Madras Crocodile Bank Trust

Annual Report- 2018-2019

INTRODUCTION

Another busy and productive year has gone by in the annals of the Madras Crocodile Bank Trust, or "Croc Bank". It was started in 1976 by a group of idealistic conservationists including Rom Whitaker and Zai Whitaker, initially with private funds and a lot of goodwill and support from friends and family, as a desperate effort to save India's dwindling crocodilian populations from extinction. At that time the gharial was particularly endangered, with only 300 or so left in the wild. The mugger and saltwater crocodile were in better shape but hunting and habitat depletion were serious threats for them as well. Today, after over 40 years of cutting-edge science/research and grassroots education and awareness building, the Croc Bank is recognized as a world leader in the field of frontline conservation of species and habitats. Its infrastructure and programs include a reptile zoo on the East Coast Road south of Chennai, and field stations and study sites reaching as far afield as the Nicobar Islands. The zoo receives about 4.5 lakh visitors annually, making it one of the popular tourist attractions in the region.

Originally designed to be a living repository of crocodilians for genetic safekeeping, the Croc Bank is now no longer confined to crocodile conservation but includes all reptiles in its mandate and its title includes "Centre for Herpetology". The release of captive bred crocodiles into the wild, which was the original goal, has not happened because of shrinking wilderness areas and the lack of suitable habitats. There are therefore about 2000 crocodiles in residence. The mandate has also extended to crocodilians from other countries, in fact all the world's species, ie 23. Of these, 16 are housed at the Croc Bank currently, the only place in the world where such a sizeable chunk of the total species can be seen. Of the species represented, 2 are listed as *Critically Endangered* by the IUCN, and 3 as *Threatened.*

In 2003, the Trustees of the Croc Bank decided to expand its mandate and reach, and become a centre for herpetology. Its work now includes the conservation of all reptiles, ie snakes, chelonians and lizards as well. The need for chelonian conservation has grown in recent years and MCBT now breeds several threatened species including 2 that are listed as *Critically Endangered* by IUCN. Field work, namely surveys and ecological studies, are a large part of its activities; in fact our core operation is as much a field based conservation outfit as it is a captive gene pool of endangered species.

Over the years, the Croc Bank has developed into a world-renowned conservation NGO with strong community and government support at the local and national level. Apart from its commitment to research and conservation of herpetofauna, it is a recognized resource for environment education and interpretation. Its strength has been to maintain a relatively small but effective operation that is dynamic in action and prolific in results. An example of this is its field station in the Andaman Islands, ANET (Andaman and Nicobar Environment Team).

Shortly after its foundation in 1976, the Croc Bank team realized that there was a serious and urgent need for herpetological surveys and conservation action in the then little-known and neglected Andaman and Nicobar archipelago. ANET was conceived and started, and has since carried out extensive work on marine turtles and marine ecosystems, herpetofaunal

biogeography and many other biological studies. In addition, ANET has also been productively involved in the broader ecological and social spheres, including projects on natural resource utilization, sustainable development and protected areas management. As one of the oldest and most known and trusted NGOs in the Islands, ANET played a pivotal humanitarian role after the 2004 tsunami devastated the region, including getting relief supplies to desperate victims. Today, although still active in the herpetological arena, ANET carries out a broad range of environmental work including marine and terrestrial components. It remains the only research base in the archipelago and voices ecological concerns on many local committees which advise government on development policies and assessments. Its education and awareness building work includes programs and presentations for local and mainland schools, colleges and other institutions and groups on the amazing ecology of these islands and the need to conserve it.

Currently, Dakshin Foundation partners with the Croc Bank in the administration and development of ANET and this has been a most productive partnership which will have long-lasting benefits for the conservation and research platforms in the Islands.

Another such field station is ARRS, the Agumbe Rainforest Research Station. Situated in Agumbe in the Western Ghats, it was set up by Rom Whitaker in 2005, it's focus being the biology and conservation of the king cobra. Agumbe is one of the world's last refuges of the "king". Other iconic herpetofauna in the area, include draco (flying lizard), pit vipers and several species of endangered amphibians. A black panther routinely strolls down one of the pathways that adjoins the ARRS campus. Research projects range from frogs to pit vipers, and of course the king cobra. A rescue-release project for king cobras is the "call centre" for farms and households in the district, which have now become increasingly tolerant to this occasional visitor, thanks to the public education work being done by ARRS staff. The snake is removed and relocated, and the family/community is given moral support and confidence because superstitions and erroneous fears are negated, and scientific information provided. This has been named the most successful snake rescue services in the country, because it deals with one of the most threatened species of snake in the world.

2000 kms to the north of MCBT on the mighty Chambal River, is Garhaita: the base of the Gharial Ecology Project, one of the most long-term and in-depth crocodile studies in the world. Using sophisticated data collection techniques including telemetry, the study is tracking the home ranges and observing the habits of this wonderful and rare animal. Local inhabitants are being trained in these techniques, and the need for conserving the species. Interesting and surprising data and information has emerged about the natural history of the gharial, such as the extensive riverine range of adults and the protection of hatchlings by adult males.

MCBT's education programs include school camps and family activities, as well as hands-on zoo experiences for youngsters such as Zoo Keeper for a Day. There are also presentations in rural schools and this year, with funding from USV Pharmaceuticals, the Croc Bank conducted programs on snakebite and its treatment at schools, colleges, NGOs, government departments and tourist groups. Education is definitely the key to long term sustainable

conservation. We devote a large part of our time and resources towards educating people of all ages and backgrounds on the importance of conserving reptiles and natural ecosystems. Workshops and training programs are also tailor- made and carried out for other zoos, schools, colleges, conservation agencies and government departments on topics related to reptile conservation, husbandry and management. These include groups from other countries as well, since we hold husbandry experience for species in those regions (eg the Siamese crocodile).

We could not do what we do, without the help we receive from innumerable well-wishers. This includes donations, field and program participation, partnerships, and other "in kind" support. The names of this community of Croc Bank friends is too extensive to include in this report in its entirety, but we are extremely grateful for this.

ADMINISTRATIVE DETAILS-MCBT

Office Bearers

Ex Officio Trustees:

Rom (Romulus) Whitaker (Founder)
Zai (Zahida) Whitaker (Founder)

Trustees:

Ashish Gupta	Samit Sawhny
Prof Satyajit Mayor, Director, NCBS	Kamini Sundaram
M.M. Venkatachalam	

Personnel-office and administration

Joint Directors	Zai Whitaker
	Allwin Jesudasan
Curator	Nikhil Whitaker
Assistant Curator/Snakebite Coordinator	Ajay Kartik
Zoo Manager	K K Rajendran (Till August'18)
	K Narasimmarajan (From September'18)
Education Officer	Anjana Srimathi
Zoo Educator	C.V. Arul
Veterinarian	Dr Arun Pari
Communications Officer	Venetia Sharanya
Conservation Officer	Ganesh Muthiah
Asst Coordinator, Snakebite Mitigation	Gnaneshwar Ch
ANET -Senior Research Fellow	Dr Manish Chandi
ANET- Operations Manager	Saw John

ANET- Base Coordinator	Adhith Swaminathan
ANET- Marine Research Officer	Mahima Jaini
ANET- Post Doctoral Fellow	Madhuri Ramesh
ARRS- Field Director	Ajay Giri
ARRS-Research Director	Seshadri KS
ARRS- Research Associate	Yatin Malik
ARRS- Base Manager	S S Jayakumar
Gharial Ecology Project PI	Dr J.W. Lang
Gharial Ecology Project Coordinator	Jailabdeen A

Accounts, Husbandry and Maintenance

M. Mohan	Accountant
M Pavithra	Assistant Accountant
V. Gangadurai	Chief Reptile Keeper
S. Nagarathinam	Chief Reptile Keeper
S. Sampath	Snake Keeper
R. Thangaraj	Supervisor, Entrance and pen watchers
C. Dhanasekaran	Zoo Educator
L. Gunasekaran	Maintenance Supervisor
V. Mohanasundaram	Curatorial Assistant
T. Mohan	Office Assistant
C. Purushothuman	Senior Office Assistant
N. Selvamani	Ticket checker
R. Gnanamurthy	Ticket checker
M. Indradevi	Senior House Keeper
E. Amutha	Enclosure Maintenance and House Keeping
S. Shanthi	Chelonian Keeper
J. Parimala	Enclosure Maintenance
M. Ramu	Driver
S. Janakiraman	Animal Keeper
N. Pushparani	Croc Shop Operator
G. Ashok Somai Magar	Chief Cook
S. Mohan	Cleaning and Maintenance Asst
G. Gowri Shankar	Animal Keeper
Tek Bahadur Somai Magar	Security Guard
Budibal Somai Magar	Security Guard
Krishna Bahadur Somai Magar	Security Guard
V. Yuvarani	Maintenance and Cook
A. Kumari	Maintenance and Cook
K Elumalai	Maintenance Assistant

ACTIVITIES AT THE CROC BANK

Additions and Changes:

New signage includes a hand-painted information board on snakebite and an adoption board near the entrance. The biggest structural change has been the near-completion of the service road outside MCBT, and the western compound wall. The Education Office was moved to the "Reptales" building, allowing for work spaces for volunteers and interns as well. The canteen and dormitories were repaired and refurbished. The "beach pen", which had been occupied by spectacled caiman before the new enclosure was built, was filled in using sand from the mound behind the gharial enclosure, and is no longer an eyesore!
A café franchising with Tibbs-Frankie will be opening shortly near the interpretation centre, with snacks and beverages.

Accessibility

A new, sand-friendly wheelchair is now available for handicapped visitors and is being frequently used. (The earlier one was too heavy, and difficult to manoeuvre on the sandy paths.)

Staff Professional Development and Networking

In July 2018, Anjana Srimathi participated in the "Getting to Know" workshop organised by Oracle with support from CAF India. The workshop provided an excellent opportunity to know other organisations, forge relationships and helped participants understand areas of knowledge building that will partners like MCBT in the future. I learnt entirely new aspects of project management - Finance and Accounting and impact reporting in the workshop. Each organisation was provided with a chance to discuss in detail about our mission and projects. Utilising the platform provided, I presented the snakebite conservation project and addressed each nuance concerning our awareness models (in-situ and outreach) plus advertised the various opportunities ARRS can provide for prospective groups.

The Student Conference on Conservation Science (SCCS) is one of the best platforms that act as a bridge between organisations and like-minded individuals. Anjana Srimathi attended the SCCS 2018 in Bangalore held from 27th Sept to 30th September and represented the Croc Bank at the "Who's Who in Conservation" section. Through this session, she publicized Croc Bank and its field stations (programs, projects and opportunities). She was assisted by two ex- volunteers Chaitrika Reddy and

Laurynn D'Souza. Their personal anecdotes about their experience at MCBT brought in several applicants for volunteering and interning. She also had the opportunity to discuss and understand the current conservation research and attend workshops on social science and conservation, grant writing, eco-tourism and conservation optimism.

On 15th February, Venetia attended the Rotary Karnataka CSR Conference in Bangalore. It had four components, namely, growing local economies, education, health care, and sanitation. It was attended by several corporates and NGOs.
The CSR heads of organizations spoke about their targets and what they look for in projects for consideration. Heads of NGOs also were part of the panel and voiced their concerns and challenges. The main challenge for most NGOs and funding agencies, especially those working in the field of preventive health care is the measurement of the success of their work. Mr. D Ravishankar, a realtor who donated Rs 100 crore to the Rotary foundation was also present and gave a talk on 'Giving Back'. Ms. Mary Kom was one of the Keynote Speakers. She spoke about what inspired her to become a boxer, and her plans to start a boxing museum.

