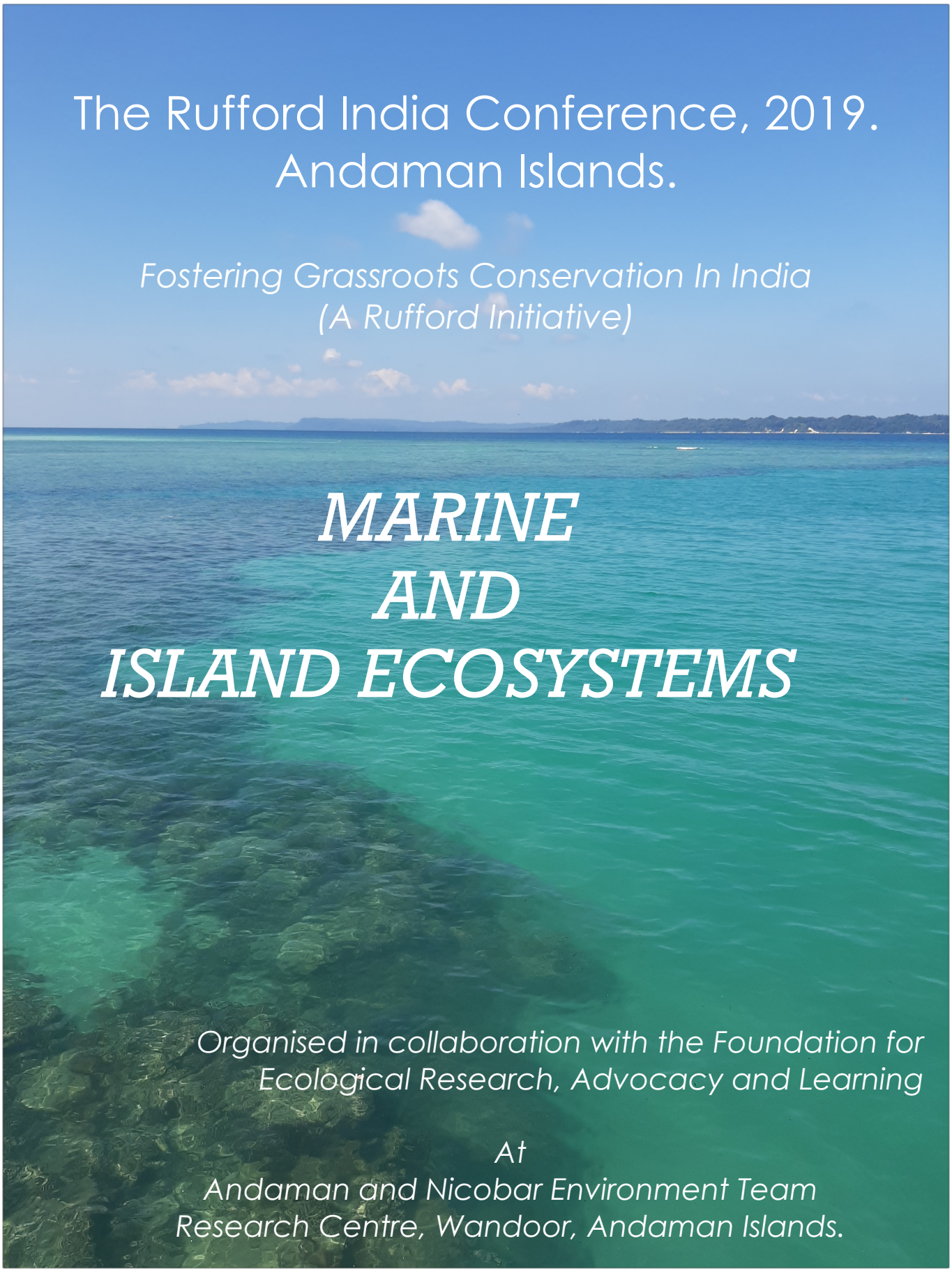

The Rufford India Conference, 2019.
Andaman Islands.

Fostering Grassroots Conservation In India
(A Rufford Initiative)

MARINE AND ISLAND ECOSYSTEMS

Organised in collaboration with the Foundation for Ecological Research, Advocacy and Learning

At
Andaman and Nicobar Environment Team Research Centre, Wandoor, Andaman Islands.

India Conference Report, 2019.

The Rufford Foundation's Small Grants Programme enables numerous researchers in various developing countries to carry out nature conservation projects. In India, the foundation has supported 695 projects. In 2012, the first Rufford Conference was held in India, and since then, the Foundation for Ecological Research, Advocacy and Learning (FERAL) has organised six conferences for grantees to present their work, discuss ideas and form collaborations.

Each year the conference is held in a different part of the country, and this year, it was held at the Andaman Nicobar Environment Team (ANET) research centre in Wandoor, South Andaman, around the central theme of marine and island ecosystems. Previous conferences have been held in Uttarakhand, New Delhi, Bengaluru, Sawai Madhopur, Rajasthan and Goa.

There were seventeen presentations by researchers from ANET, Wildlife Conservation Society - India, Ashoka Trust for Research in Ecology and the Environment (ATREE), Dakshin Foundation, Nation Centre for Biological Sciences (NCBS), Society For Integrated Rural Development (SFRID) and Nature Conservation Foundation (NCF).

