and suggested that an average of 45 turtles nested every year at South Reef Island. Though the tagging program that Bhaskar conducted revealed little information on the remigration interval of nesting turtles, he encountered one turtle in 1995 that was originally tagged in 1992. He also identified other islands with

similar and lower nesting intensities in the Andaman group of islands, and indicated that additional sites required protection for conservation of the Andaman hawksbill turtle populations. The studies also revealed that the peak nesting season for hawksbill turtles in the region is during the month of September.

**GREEN TURTLES**

During the exploratory phase, Bhaskar (1979b) recorded only one green turtle nest from South Andaman (clutch size 93 eggs, with an average egg diameter of 41.8mm). He predicted that the peak nesting season for green turtles ranged from May to September, although they also nested throughout the year. In 1981, while *en route* to the Nicobars, Bhaskar recorded one green turtle nest at South Bay on Little Andaman Island. Intense surveys of green turtles began in 1983-1984. Data collected during the entire survey period (1978-1995) for green turtles is provided in Table 7. Green turtle nesting data for South Reef Island is provided in Table 8.

**Green turtle nesting data from South Reef Island, 1992-1995**

Bhaskar monitored the nesting of green turtles and tagged nesting females at South Reef Island (Bhaskar 1993b, 1994a, 1994c, 1995c). Some useful information from the study is summarized in Table 8.

Bhaskar monitored the inter-nesting intervals for 52 green turtles at South Reef Island over a period of four years, and determined a range from 11-14 days with an average of 12.5 days (Bhaskar 1994c, 1995c). In addition, Bhaskar measured a total of 22 nesting green turtles over a period of 4 years from the South Reef Island (refer table 9) and found the Curved Carapace Length (CCL) to range from 86.5-100.5cm and the Curved Carapace Width (CCW) to range from 76.5-94.8cm.

**Table 7. Number of green turtles nesting on the Andaman and Nicobar Islands, 1978-1995.**

Location	1978-79	1983-84	1994	1995
South Andaman Island	1	-	-	-
Little Andaman Island (South Bay)	1	-	-	-
Smith Island	-	13	-	-
Ross Island	-	3	-	-
Snark/Shark Island	-	12	15	-
Interview Island	-	105	-	-
Kwangtung Island	-	-	2	-
Latouche Island	-	-	1	-
Western Twin Island	0	1	-	-
Little Andaman, North	0	2	-	-
South Sentinel Island	-	-	-	550
North Brother Island	-	0	-	16
South Brother Island	-	37	-	111
The Sisters	-	0	-	2
Eastern Twin Island	0	0	-	3
Dahayu beach, Little Nicobar	-		2 nested on 30-31 March	
Pul Kiyang beach, Little Nicobar	-		Reports green turtle nesting, but not exact numbers	

### Summary of green turtle data

The most important discovery of Bhaskar's surveys of the Andaman group was the identification of South Sentinel Island as perhaps the largest nesting site for green turtles in the region (Bhaskar 1995b). The surveys also helped identify Interview Island as one of the largest green turtle nesting sites in the North Andaman group and South Brother Island, south of South Andaman. His monitoring of green turtle nesting at South Reef Island was

not as rigorous as that of his hawksbill turtle studies. However, his observations indicate that green turtle nesting in the region peaks during the monsoon season (July-August) and the inter-nesting interval is, on average, 12.5 days. In 1993, the minimum incubation period for hawksbill nests was 54 days, and 57 days for green turtle nests. The tagging efforts did not yield many returns, however, based on an average of 4 nests per turtle per season, Bhaskar estimated that 10-15 turtles nested on South Reef Island each season (Bhaskar 1995c).

**Table 8. Number of green turtle nests laid at South Reef Island, 1992-1995.**

Monitoring period	No. of nests
9th July to 12th December 1992	45
15th July to 22nd November 1993	55
28th June to 7th December 1994	42
16th June to 27th October 1995	22

**Table 9. Size of nesting green turtles at South Reef Island, 1992-1995. Numbers indicate the range and average (in parentheses).**

Carapace Measurement	1992 (n=5)	1993 (n=7)	1994 (n=4)	1995 (n=6)
CCL (cm)	86.5-93.3 (90.5)	92.0-96.5 (94.75)	91.0-99.0 (94.25)	90.0-100.5 (95.5)
CCW (cm)	81-85.3 (83)	81.3-94.8 (87)	-	76.5-85.3 (85.3)

**OLIVE RIDLEY TURTLES**

Information on olive ridley turtles was sparse from Bhaskar's initial surveys in 1978-1979. There is a single nest record at South Andaman, with a clutch size of 119, from 1978 (1979a). His survey of the Nicobar Islands (Great Nicobar and Little Nicobar islands) and the Little Andaman Islands in January-March 1981 helped identify some important olive ridley nesting sites (Bhaskar 1981a). Alexandria Bay, Dagmar Bay and Renhong beaches yielded 33, 104 and 2 nests, respectively. Olive ridley nests were also recorded on South and West Bays, Little Andaman Island (Bhaskar, 1981a). In 1994, Bhaskar compiled the data on olive ridley nesting at Cuthbert Bay, Middle Andaman, collected by the Andaman and Nicobar Forest Department (Bhaskar 1994b). He described the nesting at this location as an arribada-type event, with

a large number of turtles nesting within a few days (see Table 10). The analysis revealed that about 50-75% of the olive ridley nesting happens occurred on a few nights, usually between mid-January and end of February.

Combining his data from the Nicobars and other surveys, Bhaskar tried to determine the total number of olive ridley turtles nesting in the entire Andaman and Nicobar archipelago (see Table 11) (Bhaskar, 1994b). He estimated a total of 502 turtles for the Andaman group of islands each season and a total of 198 turtles for the Nicobar group. Bhaskar's assumption of 1.5 nests per turtle per season may be an underestimate for the region, and possibly led to an overestimation of the number of individual turtles. However, considering many of sites in the Andaman and Nicobar had not yet been surveyed, the estimate may have been lower than the actual population size.

**Table 10. Olive ridley nesting at Cuthbert Bay, Middle Andaman Island, indicated an arribada-type event, with peak nights during the nesting season.**

Nesting season	Total nesting duration	Total no. of nests	Peak nesting nights	Number of nests laid on the peak nesting nights	% of nests laid on the peak nesting nights*
1990-91	16/11/1990 - 30/04/1991	706	04/02/1991	70	58%
			06/02/1991	37	
			11/02/1991	147	
			12/02/1991	156	
1991-92	01/12/1991 - 26/02/1992	711	14/01/1992	52	73%
			29/01/1992	170	
			30/01/1992	93	
			26/02/1992	205	

**Table 11. Estimates of olive ridley turtles nesting in the entire Andaman and Nicobar archipelago.**

Location	Source	Date of Survey	No. of nests	No. of turtles*	
Andaman Group	Coffeeder Island (North Andaman)	Bhaskar, 1993	02/04/1993	13	9
	Cuthbert Bay	Forest Dept.	1990-94	723**	482
	Karmatang No.9 Island	Bhaskar, 1993	27/03/1993	14	9
	Little Andaman Island	Bhaskar, 1993	29/03/1978 - 05/01/1979	5	3
	Subtotal			755	503
Nicobar Group	Katchal Island	Bhaskar, 1993	7/02/1979 - 11/02/1979	9	6
	Teressa Island	Bhaskar, 1993	12/03/1979	8	5
	Great Nicobar Island	Bhaskar, 1993	12/12/1991 - 22/04/1992	280	187
	Subtotal			297	198
Total			1052	701	

\*based on the assumption that olive ridleys nest 1.5 times on an average per season (however, Bhaskar himself observed that ridleys often nest 2-3 times per season)

\*\*based on an average estimate for a single season

## LEATHERBACK TURTLES OF THE ANDAMAN AND NICOBAR ISLANDS

The first confirmation of leatherback nesting in the region came from Bhaskar's initial surveys (Bhaskar, 1979a), when he recorded leatherback nesting on Jahaji Beach at Rutland Island. Surveys during subsequent years lead to the discovery of a significant leatherback nesting beach at West Bay (70 nests) and a few nests at South Bay on Little Andaman Island, important nesting sites at Alexandria Bay and Dagmar Bay on Great Nicobar Island (Bhaskar, 1981). He counted similar numbers during his subsequent visit to Little Andaman (Bhaskar, 1984), but much larger numbers were counted from the Great Nicobar Island during complete season surveys in 1991-92 (summary provided in Table 12).

Bhaskar's surveys confirmed leatherback turtle nesting and identified nesting beaches in the Andaman and Nicobar Islands. Important nesting sites in the Andaman group were West and South Bay beaches on Little Andaman Island and Jahaji beach on Rutland Island. Surveys of the Nicobar Islands revealed some of the largest leatherback nesting sites for the entire archipelago. The most important beaches of the Nicobar group were Alexandria and Dagmar Beaches on the west coast and Galathea Bay Beach on the east coast of Great Nicobar Island, and Pulo Kiyang and Dahayu beaches on Little Nicobar Island. Based on multiple years of data, Bhaskar (1994b) estimated the number of leatherback turtles nesting per year in the Andaman and Nicobar archipelago (see Table 13).

**Table 12. The number of leatherback turtle nests laid per year in the Andaman and Nicobar Islands.**

Location	Survey Period				
	1978-79	1981	1983-84	1991-92	1993-94
Jahaji Beach, Rutland Island	*	*	-	5	-
West Bay, Little Andaman Island	70	80	84	-	-
Katchal Island	5	-	-	-	-
Teressa Island	4	-	-	-	-
South Bay, Little Andaman	-	10	4	-	-
Pulo Kiyang beach, Little Nicobar	-	-	-	-	115
Dahayu beach, Little Nicobar	-	-	-	-	47
Dahayu cove, Little Nicobar	-	-	-	-	3
Great Nicobar Island (all beaches)				811	
Galathea Bay, Great Nicobar	-	-	-	158**	237
Alexandria Bay, Great Nicobar	80	55	-	343**	
Dagmar Bay, Great Nicobar	80	8	-	171**	
Renhong beach, Great Nicobar		4	-	-	

\*Nesting was observed but numbers of turtles were not recorded

\*\* 811 nests were recorded for the entire Great Nicobar Island; an additional 139 nests were recorded along other beaches of the west coast of Great Nicobar Island.

