

Project Report

**Advancing the conservation of sea turtles
in India at a national scale through the
monitoring of index sites, and coordination of
coastal management efforts with a network of
partners.**

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Contents

1. Executive Summary.....	1
2. Project objectives.....	4
3. Project activities and outcomes.....	5
4. Future plans for TAG.....	14
5. Recommendations.....	16
6. Acknowledgments.....	17
7. Appendices:.....	18
Appendix I(a): Monitoring olive ridley turtles in Odisha.....	18
Appendix I(b): Monitoring leatherback turtles in the Andaman & Nicobar Islands.....	26
Appendix I(c): Ecotourism as an alternate livelihood for local communities in Rusikulya, Odisha.....	33
Appendix II: Team Turtle.....	35
Appendix II(a): Other achievements by project personnel	40
Appendix III(a): Member organisations of TAG.....	41
Appendix III(b): Core committee members of TAG.....	42
Appendix III(c): TAG members profile.....	44
Appendix IV: Small Grants Program 2016-2017 details.....	47
Appendix V: Audit Report 2016-2017.....	48

1.

Executive Summary

The Indian coastline has significant nesting and feeding grounds for four species of marine turtles, namely leatherback (*Dermochelys coriacea*), green (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*) and olive ridley (*Lepidochelys olivacea*) turtles. The most remarkable among these are the mass nesting beaches of olive ridley turtles in Odisha, feeding and nesting grounds for green and hawksbill turtles in the Andaman and Nicobar Islands and the Lakshadweep islands, and the nesting population of leatherback turtles in Little Andaman Island and the Nicobar Islands. These sites are of high importance in terms of conservation. Even though all four species are listed under Schedule I of the Indian Wild Life (Protection) Act, 1972, their populations in the Indian waters are under threat due to indiscriminate coastal development and incidental catch in fisheries.

Sea turtles play an important role as flagship species for diverse habitats such as coral reef ecosystems, sea grass meadows, open seas and sandy beaches. The threats that sea turtle populations face are representative of threats that impact other marine and coastal flora and fauna. In the Indian subcontinent, coastal and ocean resources play an important role in the economy of fishing and other coastal communities. Sea turtles have also been part of legend and culture in this region for more than a thousand years. They move freely across socio-political boundaries, and many factors need to come together for effective conservation.

For this reason, monitoring and outreach projects were started at key sites in India. This project was started in 2008 and has since been involved in uniting organisations and individuals that work along the Indian coast on marine turtle ecology and conservation. In 2008, a consortium of NGOs (Non-Governmental Organisations) called Turtle Action Group (TAG) was formed to work towards sea turtle conservation and coastal ecosystem protection in India.

From 2008 to 2015, the project's activities have been supported through grants from the Marine Turtle Conservation Act Fund of the US Fish & Wildlife Service (USFWS). For 2008-2009, the project funds were administered, and project activities executed through Ashoka Trust for Research in Ecology and the Environment (ATREE), Bangalore, India. Since 2009, project funds have been administered by Madras Crocodile Bank

Trust (MCBT), Chennai, in partnership with Dakshin Foundation, Bangalore which is responsible for the execution of project activities and formulation of action plans for the project.

2008 – 2009: Formation of a national level network: The first grant of \$5000 helped facilitate the formation of a network of committed groups and organisations from across the country's coastline and in the initiation of activities that were undertaken by the network.

2009 – 2010: Expansion of the network and its scope: The second grant of \$30,500 provided support to expand membership of the network to include local, community-based organisations and strengthen the activities and broaden the scope of TAG.

2010 – 2011: Building and strengthening the network for conservation of marine turtles of India: The third grant of \$ 39,000 supported the initiation of new activities, and expansion of existing programmes, ensuring inclusion of all community based groups from around the country working on sea turtle conservation.

2011 – 2012: Strengthening ongoing conservation activities on marine turtles of India: The grant of \$45,000 provided support to strengthen and expand existing activities of the network, execute various capacity building workshops, and to disburse small grants.

2012 – 2013: Monitoring and conservation of sea turtles in India: The grant amount awarded for this year was \$55,000. Similar to previous years, this grant was utilised to strengthen and expand the activities of the network, to disburse small grants, to conduct workshops for capacity building and to produce outreach material. Additional emphasis was laid on monitoring key index sites for sea turtles on the Indian coast.

2013 – 2014: Monitoring and conservation of sea turtles in India through a network of partners and index sites: The grant amount awarded for this year was \$45,000. This year's grant was used to monitor and promote conservation of sea turtles, specifically at the index sites for olive ridley turtles in Odisha and leatherback turtles in the Andaman Islands. Also, as in the previous years, it was used to conduct workshops, disburse small grants and produce outreach material.

2014 – 2015: Promoting conservation of sea turtles in India at a national scale through a network of partners and index sites: The grant award of \$52,500 was utilised to sustain and augment the activities and reach of the sea turtle conservation network. Certain new projects were undertaken, as elaborated in the appendices. The annual workshop, small grants program and publications were also continued.

2015-2016: Advancing the conservation of sea turtles in India at a national scale through the monitoring of index sites, and coordination of coastal management efforts with a network of partners: This year's grant of \$52,500 was utilised to continue sea

turtle monitoring at Odisha and the Andaman Islands, and to initiate monitoring sea grass meadows in the Lakshadweep islands. It also contributed to the organisation of capacity building workshops, disbursal of small grants, and generation of outreach material.

2016-2017: Advancing the conservation of sea turtles in India at a national scale through the monitoring of index sites, and coordination of coastal management efforts with a network of partners: This year's grant of \$52,580 was utilised to continue sea turtle monitoring at Odisha and the Andaman Islands. It continued the organisation of capacity building workshops, disbursal of small grants, and generation of outreach material.

The primary aim of the project is to provide a common platform for sharing information and experience amongst various groups and individuals working on sea turtles in India. It has strived to strengthen community based NGOs from various coastal states by providing small grants, training and technical assistance. The project seeks effective engagement of network members with other stakeholder groups, research institutions and government agencies in order to better execute conservation action. The fund is being used for website (www.seaturtlesofindia.org) maintenance and to develop an online data repository, which is under progress. A portion of the fund is utilised for the publication of outreach and educational material, and partial support towards the production of the Indian Ocean Turtle Newsletter.

Turtle Action Group is a well-established network of over 25 organisations from across the country. The network has established a set of goals and action plans to address sea turtle conservation effectively through cooperative and collaborative efforts. Research and monitoring capacities of the member organisations in collecting uniform and reliable data are being developed through monitoring protocols and training programmes. This will lead to standardisation of data collected during the nesting season at key sites along the Indian coast. The current project seeks to continue to support and coordinate sea turtle conservation activities along the Indian coast, and to undertake collaborative actions that can lead to better coastal and marine conservation.

This report provides details of project objectives, and activities carried out during the current funding cycle, which include sea turtle monitoring programmes at index sites in India, functioning of the network and its member organisations, and the outcomes and outputs from the project. It also lists recommendations and future plans to further effective conservation of sea turtles in India.

2.

Project Objectives

Goal:

To strengthen and sustain collective and collaborative sea turtle conservation through the monitoring of key sites and a network of partners in the Indian sub-continent.

The project objectives for 2016-17 were:

1. To continue and strengthen the long-term monitoring programme of olive ridley turtles in Odisha, olive ridley and leatherback turtles in the Andaman and Nicobar Islands and increase participation of local groups in these efforts.

2. To continue monitoring the status of marine turtles at key sites along the Indian mainland and islands with the involvement of network partners, through the promotion and use of standardised data collection and monitoring techniques.

3. To continue a recently initiated monitoring and conservation programme for green turtle feeding habitats in the Lakshadweep islands to better understand the fisher-turtle interactions in the region

4. To enable the collation and analysis of data collected across sites to inform studies on population trends and impacts of climate change.

5. To improve the existing online portal for the upload and synthesis of relevant data contributed by member organisations.

6. To develop appropriately designed educational and outreach material that can broaden the reach of the network to specific target groups including other stakeholder groups, educational institutions, governmental departments and the general public.

7. To conduct training programmes for capacity building in order to enable individual member organisations of TAG to become financially and programmatically independent.

8. To encourage and support independent, location specific conservation activities of member organisations through the provision of small grants.

9. To strengthen a larger regional network in the Northern Indian Ocean region of the IOSEA through a regional level workshop, and hold consultations in addition to inter-regional exposure and exchange programmes for members of the network.

3.

Project Activities and Outcomes

To achieve the objectives, the following activities were carried out:

1. Monitoring the status of marine turtles at key sites along the Indian mainland coast and islands

A. Monitoring olive ridleys in Rushikulya rookery, Odisha

Odisha, with a 480 km long sandy coastline, is a suitable nesting habitat for olive ridley turtles (*Lepidochelys olivacea*). Over the past decade, activities such as mechanised fishing have resulted in large scale turtle mortality of turtles in offshore waters. Other factors that possibly affect their populations are rise in sea level, climate change and development activities, both onshore and offshore. It is imperative to protect their breeding habitat and to monitor populations in order to understand their biology and behaviour with respect to climate change. This knowledge will be instrumental for overcoming these threats.

With funding from Marine Conservation Society, U.K., a long term monitoring programme was initiated by Indian Institute of Science and Madras Crocodile Bank Trust at Rushikulya rookery, a major olive ridley mass nesting site in the world. The project is coordinated by the Indian Institute of Science, Dakshin Foundation and the Odisha Forest Department and funded by the USFWS Marine Turtle Conservation Act grant. For the past eight years, the project has worked in collaboration with the local Forest Department staff and NGOs involved in marine turtle conservation. As part of capacity building, the forest department staff, NGO employees, local and other researchers are trained in conducting a census of nesting populations during 'arribadas', shore line monitoring techniques, hatchery management, offshore turtle monitoring and other activities related to sea turtle monitoring.

The primary aim of the project is to study the impact of climate change on the Indian Ocean olive ridley nesting populations. With the help of data loggers, variables such as air, sand and nest temperature are recorded to determine change in temperature and its relationship with hatchling sex ratios. A sample set of nests is relocated to a hatchery from the natural nesting beach to understand hatching success. These nests are collected over a period of 3 months. Along with onshore monitoring, offshore surveys are conducted to monitor the abundance and distribution of mating turtles in offshore waters.

Since 2008, the population is being estimated using a strip transect method during mass nesting. The nesting turtles are also checked for tags. The results show that the number of nesting females has increased over the years at Rushikulya. In February 2014, fewer turtles nested during the mass nesting event than in previous years, while there was a large arribada in March 2015. Despite significant offshore congregations, mass nesting did not occur at Rushikulya in 2016, but such fluctuations are not unusual. A detailed report on this can be found in Appendix I (a).

In response to the training under this project, the Forest Department is actively involved in monitoring and protecting both offshore and onshore turtle habitats. Working with local NGOs, they help in spreading marine turtle conservation awareness through education programmes. A sea turtle interpretation centre has been set up and small events such as beach cleaning with participation from local communities have been undertaken. There has been considerable increase in local awareness and interest generated by working in collaboration with the government and local NGOs.

B. Monitoring leatherback turtles in the Andaman & Nicobar Islands

A long term leatherback turtle monitoring project was started in the Andaman and Nicobar Islands by Indian Institute of Science (IISc), Dakshin Foundation, Andaman and Nicobar Environment Team (ANET), and the Madras Crocodile Bank Trust (MCBT). Since 2008, leatherback turtles (*Dermochelys coriacea*) have been monitored on West Bay and South Bay beaches of Little Andaman Island. Alongside collecting long term data on leatherback populations, the project aims to develop a conservation network in the region with a long-term education and outreach programme for local communities on the islands. Not much is known about the status of leatherback populations in the Indian sub-continent except for studies by ANET, IISc and Dakshin Foundation on Great Nicobar Island and Little Andaman Island. In light of the decline of the Pacific Ocean leatherback population, it is important to monitor Indian Ocean populations and threats to them.