The research was broadly focused on monitoring projects, analysing fisheries and their impact on marine life, documenting the population of different species and their threats, and raising awareness among communities about endangered species.

Students from Jawaharlal Nehru Rajkeeya Mahavidyalaya and Pondicherry University were invited to interact with researchers and gain insights into ongoing research and conservation projects.

Participants were also taken to two fish landing sites where they could analyse what fish were being caught and in what proportion. They were also able to see the kinds of boats and fishing equipment being used.

In addition to this, Pooja Powar conducted a workshop on how birdwatchers could use their personal birdwatching logs to help build a global citizen-science database on bird sighting patterns, ranges and population status. This will help generate new data-driven approaches to science, conservation and education, she said.

Schedule

15 November, 2019

TIME	*EVENT*
11.00 – 13.30	*CHECK IN, REGISTRATION & LUNCH*
13.30 – 13.40	*WELCOME ADDRESS by Srinivas Vaidyanathan* *Foundation for Ecological Research Advocacy and Learning Tamil Nadu*
13.40 – 14.10	*Interactive Session* *Participants will introduce themselves and their work*
14.10 – 14.50	*Beyond bird watching- How birdwatchers can help bird monitoring – Part I* *Pooja Pawar* *Nature Conservation Foundation Mysuru*
14.50 – 15.00	*TEA BREAK*
15.00 – 19.00	*Visit to Chidiyathapu*
19.30 – 21.00	*DINNER*

16 November, 2019

Morning session:

TIME	*EVENT*
06.00 – 09.30	*Visit to fish landing site – Jungli Ghat*
09.30 – 10.00	*BREAKFAST/REGISTRATION*
10.00 – 10.30	*Opening talk: ANET and work done by ANET in the Islands* *Adhith Swaminathan Dakshin Foundation Bangalore*
	ORAL PRESENTATIONS
10.30 – 11.10	*Zoya Tyabji - Trends and drivers of elasmobranch fisheries in the Andaman Archipelago* *Rahul Muralidharan - Fishy conflicts: humpback dolphins and artisanal fisheries in the Palk Bay and the Gulf of Mannar, India*
11.10 – 11.30	*TEA BREAK*
11.30 – 13.00	*ORAL PRESENTATIONS*
	Mahima Jaini - From monitoring to managing the Lakshadweep pole and line tuna fishery *Rajeswari B T - Hook-line and sinker: the growth of a commercial reef fishery in the Lakshadweep archipelago* *Mahima Jaini/ Sahir Advani - Understanding the grouper fishery of the Andaman Islands*
13.00 – 14.00	*LUNCH*

Post-lunch session:

TIME	*EVENT*
	ORAL PRESENTATIONS
14.00 – 14.30	*Vardhan Patankar - An Overview of WCS- India Marine Conservation Program:* *Wildlife Conservation Society – India* *Bengaluru*

14.30 – 15.15	*Mahi Mankeshwar - Cetaceans of the Andaman Islands* *Kumar Chandrasekaran - Awareness, survey and conservation of rays along Tamil Nadu coastline*
15.15 – 15.45	*TEA BREAK*
15.45 – 17.35	*ORAL PRESENTATIONS*
	Tanmay Wagh - The process of fish herbivory and the role of protected areas on recovering reefs of the Andaman Islands, India. *Chetan Rao - How has fishing affected sea snakes along the Malvan coast?* *Adhavan Devendiran - Developing technology for successful transplantation of seagrass in India with respect to climate change* *K. Ravi Pradeep - Mangroves as safeguarding "buffers" for coastal villages* *Dipon Sarmah - Influence of disturbances on arbuscular mycorrhizal fungal diversity in Indo-Burma megadiverse region*

17 November, 2019

TIME	*EVENT*
06.00 – 12.00	*FIELD VISIT*
12.00 – 13.00	*LUNCH*
	GUEST TALKS and DISCUSSION
13.00 – 13.45	*RS Bhalla - The changing face of fisheries on the Coromandel Coast* *Foundation for Ecological Research Advocacy and Learning Tamil Nadu*
13.45 – 15.00	*Guest talks by the researchers at ANET & Forest Department officials*
	Adhith Swaminathan - Long term monitoring of leatherback turtles in Andaman and Nicobar Islands
	Juilee Palkar - Long-term monitoring of carbon and biomass dynamics in the Andaman Islands
	Krishna Anujan - Interactions between biotic and abiotic factors affecting seedling growth in the Andaman Islands
	Talk by Forest Department Official
15.00 – 15.30	*DISCUSSION*
15.30 – 15.45	*TEA BREAK*
15.45 – 19.00	*Visit to fish landing site – Wandoor Jetty*
19.00 – 21.00	*Barbeque Party*

18 November, 2019

TIME	*EVENT*
09.00 – 11.00	*Beyond bird watching- how birdwatchers can help bird monitoring – Part II* *Pooja Pawar* *Nature Conservation Foundation Mysuru*
11.30 – 13.00	*LUNCH and CHECK OUT*

Opening talks

Srinivas Vaidyanathan, a senior researcher at the Foundation for Ecological Research Advocacy and Learning, began the conference by welcoming all the participants. He stressed the importance of the understanding island and marine ecosystems and urged participants to engage with one another to discuss ideas, problems and potential solutions. He also emphasised the need for long term monitoring and research programmes to sustain science based conservation of marine ecosystems. Working as a marine ecologist requires persistence due to the difficulties in obtaining permits, especially in the Andaman Islands, he said, and encouraged participants to collaborate with other researchers in order to strengthen their work. This was followed by an interactive session where participants introduced themselves and the work they have undertaken.

