Foundation for Ecological Research, Advocacy and Learning

Annual Report 2021 - 2022

Foundation for Ecological Research, Advocacy and Learning (FERAL)

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Cover image: Srinivas Vaidyanathan

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Chrysocoris stollii or the green jewel bug feed on plant juices from many species, including some commercial crops such as Pigeon pea, Pongamia, Arecanut. Image credit: Srinivas Vaidyanathan.

Mandate

FERAL is a public charitable trust founded in 1997 with a mandate to develop sustainable and community centred solutions to address the pressing challenges that affect our natural ecosystems and the services they provide. We rely on interdisciplinary and quantitative methods to understand these systems and provide practical, participatory and gender responsive strategies toward their restoration and management. Our programmes invest in rigorous field studies to track and measure ecological processes over sustained periods. We adopt an evidence-based approach to identify problems, provide frameworks for their resolution and monitor the effectiveness of our interventions. We develop scientific and educational material, technical know–how, provide training, employment and skilling of stakeholders. We believe that addressing the seemingly intractable challenges we face in finding solutions to ecological and environmental problems today is only possible through meaningful collaborations with multiple stakeholders.

The Year That Was

FERAL celebrated the 25th Anniversary of its founding on July 22, 2021. In this Silver Jubilee year, most parts of the world continued to reel from the effects of the Covid-19 pandemic that emphasized, in more ways than one, the importance of nature. We at FERAL continued our efforts to finding nature-based solutions for various challenges that affect the natural world with 16 projects. Our research and conservation contributions covered both terrestrial and aquatic ecosystems, including the forests, grasslands, marine and fresh water, with our project locations covering the North East of India to peninsular India.

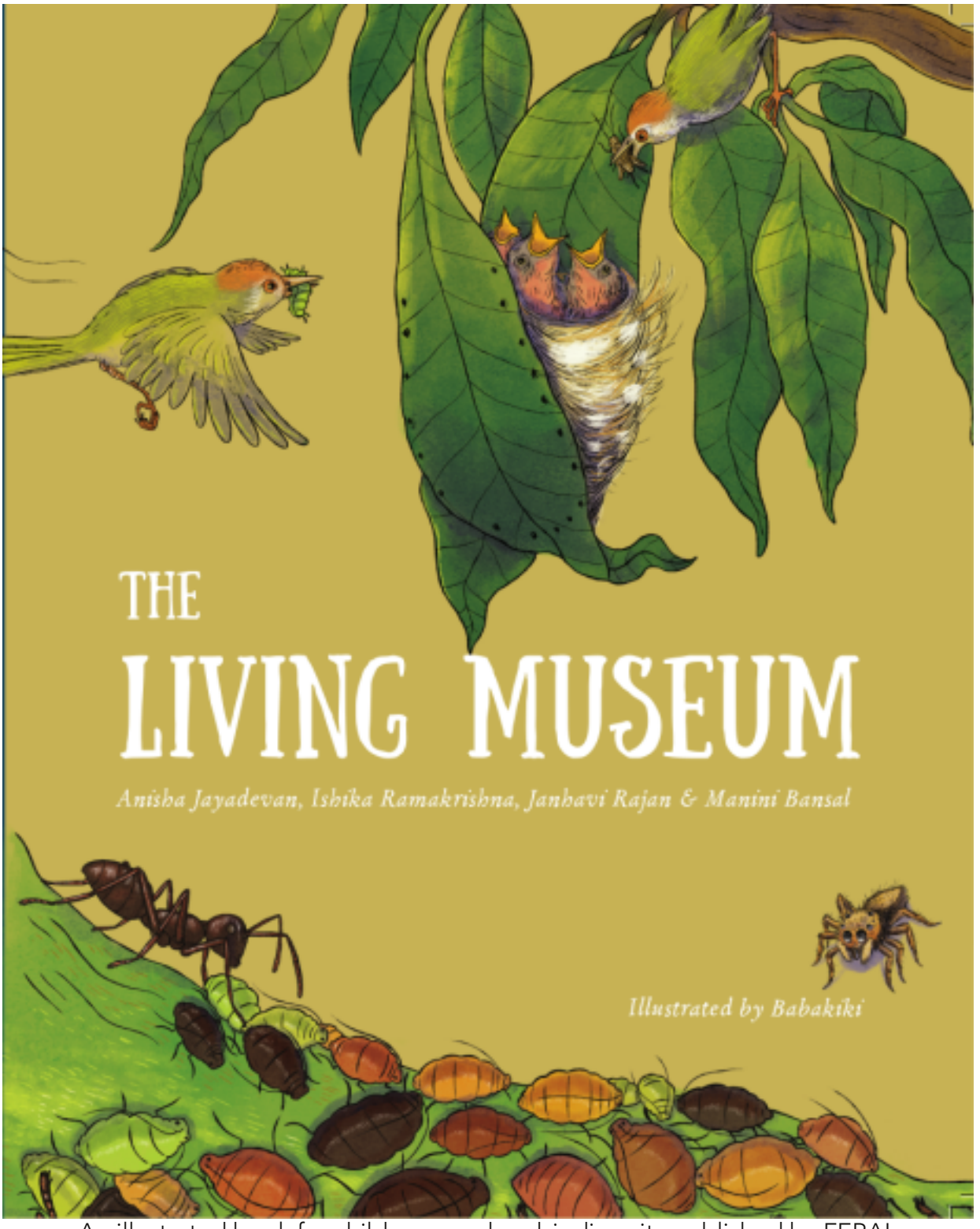
As the restrictions due to the pandemic were eased we were able to resume our field based projects. While returning to field was very much appreciated and welcomed, it did not take us too long to realise the impact of the pandemic on funding. However, we have managed to continue our activities in sites in the North East of India, Western Ghats, the Nilgiris and the coasts. Our interventions in the conservation of marine ecosystems found renewed effort and this year, FERAL reinitiated the marine sciences programme to build on our earlier efforts in this ecosystem with projects along the east and west coast of India. Our collaborations with other institutions, imparting knowledge and sharing experiences through workshops and facilitating student internships was continued.

Changeable hawk-eagle (***Nisaetus cirrhatus***) found roosting along the back waters of the Kabini reservoir. Image credit: Srinivas Vaidyanathan.