The programme involves monitoring of nests, threats and tagging of leatherback turtles. In 2010, with support from the Indian Space Research Organisation (ISRO) and the Space Technology Cell of IISc, Bangalore, a satellite telemetry study was initiated at Little Andaman Island. A total of 10 turtles have been tagged with PTTs (Platform Trans-

mitter Terminals) between 2010 and 2014 (tracks can be viewed at www.seaturtle.org). A detailed report is *provided in Appendix I (b)*.

2. Website and online data repository

The website, www.seaturtlesofindia.org, is a platform for information on the biology and conservation of sea turtles and their habitats in Indian sub-continent. Numerous community based groups, local, national and international conservation organisations (NGOs), academic institutions and government departments have contributed to studies and surveys over the last two and half decades. The website hosts this information and makes it possible for students, researchers and others to get easy access to material. This site also includes a repository of papers, reports, notes, historical records and other grey literature. The bibliography section currently includes over 700 references, with PDFs for a large number of publications, many of which are not available anywhere else.

The website also carries content dedicated to the Turtle Action Group (www.seaturtle-sofindia.org/tag). Information on the network's activities, workshop reports, member organisations and their detailed profiles is currently made available here.

The blog 'Talking Turtles' was started in 2012 to host posts by people working on marine turtles. It features pieces by scientists, journalists, activists, students and enthusiasts. From first encounters with turtles to unusual observations to expert insights, the blog welcomes stories about marine turtles in the Indian Ocean.

Sea turtles of India Website



Talking Turtles blog



3. TAG - the sea turtle conservation and monitoring network

The Turtle Action Group

The Turtle Action Group (TAG) is a network of non-governmental organisations from around India, working towards sea turtle conservation and coastal protection. These groups initially came together in January 2009 at a workshop held in Chennai, where the need for a national level network to enable various groups to work together and collaborate towards more effective sea turtle conservation was acknowledged. There is worldwide consensus that effective sea turtle conservation requires collaboration between agencies and various stakeholders to ensure long term survival of the species and sustainable use of the resources of the habitats they occupy.

Such a collaborative effort at the national level was lacking and TAG was formed to fulfil this need. TAG seeks to benefit from the pooling of resources and knowledge and to bridge the gap between conservation measures that are effective at local, state and national levels.

Functioning of TAG

Executing organisation

The network's fund is channelled through the executing organisation, the Madras Crocodile Bank Trust. Under the programme, a policy team oversees the network's activities and utilisation of funds, and guides the disbursement of funds to member organisations to carry out specific activities. The administrative staff at MCBT carries out specific administrative tasks which include coordinating training programmes, disbursing small grants, administering the work of network members, as and when required, and handling the financial aspects of the MTCA project till the end of the project term.

Members of TAG

The TAG network comprises a core group of community based and local NGOs from across the country. Currently, its membership includes 25 organisations from the mainland and one each from the Andaman and Nicobar and Lakshadweep Islands. Appendix III (a) lists the member organisations.

Seven large organisations, including national level NGOs and research institutions, are part of the network, and do not receive funding support for their activities from TAG. Since 2010, TAG has been providing small grants to a few member groups after evaluating their proposals. Institutional representatives from MCBT and Dakshin Foundation contribute by way of resource personnel and providing inputs at annual workshops, and are represented on the advisory board of TAG.

The network also liaises with state level government organisations, primarily forest departments of coastal states within whose jurisdiction the protection of sea turtles and their nesting habitats falls. TAG also seeks regular inputs from other stakeholder groups and organisations working with fishing communities and coastal development to better inform conservation interventions that the network adopts.

Core Committee

The Core Committee constitutes elected representatives from amongst member groups of TAG. The main responsibilities of the Core Committee are to coordinate the activities of the network that are determined at annual workshops, over the course of the following year through sustained communication with all members of the network. The Core Committee reports to the team at the executing organisation regarding the progress of activities that the network has set out, and identifies areas where a particular group, or the network as a whole, requires support in terms of inputs, resource material, or funds. Individual members of the network approach the core committee with suggestions or queries. The Core Committee is mandated to make decisions based on a consultative process and approaches the project team at the executing agency when required. The present constitution of the Core Committee ensures representation across the geo-

graphical scope of the network and its members belong to each coastal state and both the island groups. Appendix III (b) enumerates the members of the Core Committee.

Advisory Board

The network seeks inputs on its activities and agenda from an Advisory Board that includes various individuals from diverse backgrounds and fields of expertise, affiliated with research organisations such as the Wildlife Institute of India, Dehradun and the Madras Crocodile Bank Trust amongst others.

Network Volunteers

At each annual workshop, specific tasks are assigned to volunteers from within the network to take on the responsibility of coordination and ensuring completion. These volunteers communicate with and seek inputs from the Core Committee.

The member organisations are trained to follow standardised monitoring and data collection techniques, in order to study climate change and its consequences for important variables, such as egg and hatchling mortality and sex ratio. These would lead to more precise data collection and enable monitoring changes on a larger spatio-temporal scale and help predict population trends. TAG members are given financial support to help them in data collection, monitoring and conservation activities. Every year, small grants are disbursed for supporting their ongoing work during the turtle nesting season. These primarily include hatchery construction and maintenance during the season, egg relocation, and hatchling release. TAG members are also encouraged to develop their own proposals to support their ongoing projects. Appendix III (c) contains an overview of the profiles of TAG member organisations.

4. Small grants disbursed to TAG members

Grants were given out to members of TAG to support their data collection, monitoring and conservation activities. The amounts disbursed are provided in the table below.

Name of the organisation*	Grant amount (INR)**
Student's Sea Turtle Conservation Network (Tamil Nadu)	35000
Prakruti Nature Club (Gujarat)	30000
Action for Protection of Wild Animals	35000
Sea Turtle Action Programme (Odisha)	35000
Rushikulya Sea Turtle Protection Campaign (Odisha)	35000

* Appendix IV contains details of the projects

** 1 USD ~ 66 INR

5. Outreach and education material

Indian Ocean Turtle Newsletter

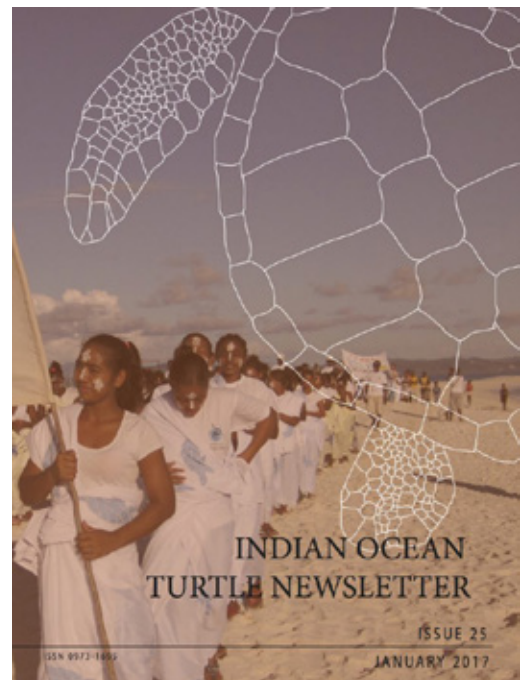
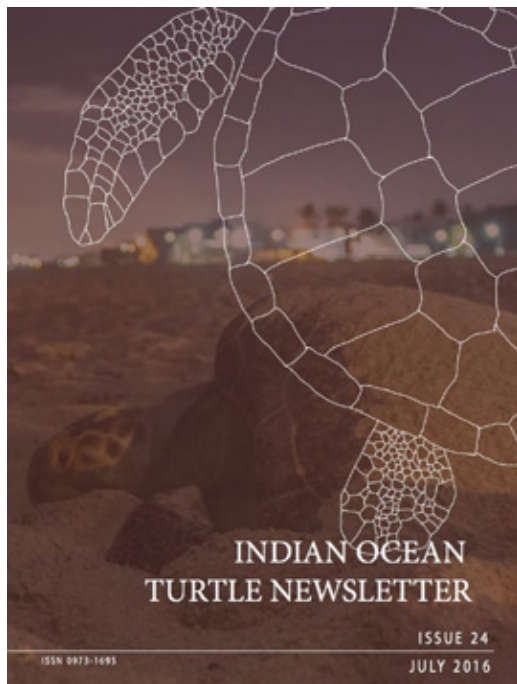
The 24th and 25th issues of the Indian Ocean Turtle Newsletter were published in July 2016 and January 2017 respectively, with partial funding support from the MTCA.

The IOTN 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 aspects such as coastal zone management, fisheries and marine biology.

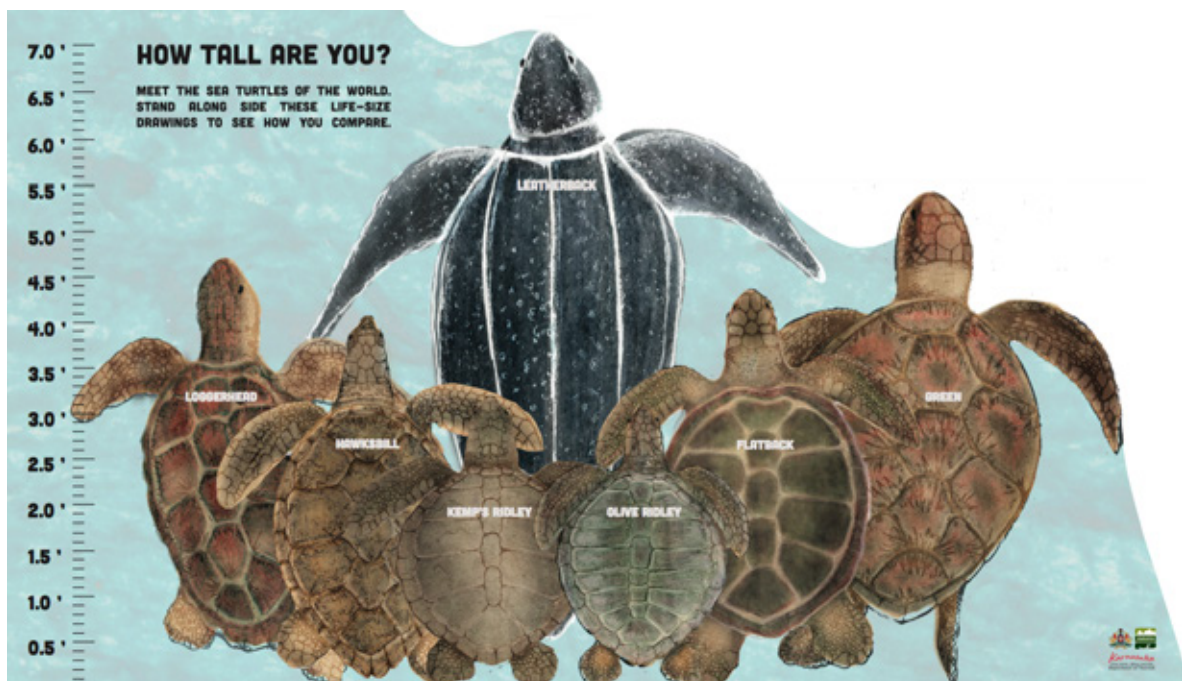
There are nearly 1000 e-copy and 1400 hard-copy subscribers for this biannual newsletter from different parts of the world. The website <http://www.iotn.org/> has an archive section with all issues to date.

The newsletter aims to reach and serve:

- Central government agencies (Ministry of Wildlife, Fisheries and Environment)
- Coastal government agencies (local Forest Departments, Fisheries Departments)
- Coastal enforcement agencies (Navy, Coast Guard)
- Non-government organisations involved in environment and conservation
- Non-government organisations involved in social work in coastal areas
- Academic institutions
- Conservation organisations
- Community-based conservation organisations
- Individual researchers, field biologists and ecologists



As part of the outreach and education initiative, an interactive life-size poster of the sea turtles of India was created. This poster was installed at the Sharavathi Learning Centre at Honnavar in Uttara Kannada district of Karnataka, which hosts solitary nesting sites for sea turtles.