Andaman Nicobar Environment Team (ANET) has been working on this archipelago since the 1970s on a broad range of concerns: from research to interventions and education. This made ANET the ideal venue for the conference to enable attendees to learn from researchers who work there. Adith Swaminathan, a senior researcher here, gave a short presentation about the history of the organisation beginning from when Zahida Whitaker and Romulus Whitaker visited the island to survey crocodiles, snakes and turtles in the 1970s, to the projects ANET is currently engaged in.

The Rufford Foundation has supported projects on a myriad of environmental topics. One such project was the study of hornbills in contiguous rainforests and adjoining plantation landscape in Anamalai Hills, India by Pooja Pawar in 2017. Pawar attended this year's conference to conduct a workshop about how birdwatchers can help build a database to aid global bird monitoring.

Welcome speech by Srinivas Vaidyanathan

History of ANET, presented by Adith Swaminathan

Participants interacting with each other

Beyond Bird Watching: How Birdwatchers Can Help Bird Monitoring

A workshop by Pooja Pawar from Nature Conservation Foundation, Mysuru.

Many birdwatchers maintain personal logs of where and when they see certain species of birds. Pooja Pawar advocated the potential of such information, if aggregated, to be used to ascertain movement patterns, range and abundance of a particular species in certain areas on a global scale.

Pooja Pawar conducting the workshop

As opposed to traditional field guides, where revisions can sometimes take years, gathering data through citizen-science initiatives from people across the globe can deliver accurate and detailed information in real-time. This information could include global migration routes, what months birds migrate in, what sites they visit, etc. One popular platform for people to upload their information is eBird managed by the Cornell Lab of Ornithology.
A discussion arose about the reliability of this information, as the number of people who go birdwatching vary throughout the year. Also the information is representative of the number of birds that have been sighted by people and may not necessarily be an accurate representation of their populations size in a specific area.

Visiting bird island:

Following Pawar's workshop, a field visit was organised to Chidiyathapu, which in English means bird island. According to research by Sivaperuman C. And others, 38 species of birds belonging to 8 orders and 19 families can be found here. Participants walked a 2 kilometre stretch along the beach and up a small hill, noting down the various birds they spotted.

Participants at the end of a bird walk at Chidiyathapu

Presentations and Fish Landing Centres

Over the next two days of the conference participants presented their research projects. There were seventeen presentations of about fifteen minutes each, followed by a discussion. These projects highlighted the important role The Rufford Foundation has played in supporting young researchers and conservation projects in the Indian sub-continent.

While researchers spoke about the impact of different fishing practices on marine life, participants were taken to two landing centres: one in Jungli Ghat and another near the Mahatma Gandhi Marine National Park, to observe the kinds of boats being used and fish species were being caught.

The first visit was to the fish landing site in Jungli Ghat, where few of the Rufford grantees have previously carried out various projects. Here, Vardhan Patankar, a researcher who has been working in the Andaman Islands for over ten years, described the various types of fishing practices and the socio-economic back-ground of the fishermen who work there.

Participants at a site visit to Jungli Ghat.

Vardhan Patankar describing fishing practices.

Presentation by Zoya Tyabji

Rays being loaded into a van

Zoya Tyabji, an ecologist studying elasmobranch fisheries, described the various sharks and rays that were seen at Jungli Ghat and spoke about the difficulties associated with the identification of individual species. Tyabji received the Rufford grant in 2016 to study the demand and current trends of elasmobranch landings. Demand for shark fins has stemmed from the global market, she said, whereas smaller sharks and rays were sold in the domestic market, resulting in a perceived decline in stocks.

Kumar Chandrasekaran also studied rays at four landing sites on the mainland. He found that among the identified species 23 per cent were threatened, 35 per cent were data deficient and vulnerable, and nearly 4 per cent of the species were endangered.

The rise in demand for fish caused traditional small scale fisheries to alter their practices to increase the volume of fish they catch, often through mechanisation. Two studies in the Lakshadweep archipelago sought to understand fishing trends here. One study, by *Mahima Jaini*, analysed fishing practices to support and strengthen those that are sustainable, while another project presented by *Rajeswari bhai* outlined the shifting preference of fishermen towards reef fishing.

Mahima Jaini discussing fishing practices in the Lakshadweep

Traditionally, skipjack tuna (*Katsuwonus pelamis*) was caught by local communities using live bait pole and line, labari or the magao method. Jaini advocated the sustainability of these practices, as opposed to newer practices that use fish aggregating devices or catching fish while they are spawning using mosquito nets and bright lights.

Rajeshwari spoke about an exponential increase in landings of emperor, grouper and snapper fish from coral reefs. She said that demand has come from outside the island as is evident from the fact that 99 per cent of fish are exported to the mainland.

Demand for groupers had not only risen only in Lakshadweep archipelago but also in the Andaman Islands. For instance, in 1998 the demand for coral and tiger groupers from South-East Asian countries, especially China, surged. Groupers are top predators on coral reefs and are long-lived, late maturing fish. As they fetched a higher price, these groupers were caught in larger numbers. *Sahir Advani,* a researcher studying the grouper trade in the Andaman Islands, found that the number of groupers being caught had declined, which could be indicative of their population trends. Furthermore, middlemen and exporters exert strong control over the fishery a finding that future conservation interventions need to incorporate to conserve grouper populations and sustain fisheries in the Islands.

