

CONTENTS

EDITORIALS

- 1 Editorial
Andrea D. Phillott

ARTICLES

- 2-5 Marine turtle update from the Eritrean red sea
Yohannes Temcelmariam Mebrahtu
- 6-7 Leatherback turtle stranded dead at Utukur Beach, Vidavalur Mandalam, Nellore district, Andhra Pradesh, India
Supraja Dharini
- 7 How many hatcheries?
Andrea D. Phillott, Jiby Mol Mathew & Nimisha K.
- 8-11 Solitary nesting and mortality of olive ridley sea turtles along the Ganjam coast of Odisha, India
Subrata Kumar Behera & Chandrasekhar Kar
- 12-16 Whale Shark Gazing and Citizen Science: An Interview with Dr. Brad Norman
Janaki Lenin
- 16-17 A deep diving olive ridley in the Bay of Bengal
Kartik Shanker & Matthew H. Godfrey

PROJECT PROFILE

- 18-21 Students Sea Turtle Conservation Network: 25 years of conservation
V. Arun

RESEARCH SUMMARY

- 22-23 Two-for-one sea turtle studies
Matthew H. Godfrey

REPORTS

- 24-29 President's report- The 33rd annual symposium on sea turtle biology and conservation, "connections,"
2-8 February 2013, Baltimore, Maryland, USA
Raymond R. Carthy
- 29-30 A summary of the Indian Ocean South East Asia regional meeting at Baltimore, USA
Lalith Ekanayake & Andrea D. Phillott

ANNOUNCEMENTS

- 30-31 34th Annual symposium on sea turtle biology and conservation, April 10-17, 2014 in New Orleans, Louisiana, USA
Roldán A. Valverde

RESOURCES OF INTEREST

- 31 Research4Life
Andrea D. Phillott & Ruvani N.N. Gamage
- 32 Instructions for authors

INDIAN OCEAN TURTLE NEWSLETTER

ISSN 0973-1695

ISSUE 18

JULY 2013

The Indian Ocean Turtle Newsletter was initiated to provide a forum for exchange of information on sea turtle biology and conservation, management and education and awareness activities in the Indian subcontinent, Indian Ocean region, and south/southeast Asia. The newsletter also intends to cover related aspects such as coastal zone management, fisheries and marine biology.

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.

This issue was produced with support from:



Cover photograph: 2013's *arribada* across Odisha coast

Photo Courtesy: Kartik Shanker

IOTN is available online at www.iotn.org



EDITORIAL

EDITORIAL

ANDREA D. PHILLOTT^{1,2}

¹ Co-editor, Indian Ocean Turtle Newsletter

²Asian University for Women, Chittagong, Bangladesh

iotn.editors@gmail.com

IOTN Issue 18 (July 2013) contains articles and summaries of sea turtle research and conservation activities from Eritrea, Egypt, India and South Africa. Also included are two articles that complement the interests of IOTN readers, the first on seagrass biology and the second on the role of citizen science in wildlife monitoring and conservation. Four programs that allow free or low cost access to international journals and books are described in the Resources of Interest. As you enjoy the reports from the sea turtle symposium in Baltimore, remember to begin preparing for registration, abstract submission and visa application

to attend the next ISTS meeting in New Orleans.

Many of the research articles and project reports in IOTN describe the use of hatcheries to protect sea turtle eggs and aid in conservation. Readers involved with hatcheries throughout the Indian Ocean and south-east Asia are encouraged to request and complete the survey described by Phillott *et al.* on page 8, to determine the number, and activities, of the hatcheries in the region. A summary of the results of this survey will be included in a future issue of IOTN. ■

CALL FOR SUBMISSIONS

The Indian Ocean Turtle Newsletter was initiated to provide a forum for exchange of information on sea turtle biology and conservation, management and education and awareness activities in the Indian subcontinent, Indian Ocean region, and south/southeast Asia. The newsletter also covers related topics such as coastal zone management, fisheries, and marine biology. If you would like to submit a guest editorial, research article, project profile, note, announcement or photo for Issue 19 of IOTN, please submit material to iotn.editors@gmail.com before 1st October 2013. Guidelines for submission can be found on the last page of this newsletter or at <http://www.iotn.org/submission.php>.

ARTICLES



MARINE TURTLE UPDATE FROM THE ERITREAN RED SEA

YOHANNES TEMCELMARIAM MEBRAHTU

Ministry of Marine Resources, Eritrea

ejohnsh@gmail.com

Eritrea's coastal and marine areas cover more than 121,000 square kilometres, include more than 350 offshore islands, and are pristine compared to other parts of the Red Sea that have been degraded by development. The Eritrean coast (Figure 1) is home to an array of marine wildlife, including five species of marine turtles: green, hawksbill, olive ridley, loggerhead and leatherback turtles. Three of these species, green, hawksbill and olive ridley, nest on Eritrea's beaches. All species appear on the IUCN Red List of Threatened Species and are listed on Appendix I of CITES.

From 2000 to 2008, the Ministry of Marine Resources worked to conserve sea turtle through the Eritrea Coastal

Island and Marine Biodiversity Project. More than 120 islands and coastal sites were surveyed for turtle nesting, and some hawksbill nesting, tagging and morphometric data were collected. These surveys included the first record of an olive ridley nesting attempt in the Red Sea.

The main threats to turtles in Eritrea are disturbance of nesting and foraging habitats, incidental net captures (gillnets and trawlers), poaching of meat and eggs, lack of adequate protection and enforcement, and limited public awareness. Although there are no records of over-harvesting, sea turtle eggs and meat are consumed locally by communities and fishermen at a subsistence level, and turtle oil is valued for medicinal purposes, as it is believed

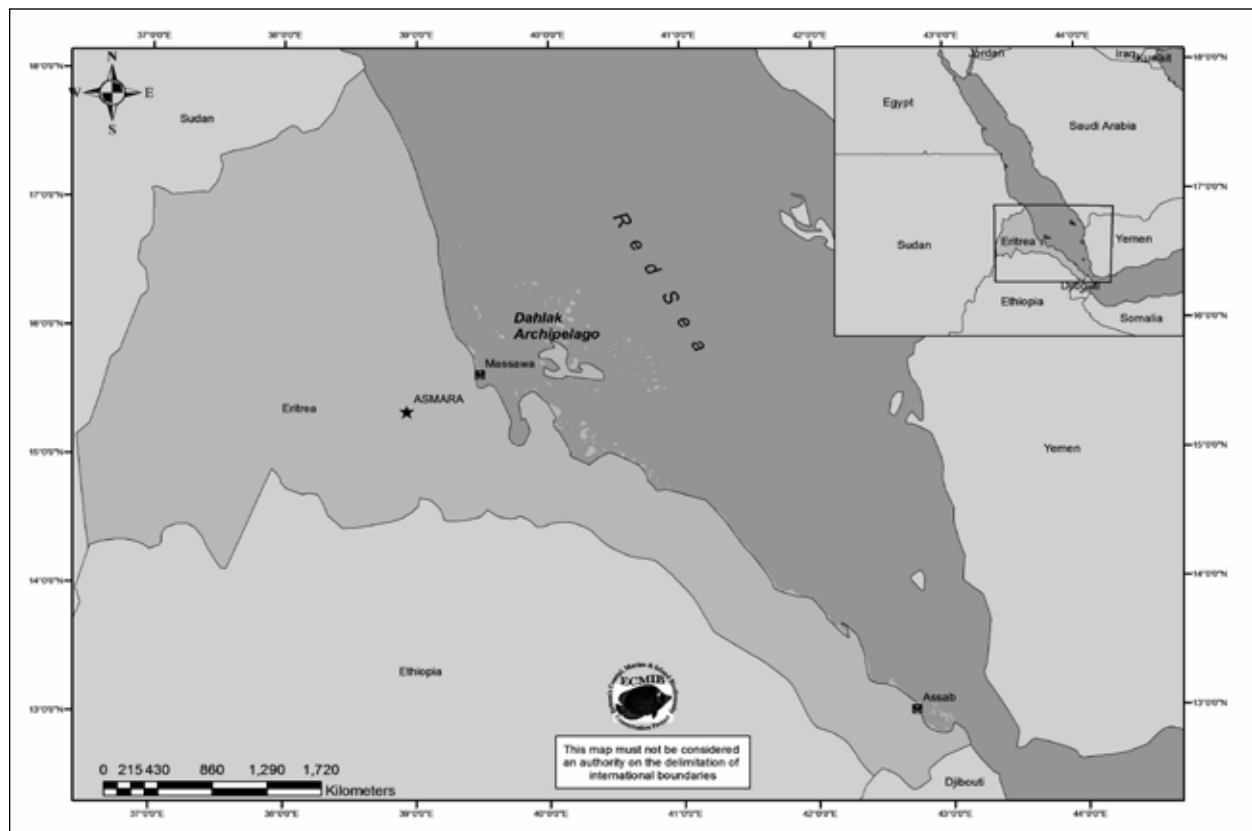


Figure 1. Coastline of Eritrea

to cure several ailments. Many years ago, hawksbill turtle carapaces were sold abroad for ornamental purposes. Although conservation and management efforts were active between 2005-2007 in some areas of Eritrea, including the offshore islands of the Dahlak archipelago, the conservation status of marine turtles in Eritrea remains largely unknown. Information concerning population dynamics is incomplete, whilst knowledge on nesting populations and feeding habitats is patchy and almost non-existent for developmental habitats.

Management options to reduce incidental take of marine turtles in fisheries, notably trawlers and gillnets, include the use of turtle excluder devices (TEDs), reduced tow or soak times, and restricted use of fishing gear in important turtle habitats. Existing Eritrean fisheries regulations state that fishing vessels operating in Eritrean waters must use TEDs in all trawl nets to reduce the mortality of turtles and other megafauna. For various reasons, TEDs have not been commonly used, but their use is now mandatory in the new fishing agreement with industrial trawling investors.

The existing Eritrean fisheries regulations state that fishing vessels operating in Eritrean waters must restrict their fishing activity to authorized zones and trawl at least 4 miles from islands, 8 miles from the mainland and at depths of more than 30m, to reduce the chance of sea turtle bycatch. In the event of incidental capture, turtles and other megafauna must be returned to the sea immediately, whether dead or alive. However, due to the lack of appropriate handling experience of on-board observers and fishermen, turtles have been improperly released (while comatose or lethargic, or thrown from the stern into the sea), which decreases their chances of survival. Sometimes fishermen would kill a turtle entangled in their gear, to reduce damage to their nets, and use it for food.

Data about incidentally caught turtles is available from booklets maintained by the Monitoring, Control and Surveillance Division of the Ministry of Marine Resources. The data includes the date of incidental catch, species type, position of catch, depth, time of trawling and condition of the incidentally caught turtles. So far the greatest threat to sea turtles is the shrimp/fish trawling associated with the main shrimp fishing grounds between islands, where turtles frequently migrate to nest and forage. Several Egyptian and other foreign-owned trawlers, in addition to a few national trawlers, have been operating in the Eritrean Red Sea.

A sea turtle field training course, complemented with practical demonstrations, was given to on-board observers of industrial shrimp/fish trawlers in 2007. Twenty copies of a photographic key to Indo-

Pacific marine turtles and the other marine mammals, which can help on-board observers' identify the captured species, and measuring tapes were provided.

Flipper tagging was conducted in Mojeidi (Southeast Dahlak), and other islands and coastal nesting areas, using titanium flipper tags with the series ERI 001-ERI 1000 and a return address to Eritrean Ministry of Fisheries in English and Arabic. Ninety-six female hawksbills were tagged during 2006, 47 of which were tagged from 18th May to 3rd June 2006 in Mojeidi only. In 2005, four hawksbills and one olive ridley were also tagged in different coastal areas of Eritrea. The tag-recapture program has been ongoing since 2005 and allowed the recapture, in 2007, of two female turtles tagged at the major turtle nesting area of Mugeidih Island. The future plan is to tag turtles, especially greens, on-board shrimp trawlers in order to elucidate their migration routes.

Domestic trade of turtles is forbidden according to the existing Eritrean fisheries regulations. There are reports that turtle products are sold illegally and there are gaps in implementation of protection measures. Nevertheless training and education/awareness programmes are ongoing. The Military, especially the Navy, has been in full support of turtle conservation activities and are penalizing their staff and locals for contravening regulations.

The Eritrean Navy held 'Fenkel 2010', from 12-14th February 2010, as a national event to promote the conservation of endangered marine species of the Eritrean Red Sea. Models of a giant sea (Figure 2) turtle, dugong and sawfish shark were displayed during the magnificent carnival show that coincided with the official opening of the festival on 13th February. The aim was to increase understanding and create awareness about marine biodiversity and its conservation needs by relevant governmental and non-governmental organizations. The event was observed in the port compound of the city of Massawa. Invited guests and higher officials, people from different sectors and organizations of the region, and members of the national media were in attendance. The President of the State of Eritrea, H.E. Issaias Afewerki, Ministers, Regional Administrators, Religious Leaders, and thousands of people attended the ceremony. The occasion was broadcast live via satellite through the Eritrea National Television channel (ERI-TV), watched by millions of people inside the country and abroad.