Ajay Kartik, Assistant Curator, was a resource person for a staff training program at Nandankanan Zoo on February 18th and 19th. Two batches of about 50 staff each attended the program, and were given presentations on zoo management, CZA guidelines and husbandry related subjects. Ajay's talk was focused on captive management of reptiles. In addition, a practical component on safe restraint and examination of reptiles was conducted on both days.

Zai Whitaker and Venetia Sharanya attended the Naturalists Conclave on 23rd February. It was organized by the Adyar Nature and Environment Centre (ANEC)at the Theosophical Society. Zai spoke about the development of MCBT, and its conservation and research work. Other speakers included Dr. Swati Gole from the Ecological Society, Pune who spoke about grassland restoration, Dr. Jayshree Vencatesan from Care Earth Trust (biodiversity of urban Entities), Dr. Supraja Dharini from Trust for Environment Education (sea turtle conservation). There were other inspiring speakers as well; a good opportunity for MCBT to meet people in other conservation NGOs and discuss possibilities of networking.

On March 14th 2019, Communications Officer Venetia Sharanya attended a grant writing workshop conducted by the Confederation of Indian Organisations for Service and Advocacy (CIOSA). Session topics included how to select possible funders, maintaining databases, and grant design.

Research Coordinator for MCBT's field station (ARRS) in Agumbe, Seshadri K.S. was selected for and attended the first SERB School in Evolutionary Biology which was held from 12th to 26th March at the Jawaharlal Nehru Centre for Advanced Scientific Research, Bengaluru.
Apart from the intense training and re-learning, he had a chance a chance to interact with the top contributors to advance in biology from our country.

Assistant Coordinator of the snakebite mitigation project, Gnaneshwar Ch, has been awarded a place as a Youth Delegate at the Youth for Wildlife Conservation Forum in Colombo, Sri Lanka, 20-28 May 2019. He is among the 21 international delegates selected from nearly 2700 applications, and will be presenting on MCBT's snakebite mitigation project. He also attended the NIDUS Herpetology course in January, organised by Dr Varad Giri, and writes: "This course was basically for me to learn about the basics of herpetology and also to develop our network of (snakebite project) partners. I attended the initial taxonomy class on 24th Jan at BNHS, where Dr Giri and Ashok Captain taught us the basics of taxonomy and identification. Following this, I went for a field trip to Amboli, Maharashtra between 25-27th Jan. This field trip was accompanied by Dr Giri and Krishna Chaitanya who taught us field techniques and hands-on sessions on taxonomy. During this initial trip, I engaged with the fellow participants and oriented them about our work on snakebite. As a result of this, they're interested in conducting some education workshops on snakebite.

Workshops and Training at MCBT

Many training programs and workshops were conducted for participants of professional wildlife management, forestry and related courses including for officer trainees of the Wildlife Institute of India and the Central Academy for State Forest Service, Dehra Dun.

Numerous programs were conducted on snakebite prevention and treatment (see Projects section below).

Visitors

Marissa Ishimatsu, wildlife photographer and conservationist from California, Rebecca Johns from the University of South Florida, a group from the Victoria Herpetological Society and the Vice President of Jet Airways were some of the visitors to the Croc Bank. Some of the filming groups included Gemini Pictures, Gryphon Films, Sameer Raichur, Love Productions.

Curatorial News

Mugger Project

- The Curator, project head of the Cauvery mugger project, visited the region several times, and an intern, Jason Gerard was hired to cover more area on the river.
- The Curator has received permission from TNFD, to conduct surveys, and radio-tag 5 mugger crocodiles (*Crocodylus palustris*) on the Cauvery River.
- Behavioural observations on captive mugger crocodiles in Pen 10 have been carried out for the second successive year, with an emphasis on the progress of nest defence through the incubation period.
- MCBT and KANS (Kenneth Anderson Nature Society) did a combined recce survey of mugger on the Cauvery River, on the Tamil Nadu side (near Hosur). The MCBT Assistant Curator was part of this survey.

Mugger crocodiles observed during surveys on the Cauvery.

Exchanges, Liaison with Zoos

- The Curator visited the Arignar Anna Zoological Park, on the invitation of their Director, to give comments on the design of a king cobra enclosure.
- We are following up with the Odisha Forest Department for the repatriation of 20 Northern River Terrapin. (*Batagur baska*) into the mangrove habitats of the state.
- Likewise, we are following up with the Uttar Pradesh Forest Department for repatriation of 30 Red-crowned roof turtle (*Batagur kachuga*).
- Permissions for import of a male and female Orinoco crocodile (*Crocodylus intermedius*) from the Dallas world Aquarium is pending with DGFT.
- CZA has approved the import of a male and female Philippine crocodile (*Crocodylus mindorensis*) from the Danish Crocodile Exhibition along with a male Black caiman (*Melanosuchus niger*)
- A request has been made from the Assam Zoo for four muggers and four gharials. They have 10 surplus Peacock softshell turtles (*Nilssonia hurum*) and we plan to request two males and two females from them in exchange.
- Alipore Zoo, Kolkata and MCBT have had an exchange approved by the CZA. MCBT is to give them 4 yellow anacondas (*Eunectes notaeus*) and receive two pairs of banded kraits (*Bungarus* fasciatus) and two pairs of monocled cobras (*Naja kaouthia*).

Captive Breeding

- The green Anaconda (*Eunectes murinus*) female produced 11 offspring in October 2018.
- Travancore tortoises (*Indotestudo travancorica*) have laid over 40 nests over the course of the year.
- Gharial (*Gavialis gangeticus*) have laid a total of five nests till date.
- The Northern River Terrapins (*Batagur baska*) laid a clutch of 23 eggs. This critically endangered turtle has bred successfully for the 4th year in a row since the acquisition of a male from Austria.

- Three striped roofed turtles (*Batagur dhongoka*) have bred for the second consecutive year and produced 8 hatchlings.

Captive bred *Batagur baska* hatchling

Education Activities

Education is a critical part of the Croc Bank's work. The Education Department designs and implements awareness programs on-site and at schools, colleges, NGOs and other venues. Additionally, working alongside the Curatorial Department, the educators provide an opportunity for interested and passionate individuals to apply for the volunteer and docent programs. The programs encourage and train individuals in various aspects concerning conservation. The program has received wide attention and appreciation, and past volunteers have spoken and written of it as enriching, inspiring and immensely valuable. Moreover, many of them have gone on to establish impressive wildlife careers for themselves.

This year (April 2018- March 2019), 61 programs were conducted for schools, NGO's, colleges and residential communities. The program duration ranged from an hour to 2-day workshops conducted at the Croc Bank.

Night Safaris were conducted throughout the year from Tuesday to Sunday and 2075 individuals (adults and children) participated in this exciting nocturnal tour.

Feeding demos and talks were done on Sundays at the following timings; 11:30 am, 12:30 am, 4 pm and 5 pm. The JAWS feeding talk was conducted at 4.30 pm every Sunday of the year. Snake talks were conducted regularly on Saturday and Sunday. If the docents were present, talks were assigned to them and conducted under the supervision of the Education and Curatorial department. Educators were present during the week to interact with visitors. During feeding demos educators, docents and volunteers interacted with the general public thereby ensuring an informed audience.

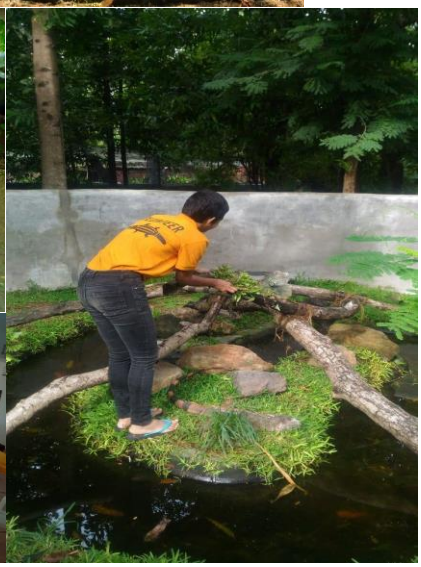
World Days were celebrated at the Croc Bank every month and new activities were modeled and implemented. The days celebrated are below:

1. World Wildlife Day – March 3rd
2. Earth Day - April 22nd

3. World Turtle Day - May 23rd
4. World Environment Day - June 5th
5. World Croc Day - June 17th
6. World Snake Day - July 16th
7. World Tomistoma Day - August 5th
8. World Lizard Day - August 14th
9. Independence Day - August 15th
10. World Wildlife Week – October 2nd to 8th
11. World Wetland Day - February 2nd





Adoption Program

The following animals were adopted this year (April 2018 to March 2019):

S.No:	Adoptee	Animal Adopted	Number of individuals	Amount (INR)
1	Dr. R. Sundarrajan	Morelet's Crocodiles	2	30,000
2	Ayan Raman	Aldabra Giant Tortoise	1	20,000
3	Mahika Mukherjee	Red-crowned Roof Turtles	2	5,000
4	MKM Matriculation Hr. Sec. School	Spectacled Caiman	7	21,000

S.No:	Adoptee	Animal Adopted	Number of individuals	Amount (INR)
5	Yamini Bhaskar	Gharial	1	10,000
6	Surajt Mahapatra	Gharial	1	10,000
7	Kamini Sundaraman	Green Iguanas	2	90,000
8	Tehnaz Bahadurji	Aldabra Giant Tortoise	1	20,000
9	Suchitra Girish	Red-crowned Roof Turtles	3	12,000
10	Dhiresh Mohapatra	Green Anaconda	1	15,000
11	Nish Niruthan	Komodo Dragon	1	40,000
12	Rujul Desai	N. River Terrapins	1	4,000
13	Pratap KS	Gharial	1	12,000
14	Vidyut Pratap	Baby Dwarf Caiman	1	4,000
15	Jayaram Krishnan	Reticulated Python	1	15,000
16	Jayaram Krishnan	Indian Rock Python	1	10,000
17	Koushik Ganesan	Red-crowned Roof Turtle	1	4,000
18	Christian Chandran	Roof Turtle and Black turtle	2	6,000
19	Aravind Chandrasekar	Red-crowned Roof Turtles	3	12,000
20	Pramod Balaji	Indian Rock Python	3	30,000
21	Sreeram Ramachandran	Green Anaconda	2	30,000
22	Saravanan	Alligators	2	45,000
23	Niveditha Mukhija	Baby Dwarf Caiman	1	4,000
24	Shobana BR	Red-crowned Roof Turtles	1	4,000
25	Dr Jaba Chauhan	Red-crowned Roof Turtles	1	4,000
26	Akshay Arya	Siamese Crocodile	2	24,000
27	Geetesh	Baby Dwarf Caiman	1	4,000
28	Shaikat Charvarthy	Reticulated Python	1	15,000
29	Christopher Manohar	Northern River terrapin	1	5,000
30	Ravi Teja	Red-crowned Roof Turtles	1	4,000
31	Shree Niketan school, Tiruvalur	JAWS	1	40,000

S.No:	Adoptee	Animal Adopted	Number of individuals	Amount (INR)
32	Shree Niketan Patasala, Tiruvalur	UW Gharial	1	50,000
33	Shree Niketan Patasala, Tiruvalur	Komodo Dragon	1	40,000
34	Surabhi Udas	West African Dwarf Crocodile	1	15,000
35	Vipul Gamit	Indian Rock Python	1	10,000
36	Gatorland, Florida	Underwater Gharial	1	3,54,340
37	Gatorland, Florida	Marsh Crocodile	1	
38	Nishand Venugopal	Indian Star Tortoise	3	7,500
39	Srinivasan Chandrasekar	Dwarf caiman	1	2,500

Volunteer Program

We had 26 candidates (including interns) for this program; and they worked on research projects and were also involved in various other aspects (maintenance and education) at the zoo.