One of the reasons that large-scale, mechanised fishing methods like trawlers, mechanised gill nets and seine nets (a type of fishing net that hangs vertically in the water with its bottom edge held down by weights and its top edge buoyed by floats) are unsustainable is that they all trap a variety of species in their nets, result-ing in a lot of by-catch.

One researcher *Chetan Rao* analysed two species of snakes that commonly get caught in fishing nets: the hook-nosed sea snake (*Hydrophis schistosus*) and the spine-bellied sea snake (*Hydrophis curtus*) that made up 83 per cent and 16 per cent of snake by-catch, respectively. He found that one of the reasons that snakes are caught is that they feed on fish that are also targeted by trawlers. Moreover, the mortality rates for *Hydrophis curtus* are significantly higher as compared to *Hydrophis schistosus*. As these short-fanged snakes are highly venomous, Rao compiled a field guide and conducted awareness programs for fishermen. He also educated fishermen in various ways that they could protect themselves from being bitten.

Field guide prepared by Chetan Rao

Trawlers often discard by-catch into the water, attracting predators, such as humpback dolphins. These dolphins have now begun feeding directly from fishing nets of artisanal fishermen, thereby damaging their nets and reducing their catch. To prevent this, fishermen often jump in the water to scare the animals away, but dolphins do not seem to be affected by their presence. *Rahul Muralidharan* studied the effect on dolphin depredation on artisanal fishermen in Palk Bay and the Gulf of Mannar and found that the composition of fish being caught based on the fishing gear type, determined the level of dolphin depredation. Muralidharan stresses the need for artisanal fishermen to be included in rethinking the practice of marine conservation by taking into consideration the politics of fisheries development to protect the livelihood of small fisherfolk.

The findings from many of these research projects indicate that fisheries were on an unsustainable path. *R.S. Bhalla* examined the collapsing trajectory of fisheries along the Coromandel Coast, located along the southeastern coastal region of the Indian subcontinent. His talk led to a discussion that drew several parallels between fishing on the mainland and on the island, where some argue that marine ecosystems have been overexploited.

Presentations by R.S. Bhalla (left) and Vardhan Patankar (right)

Long-term scientific monitoring of our marine resources will help effectively guide conservation and management actions. In the Andaman Islands, *Vardhan Patankar* has been monitoring coral reefs and its fisheries around the islands to understand bleaching and recovery of the reefs while *Adhith Swaminathan* has been working on a separate project to monitor leatherback turtles.

Mahi Mankeshwar, has been monitoring cetaceans and her findings have contributed to the area around the Southern Andamans being identified as an Important Marine Mammal Area by the International Union for Conservation of Nature-Marine Mammal Protected Areas Task Force.Monitoring projects help us understand the effects of climate change on various life forms. For instance, coral reefs are especially sensitive to changes in their environment, so it is important to understand the cause of bleaching events and the factors that influence their regeneration. In light of this, *Tanmay Wagh* has been studying how the feeding habits of herbivorous fish that feed on algae growing on bleached corals impact regeneration.

On the other hand, *Adhavan Devendiran* is working on the revival of *Halodule uninervis* seagrass beds in the Mithapur reef area, a biodiversity-rich region along the coast of Gujarat, and K. Ravi Pradeep is working with small communities who live near the coast of the Bay of Bengal to restore, safeguard and rejuvenate the existing mangrove forests.

During the conference, there were also three talks on terrestrial systems:

These projects were being carried out by *Juilee Palkar, Krishna Anujan and Dipon Sarmah.*

Palkar is monitoring two plots in Alexandria and Rutland islands of the Andaman to understand the long-term carbon dynamics of forests. Her preliminary findings indicate that there are distinct differences in growth in wet and dry seasons and between species, including important timber species, as well as a 20% increase in aboveground biomass in the plots over the past 5 years. This project is part of the Long-term Ecosystem Monitoring Network (LEMoN).

Anujan, meanwhile, is studying the interactions between biotic and abiotic factors that affect seedling growth. This is important because the forest department carries out selective logging in the Andaman Islands, they then replant these sites and return to them after a specific number of years has elapsed. Anujan's work will help understand what factors lead to the successful survival of these seedlings.

Dipon Sarmah presented his work on the comparative richness, diversity and community composition of arbuscular mycorrhizal fungi (AMF) species in undisturbed forest, slash-and-burn field and monoculture forest in Indo-Burma megadiverse region.

The conference concluded with a last visit to the landing site at Mahatma Gandhi Marine National Park.

Rufford Small Grants Conference, 2019.

Project Abstracts

Beyond bird watching- how birdwatchers can help bird monitoring

Pooja Pawar

Citizen science is being increasingly recognized as a powerful tool to understand the natural world, especially in the absence of large-scale scientific monitoring. Several birdwatchers in India now upload observations (current and past) to a citizen science platform called eBird, and this wealth of information has helped us understand Indian birds like never before. It has helped uncover phenomena such as fine-scale patterns of local and global migration, seasonality, and distributions in space. Perhaps most importantly, this data is beginning to provide insights into the long-term and current population statuses of birds in the country, thereby allowing conservation practitioners to effectively prioritize species for conservation. Set within the context of Indian islands, this talk will focus on the opportunities for bird monitoring in the islands using citi-zen science platform.