- indicates that surveys were not carried out

## THREATS TO SEA TURTLES IN THE ANDAMAN AND NICOBAR ISLANDS

In addition to collecting data on nesting in the Andaman and Nicobar Islands, Bhaskar documented the threats to sea turtles in the region. Some of the major onshore natural predators of turtle eggs and hatchlings were monitor lizards (the most significant and widespread predator), wild pigs, civet cats, estuarine crocodiles, Nicobar serpent eagles, hermit crabs and ghost crabs. Bhaskar identified feral dogs and pigs as

most destructive to marine turtle nests on beaches close to settlements; feral dogs were recorded as being of particular concern on important nesting beaches such as Galathea Bay, Little Nicobar, Little Andaman and Cuthbert Bay. Sharks and other predatory fishes (such as trevallie and barracuda) were identified as potential predators of different turtle life stages at sea.

During the surveys of the North and the Middle Andaman Islands, Bhaskar observed intense egg harvest by humans at East, Excelsior, Delgarno, Trilby and East Turtle Islands.

**Table 13. Estimation size of the nesting leatherback populations for the Andaman and Nicobar Islands**

	<b>Layout</b>	<b>No. of nests</b>	<b>No. of turtles*</b>
Nicobar group of islands	Great Nicobar	811	166
	Little Nicobar	110**	22
	Katchal	5	1
	Teressa	4	1
	Sub-total	930	190
Andaman group of islands	Rutland	5	1
	Little Andaman (West Bay)	84	17
	Little Andaman (South Bay)	10	2
	Sub-total	99	20
	Total Nests	1029	210

\*No. of turtles calculated based on the assumption that leatherback turtle lay, on average, 4.9 nests per season

\*\*165 nests were recorded during 1993-94 surveys, however, a conservative average of 110 is considered

Egg harvesting was less intense on Point, Paget, Reef, North Reef, Latouche, Kwangtung, Whitecliff, Thornhill, West, Pocock and Sound Islands. During his surveys, he interviewed local fishermen and indigenous communities in order to identify nesting sites, seasons, species etc and to understand the various issues that sea turtles in the region face.

Bhaskar identified shark fishing as one of the most serious threats to green turtle populations of the Andaman and Nicobar Islands. Based on interviews with local shark fishermen in 1994, he estimated an average mortality of 10 green turtles (mostly juveniles of sub-adults) per month. In 1994, five shark fishing groups existed in Mayabunder alone, and operated on a year-long basis; Bhaskar estimated that at least 600 green turtles were killed as incidental bycatch each year in this location alone. Considering many such fishing operations operated out of other localities in the Middle and South Andaman Islands, Bhaskar predicted that approximately 1500 green turtles were killed in the region every year. As early as 1994, Bhaskar described that green turtle populations in the region as decimated. Considering that the large predator fishery has substantially increased in the islands in the past decade, a higher level of mortality can be expected as a result of current operations. It is therefore very important to undertake monitoring of marine turtle populations in the region, especially at the same sites surveyed by Bhaskar, to understand population trends.

Bhaskar also reported extensive illegal capture of turtles

for meat by the mainland settlers, as well as by foreign poachers. He reported poaching of turtles on South Sentinel Island, one of the last remaining strongholds for green turtles in the region, as well as in some remote locations of Great Nicobar. Hawksbill and green turtles were the preferred turtles for consumption, followed by olive ridleys. Leatherback turtles were usually not killed for consumption. Sand mining was the most serious anthropogenic threat to nesting beaches in close proximity to human settlements, particularly in areas with dense human populations.

Bhaskar recommended that several sites be protected, including Snark Island, Kwangtung Island, Latouche Island, North and South Reef Islands, North and South Cinque Islands, North and South Brother Islands, and South Sentinel Island. These sites were regarded as important for conserving hawksbill and green turtles. He recommended that sand mining from nesting beaches be reduced, and strong regulations be placed on the shark fishing industry. He believed the proposal to construct a free port and an oil terminal at Galathea Bay, Great Nicobar Island, would lead to the elimination of nesting areas at Galathea Beach, Saphed Balu and Indira Point. However, Bhaskar's passion for marine turtles never made him a complete protectionist; for example he never recommended a ban on the hunting of turtle by the Nicobaris or other indigenous communities. Instead, he recommended an awareness programme for the communities about the damage caused by feral and domestic dogs and pigs to sea turtle nests.

Bhaskar frequently recommended that more comprehensive surveys and monitoring programmes were required. Leatherback monitoring programmes in Galathea Bay of the Great Nicobar Island (2000-2004) and South and West Bay of the Little Andaman Island (2007–present) were initiated because of the information he generated through his surveys. There is no better way to honour his body of work than to further the research he initiated in the islands.

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# SEA TURTLES IN THE SOUTHERN NICOBAR ISLANDS: RESULTS OF SURVEYS FROM FEBRUARY-MAY 1991

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## INTRODUCTION

The 22 islands forming the Nicobar Archipelago lie between 6-10°N latitude and 92-94°E longitude, spanning over 219 km. These islands are nesting grounds for leatherback (*Dermochelys coriacea*), green (*Chelonia mydas*), olive ridley (*Lepidochelys olivacea*), and hawksbill (*Eretmochelys imbricata*) sea turtles. A survey of Great Nicobar Island between the 1970's and 1980's (Bhaskar, 1979, 1980) showed that nesting leatherbacks and olive ridleys were most common, whereas greens and hawksbills nested in smaller numbers. However, these islands were not further investigated for a decade, and the status of the nesting population remained uncertain due to increasing disturbances and settlements in the

islands. The population of the Nicobarese, for whom turtle meat and eggs formed an important component of their diet, had been rapidly increasing and the Shompens of Great Nicobar were also known to consume turtle meat and eggs; the indigenous tribes of the Andaman and Nicobars are exempt from the Indian Wildlife (Protection) Act of 1972, which protects sea turtles. Additionally, the "Ranchi" tribals, brought as government labourers to these islands, were also known to relish turtle eggs. Therefore to assess the situation, this survey of the southern Nicobars was undertaken in 1991 and encompassed six islands, many of which had never been surveyed before (Tiwari, 1991). A summary of the survey results is presented here.

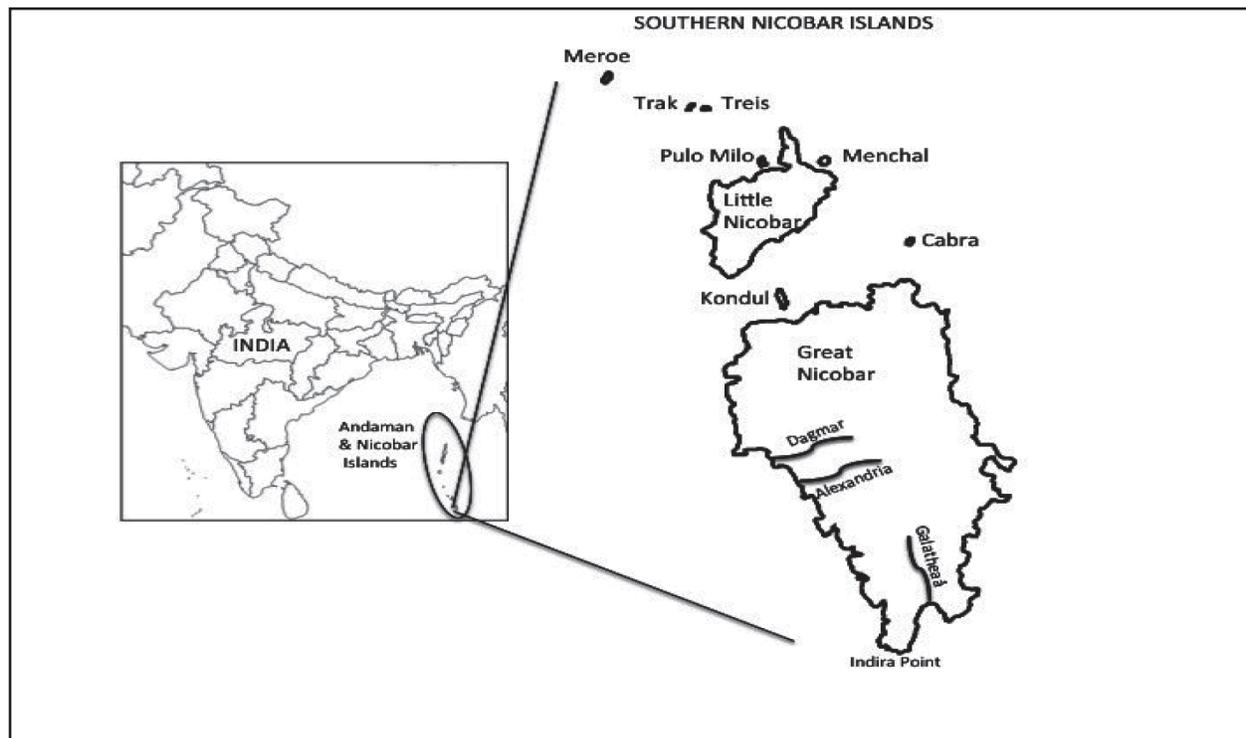


Figure 1. The southern Nicobar Islands

## METHODOLOGY

The 3-month survey (February-May 1991) included the following six islands in the southern Nicobars, of which only Great Nicobar and Kondul had been previously surveyed: Great Nicobar, Kondul, Little Nicobar, Menchal, Pulo Milo and Treis (Figure 1). Three of the remaining islands in the southern group, Cabra, Meroe and Trak, could not be surveyed due to their remote locations and the onset of monsoonal rough seas. Information on nesting turtles on these islands was collected through conversations with the indigenous groups.