S.No:	Name	Batch
1	Mrunal Deolalkar	March
2	Aravind P.	March
3	Rohit Srinivasan	May
4	Utkarsha Chavan	May
5	Chaitrika Reddy	June
6	Laurynn D'Souza	June
7	Arvind Rao	June
8	Rebekah David	August
9	Mahima Purushottam	August
10	Riya Bakde	September
11	Tiruvarur Vikram	September
12	Jayaram Krishnnan	September
13	Meenakshi Mohan	October

S.No:	Name	Batch
14	Kirtana Rajan	October
15	Benoit Simard	October
16	Joshua Callan	October
17	Prakash Kannan	December
18	Vandana Kannan	December
19	Aparajita Mathew	December
20	Ramu Nukala	January
21	Akshay Kodancha	January
22	Sachin Bharadwaj Lock	March
23	Abhishek Ghosh	March

Interns:

Sanna Vasu - Comic book illustrations for snakebite, 15th March to 15th April 2018.

Himadyuthi Chitti - Different ID techniques for crocodiles in pen 10, 15th May to 1st July 2018.

Jyotsna Penumarti - Studies on the garden lizard, 11th May to 9th June 2018.

The Volunteer Blog

1. Abhishek Ghosh (2nd Mar 2019 to 16th Mar 2019) – FB post

These posts indicate the backgrounds, experiences and outlook of our volunteers.

Growing up in the foothills of the Himalayas, I was not able to work towards my passion for the outdoors. Stuck to a desk job in an office, I wanted to break free. Until now! Finally, taking a few decisions, I decided to apply to the Croc Bank's research program. It has been a dream come true situation honestly. The adrenaline rush during the enclosure cleaning task is incomparable. Preparing and distributing the feed for the adorable Aldabras and the crocs is fantastic. Collecting eggs from a croc nest is something that could be only experienced and not described, especially when you have the adults in the same enclosure trying to stop you from collecting the eggs (all done under the staff supervision of course). It has been a life-changing experience so much so that I am giving a career in wildlife a serious thought.

2.Sachin Bharadwaj Lock (2nd Mar 2019 to 31st Mar 2019) - FB post

Reptiles have been my passion from a very young age, admittedly not a very long time ago, but giving me more than a decade to build some limited experience with some of the world's most unusual, and greatly misunderstood, scaled survivors. But as some might say in my native London, this is a whole other kettle of fish. The reptiles here are big, enormous. And their teeth and claws are proportionately big. But this should be seen as a new challenge, one that should be

approached respectfully and not fearfully. The rewards, I can assure you, are fantastic beyond measure. Every day brings something new and exciting, but you soon realise you don't need to defy death to reap these rewards. The quiet thrill of observing the relationship between a human keeper and a Komodo dragon, species divided by millions of years of separate evolution and yet joined through a bond forged through the excellent husbandry and cutting-edge enrichment, both of which you quickly realise are characteristic of the Croc Bank, will leave you breathless. The chance to contribute to such an inspiring institution is one that I jumped at before starting my degree in Zoology next year, and I am rewarded for it daily.

3. Ramu Nukala (15th Jan 2019 to 31st Jan 2019) – FB post

Ramu mentioned he is interested in donating brooms, keeper equipment (boxes, trash collection baskets etc.) worth 1000 Rs. to the Croc Bank. He was asking if there is a need for anything else for which he can chip in.

The Croc Bank is a unique place where people can interact, learn and have a wonderful reptilian experience. I am in love with these fascinating animals and learn more every day. The system at the Croc Bank is very well designed and runs smoothly like a well-oiled machine. Even though the Croc Bank is a private organisation, it is responsible for providing livelihoods to many people. It is not a small feat to maintain a zoo that works towards conservation and provide visitors with a delightful experience for the past 42 years!

4. Akshay L (15th Jan 2019 to 13th Feb 2019) – FB post

It's been a week since I started volunteering at the Croc Bank. To be honest, I'm enjoying every minute of my stay here. Being a wildlife enthusiast, I'm learning so much with a right amount of practical and theoretical work. Fortunately, I get to work with various animals which makes it even more interesting. The encouragement and motivation I get from the staff is immense. Did you know, the Croc Bank conducts a night safari? This session is exciting and informative since you get to see the animals after dusk. I would recommend volunteering/visiting this place if you are a reptile lover. If not, I am sure once you visit the Croc Bank you will definitely become one!

5. Prakash Kannan (4th Dec 2018 to 2nd Jan 2019) – FB post

My quest to understand, love, care & conserve nature has taken me to various places over the last 20 years. When you seek for answers nature surely does provide them in various shades. My current stop is at the Croc Bank and I have just completed over two weeks of volunteering here and I must admit that the Croc Bank apart from encouraging and assisting

us to learn and spread the knowledge, they have put in a genuine effort to conserve and protect the reptiles big and small alike. As I see it, the Croc Bank is a result of love and concern towards nature.

6. Vandana Kannan (4th Dec 2018 to 18th Dec 2018) – FB post

As a kid who watched Nat Geo Wild frequently, I have always been very curious about reptiles. I chose zoology as my major in college but as informative as books are, they don't teach you all the skills. Hence I looked for places that could give me first hand experience and knowledge about the behaviour and biology of reptiles. The Croc Bank, being the largest herpetology centre in Asia, gave me the perfect opportunity for the same. The volunteer program has given me an opportunity to learn about animal husbandry, conservation and research. It also enabled me to observe the reptiles in captivity and learn extensively from the staff. The depleting populations of enormous number of species of reptiles across the world is of great concern. The Croc Bank is one of the places working hard to conserve these beautiful animals and I hope to do the same in the near future, with the help of everything I learn from here.

None of this would have been possible or even half as enjoyable without the people here, each and every one more passionate than any other organisation I've known. The docents from far and wide, from all different walks of life, the fantastic cooks (They're so good they're practically chefs), my awesome co-volunteers, and the staff here. A shout out to the whole team Allwin (I thought you were a field guy!), Rajendran Sir (What's for lunch, Sir?), Meghna (The fierce, friendly Marathi), Anjana (Keep up with the one-liners!), Ajay (Thanks for answering every question I had so patiently), Nik (Thanks for everything and the Hi-five) and Arul (you're like the most chill roommate ever) for making life at MCBT amazing. Special thanks to Zai for her perspective on the social aspects of conservation, and Rom for bringing Croc Bank into this world.

I had a great time volunteering at MCBT, from starting a day with the routine 8AM pen cleaning to ending the day at the backyard beach with Toffee, and everything I've done here has benefited my view on conservation and herpetology. I only hope someday we manage to instil sustainable ecosystems throughout the world so that the necessity for such conservation measures is rendered obsolete. But for now, we have to keep working harder and harder to turn that hope into a reality!

Docent Program

The docent program has been specifically designed to encourage working professionals to be more connected with nature and environment. The primary goal is to spread awareness about reptiles and promote conservation through conversations. Currently, there are 14 active docents inclusive of the 2019 candidates. Docents have been actively involved in making our World Days a success by proactively designing and implementing exciting activities. Manasi Ravindranath, assisted us in creating a reptile themed envelope, birthday card and birthday e-invite for groups interested in celebrating at the Croc Bank.

List of active docents:

S. No:	Name	Batch	S. No:	Name	Batch
1	Kaushik Shelat	2009	8	Monica suresh	2018
2	Dr. Raj Kumar Jayapal	2014	9	Dhikshitha V	2018
3	Maheshwaran EG	2017	10	Arvind M	2018
4	Manasi Ravindranath	2017	11	Thirukumaran TK	2019
5	Praveen.H.N.	2017	12	Saravana A	2019
6	Stan Renoldo	2018	13	Suraksha	2019
7	Samyukta Sanjay	2018	14	Rajkumar A	2019

Snake Conservation and Snakebite Mitigation

Education programs conducted on snakebite prevention and treatment

Programs have been ongoing in all 7 states under the project, and the numbers are as follows:

- Tamilnadu – 73 programs completed across 8 districts
- Andhra Pradesh –31 programs completed across 4 districts
- Odisha –60 programs completed across 5 districts
- Madhya Pradesh –51 programs completed across 6 districts
- Bihar/Jharkhand –21 programs completed across 2 districts
- Maharashtra –19 programs completed across 2 districts

Highlights

- Radio Kotagiri, a community radio initiative in the Nilgiris added messages about snake safety and snakebite first aid in between their programming over 3 months.
- Two workshops were conducted for 55 snake rescuers from across India, first at Agumbe Rainforest Research Station (ARRS**)** between 16th-18th June 2018 and at MCBT on 26th-28th October 2018. The goal of these workshops was to equip snake rescuers to effectively educate communities and safely mitigate the human-snake conflict issues that are faced every day at grassroots level.
- 100+ staff of the Madhya Pradesh Forest Department were trained in community outreach, snakebite first-aid and snake safety on 13th June 2018 at Satpura Tiger Reserve.
- Capacity building workshops were also carried out for Andhra Pradesh Forest Department staff in two districts, Vijayawada and Vishakapatnam, in July/August 2018.
- In October 2018, 50+ staff belonging to all the ranges within Hazirabagh Wildlife Sanctuary, Jharkhand were trained in community outreach, snakebite first-aid and snake safety.
- On 26th November, 2018 Ajay Kartik & Gnaneswar Ch presented about snakebite at the Google India office in Bangalore.
- A training session was conducted for ecology teachers of Agastya International Foundation, Kuppam, Andhra Pradesh on 4th December, ’18.
- Information about snakes and snakebite was presented to 2000+ visitors at the Coringa Bird Festival, Andhra Pradesh on 14th & 15th December, 2018 through a stall manned by Gnaneswar Ch.
- Allwin Jesudasan presented talks at Isha Signature Villas, Chennai on 12th January 2019, regarding snakebite mitigation and presented educational materials to the owners association.
- A full day interactive session for 1500+ children was conducted on 5th January, ‘19 at Agastya International Foundation, Kuppam. This included screening of films, display of educational materials and an interactive talk followed by skits performed by children from the government schools of the six neighbouring panchayats.
- Awareness workshops were carried out for 500+ staff of Coromandel Fertilizers, Kakinada, Andhra Pradesh on 18th and 19th January 2019 about co-existing safely with snakes, identification and snakebite.

- Awareness workshops were carried out for 300+ staff of SEMBCORP, Nellore, Andhra Pradesh on 7th and 8th February 2019 about co-existing safely with snakes, identification and snakebite.
- We collaborated with Google to shoot a short documentary highlighting our snakebite mitigation work on 11-13th January 2019. The film will be released by Google in two months' time.
- We collaborated with YouTuber Wilbur Sargunaraj to create two videos about snakebite awareness with a humorous twist, and one of the videos has already been launched on his YouTube channel and the second is slated to be launched on 5th April 2019.
- We are also collaborating with cartoonist Rohan Chakravarthy to bring out a comic book on snakebite awareness and are currently working on drafts of the same.

Collating Epidemiological data, Case studies and equipment distribution

In addition to the mapping of snakes and hospitals, we have taken up the task of collating epidemiological information from published studies on snakebite from across India. The insight gained from this data can shed light on the occurrence and circumstances of snakebite. This will help us to refine our educational material to address real, on-ground issues.