Trends and drivers of elasmobranch fisheries in the Andaman Archipelago

Zoya Tyabji

India is amongst the leading elasmobranch fisheries of the world, with elasmobranchs caught in both, by-catch and in a targeted fishery in the Andaman Archipelago. Through a semi-structured survey, we investigated the drivers for the current trends of elasmobranch landings, and gain insights into the socio-eco-nomics and perceptions driving the fishery. Sharks were seen to be targeted due to the high fin demand in a global market, whereas smaller sharks and ray fisheries were driven due to a demand for a domestic market in India. Due to a multi-society presence in the islands, sharks and rays are perceived differently across the islands and by different stakeholders. Further, shark stocks are perceived to have declined, raising con-cerns about the fishery. Moving forward, we need to take a precautionary approach combining science-based management and involvement of stakeholders in order to efficiently manage elasmobranch popula-tions.

Fishy Conflicts: Humpback Dolphins and Artisanal Fisheries in the Palk Bay and the Gulf of Mannar, India

Rahul Muralidharan

A silent conflict over fish occurs between humpback dolphins and artisanal fishers in the near-shore waters of the Palk Bay and Gulf of Mannar in Tamil Nadu. Dolphins forage on fish caught in artisanal gear, damaging nets and causing economic loss to fishers. Conservation discourses frame artisanal fisheries as an emerging threat to marine mammals due to unmonitored and indiscriminate fishing practices. I question these conservation discourses to study how humpback dolphins affect artisanal fisheries. I analyse how un-regulated fisheries development in the Palk Bay and exclusionary forms of conservation practice in the Gulf of Mannar Marine National Park influence these conflicts. I used a mixed-methods approach in studying two villages for 18 months by combining fish catch sampling with fishing vessel-based surveys, interviews and observations. Due to varying ecological conditions and the type of fishing practice, humpback dolphins caused marginal impacts on the fish caught in the Palk Bay, whereas the impact was significant in the Gulf of Mannar. The target species and composition of fish caught, based on the fishing gear type, was an impor-tant factor determining dolphin depredation. Contrary to existing research, I show how artisanal fisheries are affected by humpback dolphins in the context of rapid near-shore fish decline owing to fisheries intensi-fication and exclusionary conservation practice. This study emphasises the need to rethink the practice of marine conservation in India by taking into considering the politics of fisheries development, without further alienating the artisanal fishers whose livelihoods are tied to the near-shore seas.

From Monitoring to Managing the Lakshadweep Pole and Line Tuna Fishery

Mahima Jaini

The atolls of Lakshadweep are home to live-bait pole and line tuna fishery. It is considered as a best practice tuna fishery given its high species selectivity, low by-catch and little to no environmental impact. With support from Rufford Foundation, we initiated a project in these islands in 2012 with the objective of support-ing and strengthening the sustainability of this fishery. Using our two Rufford grants, we conducted fishery independent baitfish monitoring, social surveys on the state of the fishery and initiated a community-based catch monitoring programme. While declines in baitfish populations were evident from our work, our social surveys shed light on sustainable bait fisheries management practices. The knowledge generated from these grants has improved our understanding of the fishery, engaged community members in discourses on sustainability and created a platform for fisheries co-management. The ongoing community-based catch monitoring provides data on fishery catch and effort dynamics, involving over 40 boats and generating over 4000 individual fishing records. This talk will cover the trajectory of Dakshin Foundationâ??s engagement with the Lakshadweep pole and line tuna fishery, with a special focus on the early formative years, lessons learnt and future directions.

Hook-line and sinker: the growth of a commercial reef fishery in the Lakshadweep archipelago

Rucha Karkarey, Rohan Arthur, Stella James, Al Badush, Rajeswari bhai BT * & Mayuresh Gangal

Since 1960, commercial fisheries in the Lakshadweep were focused on off-shore tuna, keeping fishing pressure on near-shore coral reefs low. This has been critical to maintain reef resilience to catastrophic mass-bleaching disturbances. In the last decade, there has been a shift towards reef fishing, threatening to deplete stocks of ecologically important reef fishes. We monitored the catch and local consumption of com-monly exploited coral reef fish (groupers, snappers and emperors) since 2014, to understand the extent and socio-economic drivers underlying the shift. The study was conducted in three atolls (Agatti, Kavaratti and Kadmat) with large fishing fleets and high mainland connectivity. Surveys were conducted in 2014, 2017 and 2019 during the peak fishing months (December â?? April). Reef fish catch has increased by an order of magnitude since 2014, while percentage local fish consumption has declined from 40% to 1% in 2019, as 99% of catch is currently exported to the mainland. The number of exclusive reef fishing boats increased from 5-50% since 2014. A four-fold increase in reef fishing profits and highly variable tuna fishing profits, suggests that economics is an important driver of this shift. Reef fisheries are susceptible to a â??boom and bustâ??, as global markets easily shift their target species and locations when local stocks get depleted. In this context, this unregulated, export-based commercial reef fishery not only threatens reef resilience, but also food and livelihood security of the islanders.