Wildlife Biology and Conservation

Under this programme we focus on scientific research on wildlife and their habitats and on using the outputs of such research to steer conservation interventions. This year saw us continuing our efforts in the conservation of freshwater and terrestrial ecosystems and in creating awareness about biodiversity.

The project to raise awareness about urban biodiversity among children saw the publication of an illustrated book. Our project on the conservation of freshwater ecosystems in the northeast undertook biological and hydrological monitoring of the Khengjang-Yangoulen Fish Conservation Zone that were created earlier under this project. In the year gone by, we also conducted a study to understand long-term trends in climate and ecosystem services in the Nilgiri Biosphere Reserve, which was an outcome of the preparatory phase project of the National Mission on Biodiversity and Human Well-Being, supported by the Office of the Principal Scientific Adviser to the Government of India.



An illustrated book for children on urban biodiversity published by FERAL

The Living Museum
Illustrated by: Babakiki
Designed by: Janhavi Rajan and Manini Bansal
Written by: Anisha Jayadevan and Ishika Ramakrishna
Published by: Foundation for Ecological Research Advocacy and Learning
ISBN: 978-8-19-575310-9
Format: Paperback
Page count: 86
Price: Rs. 250
Available at: Goobe's Book Republic and Champaca Bookstore in Bengaluru

Know your urban wildlife

Project period: April 2020 to October 2021
Budget: INR 4,81,000
Supporting agency: Bangalore Sustainability Forum and National Center for Biological Sciences
Principal investigator: Anisha Jayadevan
Co-principal investigators: Manini Bansal, Ishika Ramakrishna and Janhavi Rajan

Urban biodiversity has the potential to increase the resilience of cities and improve the well-being of its inhabitants. Yet, the disconnect between people and nature especially in cities is growing.

Project Objectives

This project aims to rekindle peoples' interest in nature through a childrens' book.

Status

"The Living Museum" is an illustrated book on urban biodiversity that aims to encourage its readers to observe their natural surroundings in cities. The book imagines nature in the city as though it were a museum of living exhibits. The book is arranged as a tour through four ‘halls’: indoors, the garden, the roadside and the night time. At the end of the book, the reader is provided with ways that they can engage with The Living Museum through citizen science.

A total of 1000 copies have been printed. Out of this, 444 copies were supported by the Bengaluru Sustainability Forum, and 556 copies were supported by the Nagarathna Memorial Grant. All proceeds from the sale of 640 books will go into translating the book to Kannada. We have listed our distribution plan below for 360 books that will be distributed for free: Karnataka Panchayat libraries: 100 Parikrma schools: 20 Bidiru learning centre: 20 Buguri community library: 20 The community library project: 100 Schools and libraries in Tamil Nadu, distributed by FERAL: 100 An online copy will be published by the end of the year, and we will also upload our illustrations to the StoryWeaver illustration database.

A *Schistura sp.*, documented in the Khengjang-Yangoulen FCZ using a "Photarium", a better approach to photograph fish during sampling. Image credit: Letkhosei Baite.

Saving the fish from Mekong to Meghalaya

Project Period: November 2019 to December 2021
Budget: USD 18524 and INR 10,79,098
Supporting Agency: Critical Ecosystem Partnership Fund, USA and Ashoka Trust for Research in Ecology and the Environment, India
Collaborator: FISHBIO
Principal Investigator: Jagdish Krishnaswamy (ATREE) and Srinivas Vaidyanathan

In many areas, traditional fishing practices have been replaced by unsustainable fishing practices (such as electro-fishing and poisoning), which has affected people's livelihoods. In addition, rivers, their biodiversity and ecosystem services, are relatively undervalued, neglected and exposed to pollution, habitat degradation and over-exploitation. In India, only a few rivers and streams remain free-flowing and these are under serious threat of transformation, possibly resulting in altered flow regimes. There is a huge gap in our knowledge of the conservation status of riverine biodiversity and spawning sites, and this along with a lack of stakeholder participation has made conserving freshwater biodiversity challenging.

This project seeks to establish community-based fish conservation zones (FCZs) in Meghalaya and Manipur, and build upon the existing experience of hydrologists, fishery biologists and aquatic ecologists to define ecological flow regimes and include it in the management of FCZs.

The FCZ model of conservation is adopted from Laos where fisheries management is largely decentralised.

Project Objectives

1) Generate baseline data on aquatic biodiversity and estimate ecological flow regimes for two rivers covering a stretch of about 35 Km.

2) Demarcate fish conservation zones in two rivers.

3) Build capacity of villages, community members, researchers, and civil society organisations to aid conservation efforts, by building their knowledge on fish taxonomy, biology and hydrology.

4) Replicate community-based fish conservation zones in freshwater ecosystems.

Locals continue to use the Tuivang river outside the FCZ for their daily needs. Image credit: Nicole Pinto.

Status

A stretch of 2.4 km along the Tuivang River in Manipur was declared as community managed Fish Conservation Zone by the Khengjang and Yangoulen villages. A series of consultative meetings with local communities and village chiefs prior to the formation of the conservation zone was used to agree on the stretch of the river to be set aside free of fishing, on the role played by the community in monitoring and the rules and regulations for managing the FCZ.

The village council of Khengjang and Yangoulen, who are the local decision making and governing bodies, participated in the project activities through several stakeholder meetings and discussions which led to the design and establishment of the FCZ. The village council members and chiefs of neighbouring villages also participated in public events and are aware of the steps and process of establishing and managing FCZs.

The FCZ was created to increase fish stocks and protect their habitat. Largely, we had expected reduced fishing pressures from the two project villages and their surrounding villages. However, the establishment of the FCZ has also restricted sand and stone quarrying to areas outside and downstream of the FCZ. This unexpected positive impact has not only helped in ensuring that the habitat for fish within the FCZ is not destroyed, it has also ensured that the two villages continue to receive clean fresh water for their domestic needs. Local residents report that the river is less polluted and cleanliness has improved since the establishment of the FCZ; a few of them have also reported increase in fish abundance.