We have received permission to collect data from the Directorate of Medical & Rural Health Services for both Primary Health Centre and Government Hospital levels**.** From March 2019, we will begin an intensive data collection effort from all Government Healthcare facilities in two districts of Tamilnadu which will provide an invaluable insight into the current statistics of snakebite in the region.

We are also compiling individual case studies of snakebites that have occurred in Kanchipuram district. Thus far, we have visited the families of 7 snakebite victims who lost their lives to snakebite in the last 5 months, and documented the details of the incidents and counselled the families on the course of action to be taken, including compensation.

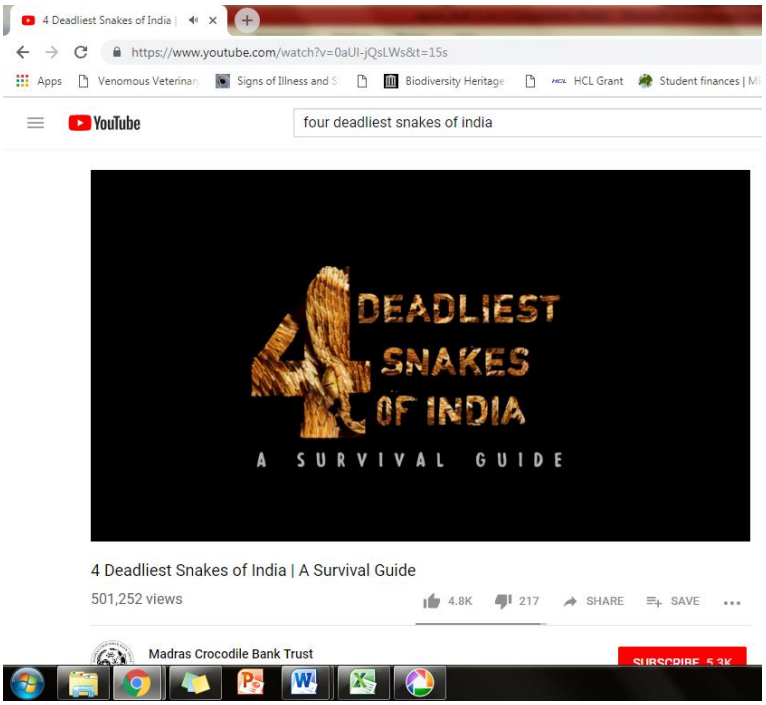
As a part of a pilot study to gauge acceptability of protective equipment, we plan to distribute 3 essential snakebite safety tools:

1. Low cost rechargeable flashlights
2. Nylon and cotton mosquito nets
3. Gumboots

and assess their acceptability levels among rural agrarian communities in Kanchipuram district.

MCBT – Gumboot distribution
Pondur, Kanchipuram – 12th January, 2019

Reach of Media Films



The educational films '4 Deadliest Snakes', 'Snakebite' and 'Snake Rescue: The Expert Way' and their regional language versions have been viewed over 650,000 times on YouTube and Facebook and shared over 5000 times and have reached a large audience worldwide.

Venom Sampling and Research

Through this component, we are looking at regional differences in snake venoms within the same species. We are also testing the efficacy of antivenom against the venoms of different

snakes from across India. This data will be extremely useful in the measures being taken by us to improve the quality of the existing antivenom.

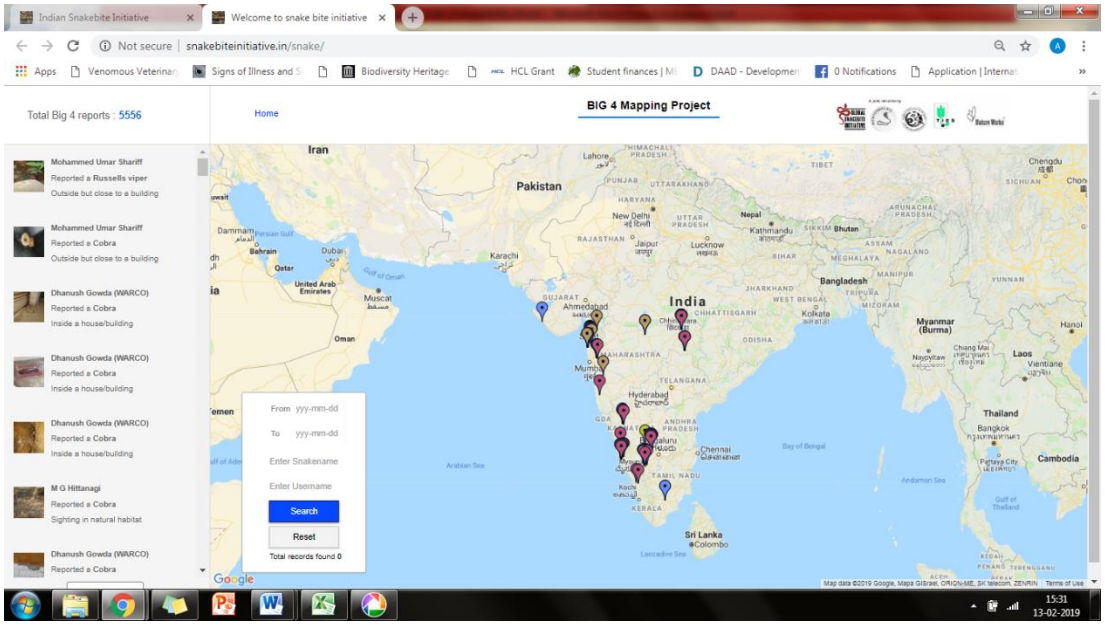
Thus far, we have conducted venom sampling in the following states –

- Maharashtra (September 2017)
- Madhya Pradesh (November 2017)
- Andhra Pradesh (June 2018)
- West Bengal (July 2018)
- Trips to Gujarat, Rajasthan, Kerala and Bihar will be done over the coming months i.e March-May 2019 when the weather becomes more conducive for snake sighting.

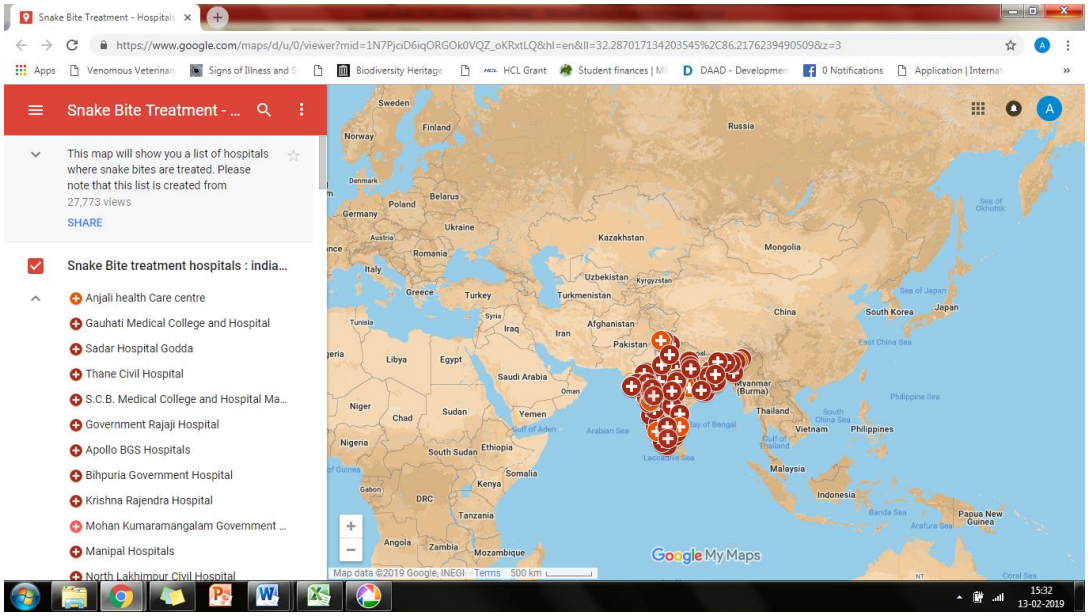
The samples collected have been transferred to Dr. Kartik Sunagar's Evolutionary Venomics laboratory, Indian Institute of Science, Bangalore where analysis of samples is underway.

Snakes and Hospital Mapping

Through our tie-up with Jose Louies at the Tropical Institute of Ecological Sciences (TIES), Kottayam, we aim to map the temporal and spatial occurrence of the common venomous snakes of India, as well as create a real-time updated database of clinics and hospitals across the country that routinely handle snakebite cases.



The snake mapping exercise has gathered 5556 unique records as of 13th February 2019



The Hospital locator has also been initiated (above) and has mapped the locations of 142 hospitals that actively treat snakebite across India as of 2nd November, 2018. The hospital map has had 27,773 unique views since being made publicly accessible.

The Croc Bank in the Media

MCBT received a lot of media attention this year, especially for its snakebite work.

- Croc On: 42 Years Later, Madras Crocodile Bank is an Ocean of Cool Reptiles . *The News Minute,* 06 February 2018.
- Reptilian Brain - *India Today,* 12 March 2018.
- Let's Talk Nature, *The Hindu Metroplus*, March 14, 2019.
- Romulus Whitaker: Urbanization Will Help Snakes - *Livemint*, 17 March 2018.
- What Goes Behind the Running of Madras Crocodile Bank, The Hindu, March 19, '19.
- A walk on the Wild Side with Romulus Whitaker - *The Hindu*, 31 March 2018.
- In Conversation with Romulus Whitaker, Madras Crocodile Bank Founder - *The Hindu,* 01 April 2018.
- Go on a Night Safari at the Madras Crocodile Bank - *The Hindu,* 22 June 2018.
- Telemetry Study in Western Ghats - *Deccan Chronicle (Vizag),* 5 July 2018.
- On the Royal Snake Trail - *The Times of India,* 15 July 2018.
- The Tale of a Crocodile Without a Tail - *The Hindu*, 17 July 2018.
- Chikkamagaluru: Study of King Cobra Starts Again in Agumbe - *Deccan Chronicle,* 7 Dec 2018.
- DH Changemakers 19 to Watch in 2019 - *Deccan Herald*, 01 January 2019.
- Reptiles Affected by Loud Noise from Sheraton Hotel, Says Chennai Croc Bank - *The News Minute,* 2 February 2019.
- Snakes Not After Us, They are Frightened of Us: Romulus Whitaker at Express Adda - *The Indian Express,* 21 March 2019.
- What Goes Behind the Running of Madras Crocodile Bank - *The Hindu*, 19 March 2019.
- India Faces Double the Sting of Snakebites as Anti- snake Venom Supply Runs Short, Efficacy Drops - *Scroll.in*, 21 March 2019

Papers and articles by MCBT staff:

- *Whitaker, N. & Srinivasan, M. 2018. Preliminary Observations on Deep Body Temperatures in Female Mugger Crocodiles (Crocodylus palustris Lesson:1831) in a Captive Facility.* International Journal of Current Microbiology and Applied Sciences. *ISSN: 2319-7706 Volume 7 Number 12 (2018)*
- *Kartik, Ajay. A note on the diet of Ahaetulla nasuta, Herpetological Review 49(2), 2018.*
- K. Narasimmarajan, A. Gopal, S. Palanivel and M.T. Mathai (2018). Status of mugger crocodiles (*Crocodylus palustris*) in river Moyar, Southern India. Cobra. XII (2) 1-9.
- Seshadri K. S. (2019). A night in the life of a frog and a frog biologist. Current Conservation-Kids, Issue 12.4. March 2019.
- Seshadri K. S. (2018). Doting dads and marauding males: The story of parental care behaviour in *Raorchestes chalazodes*. Sanctuary Asia , December 2018.
- Blog article on the Durrell Course (May 21, 2018)
- http://madrascrocbank.blogspot.com/2018/05/the-durrell-syndrome.html

MCBT Online

In the last six months, we have seen an increase in activity on our social media handles.
A Social Media Strategy was drafted with the help of Pratap KS from Google. We follow a well organized schedule and format for all our social media posts. We have also received positive feedback about our social media presence from visitors and well wishers. A large number of participants have found out about our events through our social media handles.