Mobula Rays and Ghost Fishing

Hilde van de Sande

Mobula birostris and Mobula alfredi as well as most other mobulas that are listed as Vulnerable, Endangered on the IUCN (International Union for Conservation of Nature) Red List, are increasingly threatened by fisheries, pollution, habitat destruction, climate change and unregulated tourism. Information is lacking about their biology and ecology in and around the Andaman Islands, India, a biodiversity hotspot in the Indo-pacific. Mobula rays, similar to other indicator species such as sharks, rays and turtles, are at risk due to their extremely low fecundity rates, long gestation period and late maturity (Christine and Worms 2013). Moreover, Mobulas are found in small isolated populations in shallow coastal waters (Christine and Worms 2013) and are increasingly targeted for their gill rakers which are sold as Traditional Chinese Medicine (Man-ta Trust 2013).

India has extensive coastal trawl, gillnet and longline fisheries and is reported to be the second largest elasmobranch fishery in the world, recording 70,000 t in 2009, about 10% of the global catch (FAO 2009, Lack and Sant 2009). This catch included at least 690 mobula rays (M. birostris) and 24,260 other

mobula rays (FAO, 2009). Our study in the Andamans funded by the Rufford Foundation in 2016, focused on mobu-la ray populations. In addition to discussing this project, we will also address our planned conservation project linked to this which is the issue of ghost fishing in India.

Understanding the grouper fishery of the Andaman Islands

Sahir Advani/ Mahima Jaini

The export-oriented grouper fishery in the Andaman Islands began fifteen years ago in response to demand from South East Asia, particularly China. Groupers are top predators on coral reefs with certain species threatened due to over fishing. In the islands the fishery is economically very important for local communi-ties, yet despite the ecological and economic importance of this fishery there exists poor monitoring and management in the islands. This project sought to uncover a holistic picture of the grouper fishery through three approaches. Firstly, the origins and status of the grouper fishery were uncovered through interviews with fishing community. Secondly, the magnitude of the grouper trade was explored through market surveys and examinations of export records. And finally, dive surveys on heavily fished reefs were conducted to produce a baseline estimate of grouper populations. Taken together this information can inform effective management of these fisheries as well as provide baselines for future studies. It is clear that the export mar-ket through actors like middlemen and exporters exert a strong control over the fishery, a finding that fu-ture conservation interventions need to incorporate if they are to conserve grouper populations and sustain fisheries in the Andaman Islands.

Traditional Management and Change: Studying the Effectiveness of Marine Resource Management Systems

Vardhan Patankar

Like many remote island communities, tribes of the Nicobar Islands are dependent on marine resources for sustenance and livelihood. Changes caused due to the tsunami of 2004 and external factors (e.g. tsunami aid/ modernization) that include motorization of fleets, gear introduction, could have caused changes in resource availability and the resource-use practices in the Nicobar Islands.

In this study, I document different resource-use practices, fishers' knowledge in relation to marine resource off-take, and the recent changes in these practices to explore past and present aspects of marine resource utilisation through interviews and discussions with locals. Limited entry in certain areas, closed seasons, closed areas, and restrictions on certain types of species and shing methods are some of the practices that are being used. These practices are parallel to those used in western management. The practices are more active in some areas than others and individual perceptions about these systems vary between different is-lands. Since in many areas, the substantial and fundamental aspects of traditional resource-use practice con-tinue to function, I conclude that the present resource-use practices, if strengthened, could enhance marine resource management at the lowest level of administration in the Nicobar Islands. In this talk, I will be pre-senting interesting aspects of study findings.

Cetaceans of the Andaman Islands

Mahi Mankeshwar

The Andaman and Nicobar island system offers varying near shore and offshore habitats for marine mam-mals, along with complex bathymetries and depth gradients in the open sea. Our work, the first systematic study of cetaceans in these waters, started in 2016, and we present here results from the same. We used multiple modes of data collection, viz. semi-structured interview surveys, a participatory observation and monitoring network, ferry based sighting surveys and vessel based line transect surveys. Our results show that the area is used by at least 15 species including Omura's whales, Frasera's dolphins, killer whales and sperm whales. The results have contributed towards the identification of

Southern Andamans as an Important Marine Mammal Area (IMMA) by the IUCN-MMPTF Taskforce and a consultative meeting of all Administrative and Commerce departments was held to discuss the same in November 2018. Based on our pre-liminary results we hypothesize that a combination of topographic features and oceanographic processes leads to the buildup of conditions that favour cetacean assemblages and clumped species richness. In the future our research will study these ecological processes around the Andaman and Nicobar islands and help manage areas rich in marine mammal diversity, or showing high levels of occupancy by species.

Awareness, Survey and Conservation of Rays along Tamil Nadu Coastline

Kumar Chandrasekaran

The proposed Area of work includes four major fish landing centers such as Chennai, Nagapattinam, Tuticorin and Colachal (South east coast of India), where the rays landings are mainly by mechanized boats. Landing data of rays was collected in a weakly interval and the identification of ray species was done by Food and Agricultural Organisation (FAO) and IUCN guidelines. The species specific diversity of rays was recorded from June 2016 â?? June 2017. During this period, 26 rays from 5 major families have been identi-fied. Unfortunately, most of the ray species landed are vulnerable and in a data deficient state. Species caught at juvenile stage are threat to the diversity. Tuticorin landing center has a highest rate of juvenile rays caught. Among the identified species 23.07% are in near threatened, 34.61% are in data deficient and vul-nerable, and 3.84% species are in endangered states. In this study, 57.69% of rays belonged to the family Dasyatidae.