The project team has surveyed 10 Km of the river to assess the health and status in the dry season. Biodiversity and hydrological monitoring of the river has been initiated as part of the monitoring and also to develop ecological flow regime for the Tuivang River. In the first half of the year, a mobile application was developed to record fish species and the project team used this to opportunistically document fish in fresh waters and also those sold in local markets. Due to the pandemic restriction on travel and meetings, an online hydrology workshop for researchers, grassroot organisations and interested public was conducted along with the project partners.

The project has documented the presence of 22 species of fish in the Tuivang River, 17 of them have been recorded within the FCZ. One species, *Clarias magur*, is endangered; *Rasbora ornatus*, is vulnerable; and two species, *Syncrossus berdmorei* and *Ompok pabda,* are near threatened as per the IUCN redlist.

Baseline data on river health, aquatic diversity and stream flow has been generated for adaptive management and scientific monitoring of the FCZ.

The Nilgiri Biospere Reserve established in 1986 is a biodiversity rich region in the Western Ghats. Image credit: Kamalraj.

Developing a conservation plan for the Nilgiri Biosphere Reserve

Project period: August 2020 to September 2021
Budget: INR 3,50,000
Supporting agencies: National Centre for Biological Sciences, India
Project investigators: Srinivas Vaidyanathan and Rajat Ramakant Nayak

The Nilgiri Biosphere Reserve (NBR), the first biosphere reserve to be established in India is noted for its rich biodiversity. NBR covers an area of 5500 km^2 and shows a large gradient in rainfall, temperature, and elevation, which have given rise to diverse vegetation types. The climatic and vegetation gradients within the NBR makes it an ideal site to understand the historical trends in ecosystem services and their response to changing climatic conditions. In this project we examined the long-term trends and variability in climatic factors and its impacts on ecosystem services using gridded and remotely sensed data products.

Project Objectives

1) Assess climate variability and trends and impacts on ecosystem services in the Nilgiris landscape.

2) Assess land-cover change and impacts on ecosystem services in the Nilgiris.

3) Use existing and accessible remotely sensed and climate data to map hotspots of ongoing phenological change in forests and grasslands in the Nilgiri landscape.

4) Interpret impacts of these changes on ecosystem services and implications under future climate change.

Status

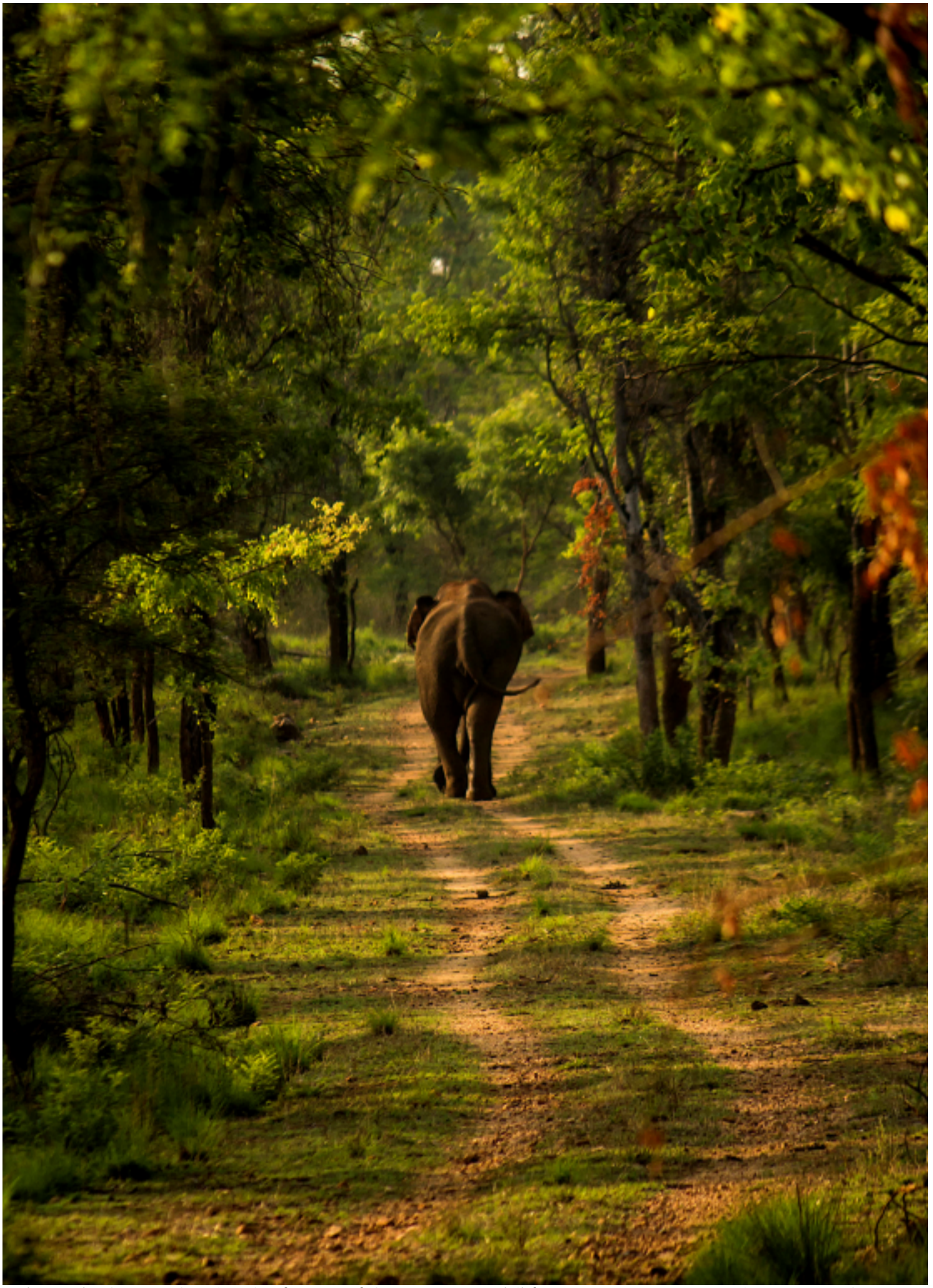
Analysis of coarse scale historical gridded data products showed that the average rainfall across the NBR during the South West Monsoon has witnessed a significant decline with a corresponding reduction in the number of rain days between 1951–2007. The entire landscape has witnessed an increase in temperature, which is in line with future climate change predictions. However, the trends in historical rainfall are contrary to large scale model predictions which indicate increase in rainfall totals with high levels of uncertainty.