*All our viewership and online traffic is organic and not promoted.

- A total of 8% increase in the number of followers on MCBT Facebook page. The highest post reach so far is 76,446 people, without paid promotion.
- A total of 11% increase in the number of followers on the ARRS Facebook page. The highest post reach so far is 3500 people, without paid promotion.
- 70% increase in the number of followers on Instagram.
- 14% increase in Twitter followers.
- 96% increase in the number of subscribers on our YouTube channel.

In the month of March alone we have successfully raised Rs. 40,470 on LetzChange, a crowd funding platform.

IN THE FIELD

Agumbe Rainforest Research Station (ARRS)

Photo- Anjana Srimathi

This was a busy, successful, productive year for ARRS. The rescue project was very active, and the telemetry tracking showed up some interesting facts of the king cobra's life. Some details:

The ARRS team rescued a total of 221 snakes in and around Agumbe. The species breakup is provided in the below table.

Snake species	Rescued	Total
King cobra	131	131
King cobra hatchlings	23	23
Spectacled cobra	53	53
Python	9	9
Krait	2	2
Rat snake	2	2
Coral snake	1	1
Total	**221**	**221**

Out of 131 king cobras, we have tagged (PIT) 78 and 'recaptured' 17.

We continue to track a male king cobra (M5) using radio telemetry. In mid-April, 2019, we plan to tag two more king cobras with transmitters. Dr. Seshadri KS is now overseeing all research aspects of ARRS.

Electricity lines now reach the field station. Due to some delay in paperwork, we still don't have an electricity supply. We are hoping that this issue is resolved soon.

The Deshpande Foundation has renewed their faith in us and has increased their funding. They have contributed Rs 22,88,256/ towards our conservation activities.

The Wildlife Conservation Trust and a few small funders contributed to help us buy a 'Thar' to carry out the research and conservation activities. The vehicle was particularly useful to us during monsoon. Earlier, our staff used to go by bike even during intense rain.

An entire episode of the series 'On the Brink' of Animal Planet is dedicated to our conservation work with king cobras in Agumbe.

Matej and Zuzana Dolinay, the founders of " Living Zoology" visited us at ARRS and are preparing a documentary about how people can live with venomous snakes which will be out in mid-2019. Parts of the documentary were shot at Agumbe. A preview can be found here - https://www.youtube.com/watch?v=qOlrBpAFXxs

GHARIAL ECOLOGY PROJECT (GEP)

(extracts from the CSG Newsletter VOLUME 37 No. 4 • OCTOBER 2018 - DECEMBER 2018)

The Gharial Ecology Project (GEP) has finished its 11th field season, since its initiation in 2008, immediately following the mass die-off of Gharial (*Gavialis gangeticus*) in the winter of 2007-08. To date, our research approach has been productive, and has been sustained by strong support from the international zoo community, and concerned NGOs. In particular, little was known about gharial reproductive behaviours, and the species is one of the most desired for exhibit, because of its unusual appearance and unique position as the only living member of its crocodilian subgroup. Gharials in captivity have the reputation of being very difficult to breed, and only recently has a North American zoo facility, St. Augustine Alligator Farm, been able to successfully breed and produce a hatchling. Within India, captive Gharial have bred since the 1980s, but seldom have other facilities been successful with captive reproduction. International zoos have taken the lead in providing range state conservation funds. And there is sustained interest among crocodilian conservationists to foster field research and conservation efforts on the remaining extant populations.

The GEP has as its ultimate goals: 1) to develop a comprehensive assessment of gharials in the National Chambal Sanctuary (NCS); 2) to identify and protect the species' critical riverine habitats; and, 3) to reduce threats and challenges to the species' continued survival. Gharials are listed as Critically Endangered (CR) on the IUCN Red List, with an estimated 650-700 mature adults globally; 500+ are resident in the NCS. Project activities are conducted by a small core staff, with the guidance of the Senior Scientific Advisor, Professor Jeff Lang.

Comprehensive Surveys. In February 2017 and 2018, the GEP team partnered with Madhya Pradesh Forest Department (MPFD) staff and other researchers based at the Deori EcoCentre near Morena to survey the Gharial population within the NCS (bottom 425 km, from Pali to Pachnada). In 2018, the total number of Gharial counted and estimated in the NCS was ~1675 individuals. Adjusted for accuracy in size categories, these counts included 75 mature males (with ghara), 464 reproductive females plus 52 "near reproductive" females, 462 sub-adults, 366 juveniles and 208 yearlings. In 2017, comparable counts were lower, totaling 1300+ Gharial, with an estimated 415 nests laid. In 2018, a total of 443 nests at 37 sites was documented, of which 318 nests hatched and 115 were lost. Survey details and comparable data are presented for 2017 and for 2018 in GEP (2018).

The relative importance of the Chambal Gharial population cannot be overstated. Now, with realistic size estimates of the other sub-populations, totaling approximately 650-700 adults globally, the NCS population comprises 85% of the global total (550/650). It also represents ~90% (450/500) of the global annual nesting. Importantly, the Chambal population is the ONLY self-sustaining population living in an open river, protected habitat. Major threats are, in order of importance: a) dams and river-linking; b) water extraction; c) sand mining; and, d) net fishing.

Red List Reassessment. Together with co-authors Subir Chowfin and J. Perran Ross, and substantive inputs from many knowledgeable colleagues, a reassessment of Gharial for the IUCN Red List was completed (June 2018), and is "in press" (Lang *et al.* 2019). Today, Gharial are limited to only 14 widely spaced, restricted localities in north India and in lowland Nepal. Only 5 sub-populations (4 in India;
1 in Nepal) exhibit recent reproduction/recruitment. In approximate rank order of importance (from high to low), these are: Chambal, Katerniaghat, Chitwan, Gandak, Corbett; a sixth locality, Babai River in Bardia National Park (BNP- Nepal) is potentially another breeding population, but recent evidence of nesting/hatching is absent.

The updated CR status of Gharial is based on: 1) a 94% exponential decline in adult numbers, within 3 generations (using 25 y/generation, from 1943), from >20,000 adults historically (based on 1 Gharial/river km) to 650 adults today; and, 2) a 94% exponential decline in occupancy area from 80,000 km^2 historically to 4400 km^2 today. Continuing major threats include dams/barrages, water extraction/irrigation, river inter-linking, fishing net mortality, sand/boulder mining and introduced species. Conservation actions have included captive breeding and head-starting in past decades, but now require smart, site-specific programs with local river communities to reduce multiple threats *in-situ*.

Gharial in Nepal. In early 2018, an updated Nepalese Action Plan for Gharial was outlined by the Nepalese Department of National Parks and Wildlife Conservation, and was reviewed upon request by the CSG. In brief, the revised plan for Gharial in Nepal refocuses attention on *in-situ* versus *ex-situ* conservation strategies, including an emphasis on an evidence-based program, informed by science. Phoebe Griffith, an Oxford University PhD student, has initiated a comprehensive series of studies, from telemetry of wild resident Gharials to "local ecological knowledge" surveys in riverside communities surrounding Chitwan National Park (CNP) (Figs. 1-3). To date, 5 wild resident Gharial have been outfitted with VHF and/or GSM transmitters, and are being tracked successfully in CNP.

The GEP has been instrumental in assisting the Nepal telemetry study by loaning equipment and supplies, as well as sharing capture and tagging methodologies. Phoebe Griffith joined GEP staff on the Chambal in late February and early March during the gharial breeding season. In November, she assisted with capture, tagging and tracking resident wild gharial living near the GEP's Garhaita base near Etawah, Uttar Pradesh.

Figure 1. From left - Ashish Bashyal, Phoebe Griffith and Jailabeen A. AB and JA are ZSL EDGE Fellows to be appointed in 2019-2021 starting their projects in March. Photograph: GEP.

Figure 2. From left - Ravi Singh, Phoebe Griffith, Deepu, Ashish Bashyal and Jailabdeen A. Photograph: GEP.

Figure 3. From left - Anil, Shiv, Ravi Singh, Jeff Lang, Jailabdeen A, Phoebe Griffith and Ashish Bashyal. Photograph: GEP.

Research Collaborations. The GEP team is regularly in touch with other researchers, and has an active collaboration with Laboratory for Conservation of Endangered Species

(LaCONES) at the Centre for Cellular and Molecular Biology (CCMB) in Hyderabad. Ravi Singh (Figs. 2 and 3) a PhD student is conducting a genetic study of creche participants, as well as characterizing the Chambal population, using microsatellite markers, and next generation sequencing to reveal how guardian adults at the creches are related to hatchlings, and how the Chambal gharial population is genetically structured. One surprising preliminary result of Ravi's studies to date indicate that certain markers are specific to the Chambal population, and show little/no variation. Ravi's studies are designed to reveal the genetic relatedness among crèche participants, including large, big- ghara male guardians, some of which exhibit "alloparental care" of hatchlings likely fathered by other males. Another collaboration with Dr. Karthik Vasudevan, in the same laboratory, focuses on stable isotope analyses to understand food webs in Chambal gharial, as the apex predators in this river ecosystem.

In early 2018, the GEP collaborated with the Madhya Pradesh Forest Department on a radio-telemetry study to determine patterns of survival and residency in head-started gharial, raised from eggs hatched in captivity, after these have been released in the wild. In mid- February, 9 juvenile gharial (1.2 m total length) which had been reared in captivity were radio tagged and subsequently tracked after release. Within 3 months, only a few of these were found close to the release sites. After six months, only 3 radios were recovered (one was inside a sub-adult mugger crocodile for three weeks). Importantly, none of the 9 gharial could be found in the vicinity of the releases, and no radios could be found. In late 2018, this exercise was repeated. Fifteen head-started juvenile gharial from Deori were radio tagged and released in a stretch of lower Chambal. In the same area, we caught and tagged 8 wild resident gharial, matched for size and sex. As of the end of December, 7 resident and 13 head-started gharial were trackable – and the study will continue into 2019.

ANET (Andaman and Nicobar Environment Team)

Education / Outreach Programmes

This year ANET Education conducted 11 day programmes that varied in duration from 1 to 3 days, involving classes ranging from 11 to 66 participants. Day programmes involved lectures, field visits and activities, and were geared towards giving students a holistic understanding of island ecosystems. In April 2018, ANET partnered with *Turquoise Change* to conduct a teacher training programme on environmental sustainability for 15 teachers from Crescent Public School in Bambooflat, South Andaman. The other local school programme was an art and photography workshop for local Wandoor school children. Researchers and staff at ANET have also been partnering with the Andaman Avians Club to conduct programmes with birding enthusiasts and local school children.

The last programme for ANET this financial year was a 2-day collaborative training programme in coral reef ecology and marine conservation run at the MGMNP interpretation centre Wandoor with support from the Deputy Conservator of Forests (Wildlife Division). This was

specifically requested and organised for the local Wandoor marine tour operator community, and it engaged all the researchers who helped to plan, develop and conduct it.

ANET staff along with visiting school students during a mangrove walk in November 2018. Photo credit: Asha Cherian.