Sandy beaches were surveyed on foot for evidence of nesting turtles, nests, tracks, hatchlings, bones, eggshells, and nest markers used by the local people. Areas that could not be surveyed by foot were approached by boat to locate substantial stretches of beach. Tribals, living along the coastline, and Forest Department workers were asked for information on nesting turtles, beaches, and nesting seasons. Carapaces found on the beaches or hung outside Nicobari huts were measured for CCL (curved carapace length) and CCW (curved carapace width). Turtles being reared by the Nicobarese were also measured.

## RESULTS

### Great Nicobar

Great Nicobar, the largest island in the Southern Nicobar Islands, had the largest number of sea turtles nesting on its shores (Table 1). At Galathea, many of the olive ridley nests were laid close to the tide line and the developing eggs were exposed by the spring tide. Other nests were destroyed, probably by pigs and dogs, and a large number of eggshells were scattered around the Nicobari settlement on the beach to the south of the Galathea River. West of Indira Point, the southern tip of the island, the narrow beaches were scattered with rocks and piled high with mounds of broken coral; several turtle tracks were found meandering over a 2m high barrier of coarsely broken coral. The tracks covered a long distance over the coral before returning to sea; occasionally there seemed to be an attempt to dig for a softer substratum. A hawksbill carapace (CCL=37.7cm, CCW=34.8 cm) was also found. Two freshly killed green turtle carapaces were discovered next to an upright coconut frond, on which the bones had been left to dry (CCL/CCW=98/87cm; CCL/CCW=105/90cm). The broad beaches that straddled the Alexandria and Dagmar Rivers on the west coast had no tribal

**Table 1. Signs of sea turtle on Great Nicobar Island**

Beach	Leatherback	Green	Olive Ridley	Hawksbill	Unidentified
Galathea	46 nests 13 crawls	4 crawls	14 nests	—	—
East of Indira Pt.	—	7 crawls	—	—	3 crawls*
West of Indira Pt.	1 nest	2 crawls 2 carapaces	—	1 carapace	5 crawls*
Alexandria	146 nests 37 crawls	—	—	—	6 nests**
Dagmar	82 nests 33 crawls	—	—	1 crawl	7 nests
Pulo Kunji	27 nests	—	—	1 carapace	36 nests
Dagroot	11 nests	—	—	—	—
Renhong	70 nests	—	—	—	—
Northeast coast	45 eggshells	—	—	—	—
Southwest coast	—	3 carapaces	1 carapace	—	—

\*Possibly olive ridley or hawksbill

\*\*Possibly green turtle nests

settlements, however, the beaches were regularly visited by the Nicobarese from nearby settlements and by the Shompens living deep in the jungles. Many of the nests had either been excavated by the tribals, who had left behind the yolkless eggs, or raided by dogs from neighbouring villages and possibly by monitor lizards. Tribals had driven upright stakes into the ground to indicate excavated nests. A hawkbill carapace was found north of the Dagmar River (CCL=38cm; CCW=33cm). The hole in the carapace suggested that it had been speared at sea.

Further up the northwest coast of Great Nicobar were three substantial beaches at Pulo Kunji, Dagroot and Renhong. The half-kilometre beach at Pulo Kunji was a short distance from the small Nicobari settlement, and the broader beaches at Dagroot and Renhong were both inhabited. The beach at Renhong was riddled with excavated body pits and strewn with eggshells. A Nicobari from the village confirmed that nests were commonly depredated by domestic pigs and dogs. Olive ridley turtles were also said to nest on this beach, although no evidence was found during the current survey. A substantial sandy stretch existed around Pulo-Bet, a two-hut Nicobari settlement, on the west coast of Great Nicobar; the locals reported that leatherback turtles nested here, though no evidence was found during this survey.

Three green and one olive ridley turtle carapaces were measured at Pulo Babi, a major Nicobari settlement (Table 2).

**Table 2. Size of sea turtle carapaces at Pulo Babion, Great Nicobar Island**

Turtle	CCL (cm)	CCW (cm)
Green	70.0	69.5
Green	105.6	88.5
Green	95.8	84.8
Olive ridley	70.9	67.0

Along the west coast of Great Nicobar, there were several seagrass areas that may have been potential foraging grounds for green turtles. The tribals specifically mentioned a village called Cochintown on the west coast, adjacent to which green turtles were known to forage.

**Kondul**

The only short stretches of beach to be found on the eastern and southern sides of this small island were inhabited, and there was no evidence of turtle nesting activity. Turtles were commonly caught in the surrounding waters; two hawksbills, each

approximately one year old, were being reared in Nicobari homes: CCL/CCW=27.5/23.6cm; CCL/CCW=17.9/14.2cm.

**Little Nicobar**

The only productive beaches lay on the southwest coast of Little Nicobar at Pulo Bahua, Monkauye and Pulo Kiyang, where leatherback, green, and hawkbill turtles were known to nest. A total of 49 leatherback nests, and 10 leatherback crawls were counted. Many of the nests had been depredated, probably by the village dogs and pigs, leaving the beach strewn with eggshells. The species could not be identified for an additional 11 nests. One green turtle carapace was found hanging from a tree (CCL= 83cm; CCW=76 cm) and another was left to decompose.

At Makachua, a village on the northwest coast, seven green turtle carapaces were found hanging outside the Nicobari huts (Table 3). The tribals on this coast claimed to eat only the green turtle, although eggs of all species were collected from the neighbouring islands of Meroe, Trak and Treis, which lie several miles off the west coast of Little Nicobar.

**Table 3. Size of green turtle carapaces at Makachuaon, Little Nicobar Island**

Individual	CCL (cm)	CCW (cm)
1	59.2	52.7
2	45.6	42.1
3	79.0	72.5
4	65.7	55.5
5	97.0	83.0
6	84.5	73.3
7	79.2	68.8

**Menchal**

The uninhabited island of Menchal had only a short stretch of sand on its west coast and enormous rocks were a feature of the remaining coastline. No evidence of nesting was found, and the tribals from Little Nicobar, who visited the island frequently to collect coconuts, confirmed that no turtles nested on this rocky island.

**Pulo Milo**

Similar to Kondul, this island is occupied by the Nicobarese whose huts are located on the eastern coast. Apparently these tribals also harvest turtles and eggs from Meroe, Trak and Treis. One of the Nicobarese possessed a live green turtle captured at Treis four months earlier (CCL=13.3cm; CCW=11.4cm).

### Treis

Access to this uninhabited island was difficult due to open sea swells and currents. Though a comparatively small island, broad beaches of coarse sand surrounded the eastern and northwestern coasts. A green turtle crawl, some green turtle scutes, and four green turtle carapaces were recorded (Table 4).

**Table 4. Size of green turtle carapaces on Treis Island**

Individual	CCL (cm)	CCW (cm)
1	80.5	71.3
2	101.4	90.1
3	68.0	59.2
4	85.8	72.5

### Trak

Though the broad, eastern beach of this uninhabited island was clearly visible from Treis, it was impossible to access Trak because of the increasing pre-monsoonal rough seas. The Nicobarese who visited the island during the calm months reported that turtles nested on this island, although the species was not determined.

### Meroe

Meroe could not be surveyed because of weather conditions and an unpredictable sea. The isolated location of the island and the treacherous currents en route make it inaccessible for most part of the year. The Nicobarese claimed to visit the island during the calm months, between January and March, to harvest coconuts, bananas, and beetlenut from their plantations. They reported year-round nesting by hawksbill and green turtles, including some daytime nesting. They also indicated that the hawksbills of Meroe were not eaten due to a few cases of immediate death after meat consumption. The year-old hawksbill measured in Kondul had hatched from an egg collected from Meroe.

### Cabra

This uninhabited island could not be visited due to its great distance from the closest island of Great Nicobar, and the non-availability of boats. The tribals indicated that no turtles nested on this island.

### Local names for turtles in the southern Nicobars

Leatherback: Hi-koonth

Green turtle: Kao-kae

Hawksbill: Kao-kael, Rea, Machar

Olive ridley: Kao-rae, Diye, Bani-kachua

One of the Nicobari hunters from the west coast of Great Nicobar described a fifth species of turtle, which he called

the 'kao-heepu'. He described it as having a large head and being a little smaller than a green. It is possible that the turtle could be a loggerhead, which would be a first record for these waters.

### Traditional use of turtles

Hawksbill carapaces were carved into ornaments by the older members of the Nicobari tribe; occasionally carapaces were sent to Car Nicobar Island to be carved. Green turtle scutes were used to make combs.

### Nesting season

Based on information collected from the tribals and Forest Department workers, earlier surveys by Bhaskar (1979, 1980), and the results of this survey, leatherbacks nested from November to March with some nesting extending into July; green turtles nested primarily during the southwest monsoons (May to September), but nests were found almost year round; olive ridleys nested from December to March; and hawksbills were thought to nest on some islands year round.

### CONCLUSION

Amongst all the tribals, opinions on the status of the turtle population over the past few years varied; while some claimed there was no change in the population size, others believed there were fewer turtles to be found now than in former times. Several of the recommendations proposed at the end of this survey (Tiwari, 1991) still remain to be implemented (Andrews *et al.*, 2006) almost two decades later, because of the challenges of working in such remote locations:

- Control of the unnecessary destruction of nests by domestic pigs and dogs.
- Enforcement of laws protecting turtles.
- Control of the collection of corals and beach sand for construction purposes.
- Evaluation of the impact of the Nicobarese and Shompens on sea turtles.
- Participation of tribals in turtle conservation activities.
- Environmental education programmes in schools.
- A systematic scientific study of the nesting turtle species and their feeding grounds.
- Extensive nesting surveys of the islands.
- Establishment of an effective conservation programme.

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## RESOURCES OF INTEREST

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### MAPTOOL

[<http://www.seaturtle.org/maptool>]

seaturtle.org's Maptool allows you to create maps as pdf, jpeg or tiff files, suitable for papers, reports, posters and presentations. Full instructions for its use can be found once you start mapping, however you must be a registered seaturtle.org user and logged in to use Maptool. The simplest basemaps can indicate your general research area or study sites, and are created by entering the map boundaries (as latitude and longitude). Detailed maps, showing multiple points and/or tracklines, are drawn from an existing dataset which you upload or created from a new data file in Maptool. Maptool can also be used to edit or delete data within a file. Points can be drawn with a variety of shapes and connected by a track line. We encourage contributors to use Maptool when preparing manuscripts for reports, newsletters (such as IOTN), and journals, and support seaturtle.org when possible.