Annual net primary productivity indicates the amount of carbon assimilated in terrestrial biomass—84% of the NBR experienced a decrease in the annual net primary productivity due to the long term influence of water stress. Trends in vegetation greening and browning showed a net greening in the NBR. Trends in hydrological services indicated an

The Nilgiris. Image credit: Kamalraj.

increase in water available as surface flows and groundwater upto 2015–2016 and a decrease thereafter. LULC changes, regional climatic variable and other non-climatic factors had greater influence on carbon sequestration compared to phenology and hydrological services. These results can feed into conservation planning, developing regional climate resilience plans, and also aid in our understanding of regional to global scale vegetation dynamics, which are required to improve models of climate biosphere interactions.

Studies have shown that climate change affects plants through changing phenology, distribution patterns and in the long term changes community compositions. Image credit: Ravinder Singh Bhalla.



A lone elephant sighted in the forests of the Cauvery Wildlife Sanctuary. Image credit: Venetia Sharanya.

Frontier Elephant Programme

The Frontier Elephant Programme (FEP) is a multi-institutional collaborative effort spearheaded by researchers at FERAL in association with scientists from the National Institute of Advanced Studies (NIAS), Asian Nature Conservation Foundation (ANCF) and the Indian Institute of Science (IISc). The aim of the programme is to conserve individuals and populations of wild Asian elephants that persist in human-dominated landscapes through long-term monitoring and citizen-science initiatives.

The goal of the programme is to harness the behavioural adaptability of elephants to help local communities adopt lifestyles that facilitate their coexistence with elephants while ensuring food security and safety in the region. Along with the long-term monitoring of individual elephants, we strive to conserve these individuals in the wild through projects that minimize human and elephant conflicts.

FEP has thus far conducted five projects that have helped generate baseline data on elephants in the human dominated landscape of the Eastern Ghats and aided in the conservation of these wild elephants through community participation and reduction in human and elephant conflicts. The “my elephant in my village” project, developed links with the Forest Department for the implementation of seasonal crop protection measures and monitor elephant activity in forest and human-occupied areas. The “elephant on the zebra crossing” project analysed elephant movement and human and elephant conflict hotspots around Bengaluru and has shown how their movement is likely to be in 2030 given the trends in land-use change. The "towards an empathetic world with elephants" project helped build the awareness among local communities on the lives of elephants they share the land and resources with. The projects "co-creating spaces for humans and elephants" and "expansion of community fences - I" both helped bolster the "my elephant in my village" project in taking the community fences to more people in the landscape.

In the year gone by, three master's students from TERI School of Advanced Studies joined the Frontier Elephant Programme and have successfully completed their Master's dissertation under our guidance. Two interns, one from Ethiraj College for Women and another from St. Xaviers College tested the elephant beeper that would warn an elephant of the presence of an electric fence and analysed the spatiotemporal distribution and behaviour of Asian elephants in musth in the Eastern Ghats landscape, respectively.

Community storage of crops to enable more households to benefit from common well guarded crop storage is one of the mitigation measures relevant for the villages that we work with. Image credit: Sandeep G.

Researchers setting up the early warning system at a cropfield. Image credit: Nicole Pinto.

My elephant in my village

Project Period: September 2018 to December 2021
Budget: USD 1,03,553
Supporting agency: US Fish and Wildlife Service, USA
Principal investigators: Srinivas Vaidyanathan and Nishant Srinivasaiah

This project is aimed at addressing the issue of human and elephant conflict and food security in regions where humans and elephants share space and resources. It assists the local communities to conserve Asian elephants in a human-dominated landscape by adopting village-level farming and lifestyle practices that are compatible with elephant use of the landscape, thereby, changing the dominant narrative of "your elephant in my village" to "my elephant in my village".

Project Objectives

1) Forming and training village level teams to reduce the loss of property and life.

2) Training and implementation of site-specific farm-based practices to reduce the loss of property and life.

3) Establishment and maintenance of physical structures to reduce the loss of property and life.

4) Deploy technology to equip villagers with early warnings to reduce the loss of property and life.

5) Developing a framework for site-specific implementation of mitigation action plans at the level of a village.

Status

By mapping the capabilities and functionings of farmers we identified flash points with elephants. Farmers were trained in monitoring elephants using camera traps and through the maintenance of records of elephant activity in the villages. Of the mitigation measures identified as being relevant to the villages, early warning system was selected to help with danger to life, hanging-wire fence to protect crops from being trampled and or eaten, community storage of crops to enable more households to benefit from common well guarded crop storage and fair markets so that the produce could be sold at a premium so as to earn additional income that can feedback into fence maintenance. Through this project we formed trained groups of farmers across seven villages who could establish community fences for the protection of crops from elephants successfully. Pre and post

Farmers checking the tarpaulins given by the project. Image credit: Venetia Sharanya.

mitigation measure assessment of perception of the farmers through a psychology survey showed a changing attitude among people.

With the availability of better and safer alternatives, these farmers today lead a less stressed life, elephants do not always turn aggressive as people are not on foot and indiscriminately chasing them, and dependency on the Forest Department to protect crops has reduced. People also earned higher than normal income as their crops were sold at a premium price, as "Elephant Friendly". Early detection of elephants, even before they enter a village so that people are well prepared and safe to deal with conflict, however, could not be achieved due to various technical issues in villages around forested areas including the non-availability of good network to transmit the messages.

A workshop on 'systems thinking' with the participating farmers to inform farmers of possible improved farm-based practices that they could implement, and provide sufficient information and support to enable them to adopt these practices has helped the farmers understand that they are part of a larger system in motion. A report detailing the specific improved practices that were implemented and an evaluation of their collective effectiveness within the project period has been put together. Physical structures built based on requirements in each village for efficient guarding, such as the hanging wire fence, have resulted in a reduction in the number of instances of loss of property and life. A change in the narrative from elephants being a problem to the fence being a solution is seen in the region. Elephants move across the fence without breaking them during the non-cropping season thereby sharing space and resources with people without any conflict.