Overview of Research @ ANET

This year ANET supported 19 research projects. Researchers worked on a wide array of subjects from plankton to sharks. Also, two ANET research alumni completed their PhD field work through Stellenbosch and Columbia universities. Brief summaries of the research projects:

Adhith Swaminathan -

Monitoring and conservation of leatherback turtles and their habitats in the Andaman and Nicobar Islands

First leatherback turtle tagged for the season. Photo credit: Adhith Swaminathan

Every nesting season, between December and March, a team of six field staff set up temporary monitoring camps at the two nesting sites, South and West Bay, on Little Andaman Island. As of February 2019, over 250 leatherback nests were encountered in West Bay and South Bay, the highest number recorded since the initiation of the project in 2008. Eight turtles were tagged with identification tags (both PIT and external tags) in West Bay. With more than a month of monitoring remaining, the team hopes to tag more turtles.

The project includes an outreach programme to sensitise government authorities and local communities to conserving sea turtles and their habitats. Several capacity building programs for the staff of the Department of Environment and Forests, Andaman and Nicobar Islands, were conducted during the non-nesting season this year.

Publications:

Swaminathan, A.2018. Tracking a Hundred-Million old Giant. Bombay Natural History Society, Hornbill Magazine.April-June 2018.

Swaminathan, A., Namboothri N., & Shanker, K. 2019. Tracking leatherback turtles from Little Andaman Island. Indian Ocean Turtle Newsletter 29 (in press)

***

Akshay Surendra -

Logging frequency and forest type modulate post-logging recovery of tropical forests in the Andaman archipelago

Enumerating trees in a plot (pictured) involves identifying all stems above a certain size and recording its girth and height. Photo Credit: Akshay Surendra

Selective logging of tropical forests for timber is an important economic activity with much associated research, and yet recovery patterns of repeat-logged forests are poorly understood. Our objective was to assess the resilience of twice-logged forests and identify any differences with forest type. We compared baseline forests with forests logged once (4-8 years ago) and forests logged twice (4-8 and 20-30 years ago); each forest patch straddled evergreen and deciduous types. Between December 2017 to May 2018, we placed 76 plots in Baratang and Middle Andaman Forest Division and enumerated trees along logging gaps. We used stem density, species density and above-ground biomass (AGB) to measure recovery.

We found that regardless of forest type, once-logged areas had either recovered or had exceeded baseline forests in measures of recovery. A second logging event did reduce recovery but it differed with forest type – in twice-logged deciduous forests, stem-density (pole-sized trees), species density (adult trees) and AGB (adult trees) decreased 0.77, 0.84 and 0.61 times. In twice-logged evergreen forests, stem and species density (adult trees) decreased by 0.78 and 0.76 times compared to baseline. The apparent resilience of AGB of twice-logged evergreen forests may be because coupes were in areas with inherently high tree density, like steep hills.

Reduction in first-order parameters of recovery in twice-logged forests have implications for biodiversity, carbon stocks and future timber extraction in the Andaman archipelago. Sustainable forestry will benefit from explicitly incorporating logging history and forest type.

Publications:
Surendra, Akshay (2018). Logging history and forest type modulate post-logging recovery of tropical forests in the Andaman Islands, India. (NCBS Wildlife Programme Master's Thesis). Tata Institute of Fundamental Research, Mumbai, India.

***

Ashmita Biswas -

An assessment of ecological and social-economic importance of Chouldhari and Ograbranj wetlands of the South Andamans and the associated governance challenges

Reclamation of wetland in the Chouldhari region. Photo credit: Ashmita Biswas

Chouldhari and Ograbraj are among the many wetland regions in South Andaman to become important habitats to a variety of avian species after their formation preceding the 2004 tsunami. However, a massive push for development to accommodate an increasing population and facilitate a boost in tourism is resulting in the reclamation of these rich ecosystems in order to build vast residential complexes and sports facilities. With the apparent lack of a local administrative body to look into matters concerning wetlands and the sites being either privately owned or under the jurisdiction of the state revenue department, the question of who manages these wetlands is a gap that this study aims to understand.

Preliminary avian observations show that both Chouldhari and Ograbraj possess a rich diversity, with 31 and 45 species, respectively. However, this result also illuminates the consequences of development activities as the site at Chouldhari is currently witnessing more construction activities and reclamation than the one in Ograbraj.

***

Elrika DSouza -

Dugongs, sea grasses and carbon sequestration

Seagrass meadows contribute to approximately 20% of carbon buried in the ocean. Given the importance of seagrasses to the C budget of the oceans, estimating the magnitude of organic carbon pools provides the first step to understanding the potential impact of the release of stored CO_2 from degrading seagrass meadows to atmospheric CO_2 budgets.

A seagrass meadow with long-lived seagrass species stores the highest level of Carbon. Photo credit: Dr. Vardhan Patankar.

We studied the blue arbon trapped in the sediment of seagrass meadows of the Andaman and Nicobar archipelago. These islands provided an ideal experimental set-up where blue carbon could be assessed along a gradient of seagrass species composition, sediment influx, and dugong herbivory. We wanted to test if organic carbon is 1) higher in areas of high sedimentation (as the depositing sediments can trap carbon and store it for millenia), 2) lower in areas with dugong herbivory (dugongs engage in a very destructive mode of feeding wherein they uproot seagrass shoots and thus constantly churn the bottom sediments) and 3) higher in meadows with long-lived species than the short-lived ones (long-lived seagrasses sequester more carbon than short-lived species as they are persistent in nature and have stronger root and rhizome systems that trap organic carbon).

We collected sediment samples from 21 seagrass meadows, three representing similar level of sedimentation, species composition, dugong herbivory and no seagrasses as a control. Samples were collected using 1m long and 40mm wide PVC cores. These were processed to obtained Carbon values through the Loss On Ignition (LOI) method.

We found:

1) Late successional or long-lived seagrass species trap higher organic C than early successional or short-lived seagrass species.

2) Dugong herbivory has no significant effect on sediment organic C.

3) Meadows with high sedimentation trap higher organic C than low sedimentation sites. These proved our initial hypotheses except the effect of dugong herbivory. This was because sedimentation had a much greater role to play in areas of dugong herbivory and hence the results did not stand out against sedimentation.

***

Ishika Ramakrishna

Human – Nicobar Long-tailed Macaque Interactions and Rising Interspecies Conflict in the Great Nicobar Island, India

The Nicobar long-tailed macaque *Macaca fascicularis umbrosa*, an endemic Schedule-I primate, is now considered a ‘weed’ macaque on the island of Great Nicobar in the Andaman and Nicobar Islands. The island first saw anthropogenic development post-1969, when people occupied a sliver of the south-eastern coastline, thereby coming into minimal contact with its wildlife.

A Nicobar long-tailed macaque foraging in an Areca nut tree from a local's plantation. Photo Credit: Ishika Ramakrishna

After the tsunami of 2004, however, both the local communities and the macaques were adversely affected, leading to increased interaction between them and an overlap in their living spaces. I utilised a mixed-methods approach to understand both the history and present-day interactions of the settler human communities and the Nicobar long-tailed macaque. Through observations, social surveys and a citizen-science initiative across the nine villages on the island, this study found that interactions between people and macaques, are affected by the adaptability of the macaques, natural disturbances, and unresolved conflict between the human communities and the island ecosystem itself. The macaques now supplement their staple of *Pandanus* fruit with human-provisioned resources like coconuts, bananas and vegetables, often grown for commercial purposes. The resultant losses are financial and personal in nature, with the familial background, socio-economic standing and the geographic positioning of the participants of this study affecting their perceptions. Through a triangulation of the aforementioned methods, the study shows how factors that drive human-animal conflict are rarely simple and straightforward.

Publications:

Ramakrishna, Ishika (2018). Human – Nicobar Long-tailed Macaque Interactions and Rising Interspecies Conflict in the Great Nicobar Island, India. (NCBS Wildlife Programme Masters Thesis). Tata Instiute of Fundamental Research, Mumbai, India.

***

Karishma Modi

Islands of Wisdom After-school Learning Programme

Students surveying their surroundings for examples of living and non-living things. Photo Credits: Sadaf Sethwala,

The Islands of Wisdom project, funded by WIPRO Applying Thought in Schools, is an after-school learning programme for students from classes 3, 4 and 5. The focus of the programme is to make education contextualised and place-based thereby helping students develop strong foundational learning and effectively deal with the demands of the school curriculum. The after-school programme seeks to provide a safe space where students can experience

the coming together of learning and play. We seek to develop this as a model that can be taken to various geographies and serve as an effective intervention in primary school education.

While the attendance at the after-school programme is limited to students from classes 3, 4 and 5, our library is open to students from all classes. The library is open after school hours on two days of the week and typically sees students from all classes coming in to read books in Bengali, English and Hindi.

Project duration: November 2017 – long-term

***

Karthik Teegalapalli

Long-term Ecosystem Monitoring Network - Andamans

1 ha forest plot within semi-evergreen forest at Rutland Island, South Andaman. Photo credit: Venkatesh Lakshmanan

The National Centre for Biological Sciences (NCBS), Bangalore in collaboration with The Andaman & Nicobar Islands Environmental Team (ANET) has established long-term forest monitoring plots in Alexandria and Rutland Islands which are part of the South Andamans Archipelago. This is part of the Long-term Ecosystem Monitoring Network (LEMoN India), a countrywide collaborative effort by NCBS. The aim is to establish and monitor tree communities, biomass and dynamics in a network of 1 ha forest plots across different forest types and environmental gradients in order to understand factors regulating long-term forest dynamics and potential responses of these systems to climate change.

During 2018 – 19, we started phenology observations on 174 trees on Rutland Island to record leafing, flowering and fruiting patterns and have completed one year of data collection. In the 2019 – 20 period, we plan to collect data on functional traits (wood density, specific leaf area, leaf nitrogen and other traits) of trees and continue long-term monitoring of trees, seedlings, leaf litter, root growth and seed rain in the 2 one hectare plots on Alexandria and Rutland.

***

Krishna Anujan

Maintaining tropical evergreen forest regeneration in a changing world: an approach combining research and local capacity building in the Andamans

To monitor seedling growth over the experimental period, our team counts leaves and measures heights of native tree seedlings. Photo Credits: Krishna

Biodiversity loss, land-use and climate change have been shifting the composition of tropical forests from evergreen-dominated systems to higher percentages of deciduous species, decreasing their biodiversity and carbon value. Deciduous canopies facilitate deciduous seedlings through increased light, causing a positive feedback. But this feedback can be buffered by biotic interactions with other plants and insect enemies. The study explores abiotic factors like shifting light regimes interacting with biotic factors like plant competition and herbivore damage impacting forest regeneration.

We are currently setting up this experiment to manipulate seedling diversity, alter light levels to simulate evergreen and deciduous canopies, estimate insect damage on leaves and measure seedling success. This model will then be tested with long-term field data collected from the Long-Term Ecological Monitoring Network (LEMoN) plots in the landscape.

***

Madhuri Ramesh

Marine Protected Areas - management and tourism in the Andaman Islands

Aerial Bay jetty in Diglipur used for docking tourist boats, fishing dunghis and Coast Guard ships. Different stakeholders depend on/administer sections of MPAs, but there is a lack of collective engagement with respect to the management of such areas. Photo credit: Deepika Sharma

The unique ecosystems of the Andaman and Nicobar Islands serve as important resource bases for local communities, as well as attract lakhs of tourists every year. Destinations such as Swarajdweep, Smith and Ross Islands, are in and around Marine Protected Areas (MPAs) and have received renewed attention from central government schemes, which the aim to further promote this archipelago as a global tourism destination. However, this is filled with challenges as the design of MPAs are based on concepts borrowed from terrestrial ecosystems and there is a lack of consensus among government institutions on even basic aspects such as the legal definition, boundaries, and the total number of MPAs in these islands.