### TERRA VIVA GRANTS DIRECTORY

[<http://www.terravivagrants.org>]

The Terra Viva Grants Directory is a free internet-based information index where grant seekers can find international funding opportunities in the fields of agriculture, energy, environment and natural resources in developing countries. Grants support projects in research, education and training, and prizes and awards in social enterprise. The site offers profiles of over 400 grant makers, ranging from funders of community projects to funders of science and research. Users can search for grants by different subject areas or offering different forms of grant support. A six-month rolling calendar presents future opportunities, and subscribers can receive monthly email updates of pending deadlines. The website content can be viewed in English, Spanish, French, Portuguese, Dutch, Chinese and Arabic. The Terra Viva Directory has tried to make its information easily accessible to users in developing countries, who often have poor internet connectivity or limited bandwidth. ■

# A STORY OF FIELD ASSISTANTS AND SEA TURTLE RESEARCH IN THE ANDAMAN AND NICOBAR ISLANDS

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In the beginning, there was a man called Satish Bhaskar from the Madras Crocodile Bank in India. He arrived in the Andaman Islands in the mid-1970's to survey sea turtle nesting beaches. At this time, the Andaman Islands were very unlike what they are today, with thousands of people, helicopters, speed boats, buses and extensive roads. There were few opportunities for transportation and communication, but there were, as there are now, 'dungy's'. A 'dungy' (an Andaman creole adaptation of the word Dinghy) is a motorised dugout canoe that can sail in rough, calm and shallow seas. These machines were operated by various kinds of people, usually fishermen and others, to reach destinations across the islands. Very few operators were familiar with the many beaches on the islands and able to navigate along the foreshore. Satish Bhaskar was on a good boat with three other men, Saw Paung (at the tiller), Saw Nelson and Saw Waller. These three Karen men were from Webi village in Middle Andaman Island. There had been previous contact with these men when Rom and Zai (also from the Madras Crocodile Bank) had arrived a few years earlier to look for saltwater crocodiles, king cobras and other herpetofauna.

The first surveys for sea turtle nesting beaches took place in the Andaman Islands with these four men in a boat. Saw Paung still recalls that they used to drop Satish at a beach, and watch him disappear with long strides, a packet of biscuits in hand and a tube for a float if he needed to cross a large creek *en route* with equipment. They would eventually pick him up further down the coast. It was a tiresome project but a very fruitful one, as they mapped the sea turtle nesting beaches on the islands. Saw Paung had visited nearly all the locations previously, and was a good boatman (he'd spent many years at sea fishing, shark fishing, skin diving for shells, living with the Andamanese for a few years) and an expert dungy craftsman. His experience and Satish's nerves of steel extended the survey across the entire archipelago, the only exceptions being the distant Barren and Narcondam Islands.

Satish proceeded to the Nicobar islands in the 1980's, and received help from various villagers in the islands, but he was not able to use a single team or boat to conduct the survey as he did in the Andamans. I re-surveyed 13 beaches on the Southern Nicobar Islands between 2000 – 2006, with an assortment of Nicobarese on Great Nicobar, Little Nicobar, Treis, Trak, and Meroe Islands, and there was always an elderly person asking if I knew Satish Bhaskar. As recently as a few months ago, a Nicobarese man named David Owen asked me if I knew Satish Bhaskar; during his survey about 25 years ago, Owen had transported Satish in his boat.

South Reef Island was the location at which Satish conducted his final monitoring program for green sea turtles, tagging to identify individuals and calculate re-nesting intervals. Saw Boney (a Forest Department Ranger), Saw Paung and Allen Vaughan organised supplies for Satish year after year while he stayed mostly alone on South Reef for months at a time. Saw Boney braved an extremely rough sea to evacuate Satish during an extended storm, after he ran out of supplies on the island and was relying on food cooked five days earlier and refrigerated in the cool, deep sand. Satish was a strong swimmer and reached the rope and ring buoys thrown into the sea, as Saw Paung dexterously manoeuvred the boat in those choppy conditions close to shore.

In 1994, Harry Andrews and a team from the newly established ANET began sea turtle surveys again, following some of the routes that Satish and team took, as well as charting new ones. I joined the boat crew in 1996, often with as few as five of us on a team (three field/boat crew included). For the next five years we explored the Andaman Islands. Saw Paung, Saw Shwether, Saw Agu and Saw Pambwein formed our main boat and field crew, and helped us piece together information about birds of the shore and mudflats, crocodile habitats, as well as visiting settlements and encroachments of an expanding human population in the islands. Often in far

flung hamlets, Saw Shwether or the Uncle's (as both Saw Paung and Saw Pambwein are referred to) introduced us to local residents, some known to them or with whom we made friends. In many locations *en route*, Saw Paung would steer the boat into a cranny or cove despite our looks of surprise at a change in a planned navigational course. He would stop at places, known only to him, to refill our water supplies, or on his own prediction of rough weather ahead.

In May 1997, we encountered our first cyclone while at sea. We had hired a dungy for our survey and on the last leg of our expedition sailed from Wandoor, south to Little Andaman Island. That morning we sailed past Rutland Island and the Cinque Islands on a regular rolling sea. It was overcast, similar to days during the pre-monsoon showers. A few hours later in the journey the sky darkened and the horizon turned black. Uncle Paung gestured for us to arrange our supplies under the tarpaulin in expectation of rain. Within a few minutes all hell broke loose, with the sea swell rising and our tiny dungy tossed by the waves and an extremely strong southern wind. Only Uncle Paung looked out, his eyes shielded by his large 'kamau' or Burmese bamboo hat. We climbed thirty feet waves that broke as we reached their crest, and bailed out knee deep water from the boats with buckets. When we were in a trough with water towering over us, Uncle sped the dungy to climb a swollen wave, and on reaching its crest slid the dungy down sideways, like a surf board, so that we did not plunge into the next trough bow first. With no sight of land and just a strong arm holding on to our tiller, we thought we were inching southward. However, the wind buffeted us back to Cinque Island in about 15 minutes, though we had crossed the island almost an hour before. Not giving in, we set sail for Little Andaman again the next day, on what looked like a calm sea after the storm. As early morning became day, we were back in that morass of huge swells, crests breaking over our bow and the howling wind screaming into our ears. There were unexpected waves throwing us about and nearly sinking our little dungy. A journey of usually five hours took us nine, but Saw Paung did not give in and we returned to Wandoor to tell our tale to those worried others who had sent us off a week earlier.

These adventures aside, the boat and base crew of Saw John (Base Manager) and Montu Bhowmik gave themselves wholeheartedly in support of what we were trying to achieve. During those five years of periodic and yearly surveys, we produced maps of nesting beaches for four species of sea turtle, and habitats for additional species as well. We assisted researchers who were new to the islands and without the logistical support that our

crew provided us. Through this work, that was initially labelled 'sea turtle surveys', Harry Andrews and Dr Rauf Ali from ANET, with others from various organisations, were able to contribute to two books on the islands, the 'National Biodiversity Strategy and Action Plan A&N Islands', and the 'State of the Environment Report- A&N Islands'. The contribution by our field assistants in the past three decades to research on the natural history of the islands is unsurpassed by any other crew across the Andaman and Nicobar Islands.

By the new millennium, three camps were set up across the islands to monitor nesting sea turtles. Two camps were in conjunction with the Andaman and Nicobar Forest Department at Cuthbert Bay, on Middle Andaman, another at Galathea beach, South Bay on Great Nicobar Island, and the third at Jahaji beach on Rutland Island. A total of thirteen men, including two researchers, manned these camps over the next three to five years. We met Saw Shwether in the northern tip of North Andaman Island during a crocodile survey in 1993. Saw Agu joined ANET to help with construction and soon was engaged in sea turtle research. Naveen Ekka, who lived on Rutland Island, helped maintain our camp there. Data collected during those years helped to identify important turtle nesting sites and gave us an indication of periodic variation in nesting green, olive ridley and leatherback sea turtles (Saw Pambwein was proud that he watched leatherback sea turtle nesting at Jahaji beach). The interest of our local contacts in sea turtles and their conservation significance slowly snowballed. We hope that with continued work, and the involvement of other islanders, sea turtles can still arrive to nest safely on those beaches.

The camp at Galathea, on Great Nicobar Island, was the last to remain until the Asian tsunami of December 2004 struck. The camp was originally established in 2000 and maintained by Saw Agu, Saw Glen, and Shreyas Krishnan; in 2004, Dr. Ambika Tripathy replaced Shreyas after spending the previous season at the Cuthbert Bay camp. Saw Glen had left the camp to visit his family in December 2004, and only Ambika and Saw Agu remained with four visiting naturalists from Pune when the tsunami struck. Ambika, a young man from the state of Orissa, was dedicated to sea turtle conservation and joined this camp despite its logistical difficulties and not being able to contact his wife and young child regularly. He has not been seen since the tsunami destroyed the camp, road, primary forest and mangrove. Saw Agu miraculously survived, after being marooned alone on a pile of logs in a desolate landscape for two and a half weeks without food, water or clothes, to tell his tale. He returned a few years later, with Dr. Naveen Namboothri,

to relocate nesting sites at the post-tsunami beaches.

After this catastrophic event, all turtle camps were closed and ANET conducted its last boat survey in 2006. In 2007, Dr. Kartik Shanker, from the Indian Institute of Science and Dakshin Foundation, collaborated with ANET to set up a camp to monitor leatherback sea turtles on Little Andaman Island. This project has seen a new order of field assistants, young Karen boys and Saw Burney, the elderly boatman on his boat the MV Powmay (named after his daughter in-law). In the first year, the camp was run only by our Karen crew, and two research assistants, Devi Subramaniam and the energetic Adhith Swaminathan, eventually expanded the camp to two beaches, on South Bay and West Bay.