6. Project Personnel

The marine turtle project has engaged an assortment of individuals, some of whom have remained dedicated to the project over the years, and some of whom have diversified into other spheres.

4.

Future Plans for TAG (2016-17)

Members of TAG are committed to sustaining interactions through annual meetings and workshops, in addition to individually carrying out activities towards meeting the larger objectives laid out by TAG. The specific plans for the year 2017 – 2018 are:

a. To collectively address issues of common concern

A variety of threats and issues on the coastline form the basis of conservation action undertaken by different groups. TAG has identified these specific issues that the network can examine and address. These include:

i. Standardisation of data collection and monitoring techniques: In order to collate data and information collected individually by member organisations, TAG will develop standardised procedures for data collection and monitoring to enable this information to be shared. This would also allow for site-specific data to feed into distribution and abundance assessments at larger geographical scales. The collated data will be available on the seaturtlesofindia.org website which will also be used as a portal to upload/download data and generate maps of distribution and temperature related data.

ii. Coastal development: Unplanned and unsustainable coastal development along the country's coastline has threatened sea turtle nesting habitats. Although the impacts of such developmental activities (such as construction of sea walls, urbanisation, development of ports, etc.) vary from one location to the next, all members of TAG are individually contesting decisions made at the local scale. Common themes of the development agenda across sites and states have to be brought to the notice of higher authorities, including the central government. Demands can be made for more transparent decision making procedures, greater participation of local communities and stakeholders, and the development of sustainable and responsible coastal zone management plans.

b. Capacity building and involvement and initiation of new community-based enterprises

A primary focus area of the network is capacity building for local forest department officials and interested local enthusiasts. By imparting knowledge on proper monitoring techniques and hatchery management, local communities can effectively work towards conservation. The potential of ecotourism as a means of generating revenue and opportunities for conservation has also been explored. Collaboration between the local government and NGOs will motivate local groups to start their own projects and pave the way for such community-based conservation.

5.

Recommendations

After careful assessment of the outcomes of the network and expectations of member organisations, the following recommendations were made to strengthen TAG and enable effective conservation efforts:

1. Increasing interactions of TAG members with other similar regional and global organisations and networks to improve communication, and addressing conservation issues faced in other parts of the world.
2. Collation of information on marine turtle status, biology, habitat and conservation techniques. By encouraging discussion, the member organisations can come up with effective solutions to frequently faced problems.
3. Communication with the central government through the Ministry of Environment, Forests and Climate Change (MoEFCC) regarding national issues to help the government in effective policy making that could serve as a solution to local conservation problems.
4. Joint awareness programmes with other TAG members, especially within the state by sharing resources, ideas and staff.
5. Advertising network activities through media campaigns to attract other similar organisations and to highlight individual organisations' efforts to give them recognition.
6. Collaboration with local stakeholders including non-members of TAG, individuals working on sea turtles and their conservation and related groups to develop holistic approaches to species-specific conservation.

6.

Acknowledgements

We are grateful to the US Fish & Wildlife Service for providing funding support under the Marine Turtle Conservation Act Fund.

We are also thankful to the staff at Dakshin Foundation and Madras Crocodile Bank Trust for carrying out the research, outreach and administrative tasks under the project and lending their constant support as and when required.

We are also thankful to the Ministry of Environment, Forests and Climate Change (MoEFCC) for endorsing the network. We are hopeful that representatives of the Ministry and coastal state government agencies will be actively involved in network activities in the future.

Finally, we would like to thank all our member organisations, whose enthusiasm in sustaining the network and dedication towards sea turtle conservation has validated our efforts in initiating and facilitating the Turtle Action Group.

7.

Appendices

APPENDIX I (a)

Monitoring olive ridley turtles in Odisha

Odisha has a 480 km long coastline lined with sandy beaches suitable for olive ridley turtle (*Lepidochelys olivacea*) nesting. This population is an evolutionary source for other populations across the world. This population is facing large-scale mortality due to natural and anthropogenic causes such as predation, mechanised fishing and other related development activities. Extreme changes in the nesting beach topography due to erosion have also affected nesting within the area. In order to assess the population trends of this species in response to threats and climate change, it is important to understand their biology and behaviour. This is essential to set and achieve conservation goals.

The Madras Crocodile Bank Trust (MCBT) initiated a long term monitoring project with funding from Marine Conservation Society, U.K. and USFWS Marine Turtle Conservation Act grant to study the population trends of these turtles in 2007. Rushikulya rookery, one of the major mass nesting sites in the world, was chosen as the study site. In 2008, long term monitoring began in collaboration with the local Forest Department and NGOs involved in sea turtle conservation. The forest department staff, NGO employees, enthusiastic locals and researchers have been trained in activities such as hatchery maintenance, beach monitoring, nesting population census and other monitoring methods through capacity building workshops. To understand the effect of climate change on the olive ridley population, air, incubation and sand temperatures are recorded by placing data loggers in a room, relocated nests and sand respectively. A hatchery is maintained close to the natural nesting site, for relocated nests. Hatchlings succumbing to natural mortality are collected and sexed using histological techniques to study the effect of climate change on the sex ratios.

Arribada monitoring:

Mass nesting events at the Rushikulya rookery were not monitored using standardised methodology before 2007. Since 2008, Indian Institute of Science and Dakshin Foundation have been monitoring the Rushikulya beach, recording both solitary and mass nesting data, using a scientifically robust method known as a strip transect. During each arribada, a 20 m strip transect method is used to count the nesting females. Table 1 provides estimates of mass nesting from 2008 to 2017.

Monitoring offshore congregations of olive ridleys on the Odisha coast

The team from Indian Institute of Science and Dakshin Foundation started offshore monitoring at Rushikulya in 2010. A line transect approach is used to measure the changing offshore abundances of turtles during the breeding season (Figure 1). Initially done only in Rushikulya, this was extended to cover the entire coastline of Odisha in January 2014. The other places included in the survey are Bahudha, Chilika, South Devi (Puri-Konark), Devi, Hukitola and Jatadhar. Due to logistic constraints and lack of permits, Gahirmatha Marine sanctuary and Chandipur could not be covered. The result of the number of turtles encountered in all the sampled locations is shown in Figure 3. The 480 km coastline of Odisha was divided into transect blocks of 40 sq. kms every 48 km. All transects except Rushikulya are 2 km wide and 4 km long. In order to get a finer resolution of estimates, the transect effort in Rushikulya was intensified by surveying 1 km wide and 3 km long transects (Figure 2). The primary design of these transects will be within the confines of stratified random sampling within each sampling block. Along with observations of turtle number, abiotic factors (surface salinity and depth) were also sampled to get a better ecological perspective of these congregations. Location data was collected using a handheld GPS. The purpose of collecting abiotic variables is to create a profile of these and overlay them with the aggregation sites (Figure 6). Due to logistical difficulties only three sites could be surveyed for offshore monitoring, viz., Chilika, Rushikulya and Bahuda. For Rushikulya offshore surveys were carried out once every month. The average number of turtles sighted has been listed in Figures 3 and 4. The density data were analysed using Distance Software version 6.2.

In 2014, a total of only 451 observations of turtles were made from only three out of the seven sampling locations (Bahuda, Rushikulya and Chilika). Most of the turtle sightings were concentrated around Rushikulya ($n=407$). There were no turtle sightings in any of the other locations north of Chilika. We do not have data from Gahirmatha or Chandipur so the densities were calculated by pooling the data only from the sampled sites. The results depict a density estimate of 24.44 turtles/per sq.kms ($p=0.49660$, $S.E=0.05$, $n=3$ sites). The average cluster size was 3.74 turtles. The summary of the model is given below. Please note that the density estimates in Rushikulya (average= 23.546, $S.E=0.05$) have contributed most to this estimate. The results for 2015 show maximum turtles were observed in Rushikulya ($n=1751$), the average cluster size of surfacing turtles was 2.9 turtles/km² and the density estimate of 9.43 turtles/km² (%CV= 19.2). During the latest season – 2016, density estimates were about 134 turtles/km² ($SE=21.25$, %CV= 15.80) which is higher than recorded by Tripathy, 2013 (Density – 35.1/km²). The summary of the density analysis is given in Table 2.

Air and sand temperatures; hatchling sex ratios

The mean temperature for nests 3 and 4 exceeded the pivotal temperature, whereas the incubation period of nest 1 was extended to 69 days at a mean temperature of 27.1°C. The hatching and emergence success (both at 77%) was highest for nest 2 at an incubation temperature of 29.9°C.

A sex ratio profile was developed by using pivotal temperature at 29°C and threshold range of temperatures (28°C and 30°C) as reported by Dimond & Mohanty-Hejmadi (1983). In 2008, the mean nest temperatures exceeded the pivotal temperature (28.2°C), which could have led to the production of more females than males. As observed in the past couple of years, the highest temperature reported during incubation period in 2013 was the highest (37.4°C) recorded during the duration of the study.

Table 1: Arribada estimates from Rushikulya, 2008-2016

Year	Day	Mean	LCL	UCL	SE
2008	1	53138.0	41372.0	64904.1	5883.0
	2	17847.9	14509.7	21186.1	1669.1
2009	1	30828.2	25017.8	36638.5	2905.2
	2	31031.0	25767.2	36294.8	2631.9
	3	9785.9	7514.5	12057.3	1135.7
2010	1	11171.8	9177.1	13166.5	997.3
	2	46732.4	40925.0	52539.8	2903.7
	3	29983.1	26315.3	33650.9	1833.9
	4	1453.5	983.7	1923.4	234.9
	5	7149.3	5974.8	8323.8	587.2
	6	2416.9	1834.5	2999.4	291.2
	7	980.3	585.5	1375.1	197.4
2011	1	28123.0	23215.9	33030.1	2453.5
	2	35501.6	31297.9	39705.4	2101.9
	3	33818.8	30718.7	36918.9	1550.0
	4	24368.9	22356.4	26381.4	1006.3
	5	9530.7	7703.5	11358.0	913.6
	6	12928.8	11161.8	14695.8	883.5
	7	2313.9	1915.3	2712.6	199.3
	8	4530.7	3723.7	5337.8	403.5
2012	1	31634.99	28955.5	34314.47	1339.74
	2	9588.865	8633.87	10543.86	477.5
	3	1707.245	1348.3	2066.19	179.47
2013	1	16347	14487.72	18206.63	929.73
	2	19781	18251.48	21310.95	764.87
	3	59290	55462.47	63116.83	1913.59
	4	30458	27025.33	33890.6	1716.32
	5	7702	5717.7	9685.93	992.06
	6	8972	7869.29	10074.31	551.26
2014	1	6211	5107.04	7314.76	551.93
	2	8638	6394.03	10881.9	1121.97
2015	1	33177	28725.90	37628.90	2225.76
	2	44703	40316.80	49088.88	2193.02
	3	49234	45235.74	53232.15	1999.1
	4	25043	21696.49	28388.94	1673.11
	5	12666	9107.68	16223.92	1779.06
	6	6116	4879.86	7351.42	617.89
2016	0	0	0	0	0

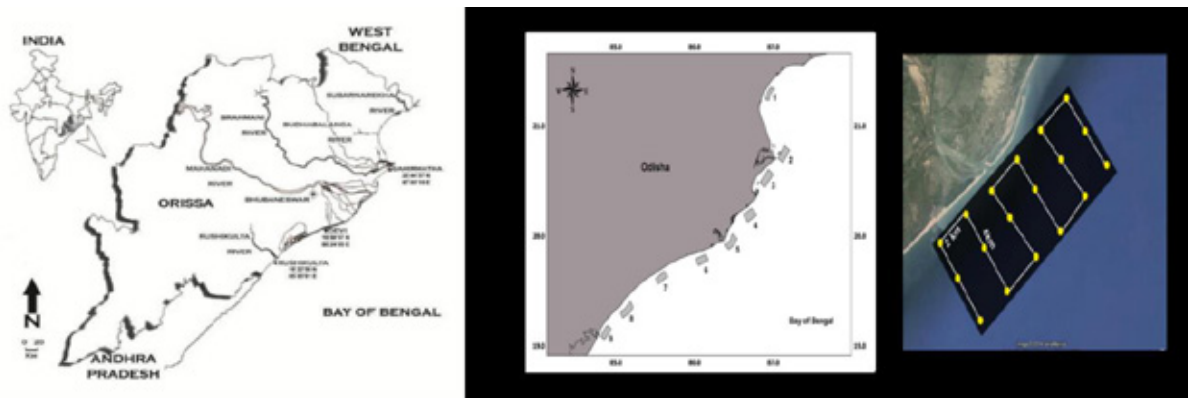


Figure 1. Map of Odisha (left) and map showing transect type carried out at Chilika and Bahuda



Figure 2. Offshore transect in Rushikulya - 1 km wide and 3 km in length.