Further, Ray fish identification chart has been prepared in local language to make fishermen aware of the species in marine ecosystem and about the importance of conservation of those endangered ray species. Local name as well as scientific name along with its conservation status (IUCN) were included in the chart and distributed. Fishermen and other stakeholders has shown a great interest to know about the biological information like lifespan, gestation age, fecundity value and maturity period of various ray species. Effective awareness has been created by reaching the fishermen community at the landing centres. There we distribute and explain the conservation status of the ray species.

The process of fish herbivory and the role of protected areas on recovering reefs of the Andaman Islands, India.

Tanmay Wagh

With the increase in the frequency of global coral bleaching events, the role of ecological processes that mediate reef recovery have become imperative in understanding reef ecosystem dynamics. Herbivory is a key top-down process that plays a role in reef recovery by limiting growth of algal communities and clearing substrate for new coral recruits to settle and thrive. We analyzed herbivore community composition and their contribution to reef herbivory across 15 reefs in the Andaman islands. Five of these are part of the Marine Protected Area and the other ten arenâ??t protected. We recorded 30 species of active herbivores dur-ing the study. Herbivore foraging revealed contrasting responses of dominant functional groups to an in-crease in algal cover. The results form an important link in our understanding of herbivore-algal dynamics and reiterate the need to study these processes in the face of global climate change and anthropogenic stressors.

How has fishing affected sea snakes along the Malvan coast?

Chetan Rao

We studied bycatch of sea snakes in trawler, mechanised gill nets and shore sein nets in Malvan, Maharashtra. Two species predominated catch viz. the hook-nosed sea snake (Hydrophis schistosus) (~83% of the catch) and spine-bellied sea snake (Hydrophis curtus) (~16% of the catch). This is a reversal in catch trends observed a decade ago with H. curtus caught dominating catches. Mortality indices were

higher for H. curtus (~78%), particularly in trawlers than H. schistosus (~20%). As fishing boats and sea snakes compete for similar resources, effects of such interactions were studied using stable isotope analysis (SIA). The prelimi-nary results found that both species partition habitats (t = 8.513, p<<0.01). H. curtus use deeper waters (18.29Â±9.8m) and show strong seasonal trends in depth use. The species show distinct trophic niches, with little overlap in prey species (Morista overlap = 0.2878). Compared to previous studies, both species fed on a moderate range of prey families, but H. schistosus preferred a few species of Tetraodontids (29.16%). H. curtus is a trophic generalist, competes with syntopic sea snake species and is dominant in most assem-blages. It seems that H. schistosus exhibits higher plasticity in trophic resource use and seems to outcom-pete H. curtus. Sea snakes form an important part of the marine food web and are encountered on a regular basis in fishing nets. However, considerable information is lacking on their basic ecology and is urgently needed to implement any informed conservation action.

Developing Technology for Successful Transplantation of Seagrass in India with Respect to Climate Change

Adhavan Devendiran

The global decline of seagrass beds is becoming severe due to the increasing anthropogenic pressures and changing climatic conditions. Mithapur reef area is a biodiversity-rich region of Gujarat coast with unique oceanographic features. The seagrass beds are one of the important components of Mithapur marine bio-diversity. Among the four species, Halodule uninervis has been selected for the restoration due to its sparing distribution. The nursery site was selected near to dense seagrass area after considering all favourable conditions. After the initial experimentation, manual transplantation of seagrass was carried out. The vegetative rhizome from the nearby donor site was carefully transferred to the recipient site. In order to hold the vegetative seagrass, a combination of the iron frame method and staple method with slight modification was adapted based on the environmental condition. In this method, a frame (1m x 1m) with mesh and cement blocks at the four corners was designed. The rhizomes were planted by attaching with the help of clip or metallic string within the frame. The plantation was carried out consecutive days for a week during low tide. The site was monitored after a week and the transplants were found to be stabilised. The site was found accumulated by different types of fishes. The seagrass species H. uninervis was stablised in few weeks within the frame. The growth of the seagrass was luxurious and was not washed away by the current and water movement due to firm attachment of rhizome in the mesh.

Nicobar Islands, coping with change and conflict after a natural disaster

Manish Chandi

My work in the Nicobar islands spans close to 2 decades, of which I spent a considerable portion working towards a thesis on cooperative strategies and resource management regimes in the islands. This was done on witnessing the breakdown of socio-ecological systems in the archipelago, the lack of such information among the administrators in the islands, and the utility I perceived of understanding the islanders and their resources from these lenses. I will share parts of my work and understanding facilitated through funding from the RSG and others as well.