Training farmers in Ramnagara to put up fence. Image credit: Venetia Sharanya.

The Asian elephant is an endangered species. Image credit: Venetia Sharanya.

Elephant on the zebra crossing: Predicting human elephant conflict to inform urban development in and around Bengaluru city

Project Period: August 2019 to December 2020 June 2021
Budget: INR 4,90,000
Supporting agency: Bengaluru Sustainability Forum and National Centre for Biological Sciences
Principal investigators: Nishant Srinivasaiah, Srinivas Vaidyanathan and Uma Ramakrishnan (NCBS)

This project aimed to highlight the potential impacts of land use change on the elephant, an icon of conservation efforts. We focus on human-elephant conflict in and around urban habitats, and provide guidelines for agriculture and infrastructure development and town planning in regions that are close to elephant habitats. Through this document, we also hope to make policy-makers more receptive towards the elephant use of this already fragile forest habitat of southern India.

Project Objectives

1) To assess environmental and biological factors influencing the current foraging and ranging decisions by elephants in the peri-urban areas of Bengaluru city.

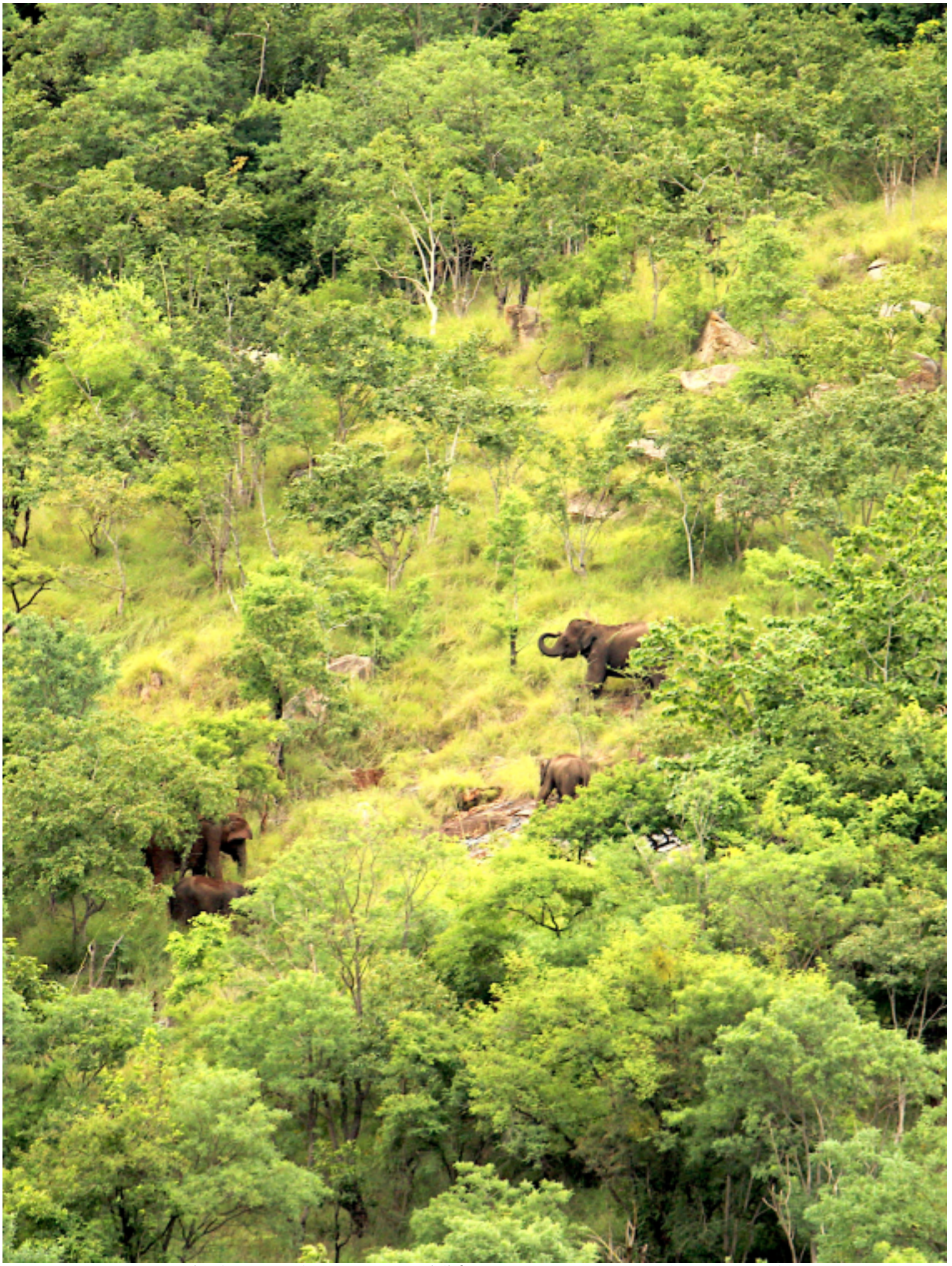
2) To assess current trends in elephant distribution and human-elephant conflict in the districts of Bengaluru, Ramanagara, Tumakuru and Krishnagiri and to identify human-elephant conflict hotspots.

3) To develop predictive models of human-elephant conflict, given future trends in landuse change in Bengaluru city, including Tumakuru, Ramanagara and Kanakapura towns based on the Master Plan 2031 of Government of Karnataka and the identification of Hosur as a special investment region by the Government of Tamilnadu.

4) To generate guidelines that can act as a policy document to help urban development in regions co-habited by elephants.

Status

Using recursive partitioning classification trees, we used data on elephant locations and contiguity, to assess environmental and biological factors influencing foraging and ranging



Foraging elephants in the Cauvery Wildlife Sanctuary. Image credit: Venetia Sharanya.

patterns of Asian elephants, especially males, in peri-urban areas of Bengaluru. The results from this exercise provided us with the baseline values that reflect decision-making in individual elephants.

We used these values, based on empirical data to predict elephant movement under three scenarios of landuse change: 1) modelled: future land-use change is modelled based on past land-use change; 2) planned: future land-use change is modelled based on past land-use change, and incorporates planned changes to infrastructure as detailed in the Master Plans, and 3) hopeful: future land-use change based on steps 1 and 2 above, which incorporates mitigation structures to enable increased permeability to elephant movement. We then ran the final model that showed us how elephant movement is likely to be in 2030 given the trends in landuse change until today and the planned developmental works in and around Bangalore city.