The sustainability of sea turtle conservation efforts depends mainly upon the participation and education of local people. Efforts to enhance public awareness through the fishermen cooperatives were undertaken at every coastal village and island, including fishing



Figure 2. Inflatable turtle used to promote turtle conservation during an Eritrean festival in 2010.

Photo credit: Yohannes Mebrahtu

camps. The involvement of indigenous people and community based conservation projects is considered essential for future turtle conservation programmes. In practice, frequent meetings with the *Derrder* (Sultan) of the (indigenous) Afar Community have resulted in fewer turtle killing practices in some areas.

A juvenile and an adult female hawksbill turtle were released to their natural habitat on 15th of March 2012 after a period of convalescence and being nursed back to health from injuries caused by incidental capture. The programme, which was held at the Port City of Massawa, was designed to publicize this work and highlight the need to protect marine species and their habitats along the coast and islands of the Eritrean Red Sea. The activity dominated the country's main broadcasting national media channels, including the main news on ERI-TV, radio and newspapers, with coverage in at least five native languages, Arabic and English. The hawksbills were the first species to be tagged with titanium flipper tags in front of the public and the media (Figure 3).

In collaboration with the National Union of Eritrean Youth and Students (NUEYS) a sea turtle club was established in the town of Assab, an active Eritrean coastal area with a

lot of fishermen and a fish-landing site. An illegal market for turtle meat persists in the area. Teaching children of these fishermen will help indirectly raise awareness on turtle issues among older fishermen and directly raise awareness in future fishermen. The Ministry of Marine Resources has equipped the club with some educational and recreational materials, such as a satellite dish and TV for viewing environmental documentaries and films.

The drafting of the 2008 coastal policy that defines the coastal area, with 100 meters of setback from a fixed geological feature near the coastline, and the Integrated Coastal Area Management proclamations for the entire coastal area of the Eritrean Red Sea as 'Multiple Use Managed Area', are supposed to support the endangered marine turtle populations. In addition, a core national Marine Protected Areas (MPAs) network and a species conservation programme have been established with necessary technical and legal documents to declare two MPAs for their species and educational purposes. From more than 100 sites discovered to be turtle nesting areas, 40 sites have been identified for marine turtle research and conservation programmes.

Those critical habitats that will be outside future protected



Figure 3. Release of rehabilitated hawksbill to promote turtle conservation in Eritrea.

Photo credit: Yohannes Mebrahtu

areas can be declared as sanctuaries and regulated as such according to the 2005 Sea Turtle National Action Plan. Marine turtles also feature prominently in plans to set aside MPAs, which will safeguard these resources and leave behind a longstanding legacy for future generations. Eritrea aims to become the first country in the world to turn its entire coast into an environmentally protected zone, to ensure balanced and sustainable development.

As most turtle nesting sites are located on remote offshore islands, Eritrea could become a safe area for endangered marine turtles and possibly seed other areas of the region that have lost their marine turtle populations. Eritrea's interest in its marine resources in general, and particularly marine turtles, is reflected in the country signing the IOSEA Memorandum of Understanding in 2006, which made Eritrea the 24th Signatory State in the region. ■

LEATHERBACK TURTLE STRANDED DEAD AT UTUKUR BEACH, VIDAVALUR MANDALAM, NELLORE DISTRICT, ANDHRA PRADESH, INDIA

SUPRAJA DHARINI

TREE Foundation, India

treefoundation2002@gmail.com

The leatherback turtle (*Dermochelys coriacea*) is rarely observed on the coast of mainland India (Shanker, 2013). Here I report the occurrence of a dead stranded leatherback found on the shore near Utukuru fishing village, Vidavalur Mandalam, Nellore District, Andhra Pradesh, India, on 6th January 2013 (Figure 1). The turtle was discovered by TREE Foundation's Sea Turtle Protection Force members, from a local fishing community, while they were on their regular morning sea turtle patrol. The leatherback had two

injuries: a crushing wound on the top of the head, and a deep puncture on the left hind flipper. It was difficult to ascertain whether the injuries occurred pre- or post-mortem. The turtle measurements were as follows: curved carapace length= 122cm, curved carapace width= 81cm, head length= 36cm, front flipper length= 60cm, hind flipper length= 36cm. Although there was no scale available, I estimate the turtle weighed approximately 200kg, given that it took more than seven people to move the turtle for burial. Based on the size, I



Figure 1. Stranded leatherback turtle at Utukur Beach, Andhra Pradesh.

Photo credit: M. Prabhakara Rao

presume that the leatherback was a sub-adult, although smaller adult leatherbacks have been documented nesting in various locations (Stewart *et al.*, 2007).

The District Forest Officer of Nellore, Andhra Pradesh, and the Assistant Conservator of Forests, Kavali Range came to the beach site and conducted a detailed enquiry with the local fishermen on the possible cause of the injuries to this turtle, and other injuries to all turtle species in the region. Most sea turtle mortalities in the area appear to be the result of fisheries interactions and there has been an alarming increase in turtle mortality along the Nellore coast, from 13 dead stranded turtles during the 2012 turtle nesting season (January to April) to 78 dead stranded turtles observed between 22nd December 2012 and 6th January 2013 alone. Concurrently, there has been an increase in the gill net fishery effort along the Paderu River estuary in the conservation area, with an increase from 34 to 54

boats operating in the area over the past 7 months.

The TREE Foundation's community based sea turtle conservation program is partly supported by the Andhra Pradesh Forest Department and The US Fish & Wildlife Service, USA.

Literature cited

Shanker, K. 2013. Leatherback turtles on the mainland coast of India. *Indian Ocean Turtle Newsletter* 17: 15-17.

Stewart, K., C. Johnson & M. H. Godfrey. 2007. The minimum size of leatherbacks at reproductive maturity, with a review of sizes for nesting females from the Indian, Atlantic and Pacific Ocean basins. *Herpetological Journal* 17: 123-128. ■

HOW MANY HATCHERIES?

ANDREA D PHILLOTT[#], JIBY MOL MATHEW & NIMISHA K.

Asian University for Women, Chittagong, Bangladesh

[#]andrea.phillott@auw.edu.bd

Sea turtle eggs in the Indian Ocean and south-east Asia are often collected for incubation in a hatchery to reduce natural and human threats to nests, including poaching, predation, and beach erosion. Hatcheries may be maintained by governmental and non-governmental agencies for protection and/or education and outreach, or to provide income to local communities through ecotourism. To better understand the practices of hatcheries and the contribution to sea turtle conservation, we are conducting a survey to quantify the number of sea turtle hatcheries in this region and determine the

location of hatcheries and proximity to nesting beaches, number and species of eggs collected, methods of egg collection and transport, density and depth of nests, and practices of head-starting or holding hatchlings.

Interested persons involved with sea turtle conservation and management of hatcheries in countries throughout the Indian Ocean and south-east Asia are requested to email Dr. Andrea D. Phillott at andrea.phillott@auw.edu.bd to receive a copy of the survey. A summary of results will be published in a later issue of IOTN. ■

SOLITARY NESTING AND MORTALITY OF OLIVE RIDLEY SEA TURTLES ALONG THE GANJAM COAST OF ODISHA, INDIA

SUBRATA KUMAR BEHERA[#] & CHANDRASEKHAR KAR

Integrated Coastal Zone Management Project, Bhubaneswar, India

[#]subb92@gmail.com

INTRODUCTION

The Odisha State has a coastline of 480 km, from which several rivers flow into the Bay of Bengal. Ganjam is the most southern district of Odisha, its 60km coastline extending from Prayagi to Patisonapur (Figure 1). Rushikulya, a well known arribada nesting site, is located north of the Rushikulya River mouth and close to the fishing villages of Purnabandha, Gokharkuda and Katigada (Bateswar). Olive ridley sea turtles have been observed to nest almost every year (Das and Kar, 1990; Pandav *et al.*, 1994; Sankar *et al.*, 2004; Tripathy 2008) since the discovery of this rookery

(Pandav *et al.*, 1994). Most turtle conservation work in the area has been restricted to the mass nesting events that occur on this 6km nesting beach; only one study has described the sporadic, solitary nesting that occurs along the adjacent beaches of the Ganjam coastline but no location was provided for any of the 180 nests (Pandav *et al.*, 1994).

Solitary nesting of olive ridleys at Gahirmatha rookery occurred almost every month during the nesting season. However, solitary nesting turtles were more frequent between February and April, suggesting this is the main nesting season for the species (Dash and Kar, 1990).

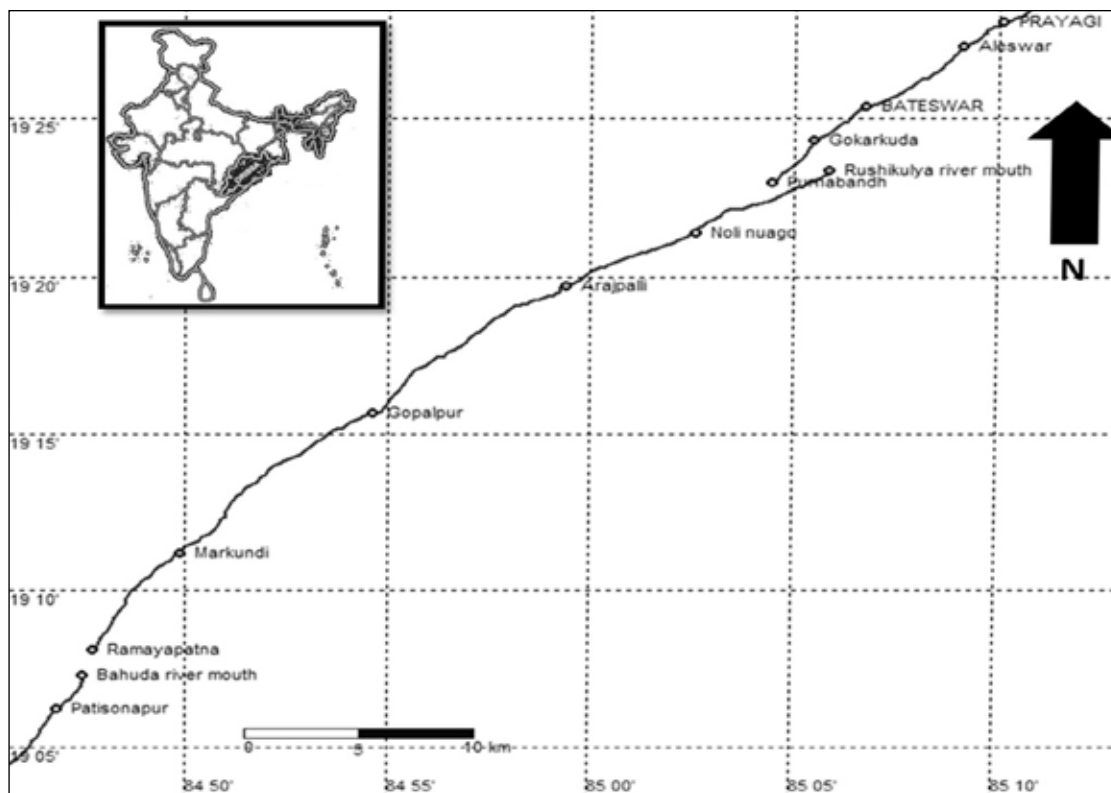


Figure 1. The study area of nine beaches on the Ganjam coast, Odisha, India.

As solitary nesting activity of olive ridley turtles on the Ganjam coast was not well documented previously, our aim was to do so and determine if nesting beaches in addition to Rushikulaya were present along the Ganjam coast.

METHODS

To count the number of nesting and non-nesting turtles that emerged each night, daily track counts were conducted between December 2012 and April 2013 on nine beaches along the Ganjam coast of Odisha, India (Figure 1): Prayagi-Bateswar, Bateswar-Gokahrkuda, Gokahrkuda-Rushikulaya River Mouth (Island Beach), Rushikulaya River Mouth- Nolia Gauon, Nolia Gauon-Arajapalli, Arajapalli-Gopalpur River Mouth, Gopalpur River Mouth-Markundi, Markundi to Bahuda River Mouth, Bahuda River Mouth-Patisonapur.

RESULTS AND DISCUSSION

Of the nine beaches we surveyed, sporadic nesting occurred only at Gopalpur-Markundi and Markundi-Bahuda River Mouth. Bahuda River is the southern-most river in Odisha; Ramyapatana village is situated north of its mouth. About 14km north of Bahuda River mouth is another small rivulet mouth, behind which are Markundi and Gopalpur villages. To quantify the annual sporadic nesters and to conserve the ridley nests, hatchery management programs were initiated near Ramayapatana and Markundi Villages. At both sites a hatchery was established on a level beach devoid of vegetation. The hatchery area was cleared of plastic and metal refuse then fenced with bamboo poles to minimise the risk of predation. Within the hatchery, artificial nests, resembling the shape of the natural nests, were dug by hand to 50cm depth. Nests were spaced 1m apart. During the study period, nests were relocated into the hatchery to protect the nests from predators. Eggs were collected and buried in the artificial nests within 1-4hrs of oviposition. Each nest was marked with a small wooden stake; the stakes were serially numbered and the date and time of oviposition and clutch size was recorded.