Mangroves as Safegauarding "Buffers" for Coastal Villages

K. Ravi Pradeep

Our target Villages are located along the Coast of Bay of Bengal and are prone to endemic natural calamities year after the year. The target groups comprise Dalits, Tribes and Traditional Marine Fisher folk and 70% of theses social groups are dependent on the sea for their livelihoods. Their habitations are located at less than 10 kms from the Coast â?? they are constructed with timber, tree branches which are secured from the existing mangrove forests. Besides using mangroves as material for house construction, people also use for cattle grazing and fencing around their house sites and small shrimp ponds. SFIRD has been involved in

restoring safe guarding and rejuvenating the existing mangrove forests. The local varieties of species of mangroves are Avecenia and Rhyzophora. Women are to be sensitized and educated in the aspects of re-generating and promoting mangrove species instead of using them for personal benefits. SFIRD as an NGO is working with the target people to safeguard the existing mangrove forests which helps them and pre-vents them from facing natural calamities. Children of these target Villages and Youth are also to be sensi-tized about promoting mangrove forests. The formed Women Self Help Groups and the formed and strengthened Community Based Organizations in these target Villages and their federations are to be sensi-tized in lines of planting more wild varieties which help them as â??shock observersâ? at times of gale winds at times of natural calamities. Children at local Schools are to be sensitized in order to safeguard and pro-mote these natural habitations.

Influence of Disturbances on Arbuscular Mycorrhizal Fungal Diversity in Indo-Burma Megadiversity Re-gion

Dipon Sarmah

The aim of the present study was to enumerate arbuscular mycorrhizal fungi (AMF) species richness, diversi-ty and community composition along various degrees of vegetational disturbances in a hilly slope com-prised of undisturbed forest (UF), slash-and-burn field (SBF) and monoculture forest (MF) in Indo-Burma megadiverse region. AMF diversity was comprehensively studied in the same field soils consecutively for two years which allowed establishing a possible trend by comparing the first and second year results. Alto-gether, 35 AMF species belonging to 9 genera were identified. The AMF community structure in MF was significantly different from UF and SBF by ordination and statistical method. UF and SBF harbored higher spore population and identical Shannon-Wiener and Simpsons diversity indices. These parameters were lower in MF, possibly due to the dominating presence of single tree species, Tectona grandis. Similar and higher AMF species richness and diversity observed in UF and SBF suggested diversity was not adversely affected for at least one key functional group of soil microbiota by the slash-and-burn agricultural land use practiced by the ethnic hilly tribes.

The changing face of fisheries on the Coromandel Coast

Ravinder Singh Bhalla

We present some findings from a decade and half of work with fishing communities along the Coromandel coast. Our narrative starts in 2005, just after the Tsunami. We describe the downward spiral of over exploitation of fisheries and how fishing communities, largely artisanal groups, have adapted to this. The role larger market factors and technology have played in shaping this process and how this has altered traditional fishing societies. We track the transformation of the 'idyllic' fishing family - a kattumaram owner and his wife who is a fish vendor, to the present where in most villages, merchants have replaced women vendors and sharp economic divisions separate to wage labourers from gear owners. We describe the informal and sometimes violent enforcement of gear and craft restrictions both within and between villages and the role of credit and advanced contracting where traditional leaders have ceded control to cartels of brokers and export companies. We try and show how fisheries along the Coromandel coast are inexorably linked to en-vironmental degradation, climate change and market dynamics in the fish meal industry. Fisheries along the Coromandel coast have never been more uncertain, indebtedness drives fishers to expand their grounds, markets have grown and spread further than ever, accommodating everything from tuna to trash. Urgent and multi-disciplinary research is needed to understand what drives this uncertainty and unsustainable ex-ploitation.

Long term monitoring of leatherback turtles in Andaman and Nicobar Islands

Adhith Swaminathan

The leatherback nesting populations are currently restricted to a few islands of the Andaman and Nicobar archipelago. In 2008, a collaborative long-term monitoring project was established in Little Andaman Island focusing on tagging, habitat monitoring, satellite telemetry and populations genetics. The finding of our long-term monitoring programme indicates a healthy nesting population in Little Andaman and opportunistic surveys of the Nicobar group of Islands confirm the recovery of previously known nesting.

Long-term monitoring of carbon and biomass dynamics in the Andaman Islands

Juilee Palkar*, Karthik Teegalapalli, Jayashree Ratnam, Mahesh Sankaran

As part of an initiative to understand the long-term carbon dynamics of forests in the Indian subcontinent, the ‘Long-term Ecosystem Monitoring Networket work (LEMoN)’, we have established seven 1 ha plots across different forest types and environmental gradients in India. Two such plots are situated in the tropical forests of Alexandria and Rutland islands in the Andaman and Nicobar archipelago. The plot in Alexandria is a part of Mahatma Gandhi Marine National Park (MGMNP), a relatively undisturbed type of forest plot at the current time, but logged in the colonial era. In contrast, the plot in Rutland Island, with its history of tree felling for timber, is relatively more disturbed. Besides these differences, the climatic gradient and elevation are relatively similar across the plots, making it possible to contrast these two sites for anthropological influences.

In my talk, I will present monitoring work conducted since 2012 by the LEMoN team. In particular, I will present the aims and objectives, the methods, and some preliminary findings. Our data on tree growth indicate that there are distinct differences in growth in wet and dry seasons and between species, including important timber species. In terms of biomass, our data indicate that overall, there has been about 20% increase in aboveground biomass in the plots over the past 5 years. I will also talk about the way forward and how data collected from this project will eventually contribute to global long-term data sets that can be used to predict global carbon storage dynamics and develop strategies for sustainable forest management.

This conference was organised by FERAL in collaboration with The Rufford Foundation to foster grassroots conservation in India.

Image credits: Srinivas Vaidyanathan, Rajat Nayak, Vardhan Patankar and Nicole Pinto.