We are finalizing a manuscript that assesses the change in habitat selection and daily activity patterns in elephants as they transition across a gradient of forest contiguity in peri-urban areas around Bengaluru. Our results suggest that male elephants in low contiguity areas with little available natural forest have modified their behaviour to select waterbodies as refuge sites more than expected based on its availability. In contrast, when they are in high contiguity areas, elephants use forests more than expected based on availability, and adjoining crop fields and scrublands as per availability. Finally, based on the results from this project we are looking forward to developing policy guidelines for land use planning that can make the elephant use of these areas more compatible with that of human use.

We have identified the key environmental, biological and anthropogenic drivers, which bring elephants close to human-use areas including urban centres through this study. Detailed analyses of the socio-ecological processes that has lead to male elephants coming close to Bengaluru and other peri-urban centres will provide us with ideas for better land use planning and management close to elephant habitats. Very importantly, maps of current elephant distribution and human-elephant conflict, predictive models of elephant use of the region in response to alterations in the landscape and its implications on human-elephant conflict, and a policy document on urban development in areas co-habited by Asian elephants that are being prepared will all be tangible outcomes of this project, which can then be used effectively in advising urban planning in the immediate future. We will compare the results obtained across the predictive models to identify potential challenges and strengths of the existing management plans for forests and elephants in this landscape.

A camera trap photo of an elephant charging buffaloes at a water hole. Image credit: Frontier Elephant Programme.

Towards an empathetic world with elephants

Project Period: November 2020 to February 2022
Budget: INR 1,99,174
Supporting agency: Quilt AI PTE Ltd., Singapore
Principal investigators: Nishant Srinivasaiah

Through this project we aim to conserve individuals and populations of Asian elephants that persist in human-dominated landscapes, through a change in human perception of the elephant as 'the farmer and architect of the landscape' and not a marauder of villages and by ensuring that people are more empathetic towards the elephants they share space with by knowing and acknowledging that elephants, like us humans, are highly social, intelligent and most importantly empathetic beings.

Project Objectives

1) Sustained long-term monitoring of the changing lives of the elephants

Status

Our monitoring efforts give us a window into the lives of elephants which help us understand their behaviour and movement patterns among other things. Over the course of this project, we have continued monitoring elephants in Ramanagara and Channapatna Forest Divisions of Karnataka through camera traps and personal observations. With the change of seasons from winter to summer, we witnessed drastic changes in the landscape —large waterbodies shrunk and some small ones altogether disappeared. Where we once waded through the water to reach the ideal tree to set up our camera trap, we now walked on dry ground. Animals frequently came to the waterbodies to quench their thirst and cool off and we were able to get numerous images of elephants.

Due to our long term monitoring of individual elephants, we began to see patterns of individual movement and anticipate who a particular individual might associate with. In Ramanagara and Channapatna we almost exclusively saw male elephants, most of whom moved around in all-male groups, consistent with our findings that young male elephants associated with older ones to navigate through an unknown environment or risky situations. With the development of irrigation and a longer growing season, elephants are staying in the landscape for longer. This, however, also gives rise to conflict as elephants sometimes leave the forest to feed on agricultural crops.

We also began setting up cameras in Bannerghatta National Park where we could also observe elephant herds. Water was more easily available here and we frequently saw

Elephants at a water body. Image credit: Sandeep G.

images of herds at the waterbodies. Elephants largely visit water bodies in the early or late hours of the day. We have continued assessing the proximate factors that influence the decision-making of elephants to build predictive models of conflict, which include future urbanisation, in the peri-urban and urban areas of Bengaluru City to inform future developmental activities. We have also been trying to answer questions, such as do elephants have a preference for whom they are associating with? Does a herd associate strongly with certain males? We are trying to do this by studying the social networks of elephants in the southern Indian landscape. We have been identifying individual elephants and documenting who associates with whom and how frequently.

Understanding social structure is important because it influences gene flow, spatial pattern, communication, learning between individuals and could even affect elephants' interactions with humans. Three masters students joined us for their internship to study how elephants interact with herbivores at point resources and their spatial and temporal differences in resource sharing; their spatiotemporal distribution and behaviour during musth; and how elephants are distributed historically during the wet and dry seasons.

An elephant herd captured in the camera trap. Image credit: Frontier Elephant Programme.

A farmer standing besides his hanging wire fence. Image credit: Venetia Sharanya.

Towards mitigation of human and elephant conflict through fence line expansion - Expansion of community fencing

Project Period: May 2021 to June 2022
Budget: INR 3,62,500
Supporting agency: Denver Zoo
Principal investigators: Nishant Srinivasaiah

This project seeks to address the critical issues of elephant conservation, management and conflict mitigation in the Ramanagara Forest Division of Karnataka, which is witnessing high levels of elephant movement and at times severe levels of elephant-human conflict. One of the main objectives of this project is to enable crop protection by the farmers, who are witnessing crop damage by elephants, in an 'elephant-friendly' and cost-effective manner. This is to address not only the issue of human-elephant conflict but also that of food security in regions where humans and elephants share space and resources.

Project Objectives

1) Building the capacities of local stakeholders in monitoring elephants and mitigating human-elephant conflict in and around high human-use areas.

2) Implementing improved farm-based practices that will help reduce the exposure of the crops at various stages of crop cultivation to elephants.

3) Establishment of solar-powered 'hanging-wire' electric fences that are affordable to the farmers and is designed in a way that elephants find it difficult to overcome the same.

Status

Our project is based in a rapidly urbanizing landscape where the land-use changes, from largely forest/agrarian to peri-urban settings, has occurred in the recent past due to a spurt in economic growth and development. Implementing improved farm-based practices will help reduce the exposure of the crops at various stages of crop cultivation to elephants. One such measure in this regard is the establishment of solar-powered 'hanging-wire' electric fences that are affordable to the farmers and is designed in a way that elephants find it difficult to overcome the same.