The necks of individual nests were surrounded with a woven bamboo basket, open at both the ends, 1 week before expected emergence of hatchlings. The basket was buried 15cm below the sand surface to prevent escape and

mixing of hatchling after their emergence from the nest. Hatchling were collected and released high on the beach between 5am and 7am.

Our study determined that sporadic nesting of olive ridley turtles occurred from January to April on Ganjam coast beaches between Gopalpur-Markundi (n=3) and Markundi-Bahuda River Mouth (n=195), in addition to the mass nesting ground of Rushikulaya (Figure 2). The highest density of nesting (> 4 nests/night) occurred during the first fortnight in April. We continued to monitor the beach until the end of May but there was no further sign of nesting turtles (Table 1). Temperature,

Table 1. Nesting of solitary olive ridley turtles between Gopalpur and Bahuda River Mouth, Odisha, during the 2012-13 nesting season.

	Total # of Nesting Nights	Total # of Nests Laid	Nesting Density Per Night
January	9	17	1.9
February	20	43	2.2
March	22	86	3.9
till April 15th	12	49	4.1

Table 2. Incubation period of relocated olive ridley nest at Ramayapatana, Ganjam coast during 2012-13 nesting season.

Incubation Period (days)	Month of Hatchling Emergence from Nest		
	March	April	May
51			
52			
53			1
54			
55			3
56		2	
57		5	18
58		9	25
59	6	17	41
60	1	9	33
61	3	1	21
Total no. of emerged nests	10	43	142
Average incubation period (days)	59.7	58.7	58.9

weather conditions, geography of nesting beaches and the adjacent sea, conditions of tide, and surface current circulation influence nest site selection (Dash and Kar, 1990) and probably affected the olive ridleys

selecting the Ganjam coast and other areas in Orissa. The average clutch size for 195 nests at Ramayapatana hatchery during the study period was 139.7 ± 15.9 eggs (range= 96-168), and the average incubation period

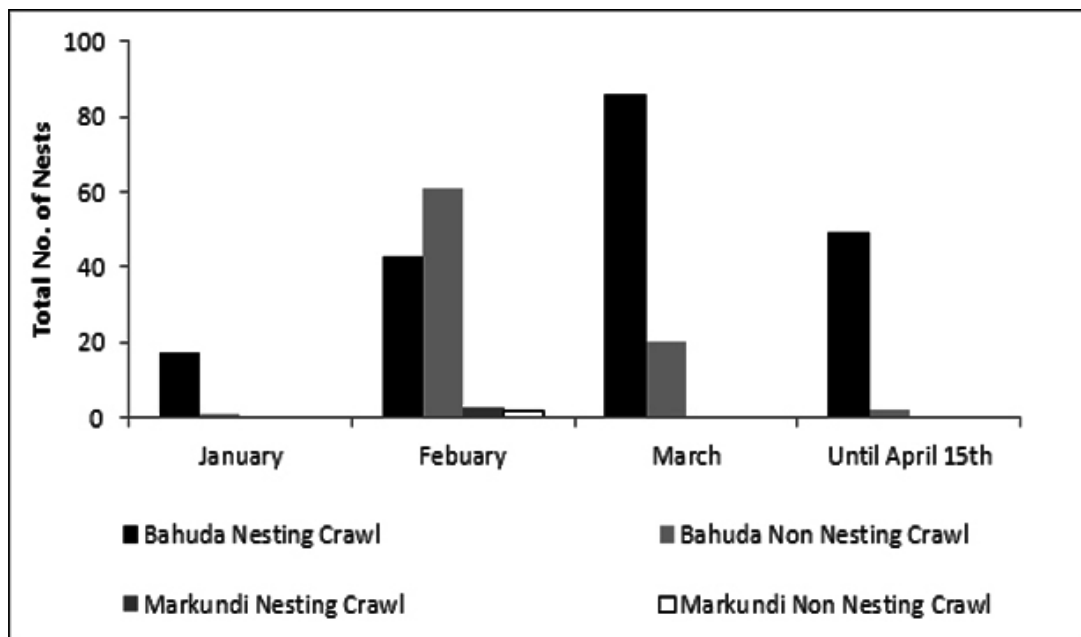


Figure 2. Nesting and non-nesting crawls between Gopalpur and Bahuda river mouth from 1st December 2012 to 15th April 2013.

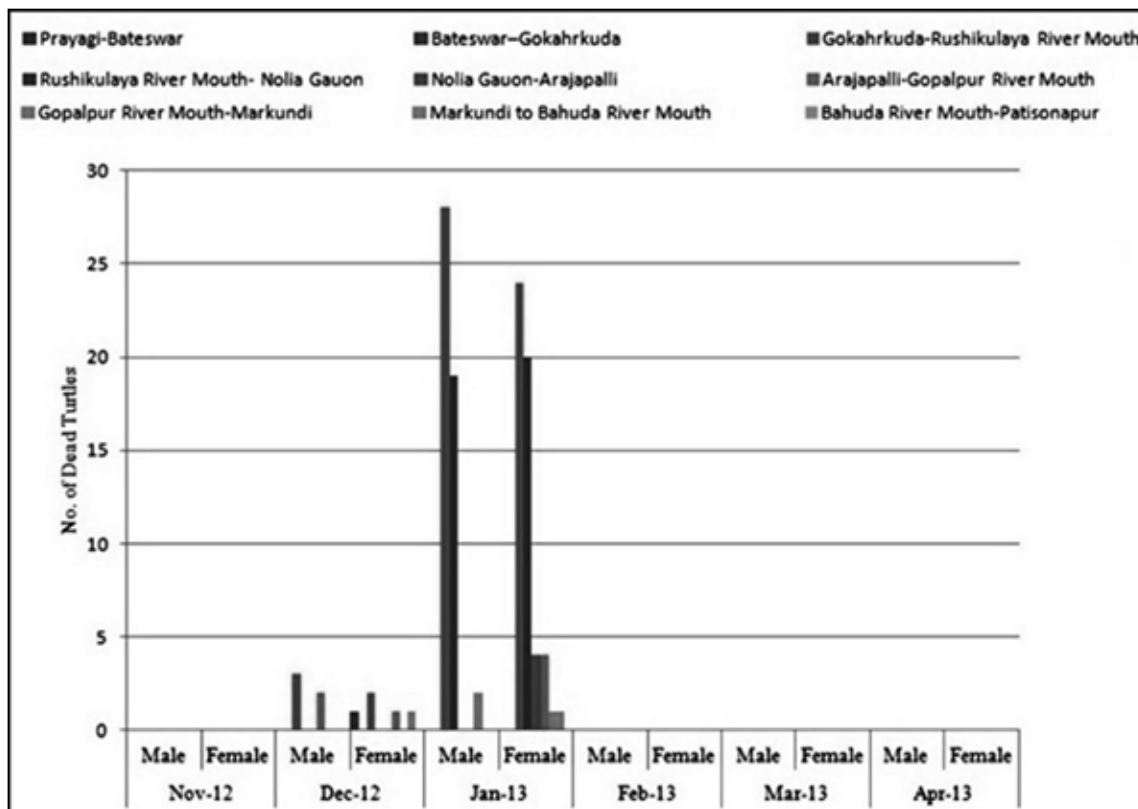


Figure 3. Mortality of olive ridley sea turtles along Ganjam coast during 2012-13 nesting season.

was 58.9 ± 1.3 days (range= 53-61). The average hatch success for the nests at Ramayapatana hatchery was $95.1 \pm 2.2\%$ (range= 87.2-100.0) and emergence success was $87.3 \pm 2.4\%$ (range= 79.1-92.3).

The Orissa olive ridley population has been subjected to high mortality in recent years; more than 10,000 dead turtles wash ashore each year after fishery related incidental mortality (Pandav and Choudhury, 2000). The present study documented 113 (54 male and 59 female) dead olive ridley turtles washed ashore during the study period of December 2013-April 2013 (Figure 3); two dead green turtles also washed ashore. Many turtle carcasses do not strand on the coast (only 7-14%; Epperly *et al.*, 1996), so the actual number of turtles killed during the nesting season is likely to be much higher than numbers recorded on the beach. Seine netting is common in the coastal waters off Ganjam coast and may be a contributing factor to turtle mortality in the region.

CONCLUSION

Solitary nesting of olive ridley sea turtles occurred on 21km of beach between Gopalpur to Bahuda River Mouth on the Ganjam coast of Odisha, adjacent to the mass nesting beach of Rushikulya. A greater number of nests were laid between Markundi and Bahuda River mouth ($n=195$) than Gopalpur to Markundi ($n=3$). No turtle crawls were observed between Rushikulya River mouth and Gopalpur. During the study period, 113 dead turtles were also observed, possibly as a result of interactions with fisheries.

Literature cited

Ackerman, R.A. 1997. The nest environment and the embryonic development of sea turtles. In *The Biology of*

Sea Turtles (ed. P.L. Lutz and J.A. Musick), pp. 83-106. Boca Raton, FL, USA: CRC Press.

Dash, M. C. & C. S. Kar. 1990. The turtle paradise: Gahirmatha 1990: 118-119.

Central Empowered Committee, CEC Visiting Orissa Report February 10-14, Government of India, New Delhi, 2004.

Epperly, S.P., J. Braun, A.J. Chester, F.A. Cross, J.V. Merriner, P.A. Tester. & J.H. Churchill. 1996. Beach stranding as an indicator of at-sea mortality of sea turtles. *Bulletin of Marine Science* 59: 289-297.

Pandav, B., B. C. Choudhury. & C. S. Kar. 1994. A status survey of olive ridley sea turtle (*Lepidochelys olivacea*) and its nesting habitats along the Orissa coast, India. Wildlife Institute of India. pp 48.

Pandav, B. 2000. Conservation and management of olive ridley sea turtle (*Lepidochelys olivacea*) along the Orissa coast. Unpublished PhD Thesis, Utkal University, Orissa.

Pandav, B. & B.C. Choudhury. 2000. Conservation and Management of olive ridley sea turtle (*Lepidochelys olivacea*) in Orissa, India. Final Report. Wildlife Institute of India, Dehradun.

Shanker, K., B. Pandav. & B. C. Choudhury. 2004. An assessment of the olive ridley turtle (*Lepidochelys olivacea*) nesting population in Orissa, India. *Biological Conservation* 115: 149 -160.

Tripathy, B. 2008. An assessment of solitary and arribada nesting of olive ridley sea turtles (*Lepidochelys olivacea*) at the Rushikulya Rookery of Orissa, India. *Asiatic Herpetological Research* 11: 136-142. ■

WHALE SHARK GAZING AND CITIZEN SCIENCE: AN INTERVIEW WITH DR. BRAD NORMAN

JANAKI LENIN

Independent Author, Columnist and Film-maker

janaki@gmail.com

Australian marine biologist Brad Norman founded ECOCEAN to protect and conserve whale sharks. Despite being the world's largest fish, little was known about them. ECOCEAN developed software to identify individual animals based on their unique patterns from photographs and its Whale Shark Photo-Identification Library has collected more than 47,000 photographs and 22,000 sighting records of whale sharks sent by citizen scientists from around the world. In 2006, Norman received the Rolex Award for Enterprise, and in 2008 National Geographic Society named him an Emerging Explorer.

In November 2012, Brad Norman was in Delhi to attend that year's Rolex Awards ceremony where Janaki Lenin interviewed him.

How big a role did citizen science play in how much you've learned about whale sharks?

It has and continues to play a really important role. As a scientist, I can only be in one place one day of the year. But now we are finding these whale sharks are distributed around the world from the input of the citizen scientists. Currently, using the photo identification library we've developed, people in 54 different countries participate by sending photos or information about the whale sharks that they may have seen in, say, Mozambique, Philippines, or Mexico.

How do you identify whale sharks?

The spots are unique to each individual. So ECOCEAN

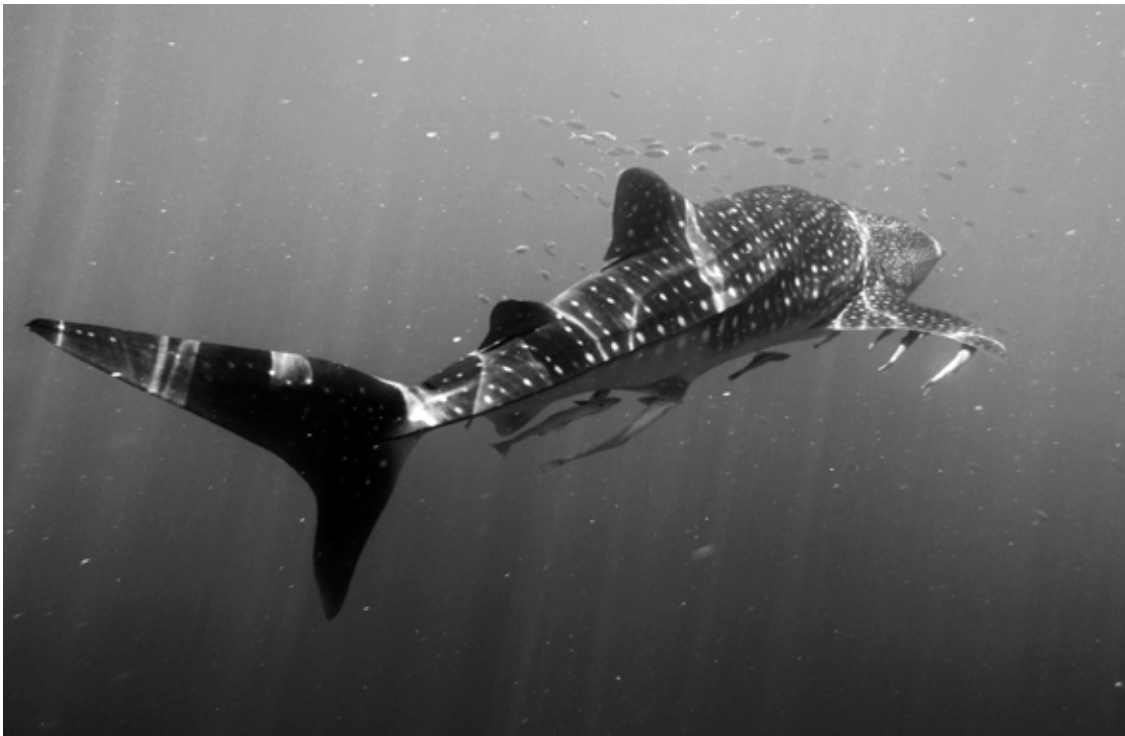


Figure 1. Whale shark.