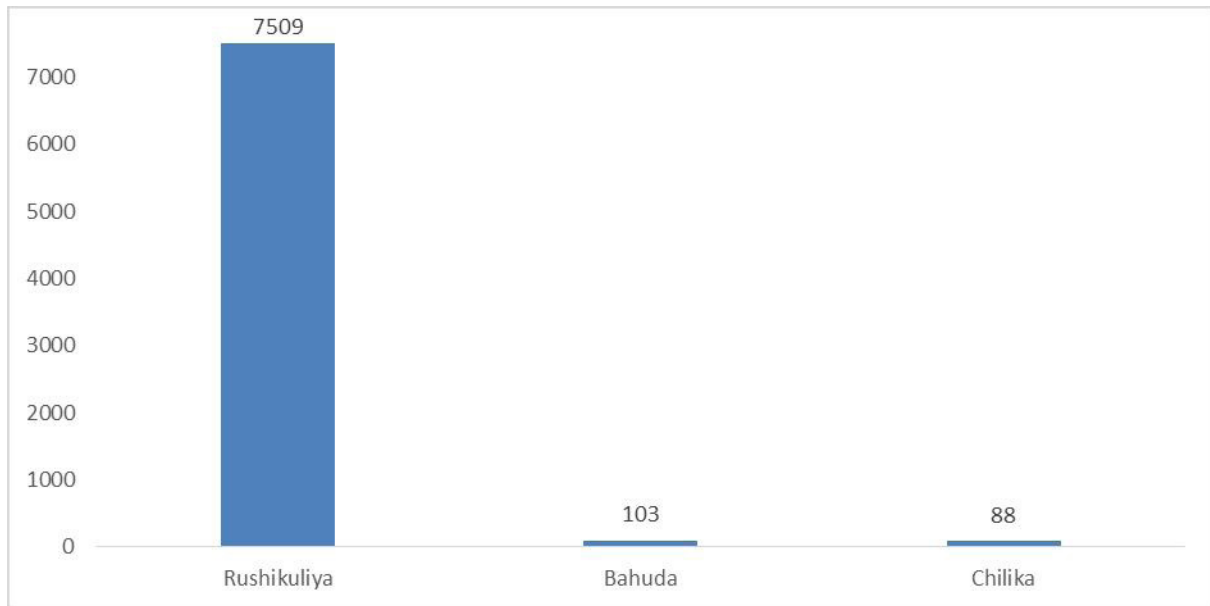


Figure 3. Surfacing turtles observed at different locations in 2016

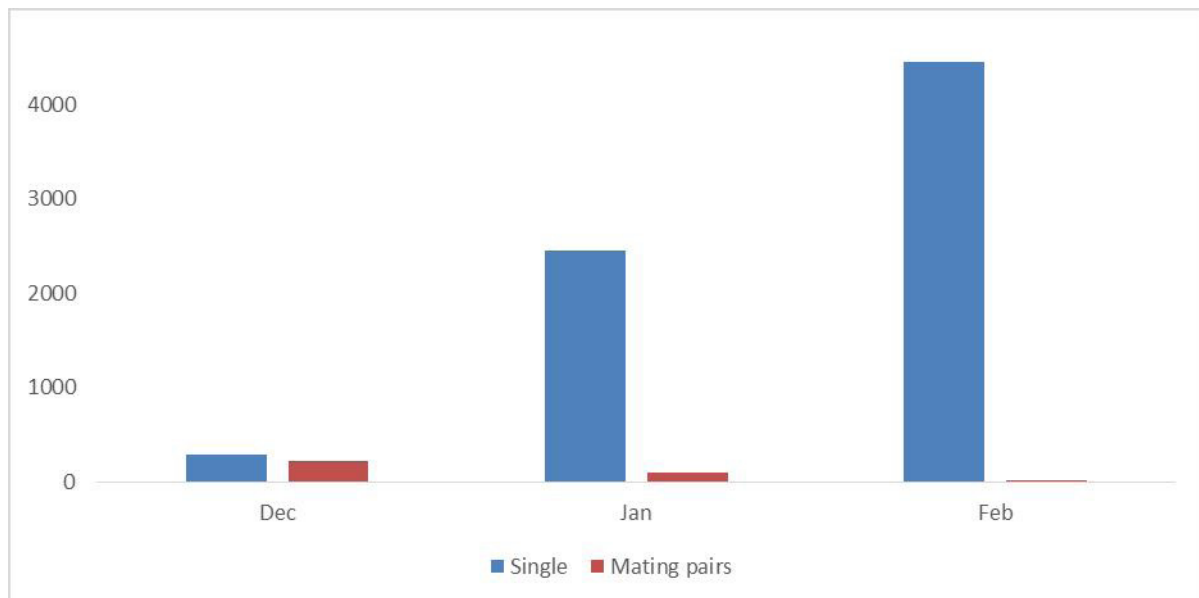


Figure 4. Number of surfacing single and mating pair turtles encountered per month in Rushikulya in 2015 – 2016

Parameter	Point Estimate	Standard Error	Percent Coef. of Variation	95% Percent Confidence Interval
DS	134.13	21.195	15.80	98.358 182.91
E(S)	1.0030	0.58394E-03	0.06	1.0018 1.0041
D	134.53	21.258	15.80	98.650 183.46

Table 2: Turtle sighting and density estimation

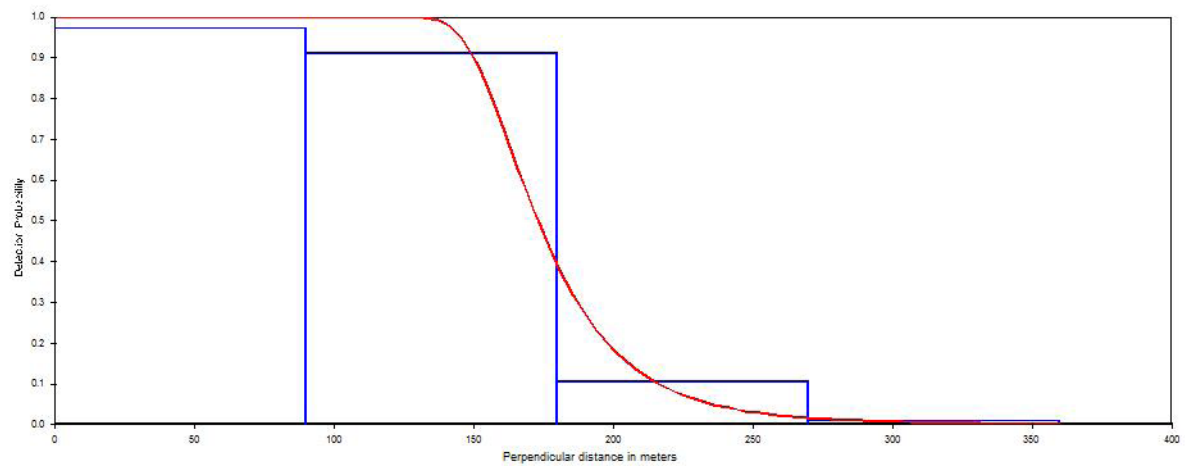


Figure 5. The detection function of turtle sighting vs distance (n=7571). On the Y axis is detection probability and on the X axis is the perpendicular distance in meters.

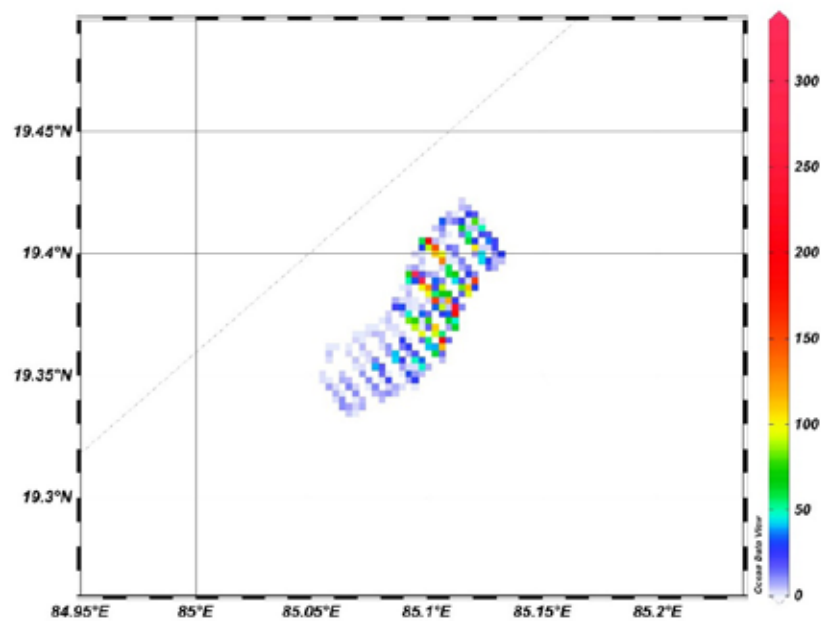


Figure 6. Spatial distribution of turtle congregations in Rushikulya in 2016.