A young elephant strolls past a water body in the Cauvery Wildlife Sanctuary. Image credit: Frontier Elephant Programme.

As a first step towards harmonious living with elephants, it is essential that human lives are safeguarded and the crops grown by them are protected. The mitigation measure planned needs to be also affordable, easy to maintain, easy to build and easy to move. The fence that has been designed and is being implemented also takes into account the behaviour of the elephant, in which it is challenging for an elephant to bring the fence down, as there is no fixed part of the fence which is accessible to an elephant. The wires drop from a height of 15 ft and are suspended from poles. The wires are electrified using a pulsating current controlled through an energizer rigged to a rechargeable solar-powered battery. The total cost of the materials for a 1 km fence is approximately INR 1.5 lakhs including the battery, energizer and solar panel. This cost, however, does not include other costs such as labour, transportation, food and accommodation.

A one-kilometre long fence would require anywhere between 4 to 5 days to set up, which is extremely fast. The cost of the fence is also 2 to 3 times lesser than any of the existing solar fences that have been used to prevent wild animals from entering crop fields. Moreover, this fence has been the most effective in keeping elephants out of the crop fields. Following the collaboration with the Ramanagara Forest Division, where three such fences were first set up to test the effectiveness of the fence in protecting crops, several farmers in the region stepped forward to set up these fences around their own farms. While some farmers could afford the fence on their own, others were assisted through the project and the Forest Department. This was done by providing them with solar sets that made up almost half the cost of the total fence. Each solar set contained a battery, energizer, solar panel and the required wiring.

The efforts of the research teams, farmers and the Forest Fepartment have been rewarding as not a single elephant intrusion has been recorded thus far in any of the hanging-wire fenced crop fields. The elephants have visited the crop fields but have been kept away because of the fence, as evidenced by their dung close to the crop field areas and their photographs. We believe that mitigation measures of this nature have the potential to be scaled up, not only by our initiation but also by villagers themselves spreading awareness to neighbouring villages and to the district. The news of crop protection using temporary hanging-wire fences has gone viral and has the potential to snowball into a movement. We hope to continue to monitor these fences and the community initiatives that may help maintain and sustain such an effort.

Ragi from farmers with whom we work with being marketed as an elephant friendly product. Image credit: Frontier Elephant Programme.

Co-creating spaces for humans and elephant coexistence

Project Period: November 2020 to March 2022
Budget: INR 1,00,000
Supporting agency: Optiv Solutions, India
Principal investigators: Nishant Srinivasaiah

Through this project we aim to conserve individuals and populations of Asian elephants that persist in human-dominated landscapes by creating opportunities for people, especially farmers, to attain their life goals. Our endeavor was to enrich the lives of the farmers by showcasing the intricate web of actors and processes which they, as much as the elephants, are an integral part of and are agents of change.

Project Objectives

1) Co-creating spaces and lifestyle practices that are more compatible with the elephant use of the area, thereby improving our own adaptability and food security.

2) Storytelling to inform the farmers of the ways in which they can deal with their own issues with elephants rather than depending on external aid.

Status

Through this project we helped connect farmers to better markets and to consumers who are conscious of where and how their food is grown to help farmers gain a better price for their crops. We organised a workshop for the farmers at the National Institute of Advanced Studies in Bangalore. While conflict has reduced in farming, there is still much progress that can be made in other areas of life. This workshop was organised to explore such possibilities with the farming communities that we work with through a systems thinking framework. The other objectives of the workshop were to introduce the farmers in different areas to each other and to facilitate exchange of ideas and cross-learning. The farmers talked about how they spend so much time growing and protecting their crops, but in the end, they very often lost a large portion to the elephants, despite trying several ways to keep elephants away. After this, they would usually approach the Forest Department to claim compensation. Now, by working together and trying new methods of crop protection, they were able to harvest all of their crops. This had boosted their morale and they now had the confidence to try new methods to live alongside elephants.

Additionally, to raise awareness about human-elephant conflict, we have come out with a comic book that tells the story from the human and the elephant sides exploring ways in which co-existence may be achieved. We also continue updating our Instagram account talking about individual elephants and their lives alongside people.

Changes in forest status can significantly influence hydrological services. A reduction in water availability due to increased evapotranspiration losses during dry seasons is a major concern associated with invasive exotic tree species in forested landscapes. Image credit: Rajat Ramakant Nayak.

Natural Resource Management

The primary objective of this programme is to document, restore and manage landscapes that sustain communities and provide essential products and services. Understanding the impacts of climate change on these services and consequently on the vulnerabilities of communities is a crucial component of this work. To this end, we collaborate with other research institutions working in the Western Ghats. We undertake action research and leverage mobile information and communication technologies coupled with low-cost environmental sensors for environmental monitoring.

The objectives of this programme are: 1) To unravel and quantify ecological processes that deliver ecosystem goods and services using participatory and multidisciplinary approaches. 2) To demonstrate and develop research tools for decision support in the management of natural systems with a specific focus on scenario building for impacts of climate change and trade-offs between interventions. 3) To use this research to identify strategies and inform and influence policy which will reduce the vulnerabilities of stakeholders and the ecosystems to natural disasters and climate change, and help restore and sustainably manage ecosystem services through community action in habitat restoration, protection and management.

This year, we continued the long-term monitoring of hydrological cycle with specific emphasis on understanding the hydrological footprint of invasive plant species in the Nilgiris using hydromet equipment installed during the Ministry of Earth Sciences supported project.

Invasion of native grasslands by woody invasive plants such as black wattle (***Acacia mearnsii***), Scotch broom (***Cytisus scoparius***) and Gorse (***Ulex europaeus***) has reduced grassland cover and affected stream-flows in the Nilgiris. Image credit: Rajat Ramakant Nayak.

The "hydrologic footprint" of major invasive alien species in the upper Nilgiris

Project period: August 2018 to December 2021
Budget: INR 23,64,339
Supporting agency: Ministry of Earth Sciences, Government of India
Principal investigators: Ravinder Singh Bhalla and Jagdish Krishnaswamy (ATREE)

Invasive trees in catchments are a source of concern due to their hydrological and ecological impacts. The Nilgiris, a high biodiversity area, is known for its mosaic of shola forests and grasslands. A large number of exotic plants were introduced in this landscape, and some of these, particularly, wattles (*Acacia mearnsii* and *A. dealbata*), have invaded natural grasslands. However, little is known about the impacts of terrestrial invasive plants on stream hydrology. This project quantifies the 'hydrologic footprint' of three major invasive species in the Upper Nilgiris, namely black wattle (*A. mearnsii*), scotch broom (*Cytisus scoparius*) and gorse (*Ulex europaeus*).