It is to the team's credit, despite all odds over the past five years, that work and interest on sea turtles and their conservation has continued. From ingenious use of flotsam and jetsam found on the beach, and of coastal resources on the island, this crew have made comfortable camps and collected valuable data on leatherback turtles. They have also extended the conservation program by reinvigorating it with fresh energy and ideas. It is this curiosity and energy that sparked Satish Bhaskar's first sea turtles surveys in the region to become a conservation and research program, and it is rewarding to see it continuing in young (and old) islanders. Our field assistants have included:

Original surveys across the islands and monitoring at South Reef Island led by Satish Bhaskar:

- Saw Nelson, Saw Paung and Saw Waller, Allen Vaughan, Saw Boney.

Periodic surveys with Harry Andrews and Team (ANET 1995-2001), and monitoring at 3 nesting sites for 4 years:

- Boat surveys- Saw Paung, Harry Andrews, Saw Shwether, Saw Palaiwa, Saw Pambwein, Allen Vaughan, Saw Poricha, Saw Agu, Manish Chandi.

- Rutland Island, Jahaji beach Camp- Naveen Ekka, Paritosh Biswas, Saw Pambwein, Saw Chi-Maung, Saw Sa-thaw.

- Middle Andaman Island, Cuthbert Bay Camp- Saw Paul Pee, John Kumar, Saw Tintu, Saw Johnny, late Ambika Tripathy.

- Great Nicobar Island, Galathea Camp: - Saw Agu, Saw Glen, Shreyas Krishnan and late Ambika Tripathy.

Leatherback sea turtle work at Little Andaman Island with Kartik Shanker and IISc/Dakshin/ANET:

- Saw Burney, Saw Thesarow, Saw Pambwein, Devi Subramaniam, Saw Standly, Saw Lulay, Saw Willy, Saw Columbus, Saw Kenick, Saw John, Sonu and Adhith Swaminathan. ■

## POST-NESTING MIGRATORY ROUTES OF LEATHERBACK TURTLES FROM LITTLE ANDAMAN ISLAND

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### INTRODUCTION

Among the seven species of sea turtles, leatherback turtles (*Dermochelys coriacea*) are known to undertake some of the longest migrations (Pritchard and Trebbau, 1984). Over the last two decades, there has been concern about the drastic decline in the nesting populations of this species in the Pacific Ocean (Spotila *et al.* 2000), though some

nesting populations have increased in the Atlantic Ocean. In India, leatherback turtles are listed under Schedule I of the Indian Wildlife (Protection) Act 1972, which offers the highest degree of protection to wildlife in India.

Current leatherback nesting sites in India are restricted to the islands of the Andaman and Nicobar archipelago

(Andrews *et al.*, 2006a, b). Very little is known about the status of leatherback populations from the Indian waters, barring recent work by the Andaman and Nicobar Environment Team (ANET) on Great Nicobar Island. More recently, a monitoring programme has been initiated by the Indian Institute of Science, Bangalore, ANET and Dakshin Foundation, Bangalore on Little Andaman Island. In order to understand where these turtles range and the mortalities to which they are subject, a satellite tracking project was initiated in January 2011.

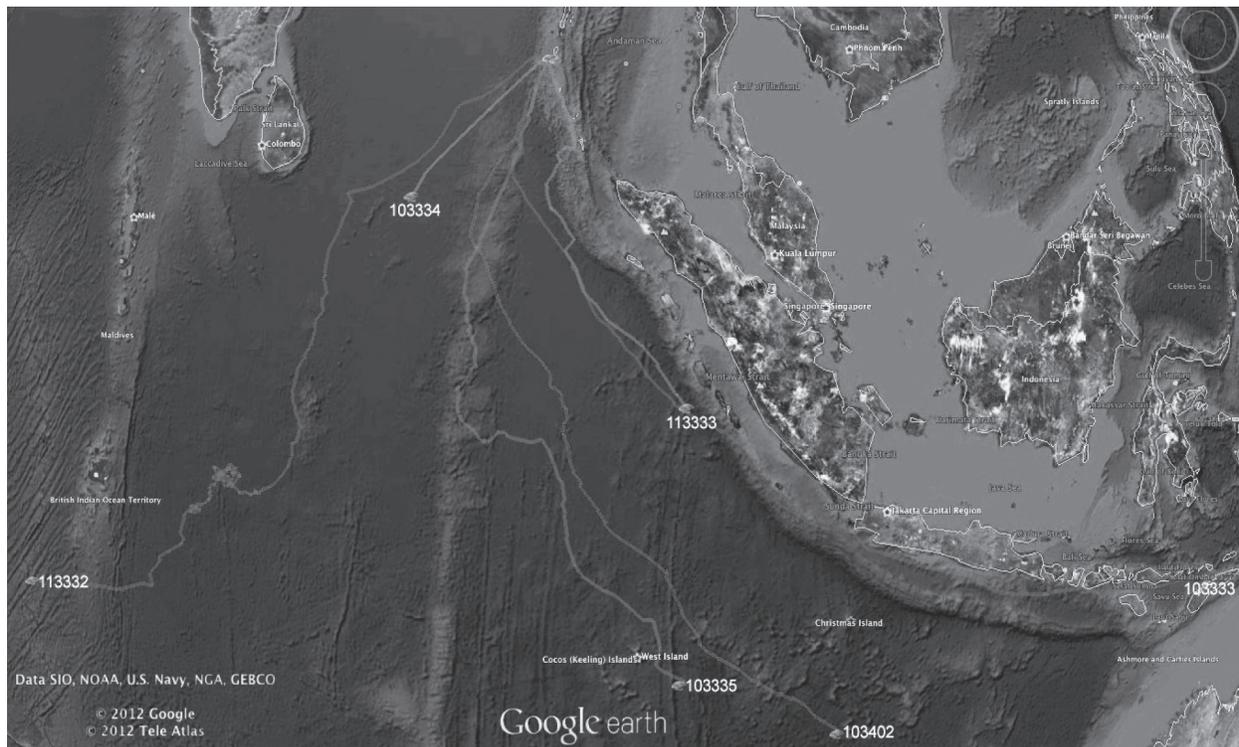
**METHODS**

Seven female leatherback turtles were tagged with Kiwisat 202 Platform Transmitter Terminals (PTT), (Sirtrack Wildlife Tracking Solutions Ltd., New Zealand) at West Bay, Little Andaman. The transmitters interfaced with the CLS-ARGOS system for deriving surface position coordinates. The location coordinates were filtered and analysed using the Satellite Tracking and Analysis Tool (STAT) (Coyne and Godley, 2005). The PTTs were fitted with a salt-water switch which automatically switched on whenever the turtle surfaced to breath, sending location signals to the nearest geo-synchronised satellite in orbit. The PTTs were programmed with a duty-cycle to transmit continuously for the first three months, and every alternate day for the rest of the period. The PTTs were attached on the most prominent part of the medial carapacial ridge, usually posterior to the

widest area of the carapace. Two holes were drilled through the medial ridge with an orthopaedic drill bit, with each hole only penetrating a few millimetres into the carapace. The transmitters were designed specifically for direct attachment to a leatherback turtle, and were secured on one side of the medial ridge using stainless steel cables inserted in surgical tubing, which acted as a sheath for the tether attachment. The cables were secured using stainless steel crimps. Direct attachment through the medial ridge has proven to be a successful alternative to the harness method (Fossette *et al.*, 2008; Byrne *et al.*, 2009). Using the described method, three nesting leatherback turtles were tagged during 2010-2011 and four turtles were tagged during 2011-2012 nesting seasons.

**RESULTS**

Of the seven turtles that were tagged, two turtles transmitted for about 6 months (179 and 193 days) and four turtles transmitted for 51 to 92 days; one turtle transmitted only a single data point (Table 1). Four out of six turtles travelled south east of the Andaman and Nicobar Islands, two along the coast of Sumatra, and two beyond Cocos (Keeling) Island towards Western Australia. Two turtles moved south-west of the islands, one of which travelled south of the British Ocean Territory (Figure 1). Turtle 103333, tagged on 04 January 2011, transmitted for 179 days and travelled



**Figure 1. Post-nesting migratory paths of leatherback turtles tagged in West Bay, Little Andaman, during 2010-2012**

the longest distance of 7312 km (straight line distance: 4185 km) (Table 1).

Three more turtles will be tagged with PTTs during the 2012-2013 nesting season.

**Table 1. Post nesting migratory data of the leatherback turtles tagged in West Bay, Little Andaman.**

ID	Release Date	CCL (cm)	CCW (cm)	Last Location Date	# Days Transmitted	Distance Travelled (km)
103333	04-01-2011	154	150	02-07-2011	179	7312
103334	04-01-2011	170	120	14-03-2011	69	1077
103335	05-01-2011	153	112	07-04-2011	92	4600
103402	02-12-2012	161	117	29-04-2012	77	4634
113332	23-01-2012	152	110	24-07-2012	183	6998
113333	23-01-2012	161	117	14-03-2012	51	2690
113334	23-01-2012	160	110	23-01-2012	0	0

## DISCUSSION

The patterns that emerged after satellite tracking of leatherback turtles from the Little Andaman Island provided some preliminary insight into their migratory patterns in the Indian Ocean. Upon departure from the West Bay Beach, leatherbacks migrated southward along varied paths, utilizing the broad expanses of the Southern Indian Ocean. While there was no single migratory corridor (Morreale *et al.*, 1996; Benson *et al.*, 2007), multiple turtles were observed to follow similar routes, with some relationship to bathymetry which requires further investigation. As the first telemetry study on leatherback turtles in the region, this provides useful information on their migratory pathways in the Indian Ocean, and highlights potential threats from deep sea fishing operations in the southern Indian Ocean. More data are, however, required to understand patterns of migration and identify specific threats during these migratory journeys.