We divided our projects in two phases: in the first phase, we studied existing management challenges in two PAs with significant marine components, i.e. the Rani Jhansi Marine National Park, and Smith and Ross Islands. In the second phase, we did a preliminary assessment of the engagement of different stakeholders involved in tourism around these MPAs as well as the state of related public infrastructure. In total, 130 semi-structured interviews were conducted with local residents, government officials and tourists.

Some key findings from this study are as follows:

1. Many well-educated islanders are interested in investing and working in the tourism sector because it offers them comparatively high-paying jobs. Hence, there is a scope for capacity building to engage more islanders in tourism.
2. But at present only high-ranking officials and businessmen are involved in the planning and implementation of tourism-related projects.
3. There is also a considerable lack of public infrastructure and services in the islands, and with the rise in tourism this gap between requirement and availability is expected to widen.

Publications:

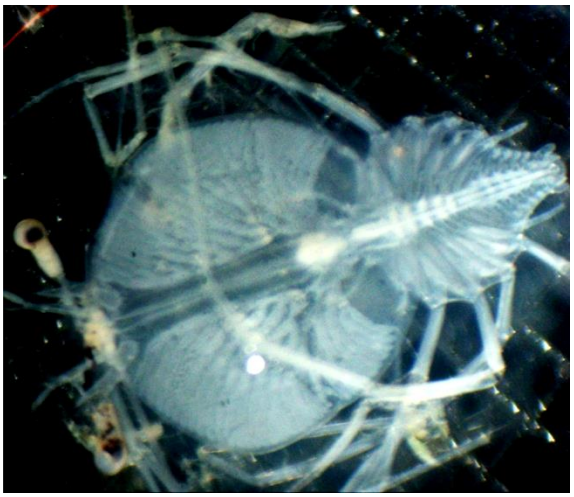
Bijoor, S., Sharma, D., & Ramesh, M. (2018). Management of Marine Protected Areas in the Andaman Islands: Two case studies. Dakshin Foundation, Bangalore. 40 pages

Sharma, D., Bijoor, S., & Ramesh, M. (2018). Development in Andaman and Nicobar Islands – for tourism or by tourism? Andaman Chronicle dated 5th Oct.

***

Mahima Jaini

Integrating microscopy and satellite oceanography to understand the dynamics of planktonic communities around the Andaman Islands



Lobster phyllosoma larvae found on a night tow in Lohabarrack Bay on 8th Dec 2019 (new moon phase). Photo Credit: Mahima Jaini

The proposed project aims to understand diurnal and seasonal dynamics of marine plankton and also ground-truth satellite-derived ocean surface metrics. Partnerships with satellite oceanographers, marine biologists and biological oceanographers at INCOIS, Pondicherry University and NIOT are being developed to achieve programme goals.

We have chosen 3 permanent stations off South Andaman Island. Day and night sampling is being conducted during the flooding tide for new moon, first quarter, full moon and last quarter phases of the lunar cycle, for the inshore station (Lohabarrack Sanctuary), for one year. Surface zooplankton samples are collected with a 200um net, and then fixed in 4% buffered formaldehyde and transferred to

70% ethanol. Due to the large size of zooplankton, samples are first analyzed under a 20x dissection scope, and subsamples are then photographed using foldscopes. Phytoplankton collection on the other hand is done using the lugol's settlement method and analysed with the help of the foldscope. Initial surveys are revealing stark differences in day and night, new moon and full moon and spring and neap tides. By focusing our effort on distinct meroplankton families we hope to establish a baseline for inshore larval diversity and abundance.

***

Manish Chandi

Conservation Spaces and Strategies in the Nicobars Islands

This project seeks to understand land and resource conservation strategies and practices in the Nicobar Islands working in consultation with the islander communities and Government. The project will document the diversity of resource and spatial conservation strategies, to present a clear understanding of the traditional modes of management, use and tenure over island spaces that are both inhabited and uninhabited. In addition, a stakeholder workshop is envisaged to bring together appropriate stakeholders from the various Nicobar Tribal Councils and Government agencies to share and inform each other of future approaches to adapting and or conserving these traditional mechanisms.

Kitchen gardens and resource conservation on Chowra Island. Photo Credit: Dr. Manish

Islands of the southern and central Nicobar islands have been visited and processes and strategies in use by the islanders have been documented using interviews and participant observation. A principal method of resource conservation in these islands takes place through traditional tenurial and managerial regimes of land (plantation, forests, and other habitats) by kinship and extended family groups from the various islands. In addition, cultural events and accompanying community feasts entail the production and distribution of resources.

This preliminary information is to be organised island-wise and compiled by strategy/resource/habitat/ and other appropriate parameters, for their significance in resource conservation and notions of community well-being in the Nicobars.

***

Mythreyi Kumaraswamy

Pilot Phase of Implementing "Treasured Islands: 3rd Edition"

Teachers at the orientation workshop for "Treasured Islands 3rd edition". Photo Credit: Sadaf Sethwala,

The Department of Education (DoE) initiated the process of introducing Environmental Education (EE) in schools in a manner that would be meaningful. Dakshin Foundation (Dakshin) and ANET have developed a 3rd edition of the environment education activity book, Treasured Islands, to be used in schools.

The DoE requested feedback and orientation workshops to be conducted, and invited 5 schools to attend the 1st training session of the pilot project in which the schools were provided copies of Treasured Islands, Workbooks and Booklets that explained how Treasured Islands could be implemented. The conversation between the teachers and the facilitators was robust and brought about some concerns surrounding the implementation of the project.

Currently, ANET is involved in finding solutions to these concerns and following up with implementation by teachers to assess if further training sessions are required.

***

Nitya Prakash Mohanty -

The invasive Indian bullfrog *Hoplobatrachus tigerinus* on the Andaman Islands

The invasive Indian bullfrog on the Andaman archipelago. Photo Credits: Nitya Prakash Mohanty

This study, which ended in January '19, aimed to understand four major aspects of the Indian bullfrog's invasion on the Andaman Islands: i) spatio-temporal patterns in distribution and dispersal, ii) trophic impact of post-metamorphic stage, iii) impact of larval stage, and iv) invasion dynamics and efficacy of potential management strategies. The study employed social science, traditional foraging ecology, manipulative experiments, simulation modelling, and species distribution modelling to answer key questions on the Indian bullfrog's invasion. Post its introduction in 2000-01, the Indian bullfrog has spread to several human-inhabited islands of the Andaman archipelago: North, Middle, South and Little Andaman Islands, and Swarajdweep and Shaheeddweep Islands. Key dispersal pathways include contaminant of the aquaculture trade (tadpole stage) and intentional release for food (adult stage). Human-mediated translocations have resulted in accelerated invasive spread, by facilitating inter- and intra-island movement. The adult stage of bullfrogs prey upon several endemic vertebrates and may compete with larger native frogs due to overlapping diets. The

larval stage is carnivorous and under experimental condition, native tadpole survival is zero in the presence of bullfrog tadpoles. The bullfrog also causes socio-economic loss to the household level economy of poultry and aquaculture. Overall, the bullfrog is likely to increase it extra-limital range by spreading to Nicobar Islands and in new locations of Andaman Islands. Screening at points of entry is likely to be effective for small islands on both Andaman and Nicobar archipelagos due to the relatively low human traffic they experience.

Publications:

Mohanty NP, Measey J. (*in press*). No survival of native larval frogs in the presence of invasive Indian bullfrog *Hoplobatrachustigerinus*tadpoles. *Biological Invasions*.

Mungi NA, Kaushik M, Mohanty NP, Rastogi R, Johnson JA, Qureshi Q. (*in press*). Identifying knowledge gaps in the research and management of invasive species in India. *Biologia*

Mohanty NP, Measey J. (*in press*). Reconstructing biological invasions using public surveys: a new approach to retrospectively assess spatio-temporal changes in invasive spread. *Biological Invasions* DOI: 10.1007/s10530-018-1839-4.

Tyabji Z, Mohanty NP, Young E, Khan T. (2018). The terrestrial life of sea kraits: Insights from a long-term study on two Laticauda spp. Laurenti, 1768, (Reptilia: Squamata: Elapidae) in the Andaman Islands, India. *Journal of Threatened Taxa*.

Mohanty NP, Measey J. (2018) What's for dinner? Diet and potential trophic impact of an invasive anuran *Hoplobatrachustigerinus*on the Andaman archipelago. *PeerJ*DOI: 10.7717/peerj.5698.

Mohanty NP, Chakravarty R. (2018). Ethno-ornithology of Karen and Ranchi inhabitants of the Andaman Islands: An annotated checklist of local names and etymology. *Indian Birds* 14(3):73-78.

***

Sahir Advani

Values of Fishing Communities in the ANI

Value cards used for the value ranking exercise. Photo Credit: Sahir Advani

The aim of the project was to uncover differences in the prioritization of values associated with fishing for cultural groups in the Andaman and Nicobars Islands, and what might be the socio-cultural factors that inform the prioritization of values. Between February and July 2018, we asked 101 respondents to rank and prioritize a set of 12 locally contextualized phrases and artwork that depicted values associated with fishing. The study communities include indigenous Nicobaris, Karens from the mountains of Burma, Bengalis from the Gangetic floodplains, and Telugu fishers

from the Andhra coast who have settled in various sites along the length of the archipelago. Individual's value prioritizations do not cluster much based on cultural group or geography. And there exists a high degree of variability in the value rankings across and within cultures. However, for some values such as freedom to fish anywhere and its link to rules and regulations, there are clear differences in the value rankings between indigenous Nicobaris and greatly commodity-driven Bengalis and Telugus.

Such findings highlight the need for fisheries management and policies to account for the varying priorities of cultural groups engaged in fishing. This will help ensure that fisheries are managed effectively and equitably while accounting for trade-offs within policy decisions.

***

Samira Agnihotri

Comparative ethno-ornithologies

This project proposes a cross-cultural investigation of bird names and folklore in various seemingly unrelated Indian languages spread across mainland India, the Andaman and Nicobar Islands as well as parts of Myanmar. Building on previous work with the Solega community in the Biligirirangan Hills, we hope to collect biologically-informed documentations of ethno-ornithology in some indigenous Andaman and Nicobar languages, including the languages of migrant communities, such as the Ranchi and Karen. We believe that the scope of our investigations will allow us to detect areal convergences/differences in bird naming and folklore among languages that are believed to have had little or no contact and in the process, may even uncover historical contact phenomena between distant communities. At the very least, we aim to create culturally-sensitive documentations of ethno-ornithology for several endangered languages of South and Southeast Asia.

***

Shiba Desor

Strengthening livelihoods through bio-cultural connections: an ANET initiative with the Karens of Middle Andamans

Workshop on responsible tourism at the Andaman Karen Crafts Community Centre. Photo credit: Shiba Desor

Ever since the beginning of ANET in 1970s, the multi-faceted nature of Karen knowledge and their openness to new challenges has led to there being a unique partnership between the field researchers and the Karen community. This relationship and motivation within the local

community led to ANET facilitating the formation of the Andaman Karen Crafts cooperative society in late 2014 with the objectives of local economic empowerment while reviving Karen cultural heritage and conserving local eco-systems.