Photo credit: Brad Norman

adapted an algorithm that NASA scientists use in the Hubble Space Telescope to map stars in the night sky to map the spot pattern on the skin of the whale sharks. We scan the photo that you took of a shark today against the thousands of other photos in the library to see whether the shark has been previously identified. We're finding that some sharks have been seen in the same location, especially at Ningaloo Reef in Western Australia where I work. I first swam with a whale shark in 1995; I saw that shark again in 2012. And we can prove that using this software. He's called A-001. It's an unexciting name, but he's also called Stumpy because a part of his tail is missing. He's got a Facebook page now called 'Stumpy Whale Shark'. Stumpy posts a different news story every day, and encourages people to learn more about the marine environment and the species within.

You started the citizen science program in 1995. How many people have participated in this?

There are a lot of members of the public that have contributed, but so have many researchers and conservationists from around the world. There are 3600+ individual people who have participated by sending whale shark identification sighting data and photographs. But tens of thousands of more people have received the ECOCEAN whale shark public awareness brochure or learnt about the sharks through various media we have produced.

Are these animals getting killed anywhere?

Very much so. That's part of the reason I started my long-term commitment to whale sharks and continue to push for their international conservation. There's still a lot of hunting in China mainly for their fins. In India, in the Philippines, in some other parts of the world, historically there was a lot of hunting going on. ECOCEAN has worked with various stakeholders to secure protection under federal legislation (Australia), and especially under international agreements, like CITES and Convention on Migratory Species (CMS). Many local groups continue to work hard to get whale sharks protected in their individual countries.

Whale sharks are listed as Threatened (Vulnerable to Extinction) under the IUCN Red List of Threatened Species. In fact, I was asked to prepare the report which succeeded in upgrading their official conservation status. Prior to this, the whale shark had been listed as Data Deficient.

There are places in the world where they are still being hunted. As an alternative, we've tried to promote ecotourism. Ecotourism, if done well, can actually be economically as well as ecologically positive, and a

sustainable alternative to unsustainable hunting. We've proven that many of these whale sharks come back to the same location each year; they are a renewable resource rather than the once-only value of a dead shark for fins. There might be a small amount of money in hunting, but if you do tourism and if people keep coming back every year, a whale shark has a high value. In some countries such as the Philippines, it's not very expensive to go swimming with whale sharks. It can cost less than US\$50 per person to go swimming with the whale sharks. In Mexico, it's a similar situation, although it appears over-exploited because the regulation and ability to monitor is limited. In fact, more than 100 vessels take people swimming with whale sharks. It's far from ideal, but fortunately, there are so many whale sharks there.

But in Australia, where whale shark ecotourism was first initiated, the industry is very well-regulated, with a very limited number of licenses, and a very high-quality tourism experience. There's a maximum of 15 licensed vessels, of which sometimes only 6 or 8 boats go out per day. There's a lot less pressure on animals. But the cost of swimming with whale sharks is almost AU\$400 per person per day. And people are really prepared to spend the money for a unique but well-regulated tour. There is however a very real risk of killing the goose that laid the golden egg if whale shark ecotourism is not regulated properly. So we need to establish that if whale shark ecotourism is to go ahead, it should be done in a way that does not over-exploit the species and ensure it has very minimal impact: no touching or grabbing hold of the shark, and not too many people in the water. That's why I helped to establish some guidelines in Australia, which we are constantly testing. The evidence is showing that the management and current situation in Australia is having a positive effect on the numbers - which is very good.

The tourists get to swim with them, see the beauty of these sharks, but also learn more about them. We try to do that with the information brochures we distribute and the public awareness work we undertake, and try to get people to feel a sense of understanding and even involvement with the whale sharks. And a little bit of ownership too. That's why we use the photo identification program, so that members of the public can play a strong role in a citizen science project to help us scientists and conservationists to monitor whale sharks and also understand their numbers in the wild: whether the same ones are coming back, whether their numbers are still in decline as they are a threatened species, whether numbers are stabilizing or even increasing because of the protection that's been brought in around the world.

In recent times, it's worked very well. There

are a lot of people participating in the photo-identification citizen science project. So we're really lucky it's becoming a good way of getting people involved, to learn about the biggest fish in the sea.

The problem in Gujarat, India, was they were killing whale sharks to use the oil.

That was one of the situations that was understandable because it was to waterproof the wooden boats up there. But there is a very high market for fins in the East Asian market, and there was a lot of export for a couple of years before there was a big furor and the Indian government brought in protection. There's an amazing story of how the fishermen who used to hunt the whale sharks were encouraged to protect them. It's a good initiative launched by the Wildlife Trust of India in collaboration with the Forest Department and local authorities. If whale sharks are caught in a net, the fishermen quickly try and release them. If they had kept hunting the whale sharks at the numbers they were taking – it was suggested that one year up to a thousand whale sharks were killed – there'd be few left within years. The species is really long-lived, and although unknown for sure, it's believed that they can potentially live up to 100 years, and they probably don't mature until around 30 years old. Most of the sharks at Ningaloo Reef are males (usually about 85%). Most of these are immature. But they are not there to breed – just hanging out like teenagers and eating a lot!

How do you know when you see a whale shark that it's an immature male? Are they sexually dimorphic or do you have to examine them?

Our work is predominantly non-invasive. In order to determine if it's a male or a female, you have to swim underneath. It's very obvious if a whale shark is a male; their sexual organs (two claspers) are underneath the pelvic fin. In a female, the claspers are absent. In a mature male, these claspers are elongated, they are hanging down a little bit, they are calcified and you can tell they are ready to mate. An immature clasper is thin and smooth and tucked up against the belly. But we don't very often see the old boys. There are a small percentage of mature males at Ningaloo and that's provided me the opportunity over many years to determine at what length and age the males become mature. We don't know at what size or age the females are mature. In order to do that, you have to cut them open and look at their ovaries to check for maturity. And we don't want to do that. It's possible they mature at a smaller size but so little is known about them.

Are you analyzing dead specimens from locations

where whale sharks are still being hunted?

Many countries have stopped hunting whale sharks – and that's good. In other countries where hunting continues (e.g. China), there is very limited data available. If whale sharks are ever found washed up on a beach, they are often in isolated locations, and by the time the authorities get to them, they are already decomposing. So it's rarely possible to do any analysis.

What's the longest distance a whale shark has traveled?

It's hard to say. Using the photo-identification library, we've identified sharks moving within a small area but between four different countries: between USA Gulf coast, the Yucatan in Mexico, Honduras, and Belize in Central America. This shows the outreach or the potential of this library. So four different groups of tourists or researchers in four different countries have taken a photo of a shark, sent it into the central database which is at whaleshark.org, and we've been able to prove several animals moving between those four countries, four different jurisdictions. We do believe these whale sharks are long distance migrators, and we really want to do some more work with satellite tags. But it's quite an expensive undertaking.

We've tagged several whale sharks but the tags have stayed on only two or three months at a time. And as a not-for-profit group, we have in the years past stayed away from spending \$3000-4000 per tag. Recently, however, we tagged a couple of whale sharks using a different technique, a different attachment mechanism. Hopefully with minimal impact but maximum output. So we did a test case, with a mechanism timed for release after four weeks. One shark traveled about 600-700 kilometres. We plan to ramp up our efforts next year, funds willing. Hopefully, we can get these tags to stay on for over a year. We've yet to track a whale shark for a complete annual migration.

How many young do they have?

We still don't know where they breed or how often they breed. Up until a few years ago, we didn't know how they actually bred – whether they really were live bearers or not. But there was a whale shark caught in a fishery in Taiwan, back in 1995, and it still is the only pregnant female that's ever been found. They cut her open and she had 300 near-term embryos. I was involved in a genetic study a couple of years ago, published in 2010, showing those embryos were at three different stages of development. Some were between 35-40cm, some were between 45-50cm, and some were between 55-60cm. At this size, they are very vulnerable when they are born. But how

often they breed, where they breed, we still don't know. These are intriguing mysteries we hope to solve soon.

Were the embryos in three different breeding cycles?

We aren't sure. Our genetic study, led by Professor Jennifer Schmidt (University of Illinois), aimed to establish whether these embryos were fathered by different dads. It turned out that they were all from the same dad. What we believe is the female has the ability to store sperm and fertilize the eggs at different stages, and maybe push out 100 babies at a location this month at a certain time, another 100 next month and another 100 the month after to maximize the chances of survival. That's the first and last time we've had a pregnant female. We don't know what the gestation period is: Is it a year, 18 months? Do they breed once a year or once every three years? We don't know.

I've recently travelled to the Galapagos at the invite of a local NGO and the Charles Darwin Research Station to train local stakeholders in the use of newly developed tags for whale sharks. The sharks there are unusually big, up to 12-13 metres. They are all females and they are quite big in the uterine region. So we believe they are pregnant. We really hope to establish whether this is in fact a breeding location - which currently remains unknown.

These animals can get up to 18 metres in length, the biggest of all the fish in the oceans. At most locations where they are observed around the world, their average size is usually between four and eight metres. The males don't seem to become mature until at least eight metres in length. So most of the whale sharks we get to see are immature.

If you say that a lot of the animals you are seeing are immature but they keep coming back to the same location, are they coming back for seasonal feeding?

Correct.

Are they social? Do you see numbers together?

They don't usually interact. There's one place in the world where you do get a lot of sharks and that is the Yucatan in Mexico. They are not necessarily interacting with each other, but congregating at a feeding hotspot. However, at most sighting locations, the whale sharks are usually swimming alone, not so social unlike whales or dolphins.

They seem to be found in both, clear and turbid waters.

Whale sharks can dive down as deep as 2,000 metres that we know. But as filter feeders, they are always looking for food pulses or areas where there is a high concentration of food. And the thing is, a lot of the time when you do see them, they are feeding and where they are feeding, the water is full of plankton.

It's rare that you find them in really clear waters, but when you do, it's wonderful as there's great visibility. Ningaloo Reef is one of those locations. Most of the time we see them, the water is quite clear in that area between 10 and 20 metres visibility even when there is a food pulse. They are known to feed at Ningaloo Reef around dusk, when the plankton comes up to the surface and congregates, enabling the sharks to take advantage of that. There are certain places around the world, including Ningaloo and a few others where this happens. It's allowed us to learn so much more about this cryptic species.

The most important thing in a scientist's career is data. With a creature like this, it seems like you spend a long time gathering itsy-bitsy pieces of data. How do you survive as a scientist?

It's actually a little difficult sometimes. And I also run a non-profit called ECOCEAN which compounds the situation. But we are very lucky to have great volunteers. We do it because we love it, and because we are passionate. You don't do it to bank a million dollars. In fact, I'm not even on a proper salary and 'keeping the wolf from the door' is sometimes a challenge. I love these animals and I want to make a difference - and this provides me with a very positive feeling. We do get a few small grants along the way. The Rolex Award for Enterprise I received a few years ago was the biggest kick I've ever got in my life. It enabled us to bring this project to many countries around the world, which was fantastic.

Why would anyone worry about whale sharks? It's just a fish. It's not a predator in the true sense of the word.

One of the things about whale sharks is they have an important niche in the environment. We believe they may be an indicator of ecosystem health. They could be a bit like the canary in the coal mine. Because they are dependent on small organisms, they are dependent on productivity. If whale sharks that have been coming to a spot every year don't come one year, we can take a look and ask, "What's going on?" It might be pollution, habitat degradation, over-exploitation, or something we are yet to identify.

We obviously want to use a lot more high technology to be able to understand their movements, behaviour, habits, and

migration. These animals don't lend themselves to doing this kind of study because they live in isolated areas, they can dive to a couple of thousand metres, and it's expensive. For an NGO that has to work hard to find funding just to keep the lights on in the office, it can be a challenge. But we are cracking new ground all the time, so it's very positive.