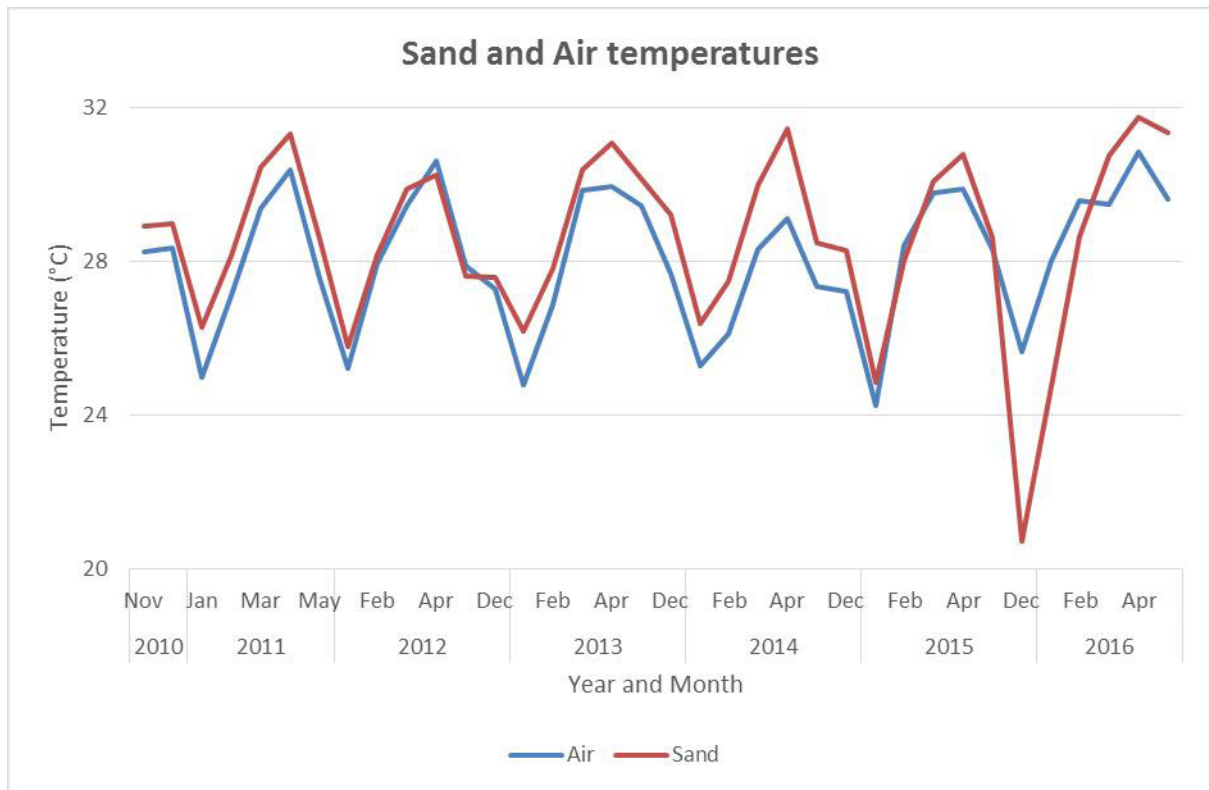


Figure 7. Air and Sand temperatures recorded at Rushikulya from 2010 – 2016 (Dec-May)

Local involvement:

A majority of the NGOs working along the Odisha coast are community based and employ local youth in carrying out their activities. They are trained in the latest *arribada* population census techniques. However, despite their interest and enthusiasm, many individuals from local NGOs are also forced to seek alternate options to secure a steady income (particularly during the non-nesting season). Therefore, projects are being initiated like coastal monitoring and beach profile data collection which would keep them involved all through the year. By developing skills in sea turtle monitoring, individuals from local community based NGOs have managed to find employment in sea turtle research and monitoring programmes carried out by academic research institutions and by the forest department. This has helped create synergy not just between NGOs and academic organisations, but between NGOs and the forest department as well. As a result of this sustained partnership over the past 5 years, it has been possible to involve a considerable number of field staff from the local communities and organisations in the *arribada* census and in collecting scientific data on sea turtle mortality and nest temperatures. A further step would be to initiate community based eco-tourism for income generation for these groups. The local NGOs involved with us are: Orissa Marine Resources Conservation Consortium (OMRCC), Rushikulya Sea Turtle Protection Committee (RSTPC), Sea Turtle Action Program (STAP), Green Life Rural Association (GLRA), Action for Protection of Wild Animals (APOWA) and Alacrity.

APPENDIX I (b)

Monitoring leatherback turtles in the Andaman & Nicobar Islands

Introduction

The leatherback turtle (*Dermochelys coriacea*) is the only extant species of the family Dermochelyidae. Leatherback turtles are the largest of living sea turtles, growing up to 2 metres and weighing as much as 900 kg. It is also the only sea turtle that lacks a bony shell. The adult leatherback is also the widest-ranging reptile migrating longer distances than all other sea turtles. It is found in tropical and temperate waters of the Atlantic, Pacific, and Indian Oceans. The leatherback, previously listed as Critically Endangered, is now listed as Vulnerable by the IUCN and under Schedule I of the Indian Wildlife Protection Act (1972). There is great concern over the declines in nesting populations of this species throughout the world, especially the Pacific. The Malaysian rookeries have undergone a well-documented decline from approximately 5000 nests per year in the 1960s down to less than 10 nests per year in the 2000s. Based on the lessons learned from the population declines in the Pacific and Southeast Asia, it is imperative to understand the nesting trends of leatherback turtles in the Andaman and Nicobar Islands and where these turtles migrate and the threats they face throughout their range.

Information on leatherback populations from India is still very patchy. Though there are earlier records of sporadic leatherback nesting from the Indian mainland, current nesting populations are entirely restricted to the Andaman and Nicobar Islands. The first confirmation of leatherback nesting in the region came from Satish Bhaskar at Jahaji beach, Rutland. Currently, very little is known about the status of leatherback populations from Indian waters, barring the work by the Andaman and Nicobar Environment Team (ANET) on Great Nicobar Island, and the collaborative efforts of the Forest Department, Centre for Ecological Sciences (CES), Indian Institute of Science, Bangalore, Dakshin Foundation and ANET on Little Andaman Island.

Many prime nesting sites for leatherback turtles in the Andaman and Nicobar Islands were severely affected by the December 2004 earthquake and the subsequent tsunami. Not much was known about the impacts of this calamity on the populations of leatherbacks here. Further, there was no information on the turtles once they leave the coast of Andaman and Nicobar Islands, especially on their migratory patterns, feeding and foraging behaviour, breeding/mating aggregations and many other parts of their life cycle. Recently, new approaches using satellite telemetry and molecular genetics have been used to gain insights into some aspects of the leatherback's life cycle.

In December 2007, a rapid survey of the South Bay and West Bay beaches was carried out. It was found that some parts of the beach had recovered considerably and leatherback tracks and nests were observed. Subsequently, a project was initiated to monitor leatherback turtle nesting at South Bay in January 2008.

Objectives and Methods

Every year, a camp has been established on the South Bay beach and monitoring of leatherback nesting has been carried out roughly between the months of January and March. Since 2010, a camp has been established on the West Bay beach for monitoring. Monitoring efforts have concentrated on West Bay ever since.

The objective of the surveys was to continue the long-term monitoring of leatherback nesting in South and West Bay, Little Andaman Island through a capture-recapture programme. Given the lack of knowledge of these populations, long-term spatio-temporal monitoring of leatherbacks using conventional tagging, satellite telemetry and genetic analysis was imperative. Therefore, the project was initiated in 2008 with the objective of monitoring the post-tsunami leatherback nesting recovery.

Over the years, the objectives have evolved to continue the long-term monitoring of leatherback nesting in South and West Bay, Little Andaman Island. Intensive surveys have been carried out to monitor tag recaptures of leatherback turtles from previous seasons. In addition, we intend to continue the satellite telemetry studies by tagging more leatherback turtles as well as the habitat monitoring component by collecting data on the profiles of the nesting beaches in South and West Bay to understand the effect of physical changes to the nesting beaches on leatherback nesting.

The surveys were carried out in collaboration with the Forest Department, Andaman and Nicobar Islands and in coordination with ongoing research activities in the region.



Figure 1. Map of Little Andaman Island

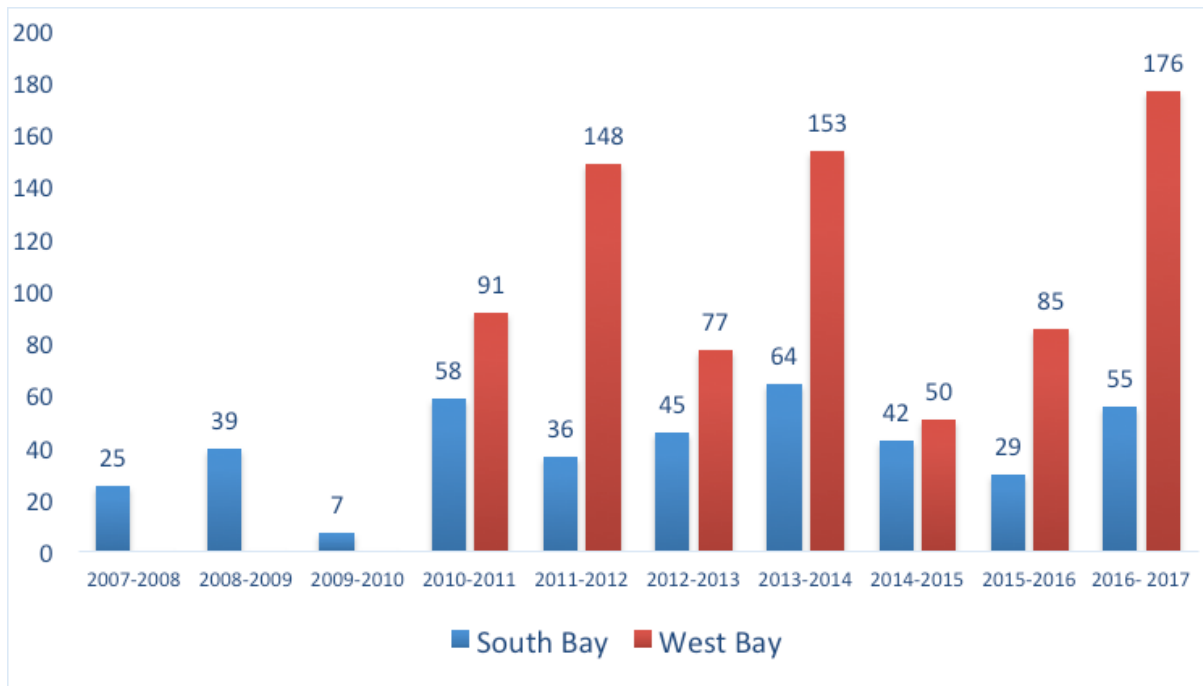
Results

The South Bay nesting beach was monitored through night surveys from 2008-2010. However, surveys had to be restricted to daylight hours since 2010 as night surveys of the nesting beach were logistically constrained due to the presence of large river openings (Benyabol & Tothibue) and the presence of saltwater crocodiles. Since 2010, monitoring efforts have concentrated on West Bay and have been primarily through night surveys. The monitoring indicates that leatherback nesting on beaches of Little Andaman Island has recovered substantially after the 2004 tsunami and seems stable with some fluctuations (Table A).

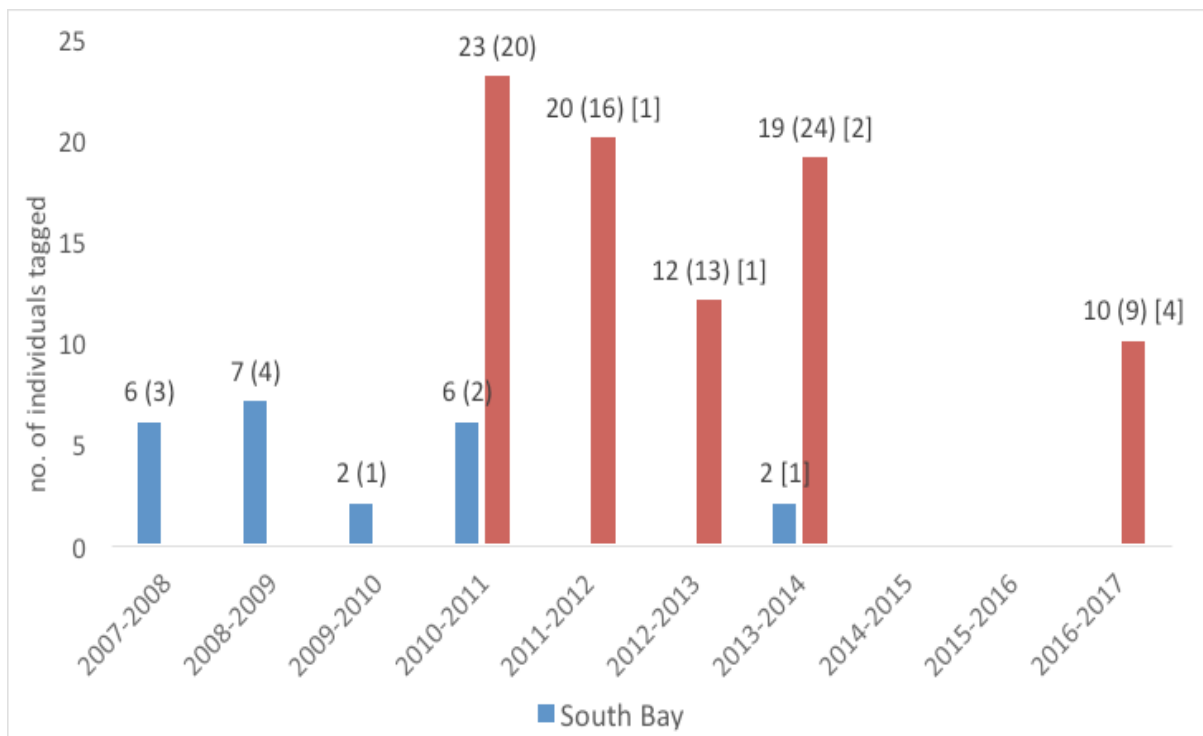
Within season recaptures indicate a minimum-nesting interval of 8 days, and across-season recaptures indicate a remigration interval of 1 year (Table B).