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# A MULTI-STAKEHOLDER PLATFORM TO CONSERVE MARINE RESOURCES IN THE ANDAMAN AND NICOBAR ISLANDS

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The Indian Institute of Science, in collaboration with Dakshin Foundation and Andaman and Nicobar Island Environmental Team (ANET), has been monitoring the nesting and movement of leatherback turtles of Little Andaman Island since January 2008. While this work contributed significantly to our knowledge of this species, there was a need to undertake parallel conservation efforts directed at the conservation of the species and their habitats.

Various government ministries, departments, institutions and organisations have similar jurisdictions, mandates, responsibilities and roles that contribute to effective management and sustainable utilisation of the coastal and marine resources of the Andaman and Nicobar Islands. While some of these mandates are in conflict with each other, many overlap, invariably leading to duplication of efforts or inadequate cooperation between departments. This necessitates greater interaction between different departments, organisations and institutions in the islands. More often than not, however, there is a lack of communication and information sharing between various departments and organisations involved in marine resource monitoring and management.

The conservation of marine resources in these islands is important from not only an ecological point of view, but also in the context of sustaining livelihoods. Degradation of habitats, unsustainable extraction of resources and limited interactions between varied resource users heighten the need for a collaborative approach to conservation and management. Opening a dialogue will help highlight issues that all stakeholders face in their interactions with the marine ecosystem and their impact on it. Over the years, there has been both research and conservation in the islands by various institutions from diverse fields. However, by complimenting and supporting each others' work, the outcomes could be far more beneficial and effective. Knowledge generated from such interactions can also feed into the management and

policy decisions.

Against this background, Dakshin Foundation and ANET, in partnership with the forest department, organised a workshop titled "Collaborating for marine conservation and resource management in the Andaman and Nicobar Islands" on March 24, 2012, at Van Sadan, Port Blair, India. One of the main aims of the workshop was to broaden the focus from sea turtle conservation to the pressing issues of maintaining healthy marine ecosystems and sustaining livelihoods that are dependent on them..

The primary focus of the workshop was to explore ways in which various organisations, institutions, departments, and entrepreneurs could work together to strengthen existing efforts towards effective resource management and environmental education in these islands. Participants included individuals from central government agencies, Andaman and Nicobar administrative departments, research institutions, non-governmental organisations, private entrepreneurs, media agencies, and agencies involved in environmental education in the islands. Participants provided an overview of activities specific to marine conservation and/or resource management conducted by their respective organizations. Participants were also encouraged to discuss circumstances where a lack of interaction with other departments led to problems in achieving their goal, and situations where work has been replicated as a result of inadequate information sharing. Suggestions to promote better collaborations with other departments and organizations were also encouraged. Facilitated group discussions were carried out to promote the beneficial exchange of ideas and identify different ways in which participants could interact and complement each others' work, with participants voicing views and concerns that affected their actions towards marine conservation.

A session focused on research, monitoring, management, and enforcement in the Andaman and Nicobar Islands

resulted in detailed presentations and discussions on the present status of marine resource management and research, and solutions that could help improve conservation efforts. The role of private entrepreneurs and non-profit groups in marine conservation, and an appraisal of conservation education and outreach, were also considered. The importance of environmental education in the islands was stressed during presentations and discussions.

Facilitating a dialogue among the various key government and non-government actors interested in resource management and marine conservation in the Andaman and Nicobar Islands was achieved, and several points of action were established and will be undertaken in the coming months. It was also determined that there was a need for a common platform where all agencies could interact in a meaningful manner. A consensus was reached that such a platform would undertake the following activities:

1. Take marine conservation science to the people of the Andaman and Nicobar Islands– facilitate the dissemination of conservation awareness through the media, with contributions from various institutions/ organisations.
2. Examine the contributions that private entrepreneurs

could offer to enforcement agencies and education initiatives.

3. Find ways to enlist the support of the A&N Administration and government research organisations in marine conservation, research and education initiatives.
4. Create a list of departments and the facilities and staff that they can offer as resource people towards conservation/ research/ education initiatives.
5. Highlight need based research and pointing out gaps for departments or individuals to fill.
6. Investigate the possibility of using AN.net to nest a marine conservation portal.
7. Create a core committee to facilitate collaborative initiatives for marine conservation in the ANI.

Assistance for organising the workshop was provided by the Andaman and Nicobar Department of Environment and Forests and the Madras Crocodile Bank Trust. The workshop was funded by several agencies including the Duleep Mathai Nature Conservation Trust, International Seafood Sustainability Foundation, Madras Crocodile Bank Trust, The Ocean Foundation, and U.S. Fish and Wildlife Service. ■

## AN UPDATED BIBLIOGRAPHY ON SEA TURTLES IN THE ANDAMAN AND NICOBAR ISLANDS

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The contents of this issue of IOTN, and the recent publications below, should be used to complement the bibliography on sea turtle records and research from the Andaman and Nicobar archipelago published in 2007 (see IOTN 5: 14-18).

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REPORTS



## PRESIDENT'S REPORT FROM THE 32ND ANNUAL SYMPOSIUM ON SEA TURTLE BIOLOGY & CONSERVATION, 11 – 16 MARCH, 2012 IN HUATULCO, OAXACA, MEXICO

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The Annual Symposium on Sea Turtle Biology and Conservation, conducted every year by the International Sea Turtle Society (ISTS), is a unique event that draws participants from around the world, from across disciplines and cultures to a common platform: sea turtle conservation. The symposium encourages debate, discussion and the sharing of knowledge, research techniques and lessons in conservation to address questions in biology and conservation of sea turtles and their habitats.

The 2012 Symposium was the third time in 32 years that this event has been held in Mexico, home to globally significant sea turtle populations and internationally renowned conservation programs. In addition to hosting two critical index beaches for the dwindling Pacific leatherback population, Oaxaca represents a critically important nesting region for olive ridley sea turtles, where they nest in synchrony by the thousands, a phenomenon referred to as *arribada*. This made Huatulco, in the southern coast of Oaxaca, an ideal venue for our meeting. The symposium was held at the *Las Brisas Huatulco Resort*, the largest Conference Center in the venue, which had the best facilities to hold a meeting this size.

The theme of this year's Symposium was Time of Innovation. Throughout the week, the meeting focused on the many innovative aspects of sea turtle conservation, including new techniques, new approaches, and new actors. We also took a critical approach to analyzing existing methods used in sea turtle research and conservation, in order to learn from past experiences. The meeting had about 500 participants from 52 countries, being a large proportion from the United States, Mexico and Latin America, as expected from the emphasis given

to this region.

### Regional Meetings and Workshops

The activities started on March 11th with a variety of pre-symposium Regional Meetings and thematic workshops. During the Regional Meetings special focus was given to each region's conservation issues: Africa, Latin America (RETOMALA), IOSEA and Mediterranean. Other thematic meetings included the Pacific Leatherback Regional Meeting, the Atlantic Leatherback Regional Meeting, Climate Change Workshop, "Train the Trainers", workshop on Biotelemetry Tags, Students and Teachers Environmental Education Workshop, Sea Turtle Medicine Workshop, Freshwater Turtles and Tortoise meeting, Forum for Sea Turtle Conservation in Oaxaca, and the IUCN Marine Turtle Specialist Group Annual General Meeting. All of these contributed to a rich discussion of specific issues and were an important training aspect of the Symposium.

### Main Symposium Program

The main symposium sessions were held between March 13th and 16th, with parallel sessions running throughout all but the keynote presentations and special sessions: The Sea Turtles of Mexico Mini-Symposium, Innovative Tools and Strategies, and Mitigation of Turtle Interactions with Fishing Activities. Held on March 13th, the Mini-Symposium 'Sea Turtles of Mexico' was the special session dedicated to sea turtle research and conservation in Mexico, functioning as the forum for stakeholders in the conservation of sea turtles in this country to exchange experiences, update on progress in nesting and population trends in the Pacific and Atlantic coasts,

share conservation achievements as well as establish work strategic alliances. This special session was sponsored by SEMARNAT Delegación Oaxaca and Comisión Nacional de Áreas Naturales Protegidas, and it consisted of an inaugural Keynote presentation by M. Sc. Luis Fueyo MacDonald, Commissioner for Natural Protected Areas, entitled Conservation Program for Species at Risk: Species and Spaces for Sea Turtles in Mexico; thematic oral presentations highlighting research and conservation results in Mexico and a discussion panel entitled Pros and Cons of Tourism on Sea Turtles, during which the participants shared and discussed different experiences around the world on tourism with sea turtles, their economic benefits to local communities, as well as best practices in these activities to avoid any damage to the sea turtle populations and their habitats, now that turtle-related tourist activities are growing in the country.

The traditional session themes included: 1) Anatomy, Physiology, and Health; 2) Behavior and Movements; 3) In-water Biology and Monitoring; 4) Nesting Biology and Monitoring; 5) Ecology and Evolutionary Biology; 6) Conservation, Management and Policy; 7) Social Sciences, Environmental Education and Outreach, and 8) Threats. The major sponsors of the sessions were Comisión Nacional de Áreas Naturales Protegidas, Secretaría de Medio Ambiente y Recursos Naturales and Fomento Ecológico BANAMEX. The main symposium sessions had keynote addresses by Dr. Larry Crowder, who gave a talk entitled Innovative Approaches to Science and Policy in Sea Turtle Conservation, and Dr. Lekelia Jenkins who spoke on Fishermen Selectivity: The Science of How to Best Engage the Right Fishers to Reduce Bycatch. The main symposium sessions concluded on March 16th with a closing keynote presentation by Dr. Jack Frazier entitled Revitalization or Innovating Innovation for Marine Turtle Conservation, and Closing Remarks by 32 ISTS President, Ana Barragán.

There was a single poster session that was ongoing for the entire symposium. Located in the Solarium Restaurant, adjacent to the Convention Center, it enabled poster presentations to be in the same space as the vendor booths, cash bar, and foyer area that was site of several social events. The *Meet the Authors* sessions gave substantial time for Symposium attendees to interact with the poster authors.