Whale sharks were only first discovered in 1828, even though they have been around for millennia. Up till the late 1980s, there were only 320 confirmed sightings of whale sharks around the world. It's testimony to their rarity. But there's still more we don't know about them than we do. They are not out of the woods yet.

Is it possible to say if they are recovering in any part of the world?

Ningaloo is probably the best place in the world to study these animals because there is so much data being collected. Ningaloo Reef is bucking the trend in whale shark decline. The most recent stock assessment available using the photo-id program has shown not only has the decline stopped, but whale shark numbers have stabilized and even slightly increased – likely attributable to good management and minimal impact ecotourism. If we use a similar design, we may be able to show recovery in other parts of the globe also.

Postscript: In May 2013, fishermen released a newborn whale shark tangled in fishing net off the coast of Gujarat, the first evidence the species may be breeding in Indian waters. ■

A DEEP DIVING OLIVE RIDLEY IN THE BAY OF BENGAL

KARTIK SHANKER^{1,#} & MATTHEW H. GODFREY²

¹Centre for Ecological Sciences, Indian Institute of Science, Bangalore, India

²North Carolina Wildlife Resources Commission, North Carolina, USA

#kshanker@ces.iisc.ernet.in

Sea turtles are known to dive fairly deep, but the deepest dives are generally attributed to leatherback turtles who have been recorded to depths of 1000m and below (Houghton *et al.*, 2008). Not much is known about dive profiles of olive ridley turtles, but they have been recorded to dive to depths of about 150 to 200m on a regular basis (Whiting *et al.*, 2007, Macmahon *et al.*, 2007). A maximum depth of about 200m was recorded for olive ridley turtles in northern Australia (Macmahon *et al.*, 2007), but typically, dives were between 10 and 20m during inter-nesting periods and 30 to 60m post-nesting (Hamel *et al.*, 2008). In a study of sea turtles hooked in the Hawaiian long-line fishery, Polovina *et al.*, (2003) reported that olive ridleys frequently dived to 150m and below, with one dive recorded at 254m. Swimmer *et al.* (2006) also reported dive depths of over 250m for olive ridleys caught on longlines.

There is limited information about dive depths of olive ridleys turtles in the northern Indian Ocean. Two post-nesting females from Masirah Island, Oman, in the northwestern Indian Ocean, displayed dives of <40m depths (Rees *et al.*, 2012). These two animals remained

in relatively shallow waters while being tracked, and thus their dive depths were constrained by their habitat. On January 20, 2013, a photograph was taken from a Remote Operating Vehicle in the Bay of Bengal, 40-50km offshore, south of Kakinada on the Andhr Pradesh coast (east coast of India) by Paul McCaffrey (Figure 1). The photograph was taken at a depth of 225m. The information reached us via Meghan Koperski of the Florida Fish and Wildlife Conservation Commission. This record adds to our knowledge of the poorly understood dive behaviour of the olive ridley turtle, and is the deepest dives recorded, to date, for the species in the Northern Indian Ocean.

Literature cited

Hamel, M.A., C.R. McMahon & C.J.A. Bradshaw. 2008. Flexible inter-nesting behavior of generalist olive ridley turtles in Australia. *Journal of Experimental Marine Biology and Ecology* 359: 47-54.

Houghton, J.D.R., T.K. Doyle, J. Davenport, R.P.

Wilson & G.C. Hays. 2008. The role of infrequent and extraordinary deep dives in leatherback turtles (*Dermochelys coriacea*). *Journal of Experimental Biology* 211: 2566-2575.

McMahon, C.R., C.J. Bradshaw & G.C. Hays. 2007. Satellite tracking reveals unusual diving characteristics for a marine reptile, the olive ridley turtle (*Lepidochelys olivacea*). *Marine Ecology Progress Series* 329: 239-252.

Polovina, J.J., E. Howell, D.M. Parker & G.H. Balazs. 2003. Dive-depth distribution of loggerhead (*Carretta carretta*) and olive ridley (*Lepidochelys olivacea*) sea turtles in the Central North Pacific: Might deep longline sets catch fewer turtles? *Fishery Bulletin* 101: 189-193.

Rees, A.F., A. Al-Kiyumi, A.C. Broderick, N. Papathanasopoulou & B.J. Godley. 2012. Conservation related insights into the behavior of the olive ridley sea turtle (*Lepidochelys olivacea*) nesting in Oman. *Marine Ecology Progress Series* 450: 195-205.

Swimmer, Y., R. Arauz, M. McCracken, L. McNaughton, J. Ballester, M. Musyl & R. Brill. 2006. Diving behavior and delayed mortality of olive ridley sea turtles (*Lepidochelys olivacea*) after their release from longline fishing gear. *Marine Ecology Progress Series* 323: 253-261.

Whiting, S.D., J.L. Long & M.C. Coyne. 2007. Migration routes and foraging behavior of olive ridley turtles (*Lepidochelys olivacea*) in northern Australia. *Endangered Species Research* 3: 1-9. ■



Figure 1. An olive ridley at 225m depth, 40-50km offshore the Andhr Pradesh Coast

PROJECT PROFILE

STUDENTS SEA TURTLE CONSERVATION NETWORK: 25 YEARS OF CONSERVATION

V. ARUN

Co-ordinator, Students Sea Turtle Conservation Network, Chennai, India

arun.tree@gmail.com

Introduction

Students Sea Turtle Conservation Network, commonly known as SSTCN, has completed its 25th consecutive year as a voluntary organisation. We have been working on the beaches of Chennai, Tamil Nadu, India since 1988. Olive ridley turtles nest in this region between January and April. We begin our walks each night around 1am, take a one hour break at 3am if we haven't found a turtle or nest, and then continue monitoring the beach until at least 5am.

Since 2009, we have covered two stretches of beach, north (6km long) and south (8km long) of the Adyar River. The beaches north and south of the Adyar River have very different dynamics. Nesting on the southern beach begins and ends early in the season, while the opposite pattern is observed on the northern beach as nesting begins later and more slowly but lasts for longer. In 2013, the southern beach yielded 120 nests with the last nest found on 10th April; the northern stretch yielded 165 nests with the last nest found on 1st May. Often there were 8-10 nests laid per night on the northern beach and none on the south. SSTCN volunteers are limited to doing walks involving public participants on the southern beach only, due to safety, police permission, and transport availability. After finishing the nightly public walks, some volunteers go to the northern beach to assist the volunteers with the nesting turtles.

This year has been very special. We collected the greatest number of nests (n=285), nearly 40% more than our previous record, and subsequently released the largest number of hatchlings (n=22,000), 50% more than previously produced in our hatcheries. It is as though the turtles wanted to celebrate our 25 years with us.

SSTCN Hatcheries

As we work within city limits, there are bright lights along entire beaches which disorient the hatchlings, intense

usage of the beach by the city dwellers, and poaching of turtle eggs. Until 10 years ago, there were many stretches of beaches which were quite dark, and we could leave nests in their original location after concealing the turtle tracks. Once concealed from poachers, the eggs were quite safe. But in recent years the entire stretch of beach has become brightly lit with the construction of buildings, resorts, clubs, most of them in violation of existing laws such as the coastal management zone laws. We therefore relocate every turtle nest that we find (Figure 1). Our hatcheries are bamboo-fenced sections of the beach, located about 15-20m from the high tide line. We change the location of the hatchery every year, and move it at least 100m from the previous location to ensure that there are no pathogens or parasites from the previous year's eggs. SSTCN re-uses the same fencing for at least 5 years, with minor repairs between seasons (Figure 2). Once the sand temperature increases in summer, around mid-March, we cover the entire hatchery with jute cloth to prevent the nests from over-heating. Watchmen from the fishing community protect the nests in the hatchery. Hatchlings are released at the time they emerge (Figure 3); when hatchlings are released at night, our volunteers need to guide the hatchlings into the sea with powerful torches to reduce distraction by the city lights.

SSTCN Volunteers

We are lucky to have many inspired and committed volunteers (Figure 4). After a full day of college studies or other work, they always are ready for yet another night of work on the beach. Nishanth, a final year engineering student who wants to pursue wildlife conservation, was personally involved in collecting 72 nests this year. His class mate Robin walked 22 nights without a break. Raghuraman, a young auditor, who has been with us for 7 years, walked through the season and took charge of the Marina Beach hatchery. Shravan, a budding cricketer, who has been with us for 8 years now, took charge of the Besant Nagar hatchery and was there every evening throughout the season. If not for the dedication of these



Figure 1. Counting sea turtle eggs before relocation of the nest to a hatchery

Photo credit: Ashish Tatolu



Figure 2. Constructing a hatchery in Besant Nagar.

Photo credit: Ashish Tatolu



Figure 3. Community spectators during a hatchling release by SSTCN volunteers.

Photo credit: Ashish Tatolu

volunteers, we would never be able to achieve our goals.

Involving Local Fisher folk

We have always explained during our education programmes and turtle-walks that small scale fishermen are not threats to turtles, but trawlers can cause mortality if turtles become entangled in nets. Many local fishermen help us during the turtle nesting season. For example, a fisherman in Marina conceals turtle tracks and marks the nest site. When SSTCN volunteers reach his area at 3-4am they call him and he indicates if there is a nest to find and describes the location(s). If too many people are present when he discovers a turtle nest, he relocates it to a site near his boat to prevent the eggs from being poached.

Disastrous Start to 2013

This year began on an ominous note. Even before the nesting season began, we heard stories and witnessed dead turtles washing ashore. Sadly, this is always the first indication that nesting turtles have begun to arrive on our coast. But the number of dead turtles kept increasing this year and by the third week of January we had already counted more than 30 dead turtles, more dead turtles than nests. Our public walks were

becoming difficult as we tried to explain to a curious public why so many turtles had died. We temporarily called off the public walks for the first time in our history. We ensured that the problem was publicised in all the press, and then went on to petition the Chief Minister of Tamil Nadu to investigate the mortalities. The Forest Department supported our call for action.

Sudden Turn Around

It was the first of February; we had cancelled the public walk that night but a group of engineering students were determined to come on the walk and watched as we found 10 nests on the southern beach and three on the northern beach. We all felt a huge sense of relief. After that night, the number of nesting turtles began to increase rapidly and we soon experienced nights with more than 10 nests laid. There were still dead turtles washing ashore, but these numbers were slowly beginning to reduce. We kept a record of the number of dead turtles, and all volunteers carried a small tube of paint to mark the dead turtles and ensure that we did not count the same ones again.

Formation of Sand Walls

A phenomenon we have noticed in the last 3 years is

the formation of sand walls by tidal action. These walls can be as low as 1 foot or as high as 5 feet. Some turtles unsuccessfully attempted to climb the wall, then nested at its base below the high tide line. These walls were much more pronounced in the southern beach than in the northern stretch; from January till March 2013, the southern beach had sand walls that prevented turtle nesting along 50% of its length. A few nests that were missed when laid were found after collapse of the sea wall; the nests were relocated and demonstrated good hatching success.

Other Finds

We often find marine life such as eels, puffer fish, dolphins, and sea snakes, which are washed ashore after drowning in nets or due to injuries. We once found a 30 foot long baleen whale carcass. The notable find of 2013 was a 7.5 foot long Risso's dolphin.

Future of SSTCN

We intend to remain a small group and not grow too large. Our unique feature has been that we are a voluntary organisation which functions without funding from funding agencies or corporations. We strongly believe that it is important for concerned citizens to participate in conservation and education work in their own surroundings, and encourage the local community to participate when possible.

We would like to focus not just on turtles, but on the state of the entire marine ecosystem. We are working with sea turtles because they happen to nest on our shores, but while interacting with students or participants in the walks we stress the importance of a sustainable lifestyle and an urgent need to reconsider the destructive development path that the world is following. We are hopeful that small organisations like ours will lead to a change in community perceptions and actions. ■



Figure 4. A meeting of SSTCN volunteers.

Photo credit: Ashish Tatolu

RESEARCH SUMMARY



TWO-FOR-ONE SEA TURTLE STUDIES

MATTHEW H. GODFREY

North Carolina Wildlife Resources Commission, Beaufort, NC, USA

mgodfrey@seaturtle.org

Nel, R., A.E. Punt & G.R. Hughes. 2013. Are coastal protected areas always effective in achieving population recovery for nesting sea turtles? *PLoS ONE* 8(5): e63525. doi:10.1371/journal.pone.0063525.

Hanafy, M.H. 2012. Nesting of marine turtles on the Egyptian beaches of the Red Sea. *Egyptian Journal of Aquatic Biology and Fisheries* 16: 59-71.