No turtles were tagged with external or PIT tags from 2014 to 2016 due to lack of permits.

A. Leatherback nesting patterns in South and West Bay



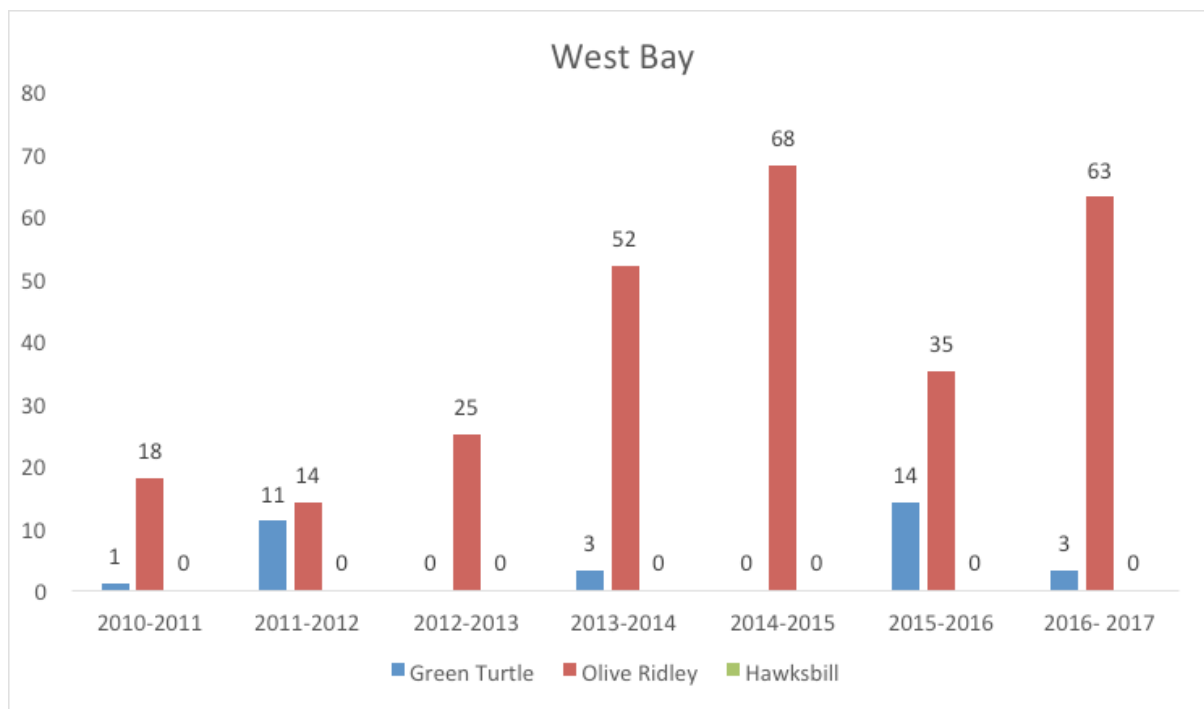
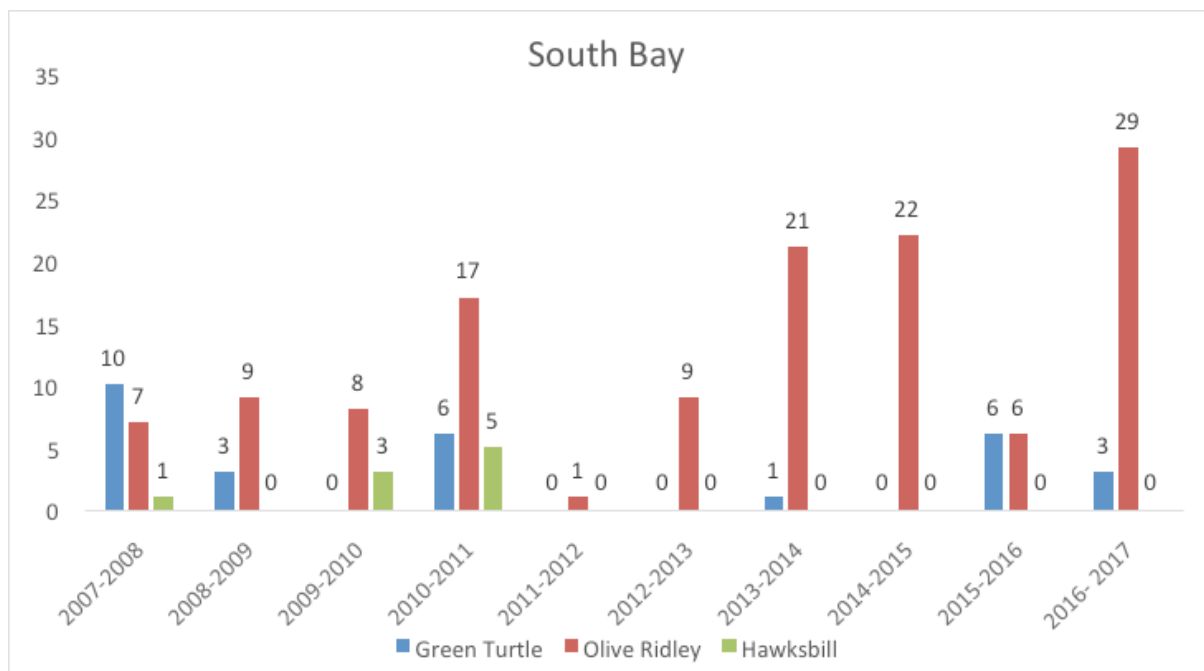
B. Leatherback tag and recaptures



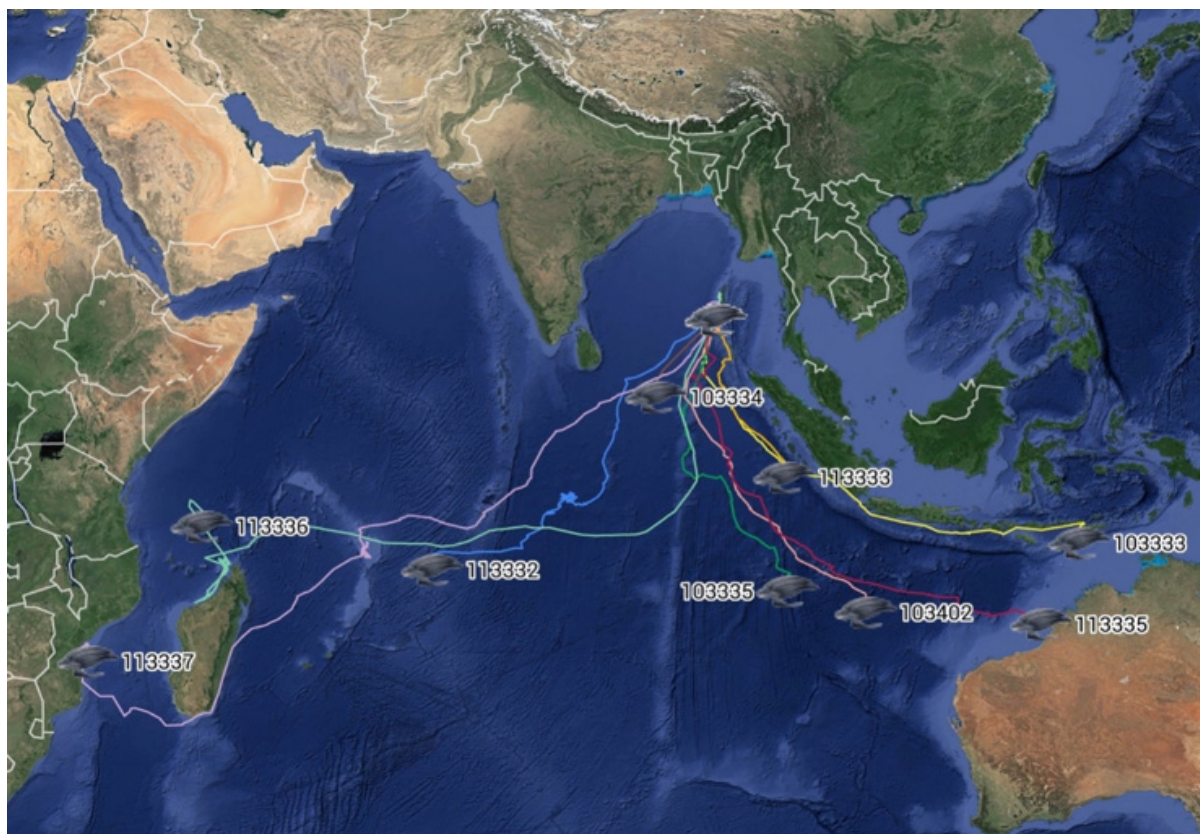
C. Morphometric measurements of leatherback turtles

- **Curved Carapace Length (CCL): 159.19 cm (Min-140, Max-181, ± 8.60)**
- **Curved Carapace Width (CCW): 117.01 cm (Min-100, Max-155, ± 12.36)**

D. Nesting patterns of other sea turtles



E. Post Nesting Migratory Route of Leatherback turtles:



F. Capacity Building

In 2017, capacity building programmes were conducted for the field personnel working in sea turtle projects from the Forest Department North and Middle Andaman. Workshops were conducted in the following locations:

1. Cuthbert Bay
2. Karmatang no.9
3. Ramnagar
4. Lamia Bay
5. Kalipur
- . Ross & Smith Island

The capacity building programs built on and refreshed the capacities of the field personnel working with sea turtle projects of the Andaman and Nicobar Forest Department. This will help standardise the protocols for data collection and improve upon existing conservation programs across the island territory.

Recommendations

We recommend the following actions for the conservation and management of leather back turtles in the Andaman and Nicobar Islands.

1. Monitoring

- a) The current monitoring programme at the beaches of South and West Bay, Little Andaman Island should be continued in order to understand trends in leatherback nesting at the site and the threats they face and changes in their nesting habitats. These beaches serve as **index beaches** for monitoring leatherback populations in the islands.
- b) Annual surveys records of the nesting sites at Great and Little Nicobar Islands are required to assess the status of these beaches and the abundance of leatherback nesting at these sites.
- c) Survival percentage of nests needs to be determined by monitoring the entire season to gain insight into predation patterns, hatching success and emergence success of nests laid in these index beaches.

2. Satellite telemetry

Since 2010, only 10 turtles have been tagged with satellite transmitters and only 5 of these turtles provided data for more than 100 days. Only three turtles have transmitted extensive data where we have been able to identify their foraging grounds.

While we have some insights into the post-nesting movement patterns of leatherbacks in the Indian Ocean, more satellite telemetry studies need to be carried out in subsequent years to assess if there are other migratory routes taken by the turtles nesting in Little Andaman. A better sample size will also help us assess their exposure to fishery related threats in the high seas. Supporting funds will be raised during the upcoming seasons.