## Media

One week prior to the Symposium, media activities started with a nation-wide press conference to announce the event, which was later covered by both local and national level newspapers and television channels. A

number of articles in newspapers and online magazines occurred the week of and the week after the Symposium. This coverage helped draw attention to the hot topics in sea turtle research and conservation that were highlighted at the Symposium.

One novelty introduced for this Symposium was a more extensive use of Social Media forums and channels, in an attempt to socialize the ISTS talks, workshops and activities to a broader community of researchers, field turtle activists, volunteers and professionals, as well as people interested on the subject so all of them could network and collaborate on information related to the field and create knowledge repositories. The Social Media channels have proved to be the most efficient way to share content, ideas, videos, and almost anything. We have a Facebook Fan Page which let people share things related to the event as well as interact in conversations, questions or other invitations. We also set up a YouTube Channel where all the videos related to the event could be uploaded. A Blog was set up and linked to the main Symposium webpage, where periodically information regarding Huatulco, Oaxaca and sea turtles was uploaded. Stream channels were set to show on live streams of some of the keynotes, events and activities, letting people outside the event attend and learn without being actually there. These channels also allow people to ask questions via social networks like Twitter or chat. There is also a photo album with all the pictures of the symposium, some of them shared by attendees. Unfortunately, problems with the internet connection at the venue hotel (mainly low bandwidth) prevented us bringing these activities to their full potential; because of this, fewer videos were available and many posts were done using audio only. The links to these materials are:

Facebook Fan page:

[<https://www.facebook.com/InternationalSeaTurtleSymposium>]

YouTube Channel:

[<http://www.youtube.com/user/IntlSeaTurtleSymp>]

Photo album Picasa:

[<https://picasaweb.google.com/114001894980314737068>]

Blog:

[<http://internationalseaturtlesymposium.blogspot.mx/>]

Ustream channel:

[<http://www.ustream.tv/user/ists32>]

Spreaker (podcasts):

[<http://www.spreaker.com/user/ists>]

## Vendors

This year we made sure that the vendors and exhibitors were right in the middle of the action, setting them up

from March 12th to 16th in the Solarium Restaurant, along with the poster presentations and cash bar. Vendors and exhibitors at the 32nd Annual Symposium included Telonics, Inc., Wildlife Computers Inc., Sirtrack Ltd., Collecte Localisation Satellite, Desert Star Systems LLC., Conservation International, Drexel University, The Leatherback Trust, Ayotzintli A.C., NTV MSNBC, WWF International, Sea Turtle Foundation, Kutzari A.C., CONANP, Fomento Ecológico BANAMEX, Hombre Naturaleza A.C., and Universidad Autónoma Benito Juárez de Oaxaca.

### **Social Events**

It is generally agreed that having all Symposium activities held in one place is better; this time, having the event in an all-inclusive resort allowed us to organize many evening social activities since most of the participants stayed at Las Brisas. For the second year we had the Speed Chatting with Turtle Experts, a fundraising event that aimed to provide a means for Symposium newcomers and veterans alike to spend time chatting with a stellar collection of turtle enthusiasts and ISTS Symposium veterans. Students in particular appreciated this activity since they got to know people they always wanted to but had never approached.

The farewell banquet was held at a gorgeous tropical setting on Las Brisas gardens on March 16th, the last day of the main Symposium. The evening commenced with a sampler of world-renowned Oaxacan cuisine for dinner, and later the distribution of the Archie Carr Student Awards and the ISTS Special Awards. The President's farewell speech and acknowledgements was followed by the handing over of the Presidential trowel to the incoming ISTS President Raymond Carthy. The Closing Ceremony was followed by 3 hours of animated dance to Salsa, Merengue and other party music by the local band La Maraka, which gave the perfect closure to a fantastic and intense week.

### **Silent and Live Auction**

As is a tradition of the ISTS's fund raising efforts at each year's Symposium, both silent and live auctions were held. For this year we focused on handcrafts and items from the Latin American region, but of course every contribution was happily accepted. A fantastic range of items, which included showpieces, artwork, trinkets, items of clothing, etc., brought by participants from around the world, were displayed at the silent auction.

The live auction was held on March 15th, and as usual, it was lively evening with lots of fun, cheer, and competition.

It started with a presentation of La Escobilla Music School, a group of young and enthusiastic performers from a community nearby the arribada beach, who animated and set the tone for the evening. Later we had a presentation of the history and culture surrounding Mezcal, the famous Oaxacan liquor, followed by a sampler of the most representative kinds. After trying Mezcal, everybody was more than ready for bidding! Veteran bidders competed with fresh hands and tried to outbid each other for all shapes and forms of donated collectibles. This has been the crown jewel of ISTS social events for decades and this year did not disappoint. Proceeds from both auctions contribute to the travel grants for the next symposium. Special thanks are due to Jennifer Homcy, Marina Zucchini and their dedicated team of volunteers for this outstanding effort.

### **ISTS Awards**

Recognition of achievements has been a strong philosophy of the International Sea Turtle Society. A variety of awards were presented this year, including career achievement awards (Life-Time Achievement, ISTS Champions, President's, and Volunteerism) and Symposium presentation awards (Archie Carr Student and Grassroots Conservation). The Career Achievement Awards Committee, comprising elected members of the Society, and chaired by Karen Arthur, worked very hard to consider deserving individuals and organizations that were nominated for the ISTS Awards this year. The Archie Carr Student Awards Committee was co-chaired by Matthew Godfrey and Andrea Phillott, and the Grassroots Conservation Award Committee was co-chaired by J. Nichols, Manjula Tiwari and Ingrid Yañez. All did a great job in identifying those presentations deserving of the presentation awards. Congratulations to all.

The ISTS Lifetime Achievement Awards were presented to George Balazs, James Spotila, and Llewellyn Ehrhart for their highly significant impact on sea turtle biology and conservation through the course of their careers. All three are true icons of the Symposium, and heroes of sea turtle research and conservation. The ISTS Champions Awards were presented to George Petro, for his contribution to the development of whole networks of sea turtle monitoring and conservation through Vanuatu and Fiji, and to Laura Sarti Martinez, for her 30 years of conservation efforts and her influence on establishing leatherback conservation and research networks in Pacific Mexico. This was a very emotive award since many of her former students were in Huatulco to congratulate her on this recognition.

The ISTS Ed Drane Award for Volunteerism was given to Gary Buckles, who has tirelessly and selflessly worked with the Georgia Sea Turtle Center since 2007. The ISTS President's Award was presented during the Welcome Ceremony to Cuauhtemoc Peñaflores, pioneer of sea turtle research in Mexico and the person who helped establish important conservation programs at beaches such as Rancho Nuevo, Escobilla and Barra de la Cruz,

among others.

There were 135 student presentations eligible for the Archie Carr Student Awards (59 oral presentations and 76 poster presentations). All presentations were viewed and ranked by 15 judges, all recognized sea turtle researchers and project leaders. The awards were given to:

Category	Format	Prize	Student	Institution
Biology	Poster	Winner	Anahí Martínez Arenas	Universidad Nacional Autonoma de Mexico
		Runner Up	Ana Patricio	University of Puerto Rico, USA
Conservation	Poster	Winner	Joanna Hancock	University of Exeter, UK
Biology Experimental	Oral	Winner	Daphne Goldberg	Universidad de Estado do Rio de Janeiro Brazil
		Runner Up	Anthony Rafferty	Monash University, Australia
Biology Field-based	Oral	Winner	Deasy Lontoh	Moss Landing Marine Lab, USA
		Runner Up	Karl Phillips	University of East Anglia, UK
Conservation	Oral	Winner	Monette Auman	University of Central Florida, USA
		Runner Up	Lori Kim Alexander	Florida Gulf Coast University, USA
		Runner Up	Nick Ehlers	University of Northern British Columbia, Canada

The Grassroots Conservation Award was given to Ever Ernesto Rizo Guardardo, from the community of La Barrona, Guatemala.

### Travel Grants

The ISTS provided \$100,000 for travel grant support this year to help 224 travelers attend the meeting. A total of \$32,359 was distributed as cash and the remainder as free accommodations at the Symposium hotel for the entire duration of the symposium, which included meals in the all-inclusive system. The tireless efforts of Alexander Gaos (Travel Chair) and the regional travel chairs made sure that all deserving participants could avail of the travel award. The regional travel committee was comprised of Aliko Panagopoulou (Europe), Angela Formia (Africa), Nicolas Pilcher (Asia/Pacific), Karen Eckert (English-Speaking Caribbean), Emma Harrison (Mexico, Central America and Spanish-speaking Caribbean), Alejandro Fallabrino (South America), Kartik Shanker (India/South Asia), Alan Rees (Middle East), and Kelly Stewart (USA/Canada).

### ISTS Student Committee

In 2010, an official ISTS Student Committee was appointed to promote knowledge exchange, enhance

students' professional development, and provide a centralized communication base for students worldwide. Since that time, more than 50 students from over 15 countries have become involved in the Student Committee. This is the second year that this President-appointed committee is present during the symposium, organizing different activities that we thought students would benefit from. As last year, this year we focused on three main tasks: (1) presentation feedback, (2) student workshop, with the subject "How to create an NGO", and (3) student mixer. I gratefully acknowledge Co-Chairs Lisa Komoroske, Annelisse Barcenos and Itzel Sifuentes for their vision, enthusiasm, and leadership that brought this new Symposium initiative to whole new levels.

### ISTS Business Meeting and Elections

The ISTS Business Meeting held on the afternoon of March 16th was attended by about 120 members. The opening statement by the President was followed by presentations of the Treasurer's Report by Terry Meyer, the Travel Committee Report by Ingrid Yañez on behalf of Alexander Gaos, the By-Laws and Constitution amendments by Jack Frazier, the ISTS Media call for proposals by Ana Barragán, The Awards Committee report by David Godfrey and the Nominations

Committee report by Frank Paladino. The meeting closed with an introduction to ISTS-33 in Baltimore, by President-Elect Ray Carthy. No resolutions were received to be discussed at the Business Meeting this year.