Sea turtle conservation historically has had a biased focus on protecting sea turtles at nesting beaches. This makes logistical sense, as nesting females, their incubating eggs and the emergent hatchlings are much more accessible to conservationists than freely swimming turtles in the ocean. As a result, many sea turtle nesting beaches have received some form of protection, ranging from basic restrictions such as marking of nests containing incubating eggs, to more stringent protections such as limiting, or even banning, human access to the beach, in addition to other conservation measures such as relocating eggs that would otherwise be lost to erosion or removing egg predators. The assumption is that an increasing trend in the number of nests laid on a nesting beach is an index of successful management, and there have been several examples of increasing trends in number of nests linked to protection in the published literature (Garcia *et al.*, 2003; Dutton *et al.*, 2005; Marcovaldi & Chaloupka, 2007). In a recent paper, Nel and colleagues look at trends in nests laid by leatherbacks and loggerheads that share the same nesting area in northeastern South Africa. This is an ideal dataset to analyze, because it is one of the longest running sea turtle monitoring projects in the world, having been established in the 1960s. Nel and colleagues report that while both species receive the same type of protection on the nesting beach, the trends in nest numbers are different: loggerhead nest numbers have increased over time, while leatherback nests have oscillated with a decreasing trend in recent years. The question is why this might be happening. There are several potential reasons, none of them mutually exclusive: leatherbacks are subject to greater mortality away from the nesting beach; loggerhead hatchling sex ratios in this region are more female biased, leading to relatively more females returning to nest; weaker fidelity

to the nesting beaches for leatherbacks means that leatherback nests may be laid outside of the monitoring area and thus are not counted. While the authors were not able to definitively say which factor(s) are involved in the declining leatherback population trend, they have defined specific research questions that should help answer this question. This in itself is highly valuable.

One of the other things I like about the paper by Nel and colleagues is the simultaneous analysis of two species using the same nesting beach. Although there are many examples of locations where multiple species lay eggs, there are relatively few publications that analyze more than one species at a time. Perhaps this is part of the current culture of scientific publishing, where some researchers feel pressured to divide datasets into smaller units for analysis and write-up, and thus produce more publications. In any case, it is promising to see a study from one nesting beach that is focused on more than one species at a time.

Similarly, a recent publication by Hanafy summarizes the nesting activity of two species (hawksbills and green turtles) along the Red Sea coast of Egypt. While this paper cannot provide similar trends analyses as the South African study, primarily because of the lack of long term monitoring, it does provide an insight into the current status of sea turtle nesting in the area. It also provides summary information about the size of nesting females, numbers of eggs per nest, and hatching success. These data can be highly valuable for meta-analyses or assessments. In addition, Hanafy identifies several threats to nesting sea turtles along the Red Sea coast in Egypt, including coastal development (such as artificial lighting from coastal highways) and increasing

tourism (Big Giftun Island, a primary hawksbill nesting area, receives >100,000 visitors per year). Interestingly, Hanafy reports the average clutch size for green turtles on Ras Bagdadi island was 41 (range: 31-47). This is curious, given that the average clutch size in other areas of the Red Sea coast were more typical (100 eggs/nest).

It is difficult to know whether this small clutch size is natural or artificial (a study in Brazil, by Almeida & Mendes in 2007, revealed that local participants in a sea turtle conservation program were culling eggs from clutches that they helped protect), and it begs further research. Overall, the paper by Hanafy is valuable in that it not only provides basic information about regional populations of sea turtles but also constitutes archival data that will be crucial for future trends analyses, similar to those featured by Nel and colleagues. Plus, it provides another example of the power of presenting data on more than one species in a single publication.

Literature cited

Almeida, A.D. & S.L. Mendes. 2007. An analysis of the role of local fishermen in the conservation of the loggerhead turtle (*Caretta caretta*) in Pontal do Ipiranga, Linhares, ES, Brazil. *Biological Conservation* 134: 106-112.

Dutton, D.L., P.H. Dutton, M. Chaloupka & R.H. Boulon. 2005. Increase of a Caribbean leatherback turtle (*Dermochelys coriacea*) nesting population linked to long-term nest protection. *Biological Conservation* 126: 186-194.

Garcia, A., G. Ceballos & R. Adaya. 2003. Intensive beach management as an improved sea turtle conservation strategy in Mexico. *Biological Conservation* 111: 253-261.

Marcovaldi, M.A. & M. Chaloupka. 2007. Conservation status of the loggerhead sea turtle in Brazil: an encouraging outlook. *Endangered Species Research* 3: 133-143. ■

PHOTO SUBMISSION



Mr. Jignesh Gohil of the Prakruti Nature Club, Gujarat, India, and a rescued olive ridley turtle.

The juvenile turtle (68cm CCL; 13kg weight) was discovered weak and unable to swim, held in captivity for a few days, then released.

Photo credit: Raju Goswami

REPORTS



PRESIDENT'S REPORT- THE 33RD ANNUAL SYMPOSIUM ON SEA TURTLE BIOLOGY AND CONSERVATION, "CONNECTIONS," 2-8 FEBRUARY 2013, BALTIMORE, MARYLAND, USA

RAYMOND R. CARTHY

University of Florida, Gainesville, FL, USA

ngosi@ufl.edu

The 33rd Annual Symposium on Sea Turtle Biology and Conservation was held on February 2-8, 2013 in Baltimore, Maryland, USA. Baltimore is within the National Capital Region which is 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, DC, 26-30 November 1979, and having this year's meeting in the National Capital Region just over 33 years later provided an inspirational link through time and space.

"Connections" was the theme for the Baltimore Symposium, and our focus for the meeting was to explore the biological and ecological linkages that sea turtles share with their environments, while also examining and celebrating the connections that they impose on us as we try to learn about and conserve them. The theme was evident in the attendance, the program, the special sessions and activities, and the partnerships that made the meeting a success. There were 1,016 registrants, representing 67 countries, and an additional 130 local students and educators attended particular sessions. The program included 7 regional meetings, 5 workshops, 4 special sessions, and a Video Night. There were 144 oral presentations and 248 posters- an additional 53 talks were given during a three-day Terrapin, Tortoise and Freshwater Turtle Meeting preceding the main Symposium. Forty-three vendors and exhibitors, including many new to the event, contributed to an engaging venue. The National Aquarium in Baltimore was a key partner in hosting the Symposium, providing personnel and access to their facilities, and the Virginia Aquarium and Marine Science Center were strong partners in our education efforts.

The Symposium was held at the Baltimore Marriott

Waterfront in Baltimore's Inner Harbor. The venue provided ample meeting and lodging space for the participants. The convenient facilities and the very accommodating staff, particularly the lobby staff, were conducive to both intellectual and social interactions.

Carbon Offsets

A meeting the size of the ISTS Symposium represents a considerable use of resources, primarily for travel, but also for onsite lodging and activities. This year, following a suggestion from Lekelia Jenkins and outstanding research, coordination and follow-through by Erin Seney, the ISTS introduced an initiative to offset the carbon footprint of the meeting. The organization made a donation to carbonfund.org to offset the full on-site footprint of the meeting, and subsequent voluntary donations from Symposium participants offset almost 55% of the total travel footprint for the meeting! In keeping with our organizational identity as good stewards and global citizens, ISTS is committed to pursuing opportunities and carbon offsets by proxy or through our own efforts, and we are moving toward green investments for the society's portfolio.

Educational Outreach

It's become a tradition of the ISTS Symposia to have an impact on the location where they are held. In Baltimore we enjoyed proximity to Washington, DC and increased participation by government agencies and NGOs, but the primary outreach effort was a multi-faceted educational program. In cooperation with the Virginia Aquarium and Marine Science Center and the National Aquarium, a Teachers and Educators Workshop was held on 2 February. Twenty-five local teachers and five Symposium participants learned techniques and

received materials that will aid them in incorporating marine science, sea turtles, and the Chesapeake Bay into their curricula. Local schools (St. Demetrius Bilingual Day School, Poolesville HS, South River HS, Furman Templeton Prep, Dr. Rayner Browne Academy, and Friends Meeting School) participated in a “Threats to Sea Turtles” Art Contest sponsored by ISTS, and the winning artwork was displayed at the Symposium. The opening session on Tuesday was followed by an early highlight- the “Sea Turtles Revealed” plenary was attended by 80 students and teachers from Baltimore middle and high schools (St. Demetrius Bilingual Day School, Dr. Rayner Browne Academy, Western High School, and Augusta Fells Savage Institute of Visual Arts). The students engaged a panel of renowned sea turtle biologists and conservationists with a question and answer session where the panel was surprised to find themselves not only answering the usual “how big” and “how old” queries, but pondering some of the same difficult ecological questions that drive their own work. The students and teachers that attended the Symposium’s morning session had lunch with various biologists, graduate students and others in the sea turtle community as an opportunity for more personal “connections” between participants and students. Their lunch was followed by a trip to the National Aquarium. The “Sea Turtles Revealed” session and the “Sea Turtle Success Story” session on Tuesday afternoon were made available as a live webcast to 250 web sharepoints provided to schools, colleges, and universities.

Regional Meetings and Special Workshops

The main Symposium was preceded by three days of Regional Meetings and Special workshops. The regional meetings were as follows: the Latin American Regional Meeting (RETOMALA), the Wider Caribbean Sea Turtle Network (WIDECAST), the Mediterranean Regional Meeting, the Indian Ocean and Southeast Asia Regional Meeting (IOSEA), the Africa Regional Meeting, the Pacific Islands Region and Partners Meeting (PIRP), and the East Asia Regional Meeting. The aforementioned Terrapin, Tortoise and Freshwater Turtle Meeting (Chuck and Rick Shaffer) ran from 2-4 February with the first two days focused on international and US national species and issues, and the third day focused on terrapins. Four special workshops were held on 4 February: the Sea Turtle Medicine Workshop (Daniela Freggi and Leigh Clayton), Dive Behavior and Data Analysis (Elizabeth Whitman and Junichi Okuyama), Statistics and Data Analysis (Tomo Eguchi), and a NMFS Permit Workshop (Amy Hapeman). An additional Special Thematic Workshop entitled “Cultivating Resilience: Processes and Skills” (Dr. Elena Mustakova-Possardt) was held on 6 February.

Main Symposium Program

The Symposium program of oral presentations and posters ran from Tuesday, 5 February through Friday, 8 February. Opening day welcoming remarks from the ISTS President Ray Carthy, John Racanelli of the National Aquarium in Baltimore, Bryan Arroyo of the US Fish and Wildlife Service, and Barbara Schroeder of NOAA’s National Marine Fisheries Service were followed by an entertaining and thought-provoking Keynote Address by Past ISTS President Earl Possardt of the US Fish and Wildlife Service. A brief epilogue and thoughts on the theme were provided by J. Nichols. The sessions “Sea Turtles Revealed” and “Sea Turtle Conservation Success Stories”, organized by Blair Witherington and Hoyt Peckham respectively, shared our knowledge of sea turtles with the public and provided some templates of conservation programs that are seeing positive results. The final opening day session on “Understanding Resilience” by Elena Mustakova-Possardt, underscored the Symposium theme by focusing on connecting with ourselves to sustain and strengthen the will to continue our often difficult work. Concurrent sessions ran from Wednesday morning through Thursday afternoon and included our standard categorical themes: Social, Economic and Cultural Studies; In-Water Biology; Conservation, Management and Policy; Fisheries and Threats; Population Biology and Monitoring; Education, Outreach and Advocacy; Anatomy, Physiology and Health; and Nesting Biology. A special session on Satellite Telemetry convened on Thursday afternoon. Categorized presentations concluded in a Mixed Session on Friday morning, and after lunch attendees were treated to a special “Connections” session. Over the course of about 40 minutes the session wove a story of friendship, collaboration, mentoring, hardships, success and discovery, that linked the current ISTS President to the next President through an amazing sequence of people, events and places, with sea turtles as the linking thread. ISTS President Ray Carthy provided closing remarks for the Symposium. A single continuous poster session ran from Tuesday morning through noon on Friday and was co-located with the Exhibitor/Vendor Area (and cash bars in the evening) to promote interaction. Poster authors were available to discuss their work each evening following the oral sessions. Simultaneous, bi-directional English/Spanish translation and American Sign Language translation were available throughout the main presentation sessions of the meeting.

Media

Prior to the start of the 2013 Symposium there were two press releases that announced time, place and highlights

of the meeting. Media contact efforts were also made through the National Aquarium in Baltimore's Media Relation Manager and the Education Department of the Virginia Aquarium and Marine Science Center. Although we were upstaged early on by the Baltimore Ravens football team winning the Super Bowl (who knew?!), local, national and international media were present at various times during the conference. Several ISTS officers and members were interviewed by Baltimore news affiliates and appeared on the air, and Capital News Service (CNS) interviewed ISTS and National Aquarium personnel for an article that appeared online and in print.

Exhibitors and Vendors

For the Baltimore Symposium we were joined by several longtime exhibitors and vendors as well as a large number of first-time attendees. E/V Chairperson Janet Hochella did a wonderful job of soliciting, coordinating and showcasing the exhibitor and vendor contingent alongside the poster presentations in a venue that was enjoyable and productive for all. This year's participants in the display hall included Anna Maria Island Turtle Watch, Ayotzintili AC, Bangladesh Environment and Development Society, Bioko Biodiversity Protection Program, Canadian Sea Turtle Network, Center for Biological Diversity, CLS America Inc., CRC Press/ Taylor & Francis LLC, CTL, Desert Star Systems LLC, Eco Maniac Company, Inwater Research Group, Johns Hopkins University Press, Karumbe, Loggerhead Instruments, Nature Conservation Egypt, Pentair Aquatic Eco-Systems, Sea Turtle Conservancy, Sea Turtle Foundation, Sea Turtle Restoration Project, Sea Turtles 911, Sirtrack, Society for Conservation Biology, SWOT, Tampa Bay Green Consortium, Tecolutla Turtle Preservation Society, Telonics, Texas Sea Grant, The Ocean Foundation, Turtly Inspired, Turtles in Clay, Wildlife Computers, Wildlife Rescue & Conservation Association, World Society for the Protection of Animals, and WWF.