3. Population Genetics

Genetic studies are underway to assess the stock to which the Andaman and Nicobar leatherback turtles belong. Supporting funds will be raised for the same.

4. Capacity building and training

The long-term conservation and management of leatherback turtles in the Andaman and Nicobar Islands depends on the involvement and support of local civil society and government. Since the leatherback turtle nesting beaches are currently in areas not accessible to the general public, the main focus of training needs to be forest department field staff. In addition, awareness programmes can inform the public about leatherback turtles and their value as a natural heritage of the islands.

The Forest Department officers and field staff at various sites have been supportive and dedicated to their sea turtle conservation efforts. We recommend advanced training in beach and hatchery management for Forest Department field staff throughout the islands.

APPENDIX I (c)

Ecotourism as an alternative livelihood for local communities in Rushikulya, Odisha

Introduction

In December 2016, we conducted a stakeholders workshop to discuss the preliminary results of the study that we carried out in Rushikulya (refer previous report). We invited representatives from the different stakeholder groups including the forest department, fisheries department, tourism department, local community representatives and sea turtle scientists and researchers. In this workshop, the efficacy of the current conservation regime in Rushikulya was discussed. The perils of alienating fisher communities with an unnecessary blanket ban were discussed.

The results of our study showed that support for conservation from the local community was suffering from the single minded attention that turtles were receiving. Rushikulya has been in the spotlight for over a decade but the plight of the fishers still remains unchanged, and this seems especially unfair when conservation activities have impacted livelihood of the fishers.

As a result, we decided to go beyond conservation activities and make an attempt at assisting with community development activities and exploring livelihood options.



Our activities this season included networking and facilitating entry of different specialised NGOs into the region.

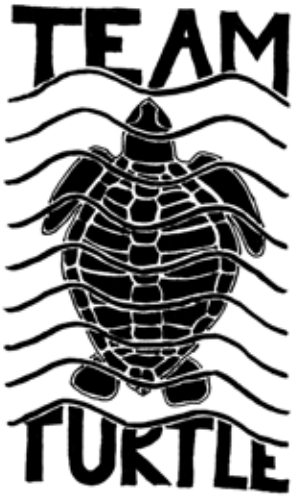
Thinkzone is one such NGO that was able to access the community through us. They work with livelihoods for women and early education for pre-primary and primary school children. Dakshin sponsored the training of 5 women from the villages to become teachers in this program.



Apart from this, we also brought to light the water scarcity that exists in these villages to different NGOs such as WaterAid and Gram Vikas. Both of these organisations have a large presence in Odisha. Dakshin is also exploring areas such as sustainable water supply through rain water harvesting and providing low cost water filters to fisher families that do not have regular access to drinking water. We are further discussing collaborations with Indian Gramin services (work with livelihoods) and Institute of Public health (IPH). We have also offered assistance to the Forest department in their trust building exercises such as the organisation of a health camp.

We have been working on trying to understand how we can embed these activities in the larger framework of conservation. We are focusing on building a partnership with the community, to strengthen bonds at the grassroots level for a stronger framework of conservation combined with community development.

APPENDIX II



A t-shirt was made to celebrate 8 years of tracking sea turtles along the Indian coast. The t-shirt is available for sale to non-project persons, and proceeds will go to sea turtle monitoring.

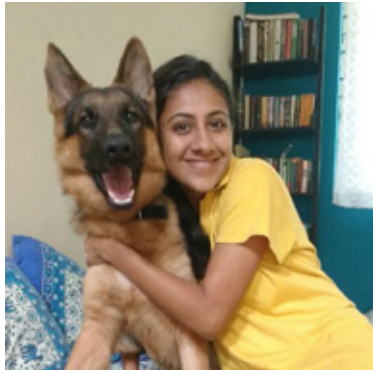


Field staff and project personnel

Sea turtle monitoring



Alissa Barnes



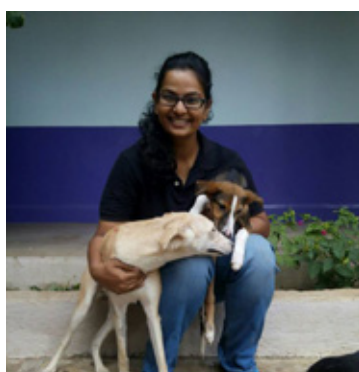
Ridhi Chandarana



Meenakshi Poti



Sadhwi Sindura



Mugdha Kulkarni



Chetan Rao



Nupur Kale



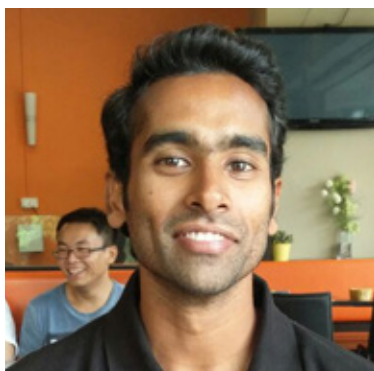
Amrit Kumar Mishra



Sajan John



Ema Fatima



Adhith Swaminathan



Divya Karnad

Project Coordinators



Kartik Shanker



Naveen Namboothri



Muralidharan M

Turtle Action Group



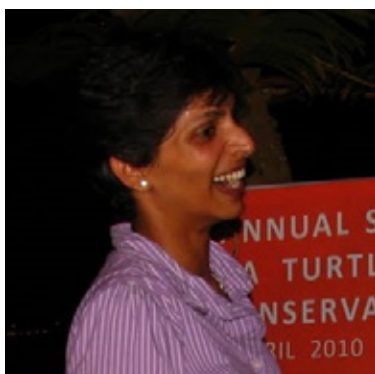
Rutuja Dhamale



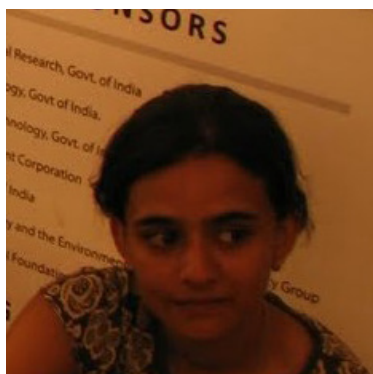
Smrutica Jeetendranath



Amrita Tripathy



Terenia Berlie



Seema Shenoy



Mallika Sardeshpande

Madras Crocodile Bank Trust



Zahida Whitaker



Mohan Murugaiyan



Pavithra Munusamy



Manish Chandi



Gowri Mallapur

Odisha field personnel



Bipro Behera



Kedar Rao



Surendra Behera



Shankar Rao



Judishtir Behera



Sriramulu



Magata Behera



Mahendra Nayak



Dhambru Behera



Madhusudan Behera



Hariprasath. R

Andaman and Nicobar Islands field personnel



Saw Colombus



Sabien Horo



Sushil Lakra



Saw Kenik



Saw Samson



Saw Watha (Agu)



Sandeep



Saw Darius



Saw Mumong



Saw Thesorow



Saw Berny

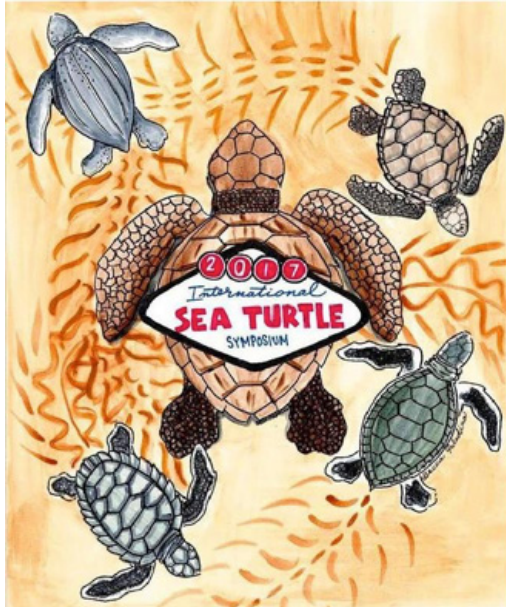


Saw Isaac



Saw Willy

Appendix II (a)
Other achievements by project personnel
37th annual symposium on sea turtle biology and conservation



Three project staff presented their work at the 37th International Sea Turtle Symposium in Las Vegas and showcased the highlights of the project.

Adhith Swaminathan presented a poster titled “The Indian Ocean is my swimming pool: Leatherback turtles of the Andaman and Nicobar islands”.

Chetan Rao presented a poster titled “Understanding offshore congregations of olive ridley turtles (*Lepidochelys olivacea*) in an arribada population along the coast of Odisha”.

Ridhi Chandarana presented a talk titled “Conflict to coexistence: can ecotourism be a game changer?” which summarized the study conducted in Rushikulya, Odisha that explored the potential of ecotourism as an alternative livelihood for fisher communities in conflict with turtle conservation.

Regular engagement with the larger community of scientists and conservation groups working on marine turtles along the globe gives the team a much needed global perspective on current and relevant topics.

IUCN-Marine Turtle Specialist Group:

Adhith Swaminathan and Muralidharan. M who have been part of the project activities of this grant since 2009 have recently been inducted into the MTSG of IUCN and are currently involved in collating information on marine turtles in the Northern Indian Ocean to submit the Regional Vice-Chairs.

APPENDIX III (a)
Member Organisations of TAG

State	Name of Organisation
Andaman & Nicobar Islands	Andaman and Nicobar Environment Team (ANET)
Andhra Pradesh	Visakha Society for the Protection and Care of Animals (VSPCA)
Andhra Pradesh	Manthini Ujwala Welfare Society
Gujarat	Prakruti Nature Club (PNC)
Gujarat	Green Future Foundation
Karnataka	Field Services and Intercultural Learning (FSL)
Karnataka	Canara Green Academy (CGA)
Kerala	Green Habitat
Kerala	Naythal
Lakshadweep	Lakshadweep Marine Research and Conservation Centre (LMRCC)
Maharashtra	Sahayadri Nisarga Mitra
Odisha	Action for Protection of Wild Animals (APOWA)
Odisha	Alacrity
Odisha	Green Life Rural Association (GLRA)
Odisha	Orissa Marine Resources Conservation Consortium (OMRCC)
Odisha	Podampeta Ecotourism and Olive Ridley Protection Club (PEORPC)
Odisha	Project Swarajya
Odisha	Rushikulya Sea Turtle Protection Committee (RST-PC)
Odisha	Sea Turtle Action Program (STAP)
Tamil Nadu	Students' Sea Turtle Conservation Network (SST-CN)
Tamil Nadu	TREE Foundation

National level organisations and research institutions that support TAG

- Centre for Ecological Sciences, Indian Institute of Science
- Dakshin Foundation
- Greenpeace – India
- International Collective in Support of Fishworkers
- Madras Crocodile Bank Trust
- Wildlife Institute of India
- Wildlife Protection Society of India

APPENDIX III (b)

Core Committee members of TAG

Odisha - Mr. Mangaraj Panda
Andhra Pradesh - Mr. Pradeep Kumar Nath
Tamil Nadu - Mr. Harish
Kerala - Mr. Sudheer Kumar P.V.
Karnataka - Mr. Jeevan
Maharashtra - Mr. Bhau Katdare
Gujarat - Mr. Dineshgiri Goswami
Islands - Mr. Adhith Swaminathan

Members organisations of the Turtle Action Group



APPENDIX III (c)

TAG Members Profile

TAG members:

1. Andaman & Nicobar Environment Team (ANET): Andaman and Nicobar islands

Unique in being the only organization based on an island. Andaman and Nicobar islands are prime nesting sites for sea turtles of all four species that occur in India, namely Green, Hawksbill, Olive Ridley and Leatherback.

2. Visakha Society for Protection and Care of Animal (VSPCA): Andhra Pradesh
Through its innovative awareness programs, VSPCA intends to educate the masses and build a strong and lasting bond between animals and human societies. They have field related expertise, necessary for effective conservation of sea turtles.