The following candidates were announced as winners of the ISTS elections: Roldán Valverde for President Elect, George Balazs and Alejandro Fallabrino for the two Board of Directors positions, Terry Meyer for Treasurer, Manjula Tiwari for Secretary, Mariana Fuentes and Marydele Donnelly for the Nominating Committee, and Dean Bagley, Sally Murphy and Jim Spotila for the Awards Committee. Congratulations to all!

### **Sponsors and Donors**

The International Sea Turtle Society and the local organizing committee is very grateful for the support provided by our international donors and sponsors, including many of our annual sponsors who supported us despite difficult economic times. In particular, we are grateful to the lead supporters of the 32nd Annual Symposium: the National Commission for Natural Protected Areas (CONANP) at SEMARNAT, Mexico, National Marine Fisheries Service, the David and Lucile Packard Foundation, USFWS Marine Turtle Conservation Fund and Fomento Ecológico Banamex. We also had much needed support from the Government of the State of Oaxaca, Huatulco Municipality, SEMARNAT-Oaxaca Office, Ocean Foundation, Disney Animals, Science and Environment Program, The Leatherback Trust, Wildlife Computers and Telonics. And for our international travelers, there were several individuals that helped with funding rooms for our travelers, including Nancy FitzSimmons, Karen Frutchey, Peter Richardson, Kellie Pendoley, Eric Koepfler and Laura Sarti. I would like to thank each of these organizations and individuals for making the Huatulco Symposium a reality!

### **Key Members of the Organizing Team**

When I engaged in this journey I had but a faint idea of the amount of work and the number of people that needed to be involved. I'm deeply thankful to the Huatulco Symposium Executive Committee who tirelessly worked to help me develop the vision and theme for the meeting and to make of Huatulco an unforgettable experience; wonderful friends and committed conservationists who I wish to fully

acknowledge: Laura Sarti, Ninel García, Christiane Aguilar, Manuel Rodríguez, Gonzalo Villalobos, Gabriela Vargas, Shaleyra Kelez, Eduardo Cuevas and Alan Zavala. All logistics details were so efficiently taken care of by Gonzalo Villalobos and the BIOAX team that very few participants were aware of all the fires they had to put down. Also helping substantially with the planning were Terry Meyer, our ISTS Treasurer, Manjula Tiwari, the ISTS Secretary, Michael Coyne, the ISTS Managing Director, Samantha Karam, this year's Registrar, Karen Lazcano, our Volunteer Coordinator, Gabriela Vargas, our Vendor Coordinator, and Marco Palet, Gabriel Manzanilla and Diana Rangel, our PR team.

The Program this year is an exciting blend of traditional and new, honoring the theme "Time for Innovation", thanks to the hard work of Program Co-Chairs Shaleyra Kelez and Eduardo Cuevas, and of DuBose Griffin and the rest of the Program Committee. Thanks also to our Poster chairs Melania Lopez and Omar Chassin, and to Alan Zavala, who as Regional Meeting and Workshop Coordinator managed to keep track of the dozen workshops and regional meetings that brought diversity and covered a broad spectrum of themes... we are so thankful with all those participants! I'd like to thank Alexander Gaos, Travel Committee Chair, and the rest of the Travel team for making the participation of so many grantees possible. Another major aspect is all the volunteer work involved in the organization, and for making this happen I give a huge thank you to our Volunteer Coordinator, Karen Lazcano. The ever-important task of Registration was possible thanks to the vigilant eyes of Samantha Karam. Thanks also to all the people serving in the rest of the ISTS Committees: Awards, chaired by Karen Arthur, Student, led this year by Itzel Sifuentes and Annelisse Barcenás, and Nominations chaired by Pam Plotkin. Of course, I won't forget to recognize the huge effort done by the judges of the "Archie Carr" Student Award, chaired by Matthew Godfrey and Andrea Phillott.

Also, I have no words to express my gratitude to our Program Officer, Elena Finkbeiner, who handled the international fund raising. On-site fund raising events are also essential, so I'd like to give a big round of applause to Jennifer Homcy and Marina Zucchini for coordinating the Live and Silent Auctions, to Rod Mast for being our Auctioneer, to Emma Harrison and Zoe Meletis for organizing the Speed-chat with experts, and to all the vendors that decided to join us and make Huatulco a fantastic experience. ■



## 33RD ANNUAL SYMPOSIUM ON SEA TURTLE BIOLOGY AND CONSERVATION, 2-8 FEBRUARY, 2013 IN BALTIMORE, MARYLAND, USA

RAYMOND R. CARTHY

President, International Sea Turtle Society

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Yes, we are going to Baltimore! The Annual Symposium on Sea Turtle Biology and Conservation hosted every year by the International Sea Turtle Society (ISTS) is a unique event that draws participants from around the world, from across disciplines and cultures to a common interest and objective: sea turtle conservation. The Symposium encourages discussion, debate, and the sharing of knowledge, research techniques and lessons in conservation to address questions on the biology and conservation of sea turtles and their habitats.

The 33rd Annual Symposium will be held in Baltimore, Maryland, USA, which is within the National Capital Region- a hub for important scientific research, policy and decision-making by the nation's government and many leading conservation organizations. The pioneering 1st World Conference on Sea Turtle Conservation was held in Washington, D.C., 26-30 November 1979 and now, just over 33 years later, a major sea turtle meeting will revisit the National Capital Region.

Baltimore is located in the heart of the Mid-Atlantic States, where nearly one-third of the U.S. population resides. The city is well-situated for visitors arriving by car (just off I-95), it is only 15 minutes from Baltimore/Washington International Thurgood Marshall Airport (BWI) and it is a main train station along Amtrak's Northeast Corridor. Baltimore offers visitors many great activities in the city and the opportunity to explore its rich cultural history; you can tour the home of the American National Anthem at Fort McHenry, eat world-famous Maryland crabs and seafood, explore the National Aquarium and the Maryland Science Center, or spend time in Baltimore's Inner Harbor.

Although most things you will want to do and see will be within easy walking distance, Baltimore also has a fast,

free, and green Charm City Circulator (shuttle buses that travel 3 routes daily in the city, [www.charmcitycirculator.com](http://www.charmcitycirculator.com)). You can also venture out to explore the natural beauty of the Chesapeake Bay Area, or take an inexpensive train ride to Washington, D.C. to lose yourself in the museums of the Smithsonian Institution.

For the 2013 Symposium we expect over 1000 participants from more than 75 countries around the world. The Symposium's venue will be the Baltimore Marriott Waterfront [[https://resweb.passkey.com/Resweb.do?mode=welcome\\_gi\\_new&groupID=9575293](https://resweb.passkey.com/Resweb.do?mode=welcome_gi_new&groupID=9575293)], located in the Inner Harbor, about 12 miles from BWI airport, 52 miles from Washington Dulles International Airport (IAD), 3 miles from Greyhound Bus Lines, and 1 mile from Penn Station-Baltimore (train) and the Baltimore Metro Subway.

The Baltimore Marriott Waterfront has luxury guest rooms and suites with great views of the city and the Inner Harbor, and is conveniently located downtown near the National Aquarium, Oriole Park, and many restaurants, shops, and nightclubs. The well-appointed conference facilities and meeting halls, as well as proximity to urban recreation, will promote interaction with other delegates, networking and catching up with old friends.

This year the Symposium will focus on Connections in sea turtle biology, research and conservation: marine turtle ecological interactions, linkages among scientists, coastal communities, turtles, humans, consumptive and non-consumptive use, collaborative research, community-based conservation, policy-makers, and managers, and any that YOU may care to share. From February 2nd to 4th, we will convene and host several regional meetings and special workshops that will enrich

our knowledge and complement our capacities for reaching our conservation goals, and have some unique opportunities to interact with the local community. On February 5th through 8th we will have the themed oral and poster sessions, an outstanding group of returning and new Exhibitors and Vendors, traditional Symposium activities, and a few new things as well!

Sea turtles have been an integral part of ecosystems for over 60 million years, and have been linked with humans throughout recorded history. In 2013 we hope to explore, discuss, and expand upon these connections. Stay tuned

for the Symposium Registration and Reservations website to go live next month, AND, with the meeting coming in early February next year, start preparing for an October 1st, 2012 deadline for poster and presentation abstracts!

Let's CONNECT in Baltimore in February!!!

Ray Carthy, President  
International Sea Turtle Society  
33rd Annual Symposium - "CONNECTIONS"  
Inner Harbor, Baltimore, MD, USA  
Feb. 2-8, 2013. ■

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## REQUEST FOR DUGONG GENETIC SAMPLES

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Concern about the plight of the dugong in many parts of its range has led to the development of a Memorandum of Understanding on the Conservation of Dugongs and their Habitat, which is administered by the UNEP/ Convention on Migratory Species (CMS) office in Abu Dhabi. The UNEP/CMS Dugong MOU Secretariat (the Secretariat) has recognised the value of a study on dugong genetics across the range states. Such a study will provide information on the recent evolutionary history of the species (where they lived in the past and where they live now), on the extent of gene flow mediated by movement of individuals between dugong populations and localities, and on the genetic diversity remaining in different dugong populations. The Secretariat is supporting the development of a network of scientists in range states who can obtain samples suitable for this work (usually small pieces of skin) and who are willing to contribute information to a range-wide study. Researchers at James Cook University in Townsville, Australia, have

already established a set of methods that are being used to obtain genetic information from Australian dugongs. Samples from other range states can be sent to Australia for analysis. However, it is important to build capacity in other countries and this is being encouraged by the Secretariat.

During the course of other work, it is possible turtle researchers might come across dugongs (dead and stranded, drowned in nets etc.) If so, a small skin sample taken from such animals can provide a lot of genetic information. We normally collect a piece of skin (the coloured part of the skin, not the underlying white dermis or fat) about 10 x 10 mm and 1-2 mm thick. In the field, preservation in ethanol (70-90%) is appropriate. Remember to have a ratio of about 1 volume of tissue to at least 10 volumes of preserving fluid. For further information and advice, or to report sightings of dugongs (hopefully alive), in rarely-visited places, please contact david.blair@jcu.edu.au. ■

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