Social Events

A hazard and benefit shared by the ISTS membership is the blurred line between our vocation and our avocation. The benefits come to the fore each year with the opportunities that the Symposium presents to share camaraderie and activities with colleagues and friends, old and new. The 33rd Symposium Opening Social marked the official start of the meeting with a gathering, drinks, and hors d'oeuvres at the National Aquarium in Baltimore. Attendees were able to enjoy the Animal Planet Australia, Dolphin Discovery, Jellies Invasion, and other fantastic Aquarium exhibits. As participating co-hosts,

the Aquarium staff was on hand to answer questions and assist meeting attendees throughout the week. A new session, "Adventures from the Field," was combined with the Student Mixer on Tuesday night, and was designed to provide an informal opportunity for people to recount the highs and lows of their conservation and research field activities. The popular "Speed Chatting with the Sea Turtle Experts" session made an appearance on Wednesday evening and was enjoyed by the experts as well as the participants that plied them with questions on topics ranging from techniques to career advice. Later that evening, the Video Night provided informative entertainment to Symposium participants as they viewed eleven video presentations from around the world. On the final day of the Symposium, 8 February, the Farewell Banquet held in the Marriott's Grand Ballroom. Dinner was accompanied by the authentic steel drum sound of the DC Pan Jammers. The evening proceeded with presentation of the Archie Carr Student Awards and the ISTS Awards. The formal portion of the evening closed with words of appreciation from the President and the ceremonial passing of the ISTS Presidential Trowel to incoming President Roldan Valverde. A spirited three hours of dancing to steel band and DJ music brought an end to an intense yet relaxed week of activities.

Auctions

The proceeds from the annual Live and Silent auctions contribute to Travel Grant funding for students and international participants. We had the usual fantastic response from the sea turtle community in the way of unique donated items for both auctions. With ISTS promoting a more socially responsible outlook, the Auction Team found themselves pushed to the limits to find creative ways to raise funds. The results of their efforts were brilliant and provided new lucrative and entertaining activities, including "Jail and Bail" and "Turtle Men Hug," that we'll likely see again in the future. Other highlights included the sale of the special "Connections Quilt" that was specially commissioned for the meeting and a Symposium Auction first: an on-stage marriage proposal! In the absence of the perennial Rod Mast, the live auction was presided over by Nick Pilcher, who did an outstanding job – he's an emerging talent in the field of fast-talking and high pressure sales! The dedication of Auction Chairs Jennifer Homcy and Marina Zucchini to the success of these important events is appreciated by all.

ISTS Awards 2013

The 2013 ISTS Awards Committee was chaired by Sally Murphy and the members were Kimberley

Maison, Stephen Dunbar, Jim Spotila, Dean Bagley, Ana Barragan, Ray Carthy and RoldanValverde. The Committee did an excellent job and presented this year's meeting with an incredible group of awardees. The ISTS Lifetime Achievement Award was presented to Jack Woody for a career dedicated to sea turtle conservation, including establishment of the sea turtle program in the US Fish and Wildlife Service, focusing attention on critical sea turtle conservation issues in Mexico and Central America, garnering international protection for Kemp's and olive ridley turtles, and advocacy for TEDs. Hoyt Peckham received the ISTS Champions Award for his tireless work in tackling difficult and pressing conservation issues for North Pacific loggerhead sea turtles, and communicating effectively with stakeholders at all levels. There were two recipients of the Ed Drane Award for Volunteerism. Betsy Brabson was recognized as an outstanding volunteer Project Leader for the South Carolina Department of Natural Resources and for her role as a catalyst in protecting nesting beaches against invasive flora and fauna. Daniela Freggi was honored for her pioneering volunteer work in sea turtle veterinary care in Italy and as a dedicated promoter of national and international cooperation and skill exchange in the Mediterranean. The ISTS President's Award was presented to Marydele Donnelly for over twenty-five years of profound involvement in global sea turtle conservation efforts, including successful support of the TED requirement for US shrimpers, the InterAmerican Convention for the Protection and Conservation of Sea Turtles, and the US Marine Turtle Conservation Act.

Archie Carr Student Awards

There were 50 oral presentations and 89 poster presentations submitted by students for consideration in the Archie Carr Awards. The winner for Best Biology Poster was Vanessa Bezy and Runners-Up were Deasy Lontoh, Tomoko Hamabata, and Jake Lasala. Best Conservation Poster went to Nicole Reintsma. The Best Biology Oral was won by J. Roger Brothers. Nicole Mazouchova won the Best Biology Field-based Oral, and Justin Perrault was Runner Up. The Conservation Oral winner was Elizabeth Bevan, and Francesca Domenech and Monette Schwoerer received Runners-Up honors in Conservation Field-based Oral and Conservation Experimental Oral respectively.

Grassroots Award

Now in its 3rd year, the Grassroots Conservation Award is given for the poster or oral presentation that best demonstrates a positive contribution towards the conservation of marine turtles and/or their habitats.

This year the Award went to the Ulithi Marine Turtle Program for their oral presentation entitled, "From sea turtles to reefs: Community-based marine conservation and sustainable development with the community of Falalop, Ulithi Atoll, Federated States of Micronesia."

Travel Grants

Making the Symposium accessible to students and international participants is a major concern of the Society, and to this end travel grants are provided to offset the cost of attending. The Travel Grant Committee was chaired by Alexander Gaos, with Angela Formia, Kelly Stewart, Karen Eckert, Kartik Shanker, Nick Pilcher, Alan Rees, Alejandro Fallabrino, Alik Panagopolou, and Emma Harrison as members. Through their coordinated efforts, 167 room grants (\$56K) and 113 cash grants (\$44K) were provided to students and applicants from nine regions. It's important to note that funding for this critical facet of the Symposium comes from the generous support of our sponsors, and from the Auction proceeds.

ISTS Business Meeting

The 2013 ISTS Business Meeting followed the closing session of the meeting on Friday, 8 February. President Ray Carthy called the meeting to order and reports were provided by the Treasurer (Terry Meyer), the Travel Committee (Alexander Gaos), the Nominations Committee (Andres Estrades) and the Awards Committee (Sally Murphy). No resolutions were submitted for consideration at this Symposium. President-Elect Roldan Valverde closed the meeting by engaging the attendees with an exciting preview of the 2014 International Sea Turtle Symposium, to be held in New Orleans, Louisiana, USA.

ISTS Elections

The report of the ISTS Nominations Committee (Mariana Fuentes, Marydele Donnelly, Mario Mota, Frank Paladino, and chaired by Andres Estrades) presented the following names of the winners of the 2013 Elections: President Elect- Yakup Kaska, Treasurer - Terry Meyer, Secretary- Manjula Tiwari, Board of Directors- Pamela Plotkin and Bryan Wallace, and Nominations Committee- Shaleyla Kelez and Nancy Fitzsimmons.

Student Committee

Since its inception at the 31st Symposium, the ISTS Student Committee has played an increasingly important role in the meeting. For the Baltimore meeting, the Committee, chaired by Itzel Sifuentes and Annelise

Ibarra, organized 50 volunteer evaluators to provide valuable presentation feedback for the 111 students that requested it. The Student Workshop, "Grant writing: How to get funds." was presented by Karen Bjorndal, Brad Nahill, Earl Possardt and Bryan Wallace, and was attended by 20 students and several other Symposium participants. The Committee combined the Student Mixer with the Symposium's "Adventures from the Field" social event for a great interaction and networking opportunity. Student participation in ISTS and the Symposia is critical to the future of the Society's mission, and we commend and encourage continued productive activity by the Student Committee.

Sponsors and Donors

Hosting an International Sea Turtle Symposium is a huge financial undertaking and would be impossible without the level of support generated by our dedicated sponsors and donors. This year found us in a particularly difficult fundraising climate: general economic hardship and natural catastrophes like Hurricane Sandy limited and diverted a lot of potential support for the meeting. Because of this we are even more grateful to our sponsors and donors at all levels. A special thank-you goes to NOAA/ National Marine Fisheries Service, the Marine Turtle Conservation Act-US Fish and Wildlife Service, and the Western Pacific Regional Fishery Management Council as consistent, high-level supporters that have integrated sustaining our important meeting with their own goals. Generous donations and sponsorships from Sirtrack, Disney's Animals Science & Environment, The Ocean Foundation, Ecoteach, The Shared Earth Foundation, International Seafood Sustainability Foundation, Vaughan W. Brown Charitable Trust, Maryland Dept. of Natural Resources, Virginia Aquarium and Marine Science Center, Patagonia, Wildlife Computers, Sea Turtle Conservancy/Florida License Plate Program, and World Wildlife Fund made it possible to assemble all the elements of a successful meeting. We are deeply grateful for the additional support provided by CLS America, Marydele Donnelly, Defenders of Wildlife, Society for Conservation Biology, Ecological Associates Inc., Telonics, Desert Star Systems, Nancy FitzSimmons, East Coast Biologists Inc., seaturtle.org, Janet Hochella, Tampa Bay Green Consortium, Karen Frutchey, Turtle Time Inc., Kiki Jenkins, and anonymous donors.

Acknowledgment

This ISTS Symposium in Baltimore came less than 11 months after the Huatulco meeting and was located 850 miles from my home base in Florida. Planning and coordination of the meeting would have been impossible

without the many people who willingly gave time and effort to ensure its success. I certainly needed help, but barely had to ask. The Team consisted of both seasoned veterans who knew exactly how to do things, and rookies who not only suggested innovative new plans, but executed them to perfection. My deepest thanks go out to every single one of them for their hard work, friendship, and their dedication to the International Sea Turtle Society.

Thanks to:

The Program Staff- Dubose Griffin, Katy Garland, Kelly Stewart, Michael Jensen, Kristen Hart, Jane Provancha and Barbara Schroeder, and all of the outstanding Session Chairs.

The Logistics Staff- Registrar Rick Herren assisted by Laura Herren, Volunteer Co-Chairs Hannah Vander Zanden and Joe Pfaller, and Exhibitor/Vendor Chair Janet Hochella .

Nuts and Bolts- The Travel Grant Committee chaired by Alexander Gaos; Sally Murphy and the Awards Committee; Andres Estrades and the Nominations Committee; Itzel Sifuentes, Annelisse Barcenas Ibarra, and Thomas Back of the Student Committee; Jennifer Homcy and Marina Zucchini of the Auction Committee; first round Draftee Auctioneers Nick Pilcher and Frank Paladino; the Student Judging Committee led by Andrea Phillott and Matthew Godfrey; Internet Monkey (!) Michael Coyne; Activity Coordinator Emma Harrison; Video Night Coordinator Cathi Campbell; Educational Outreach Coordinator Jame McCray; Proceedings Compilers led by Tony Tucker and Lisa Belskis; and Wallace J. Nichols on Press Releases and Media Contact.

Without the vision and generosity of our Sponsors this Symposium would not have been possible, and I thank them all for embracing our interests and cause as their own. My Program Officers, Elena Finkbeiner and Ingrid Yanez did a great job of fund raising under trying conditions, and were joined in their efforts by Special Executive Assistant Marydele Donnelly.

I send special thanks to our partner, the National Aquarium in Baltimore for programmatic help and for making their amazing facility a centerpiece for our meeting- John Racanelli, Brent Whitaker, John Seyjagat, Nancy Hotchkiss, Laura Bankey and Kate Hendrickson. I also thank Mark Swingle and Karen Burns and their staff at the Virginia Aquarium and Marine Science Center for their support and for their assistance in our educational outreach program.

Additional gratitude goes to:

The ISTS Board of Directors and Executive Committee for their guidance and support.

Every single one of the Special Session and Workshop Chairs and Organizers and the Regional Meeting Chairs. Chuck Shaffer for planning the Terrapin, Tortoise, and Freshwater Turtle Meeting.

Elena Mustakova-Possardt and Earl Possardt for their very special presentations.

Bryan Arroyo for his welcome from the USFWS.

Erin Seney and Kiki Jenkins for a brilliant effort with the carbon offsets for the Symposium.

The school children and teachers of Baltimore City and County for their participation in our outreach program. My special guests, Kevin Muhammad, Nicholas Alexander, Marcia Barker and David Silverthorn, from the turtle village of Grande Riviere, Trinidad, for attending the meeting and sharing the story of their amazing home site.

Manjula Tiwari for her gentle nudges in the general direction of success.

Margaret Lamont for making things happen and keeping things going.

The Staff of the Baltimore Marriott Waterfront for

accommodating our unique community.

Donna Broadbent and the Zenith Group for exemplary event coordination services (and for keeping me laughing in the face of adversity!).

ALL OF THE VOLUNTEERS FROM ISTS AND THE AQUARIUM!

Those of you un-named here, but who gave freely of your time, toil, and enthusiasm when I called you.