3. Prakruti Nature Club (PNC): Gujarat

PNC works along the Saurashtra and Gujarat coast. Their main focus is on protection of sea turtles, their nests and habitats, whale sharks and other sea creatures. Having an excellent relationship with the forest department, they hope to contribute through the collection and distribution of information and data related to turtles.

4. Canara Green Academy (CGA): Karnataka

CGA's main mission has been conservation of turtles, mangroves and medicinal plants. Along with the Karnataka Forest Department, they have established 40 sea turtle breeding centres all over the Karnataka coastline. Potential sea turtle nesting beaches have been identified and both ex-situ and in-situ conservation are carried out, depending on the security of the nests identified.

5. Field Services and Inter-Cultural Learning (FSL India): Karnataka

They have been successful in creating awareness among fishermen community along 60km of North Udupi district of Karnataka state. They are unique in placing international volunteers in local community projects to support sustainable development and to bring inter-cultural dimensions to community projects.

6. Lakshadweep Marine Research and Conservation Centre (LMRCC): Lakshadweep

The organization established by a group of islanders, is the first that has a primary focus on community based marine conservation. Lakshadweep has a significant population of endangered green and hawksbill turtles. LMRCC work with the local community, school students, fishermen and the Forest Department to reduce the threats to these ocean ambassadors through education and awareness programs.

7. Sahyadri Nisarga Mitra (SNM): Maharashtra

They work towards conservation, awareness and research of the region's biodiversity, focusing on conservation of marine turtles, white-rumped vultures and Indian swiftlets.

8. Action for Protection of Wild Animals (APOWA): Odisha

APOWA believes in finding solutions to animal welfare and conservation challenges that provide lasting benefits for animal and community. They have ten years of experience in sea turtle conservation in Odisha through research, conservation and action. Their work is carried out in the buffer zone of Gahirmatha sea turtle rookery site, world's largest olive ridley mass nesting site.

9. Alacrity: Odisha

Amongst several others, their sea turtle activity involves imparting awareness to fishing community residing within the periphery of the Gahirmatha area. They have also developed 'eco-development' groups, with 60 so far, within the region, for conservation of natural resources including mangrove forests.

10. Podampeta Ecotourism and Olive Ridley Protection Club: Odisha

They address various threats to the nesting turtles by carrying out awareness programs that inform people in nearby villages regarding the importance of turtles to the coastal ecosystem and the illegality of such activities.

11. Rushikulya Sea Turtle Protection Committee (RSTPC): Odisha

With the primary aim to help conserve olive ridley turtles and safeguard their nesting beaches along the Rushikulya coast, they began to monitor the nesting population and assist in the release of hatchlings during mass hatching. They also collect data on tagged turtles, recapture studies, distribution of mating congregations, satellite transmitter ranging studies and monitoring hatchling mortality rates.

12. Students' Sea Turtle Conservation Network (SSTCN): Chennai, Tamil Nadu

Sea turtle conservation began in 1971, when a few dedicated wildlife enthusiasts began walking the beaches of Chennai to document the status of and threats to sea turtles. The group has been mainly organized and operated by students from colleges and even schools and a few young working adults. The motive has always been conservation and awareness creation.

13. TREE Foundation: Chennai, Tamil Nadu

It involves the fishing community youth (Sea Turtle Protection Force- STPF) in a sea turtle protection and conservation program in South India. Education and creating awareness at the community level is an integral part of their conservation program.

14. Green Mercy: Andhra Pradesh

An NGO based in Srikakulam. They carried out intensive surveys, giving a better picture of marine turtle status on the coast of Andhra Pradesh. They have contributed to the conservation of marine and coastal life by holding consultative meetings with fisherfolk and local communities.

15. Sea Turtle Action Program (STAP): Odisha

This is an NGO based at Devi, another mass nesting site in Odisha. They work on sea turtle protection and community empowerment.

16. Green Life Rural Association (GLRA): Odisha

GLRA was formed in 1993, by a group of thirteen committed village youth who were then working on the Wildlife Institute of India's sea turtle project. Members of GLRA also worked in Operation Kachhapa when it was launched, at the time as a joint operation with the Forest Department and Wildlife Protection Society of India. GLRA's activities are focused in the Devi river mouth region.

17. OMRCC: Odisha

It brought together divergent groups comprising of conservationists, biologists and fisherfolk to meet and interact, which would be beneficial to both conservation as well as livelihoods. They continue to work on the ongoing olive ridley project in Odisha.

18. Green Habitat: Kerala

Green Habitat came into form in 2002 as an independent organisation. The organisation pilots activities for wildlife and environmental conservation in Chavakkad taluk in Kerala. Their areas of focus include the mangroves of Chettuwei, nesting turtles of Chavakkad beach, birds of Enamakkal Kole Islands and house sparrows among others. A major part of their efforts at conservation is directed towards environmental awareness and education among local communities in the area.

19. Naithal: Kerala

It is an NGO based in Kasargod district of Kerala that works on coastal information, conservation and action. It was established in 2001 by a group of local enthusiasts. They have worked on sand mining issues and work extensively on sea turtle conservation.

More information about the TAG members can be found in the 13th and 14th issues of IOTN. The links to the issues are:

IOTN- 13: <http://www.iotn.org/iotn-13.php>

and

IOTN- 14: <http://www.iotn.org/iotn-14.php>

APPENDIX IV

Small Grants Program 2016-2017

A part of the MCTA project fund is disbursed as small grants through Madras Crocodile Bank Trust. The small grants programme was started in 2010. The Small Grants programme provides financial support to local NGOs actively involved in sea turtle conservation, demonstrating consistency and commitment in their projects. This year, a total of INR 1,70,000 has been disbursed to four organizations as follows:

State	Organization	Amount (INR)	Project title
Odisha	Action for Protection of Wild Animals	35,000	Community awareness campaigns on conservation of olive ridleys
Odisha	Sea Turtle Action Programme	35,000	Capacity building training to personnel engaged in sea turtle protection in Devi river mouth region of Odisha coast
Odisha	Rushikulya Sea Turtle Protection Campaign	30,000	Observation and celebration of world turtle day 2017
Gujarat	Prakruti Nature Club	35,000	Hatchery management and awareness
Tamil Nadu	Students Sea Turtle Conservation Network	35,000	Sea Turtle conservation in Chennai coast and Awareness Creation in coastal Tamil Nadu

*1 USD ~ 66 INR

Increased capacities of independent groups ensure greater benefits to the network as a collective. Financial support to individual efforts of member organisations in the nature of small grants can help sustain their interest and participation in the network, in addition to achieving the overall conservation objectives of the network. As a facilitating organisation, this demonstrated need has necessitated MCBT and partner organisations to commit additional resources towards meeting long term network objectives within the broader scope of sea turtle conservation and habitat protection. With the support of Dakshin Foundation, TAG is now coordinated by a dedicated team of members from both organisations who provide administrative support to the network.

APPENDIX V **Audit Report 2016-17**

MADRAS CROCODILE BANK TRUST VADANEMMELI VILLAGE, MAHABALIPURAM						
CONSOLIDATED INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31/03/2017						
PREV YR.	EXPENSES	AMOUNT(Rs.p)	AMOUNT(Rs.p)	PREV YR.	INCOME	AMOUNT(Rs.p)
	FEED AND REPTILE RELATED EXPENSES					
3,843,334	Feed Expenses - Reptile	2,853,610		13,740,205	Gate Contributions	
2,442,031	Maintenance of Sheds	2,250,321			CONTRIBUTIONS RECEIVED FOR :	
2,192,837	Pit Maintenance	2,540,574		90,000	Adopt an Animal	375,000
83,242	Certification Fees	23,268		702,860	Education	3,153,031
17,323	Lab / Veterinary Expenses	51,415			Florida Python Project	1,311,171
53,963	Water Supply	45,147			Komodo Dragon Enclosure construction	12,000
	Crocodile Transportation	64,975	7,829,310	789,828	Contribution for ISSF Project	455,160
				3,462,084	Contribution for MTCA	3,526,015
					Vet workshop registration	189,000
	ADMINISTRATION EXPENSES					
3,032,668	Travel and Conveyance	3,114,798		2,678,979	Chariat Task Force	1,886,377
2,253,561	Food and Lodging Exp	2,029,691			USV Project	1,500,000
821,690	Croc Shop Expenses	981,496		44,000	ARRS Donations	115,600
750,500	Stationery and Printing	882,133			ARRS Nature Camp	404,300
738,349	Electricity Charges	852,081		12,158	Journal Contributions	180,000
512,108	Fax/email	652,097		3,517,354	Madras Turtle Project	
63,015	Hospitality Expenses	210,710				
341,231	Vehicle Maintenance	262,944		42,050	Contribution - N Leithli Assurance Proj	6,500
260,631	Telephone Expenses	281,671		71,000	Contribution for Venom Project	
424,301	Vehicle Hire Charges	391,012		279,350	Contribution for Coral Reef Monitoring	
175,777	Computer Maintenance	31,932		227,604	Contribution for King Cobra Telemetry Proj	66,101
93,999	Postage	88,897		45,000	Contribution for Leather Back Turtles	25,027
64,946	Publicity and Advertisement	10,719		3,521,692	Contribution for Rain Damage Repair	
3,050	Library / Books / Journals	13,200		2,000,000	Contribution Snake Bite Mitigation	
13,200	Rates, Fees and Taxes	52,900		301,321	Contribution Snake Rescue & Snakebite Awareness	309,283
45,600	Audit Fees	170,097		2,400,000	ANET Donations	
174,486	Boat Maintenance	7,420		196,412	ANET Research	129,916
36,200	Pooja Expenses			515,053	ANET-Seacology project	369,325
2,600	Office General Expenses	17,170		1,019,820	ANET Contributions	1,367,950
69,663	Workshop Expenses	20,356			Crocodile transfer contribution	215,936
13,059	Bank Charges			629,225	Other Contributions	2,169,940
31,552	ANET Merchandise Purchase				Anniversary registration	251,016
2,594	Membership and subscription	166,874			Catecean fisheries interaction project	430,400
206,779	Equipment Maintenance		10,283,621		Conservation aspects of sharks	562
					Diversity of Geckos	416,233
					MCBT Master plan development grant	356,673
					Contribution-Renewing Livelihood resources	550,000
						19,772,515
16,764,288	Carried Forward		18,112,931	36,285,995	Carried Forward	35,039,275

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Centre for Herpetology

Madras Crocodile Bank Trust

STATEMENT OF EXPENDITURE

For the period from: 01/09/2016 to 31/8/2017

Project Title: Advancing the conservation of sea turtles in India at a national scale through the monitoring of index sites, and coordination of coastal management efforts with a network of partners.

Investigator : Zahida Whitaker

Item (Description)	Sanction USD	Expenditures in USD (67.06)	Sanction Balance USD
Salaries	\$ 28,785.00	\$ 28,785.00	\$ 0
Travel	\$ 9,401.00	\$ 9,401.00	\$ 0
Activities of Partners	\$ 2,088.00	\$ 2,088.00	\$ 0
Production of Outreach material	\$ 2,261.00	\$ 2,261.00	\$ 0
Training and workshops	\$ 0	\$ 0	\$ 0
Equipment	\$ 0	\$ 0	\$ 0
Consumables	\$ 0	\$ 0	\$ 0
Communication	\$ 2,144.00	\$ 2,144.00	\$ 0
Field station rent and maintenance	\$ 3,121.00	\$ 3,121.00	\$ 0
Institutional overheads (@10%)	\$ 4,780.00	\$ 4,780.00	\$ 0
Total	\$ 52,580.00	\$ 52,580.00	\$ 0

Zahida Whitaker
Zahida Whitaker

Director

Date: 15-12-2017

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www.seaturtlesofindia.org*

Cover photo: Adhith Swaminathan