The approach is multi-faceted, simultaneously focusing on socio-cultural, economic and ecological dimensions of well-being. This implies a manifold strategy. To retain local craftsmanship while enabling generation of some revenue, trainings and skill-development is facilitated for tailoring, embroidery, handloom-weaving, bamboo-weaving and small-scale community markets. At the same time, for conserving the Karen culture and cuisine, local history and folklore is being documented and also promoted through local story-telling sessions and a slow food restaurant focused on Karen cuisine is being constructed in the lower part of the AKC community centre. To revitalise links with land, a nursery has been set up with ongoing conversations on community forestry. All of this is happening alongside regular sessions on environment and ecology.

In terms of capacity-building and community-ownership of the process, much has been achieved in the past year, and it is hoped that this cross-thematic intervention will lay foundations for a long-term strengthening of the community's bio-cultural connections.

***

Tanmay Wagh

Multi stakeholder Coastal Cleanup

Section of the participants after the clean-up. Photo Credit: Dr. Madhuri Ramesh

The Andaman and Nicobar islands lie on the cusp of massive commercial development with the tourism industry being considered the most lucrative income generating option. As the number of foreign and national tourists grows, so do the tourism allied businesses (resorts, restaurants, adventure sports, etc.). A major consequence of growing tourism is the rise in coastal litter. This is confounded by inadequate waste disposal mechanisms, lack of awareness within tourists and locals, and the logistic constraints in maintaining the vast expanse of the islands.

The growing problem of coastal litter has prompted various government offices, NGOs and other groups to carry out coastal clean-ups in isolated parts of the islands. However, cumulative efforts regarding the issue seem to be lacking. With the current project, we wanted to engage various stakeholders to co-ordinate a coastal clean-up to increase public awareness and support for marine conservation issues in the islands.

We carried out the event at North Wandoor beach along with the Wandoor Gram Panchayat on the 23rd February. Nearly 70 participants were part of the event representing various

organisations. Prominent among those were; Forest Department (Wandoor, Lohabarrack and Manglutan ranges) , Fisheries Department, Wandoor Fishermen Union, ANI Police, Andaman Public Works Department (APWD), Youth Clubs (New Wandoor, Wandoor and Kranti), ASHA Foundation, etc,. The Panchayat had invited the Deputy Commissioner, South Andaman as the chief guest for the event.

We hope that the multi-stakeholder engagement will help not only in creating awareness but also initiate a dialogue between stakeholders to manage and mitigate the growing problem of marine litter in the islands.

***

Vardhan Patankar

Assessing reef resilience in the Andaman Islands

Acropora coral thriving in the waters of Mahatma Gandhi Marine National Park. Photo credit: Dr. Vardhan Patankar

Climate change is considered the greatest long-term threat to the coral reefs. Managers must, therefore, focus on supporting the natural resilience of reefs. Factors contributing to resilience are multidimensional and contingent on local conditions. Identifying these factors at managerially-relevant scales is important if resilience principles have to be included in rational reef conservation efforts. Reefs of the Andaman and Nicobar Islands are the most diverse in India and considered a biodiversity hotspot. Multiple series of catastrophic disturbances (including repeated mass bleaching and a tsunami) have impacted these reefs, seriously testing their buffer capacity. From 2015, we have set up 10 plots inside and outside Mahatma Gandhi Marine National Park and have been collecting data on factors that are known to confer resilience of the reefs. In the year 2018, we surveyed four sites inside the park and six sites outside the park as part of a long-term coral reef assessment project. The assessment was conducted as per the guidelines of the IUCN Reef Resilience Assessment (Obura and Grimsditch 2008). We found that most corals that were bleached during 2016 and 17 had recovered, and the total mortality of corals was 5% at Chester Island, 3% at Tarmugli Island and 4% at Jollybuoy island. We recorded 140 fish species belonging to 57 genera, 32 families, from a total of 34 belt transects and 14 species of algae.

Publications:

Ghodke M., Chandi M, Patankar V. (2018) Yellow-banded Mangrove Snakes (Cantoriaviolacea) Consume Hard-shelled Orange Signaler Crabs (*Metaplaxelegans*), IRCF Reptiles &Amphinbians, 25(1):50–51.

Tyabji Z. &Patankar V. (2018) Entanglement of a Juvenile Olive Ridley Turtle in a Ghost Net in the Andaman Islands, Indian Ocean Turtle Newsletter, 1 (26), 5-7.

Patankar V., Paranjape A., Tyabji Z., Wagh T., Marathe A. (2018) Occurrence and distribution of Tetraodontiform fishes of the Andaman and Nicobar Islands, India. Check List 14 (3): 529–537 https://doi.org/10.15560/14.3.529
Bopardikar I., Sule M., Jog K., Patankar V., Sutaria, D., Klinck H. (2018) Description and classification of Indian Ocean humpback dolphin (*Sousa plumbea*) whistles recorded off the Sindhudurg coast of Maharashtra, India. Marine Mammal Science, DOI: 10.1111/mms.12479
Patankar V. (2018) Understanding reef resilience in the Andamans, Hornbill, Bombay Natural History Society Magazine, April-June, 42-45.
Patankar V. (2018) The Trials and Tribulations of the Andaman Fisheries, The WIRE.

***

Zoya Tyabji

Assessing the conservation status of threatened elasmobranchs in the Andamans

Sharks, guitarfish and wedgefish fins drying. Photo Credit: Zoya Tyabji

The Andaman and Nicobar archipelago encompass an ongoing targeted shark fishery with rays, guitarfish and skates caught as bycatch in commercial and artisanal fishing gears. In order to manage them sustainably, it is imperative to know the driving force behind this catch, trade and demand-supply chain. With this in mind, we conducted semi-structured interviews with fishermen, traders/middlemen and cold storage centre owners in the archipelago. Our interviews aimed to examine trends in species composition, sizes and abundance; trends in gear use and perceptions and knowledge of fishermen towards elasmobranchs and its fisheries. The completed project will enable us to gain insights into the social, motivational and economic drivers behind the fishery aiding us to formulate long-term and effective conservation and management plans for these species.

Publications:

Tyabji Z., Jabado R.W., and Sutaria D. 2018. New records of sharks (Elasmobranchii) from the Andaman and Nicobar Archipelago in India with notes on current checklists. Biodiversity Data Journal: 6: e28593. https://doi.org/10.3897/BDJ.6.e28593.

Tyabji Z, Mohanty NP, Young E, Khan T. (2018). The terrestrial life of sea kraits: Insights from a long-term study on two Laticauda spp. Laurenti, 1768, (Reptilia: Squamata: Elapidae) in the Andaman Islands, India. *Journal of Threatened Taxa*.

INCOME AND EXPENDITURE STATEMENT 2018-2019

INCOME

Sl.no	Particulars	INR
1	Ticket Sales	2,26,41,170.00
2	Research Grants	1,09,89,141.02
3	Donations & Rent	15,71,578.89
4	Environment Education	13,65,876.05
5	Adopt an Animal	9,81,340.00
6	Bank Interest	4,79,370.31
7	Croc Shop sales	11,51,342.00
8	ARRS	19,44,524.49
9	ANET	12,00,000.00
	TOTAL	**4,23,24,342.76**

EXPENDITURE

1	Salary and Wages	1,12,03,985.00
2	Reptile Feed Costs	29,50,725.00
3	Maintenance and Upkeep	50,11,674.50
4	Pen Maintenance and Upkeep	28,53,411.00
5	Research	1,51,45,842.92
6	Environmental Education Expenses	58,177.00
7	Croc shop Expenses	6,18,927.00
8	ARRS	22,88,652.00
9	ANET	12,03,135.00
10	Administrative Expenses	5,73,297.42
	TOTAL	**4,19,07,826.84**

Visitation to Madras Crocodile Bank 2018-2019

Month	Total no of visitors
April'18	31,351
May'18	54,186
June'18	29,524
July'18	28,288
August'18	28,844
September'18	34,129
October'18	34,706
November'18	26,921
December'18	48,319

January'19	47,592
February'19	28,126
March'19	27,866
Total	**4,19,852**

AFFILIATED INSTITUTIONS

(*Committees/ Membership/ Collaboration/ Consultation/ Editorial/ Networking*)
International Union for the Conservation of Nature (IUCN)
IUCN/SSC Crocodile Specialist Group
IUCN/SSC Tortoise and FWT Specialist Group
IUCN/SSC Marine Turtle Specialist Group
IUCN/SSC Indian Subcontinent Reptile & Amphibian
Group IUCN/SSC Captive Breeding Specialist Group
IUCN/SSC Sustainable Use of Wild Species Group
National Centre for Biological Sciences, Bangalore
Centre for Cellular and Molecular Biology,
Hyderabad World Congress of Herpetology
World Wide Fund for Nature (WWF) - India & International
Wildlife Institute of India, Dehradun
Bombay Natural History Society, Mumbai
Centre for Environment Education,
Ahmedabad Chicago Herpetological Society,
USA
Fauna and Flora International, UK
Development Alternatives, New
Delhi Chennai Snake Park Trust
Irula Tribal Women's Welfare Society, Chennai
Irula Snake Catchers' Cooperative Society,
Chennai International Association of Zoo
Educators, UK Jersey Wildlife Preservation Trust,
UK
Turtle Survival Alliance
Niligiri Wildlife Association, Ootacamand
Central Zoo Authority of India, New Delhi
Salim Ali Centre for Ornithology & Natural History, Coimbatore
Madras Veterinary College, Chennai
Madurai Kamaraj University,
Madurai Pondicherry University,
Pondicherry
Andaman & Nicobar Islands State Wildlife Board, Port Blair
Andaman & Nicobar Islands State Level Environmental Council, Port Blair.
Andaman & Nicobar Islands 'Monitoring Committee for the Working Plan for the South Andaman Division'.

Andaman & Nicobar Coastal Zone Management
Authority. Andaman's Science Association, Port Blair
Society for the Andaman & Nicobar Ecology, Port Blair
Auroville Index Seminum, Tamil Nadu
Ashoka Innovators for the Public, New
Delhi Kalpavriksh, Pune
Coral Reef Monitoring Network- South East Asia, Sri Lanka
Dakshin Foundation, Bangalore Karnataka
Survival International, UK
Trust for Environmental Education (TREE), Chennai
Zoo Outreach Organisation, Coimbatore
The Indian people's Tribunal on Environment & Human Rights, Mumbai
The Wildlife Trust of India, New Delhi
Smithsonian Institution, USA
Marine Conservation Society, U K.
UNEP/Conservation for Migratory Species of Wild Animals, Germany

People Involved with Indian Snakebite Initiative

1. Dr. David Williams (Global Snakebite Initiative/University of Melbourne)
2. Dr.Kartik Sunagar (IISc)
3. Gerard Martin (TGMP)
4. Dr. Jaideep Menon (AIMS, Kochi)
5. Dr. Joseph K Joseph (Little Flower Hospital, Angamaly)
6. Dr. Anand Zachariah (CMC,Vellore)
7. Dr.Harshjeet Singh Bal (CMC,Vellore)
8. Jose Louies (WTI/Indiansnakes.org)
9. Shaleen Attre (WTI/Indiansnakes.org)
10. Kedar Bhide (Natureworks)
11. Priyanka Kadam (she-india.org)
12. Soham Mukherjee (Naja.in)
13. Sumanth Madhav (HSI-India)
14. Jayasimha NG (HSI-India)
15. Ganesh Mehendale (OWLS)

TN – Education Partners

1. ATREE-ACCC
2. Kenneth Anderson Nature Society (KANS)
3. CEE- Tamilnadu
4. Santhi animal welfare and wildlife conservation trust (SAWWCT)
5. WWF-Western Ghats landscape program
6. CMC Vellore
7. Keystone Foundation
8. Wild Wings Trust