Postscript- As I send this report off to the Marine Turtle Newsletter and our sponsors, the global sea turtle community is reeling from the shocking and tragic death of young Costa Rican biologist and conservationist Jairo Mora Sandoval. He was killed while doing what many of us take for granted –surveying and protecting a nesting beach- and likely for those very actions. I hope that the themes imparted from the Connections Symposium, why we do what we do and our importance to each other, honor Jairo's memory and provide all of you with comfort, strength, resilience and resolve as we continue our work. ■

A SUMMARY OF THE INDIAN OCEAN SOUTH EAST ASIA REGIONAL MEETING AT BALTIMORE, USA

LALITH EKANAYAKE¹ & ANDREA D. PHILLOTT²

¹Turtle Conservation Project, Sri Lanka[#]

²Asian University for Women, Bangladesh

[#]lalitheml@yahoo.com

The Indian Ocean South East Asia Regional Meeting was held on 4th February, 2013 in Baltimore, USA, prior to the 33rd International Sea Turtle Symposium. The meeting was chaired by Lalith Ekanyake and Andrea Phillott, and attended by more than 25 participants from 15 countries, including Australia, Bangladesh, China, France, Kenya, India, Indonesia, Malaysia, Philippines, Seychelles, Sri Lanka, Tanzania, United Arab Emirates, United Kingdom and United States. After a brief introduction about the meeting and its history, nine participants presented a brief summary of activities within the region.

Teri Shore discussed the major liquid natural gas (LNG) projects under development in Australia with significant actual or potential ramifications for marine turtles. Jeff Miller discussed a nearly completed review which will provide direction for future IOSEA technical support and capacity-building activities. Nick Pilcher

described progress on the Gulf Satellite Tracking Project, a multi-year hawksbill satellite tracking project in the Gulf. Alan Rees, who has recently assumed the role of regional MTSG Vice-Chair for the Middle East, described his goals to develop better networking within the Middle East region and with ISTS and IOSEA. Creusa Hitipeuw presented a brief on leatherback turtle conservation in Indonesia, including campaigns to change community members' consumptive behaviour.

Mariana Fuentes reported on climate change research investigating the adaptive capacity of sea turtles, potential geographical shifts, and factors influencing resilience. Although previous work on climate change impacts mainly focused on green turtles, other species (e.g. loggerhead and flatback turtles in Western Australia) are also being studied. Shwetal Shah explained the work of the Prakruti Nature Club in Gujarat, India, in wildlife conservation.

Andrea Phillott explained the mission of IOTN and requested the participants contribute to future issues. She also drew attention to her ongoing study documenting turtle hatcheries in the Indian Ocean. Douglas Hykle reported on developments under the IOSEA Marine Turtle Memorandum of Understanding over the past year, notably the ongoing work related to the IOSEA Site Network, workshops and training activities, and further development of useful tools on the IOSEA website.

General topics, suggested by the participants prior to

the meeting, were also discussed, including the ongoing illegal take of sea turtles by Chinese fishers in south-east Asian waters, and a new, concerning trend for turtles to be collected by local collaborators then sold to Chinese buyers. Triet M. Truong initiated a discussion on his proposed study of sea turtle epibionts and fibropapillomas in the region. Truong requested samples of marine leeches, collected from marine turtles, for his worldwide study. Other topics of discussion included unregulated hatchery operations in the region, continued poaching of marine turtles, and the conflict between tourism and conservation. ■

ANNOUNCEMENTS



34TH ANNUAL SYMPOSIUM ON SEA TURTLE BIOLOGY AND CONSERVATION, APRIL 10-17, 2014 IN NEW ORLEANS, LOUISIANA, USA

ROLDÁN A. VALVERDE

President, International Sea Turtle Society

roldan.valverde@selu.edu

The theme of the New Orleans Symposium is “Cultures”, in honor of all the cultures that have interacted, and continue to interact today, with sea turtle populations around the world. During the Symposium we will also honor the Culture of our Society, which focuses on the conservation and study of sea turtle species and their environments. The city of New Orleans is the perfect place for such celebration given its rich heritage; indeed, the region was first inhabited by Choctow, Houma, and other pre-Colombian native cultures. Later, the city was also influenced by French, Spanish, English, African and Cajun cultures. As a result, the multi-cultural life of the unique city of “Nawlins” (New Orleans) is dominated by festivals (two of the largest being Mardi Gras and the Jazz and Heritage Festival) and its amazing food. This rich cultural heritage and relative proximity to major southern cities, in addition to the exciting scientific program, likely will contribute to attract over 1000 attendees from nearly 80 countries to the Symposium.

Besides the regular sessions usually held at Symposia, the Nawlins Symposium will feature special sessions on Collaborative Fisheries, and the Biology and Conservation of Sea Turtles in the Gulf of Mexico and on the Eastern US Seaboard. Among the topics

included in the program are 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. On 11-13 April, 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. On 14-17 April, we will have the themed oral and poster sessions, an outstanding group of returning and new Exhibitors and Vendors, as well as traditional Symposium activities.

Evidence indicates that sea turtles evolved well over 100 million years ago; some evidence suggests that the early forms may have evolved over 200 million years ago, before dinosaurs. As a group, these reptiles have withstood various extinction events. However, current species are under significant stress, mainly as a result of technology and industrialization.

Indeed, data show that current populations are only a fraction of historical levels; this awareness and reality is what gave rise to our Society, to our Culture of conserving and understanding sea turtle species. This

is the culture that together we will celebrate and renew in New Orleans. The symposium registration website will go live later this summer (<http://iconferences.seaturtle.org/>), and the deadline for early registration, abstracts and travel grants will be October 15th, 2013.

Please join us in New Orleans in April 2014 to celebrate

CULTURES!

Roldan Valverde, President
International Sea Turtle Society
34th Annual Symposium "CULTURES"
New Orleans, LA, USA
April 10-17, 2014 ■

RESOURCES OF INTEREST

ANDREA D. PHILLOTT[#] & RUVANI N.N. GAMAGE

Asian University for Women, Chittagong, Bangladesh

[#]andrea.phillott@auw.edu.bd

Research4Life (<http://www.research4life.org>)

Research4Life aims to reduce the scientific knowledge gap between industrialized countries and the developing world by providing the developing countries with free or low cost access to peer-reviewed online scientific journals. Using four programs, HINARI, AGORA, OARE and ARDI, Research4Life allows online access to over 30, 000 peer-reviewed, international scientific journals, books, and databases. The main focus is on health, agriculture, environment and other life sciences, such as physical and social sciences, in the developing world. The website provides full text articles, which can be downloaded for saving, printing or reading on screen, and are sometimes available in several languages.

- HINARI (Health InterNetwork Access to Research Initiative) is managed by the World Health Organization (WHO) in partnership with Yale University library and over 145 publishers, and provides access to ~8,100 journals, databases, indexes and reference books in health research.

- AGORA (Access to Global Online Research in Agriculture) is managed by the Food and Agriculture Organization (FAO) in partnership with Cornell University and over 70 publishers. AGORA allows access to over 3,000 high quality international journals in the fields of agriculture, fisheries, food,

nutrition, veterinary science and related biological, environmental and social sciences. It also includes numerous important databases and indexes.

- OARE (Online Access to Research in the Environment) is managed by the United Nations Environment Program (UNEP) in partnership with Yale University and more than 75 publishers. OARE provides access to more than 3,900 scientific journals and other information resources in a wide range of disciplines including nature and environment

- ARDI (Access to Research for Development and Innovation) is coordinated by the World Intellectual Property Organization, together with its partners in the publishing industry. ARDI includes literature from diverse fields in science and technology, so researchers can develop new solutions to technical challenges faced on a local and global level..

Libraries in academic, government, and research institutions in developing countries are eligible to register for access to the programs at www.research4life.org. Research4Life provides free journal access to group "A" countries and low-cost access to group "B" countries, depending on the position of the host country in the GNI per capita (World Bank figures), United Nations Least Developed Countries (LDCs) List, and Human Development Index (HDI). ■

INSTRUCTIONS FOR AUTHORS

Please refer to the style requirements listed below. Manuscripts should be submitted in MS Word or saved as text or rich text format. Appropriate files should be submitted by email to: iotn.editors@gmail.com. For further details please see www.iotn.org or consult a recent issue of IOTN.

Language and spelling: Please follow British spelling and grammar conventions.

Author names: Please provide full names of authors, e.g. Stanely T. Asah

Author affiliations: Please provide Department/ Centre/ Laboratory. Institution/ University/ Organisation, City, State or Province, Country, E-mail address of corresponding author. The symbol “#” in superscript may be used to denote corresponding author.

Tables and figures: Figures should not be embedded in the text file, they may be sent separately as JPEG, TIFF, BMP or PNG files. All figures and tables should carry a caption. Figures and illustrations must be accompanied by the appropriate credit/source. High resolution figures may be requested after acceptance of the article.

References in text: References should appear first in chronological then alphabetical order.

Two authors to be separated by ‘&’ symbol, e.g., as Rai & Sahu, 2001

More than 2 authors: first author *et al.* (*et al.* in italics) e.g., Roy *et al.*, 2004

Two publications of the same year for the same author(s), the reference in the text should be Sharma 1960a, b not 1960a, 1960b and the two publications should be dated accordingly in the references.

Multiple references to be separated by a semi colon and in chronological order (Zade, 1995; Mathew, 1996a, b, 1998; Sharma, *et al.* 2004; Forman & Gordon, 2005, 2007)

Page numbers are essential when quoting or referring to some aspect or information from a report (Sharma 1960: 22 or Sharma *et al.* 1960: 22).

References that are long and/or have acronyms: Only acronym in text,

e.g., INRA 2008

List personal communication references in text only. e.g. (Hariya pers. comm., 2011)

Unpublished/Undated references: In press, Forthcoming, In review, etc.

References in list: References should appear first in alphabetical then chronological order.

For references with more than 7 authors: first 7 names, *et al.*

Use complete page ranges. e.g., 371–379 (not 371–9); 227–235 (not 227–35).

Reference that are long and/or have acronyms: Full name followed by acronyms in parenthesis in reference list, e.g.,

Instituto Nacional de Reforma Agraria (INRA). 2008.

Unpublished/Undated references: In press, Forthcoming, In review, etc.

Examples:

Vijaya, J. 1982. Turtle slaughter in India. *Marine Turtle Newsletter* 23: 2.

Silas, E.G., M. Rajagopalan, A.B. Fernando & S.S. Dan. 1985. Marine turtle conservation and management: A survey of the situation in Orissa 1981/82 & 1982/83. *Marine Fisheries Information Service Technical & Extension Service* 50: 13-23.

Pandav, B. 2000. Conservation and management of olive ridley sea turtles on the Orissa coast. Ph.D. thesis. Utkal University, Bhubaneswar, India.

Kar, C.S. & S. Bhaskar. 1982. The status of sea turtles in the Eastern Indian Ocean. In: *The Biology and Conservation of Sea Turtles* (ed. Bjorndal, K.). Pp. 365-372. Washington, DC: Smithsonian Institution Press.

Forman, R.T.T. & M. Gordon (eds.). 1986. *Landscape Ecology*. New York: John Wiley.

Ozinga, S. 2003. Parks with people. World Rainforest Movement/FERN. <http://www.fern.org/pubs/ngostats/parks.htm>. Accessed on February 25, 2006. ■

Editors

Andrea D. Phillott <i>Asian University for Women, Bangladesh</i>	Lalith Ekanayake <i>Turtle Conservation Project, Sri Lanka</i>
--------------------------------------------------------------------------------	------------------------------------------------------------------------------

Founding Editor

Kartik Shanker
*Indian Institute of Science & Dakshin Foundation,
India*

Editor Emeritus

Chloe Schäuble
*Great Barrier Reef Marine Park Authority,
Australia*

Editorial Board

Matthew H. Godfrey *North Carolina Wildlife Resources Commission, USA*
Mark Hamann *James Cook University, Australia*
George Hughes *South Africa*
Jeanne A. Mortimer *Island Conservation Society, Seychelles*
Maggie Muurmans *Yayasan Pulau Banyak, Indonesia*
Nicolas J. Pilcher *Marine Research Foundation, Malaysia*
Sue Ranger *Marine Conservation Society, UK*
Alan F. Rees *University of Exeter, UK*
Jeffrey A. Seminoff *National Marine Fisheries Service, USA*
Lindsey West *Sea Sense, Tanzania*

Advisory Board

Khawla Al Muhannadi <i>Bahrain</i>	Maggie Muurmans <i>Indonesia</i>	Ahmad Khan <i>Pakistan</i>
Zahirul Islam <i>Bangladesh</i>	Asghar Mobaraki <i>Iran</i>	Ronel Nel <i>South Africa</i>
Yohannes Teclemariam <i>Eritrea</i>	Chan Eng Heng <i>Malaysia</i>	M.M. Saman <i>Sri Lanka</i>
Stephane Ciccione <i>La Réunion - France</i>	Maung Maung Lwin <i>Myanmar</i>	Rita Bento <i>United Arab Emirates</i>
B.C. Choudhury <i>India</i>	Robert M. Baldwin <i>Oman</i>	Bui Thi Thu Hien <i>Vietnam</i>

Editorial Assistant

Amrita Tripathy
Dakshin Foundation, Bangalore, India

Webmaster

Arjun Shankar
Bangalore, India

Cover Design: Arjun Shankar

Printed by: Medknow Publications and Media Pvt. Ltd., Mumbai, India