Project Objectives

1) Compare the effect of three dominant land covers namely, wattle, scotch broom and natural grasslands, in the Upper Nilgiris on the water balance in terms of dry season stream-flows, evapotranspiration, and soil moisture.

2) Quantify impacts of large scale removal of black wattle on sediment loads in streams.

3) Investigate decadal trends in areas under major land cover and natural grasslands and forests and their contribution to evapotranspiration at a landscape scale.

Status

Analysis of stream discharge and soil-moisture data suggests greater water loss in wattle-invaded catchments compared with native grasslands. We found greater mean daily discharge in streams within grassland-dominated catchments compared with catchments invaded by wattle during the dry-periods. Similarly, we found less soil moisture in young and old wattle stands compared to native grasslands. The decline in stream-flows and soil-moisture within wattle-invaded catchments is directly linked to a greater water loss by woody invasive plants through evapotranspiration. Analysis of land-use/land-cover trends suggest an increasing trend in wattle cover since 2000s. Modelling of evapotranspiration revealed an increase of 8–12% in the evapotranspiration values due to conversion of grasslands into wattle plantations.

Hydrological monitoring of the grasslands in the Nilgiri Biosphere Reserve. Image credit: Ravinder Singh Bhalla.

Reduced stream flows as a result of excessive water-loss through transpiration by woody invasives has greater impact on the availability of water for the forest, wildlife, drinking water for humans, and water for power-generation in the drier periods. Thus, our findings has direct water-management implications. The restoration of native montane grasslands is crucial for sustaining the hydrological cycle and increasing stream flows in the Nilgiris.

A sambar deer spotted in the Nilgiris. Image credit: Ravinder Singh Bhalla.

Sea Anemone found in tidal pools along the coast of the Andaman Islands. Image credit: Srinivas Vaidyanathan.

Marine Science Programme

The marine science programme has been reinitiated from this year. The programme focuses on protection and conservation of the marine and coastal ecosystems and the biodiversity found therein. Our approach to marine conservation starts from human interactions with the marine environment. We examine these interactions to identify key leverage points to initiate conservation action, either through collaboration with policy makers or in conjunction with communities. The goal of this programme is to provide evidence-based recommendations for marine conservation using participatory methodology, long-term monitoring and technology. We also aim to reach diverse audiences with our conservation message through unique and tailored outreach campaigns. This year, our focus was on sustainable fishing with emphasis on conservation of sharks, rays and skates along the east coast of India.

Over the past year, we have initiated work across multiple coastal states, including Goa, Andhra Pradesh and Tamil Nadu. The work has largely focussed on fisheries, and working in partnership with fishing communities. Through the Saving Sharks with InSeason Fish project, we have conducted monthly outreach and awareness programmes, to reach audiences of 65 in-person and >500 online in addition to InSeason Fish's regular social media outreach. We have also initiated monitoring of a greater suite of species at fishing harbours and working towards integrating technology into such monitoring. Through the No More Shark Bites project, we have studied the consumption of sharks and rays at restaurants in all coastal states of India, with a focus on Goa. Through the Beyond Fins project we have compiled data on catches of sharks and rays in different types of fisheries in Andhra Pradesh and Tamil Nadu. We have also compiled data on the fishing practices used, and in the long term expect to be able to understand the impacts of different types of fishing on marine species.

In the last year we trained four interns on compilation of literature, desk-based data collection and using social science methods, and subsequently absorbed two of them as junior research fellows in our projects. We also provided training and opportunities for one Master's student from Annamalai University and one PhD student from the University of Oxford to conduct parts of their dissertation research through this programme.

Divya Karnad interacting with the public during a fish identification session. Image credit: Abhishek Gerald.

Saving sharks with InSeason Fish

Project period: May 2019 - ongoing
Budget: INR 40,00,800
Supporting agency: Future for Nature, Netherlands
Principal investigator: Divya Karnad

This project works on marine sustainability from the perspective that it can be achieved only if all parts of the seafood supply chain align to support sustainable fishing. This project complements other ongoing work at the Marine Programme, by working to identify key gaps and interventions needed to ensure that fisheries can begin to reduce their impact on the marine environment. At present, India's marine seafood comes mainly from non-selective fishing nets, which can be destructive to marine ecosystems. As a result, most marine species are trapped in these fishing nets. Unlike in the Global North, the concept of bycatch (species that are caught by mistake and which have no market value) is almost non-existent in India. Instead, species that are typically considered bycatch elsewhere in the world are being sold into low-value supply chains in India and abroad.

Earlier in this project, we analysed domestic supply chains with a specific focus on domestic seafood consumption and unsustainable fishing. In the current year, we focussed on a key intervention identified from our previous work – helping Indian seafood eaters diversify their seafood consumption and avoid eating threatened marine species.

Project Objectives

1) Assess fish catches for species diversity along the Coromandel Coast.

2) Document relative differences in species diversity and create a rubric to help consumers identify what they are eating

3) Create a technology-based tool to help seafood eaters choose diverse seafood and the most sustainable choices among the options available to them.

Status

We developed a new protocol to monitor fish catches this year in order to meet our first project objective. As a result, we have been able to monitor three different types of fisheries and collect data on species diversity. We have been working with computer scientists at Ashoka University to develop a rubric to help non-scientists identify the species that are involved in these fisheries. We are also aiming to get more people involved

The project team collecting data at a fish market. Image credit: Divya Karnad.

in monitoring fish landings through the use of digital tools. Our field biologists are collaborating with the computer scientists to ensure that these tools are user-friendly and can enable not only smoother data collection by researchers from the Marine Programme, but also aid members of the general public.

We have also continued activities that began in the previous year, under this project. These activities include regular in-person and online programmes for the general public to teach seafood eaters about different fishing nets and boats, the methods used by fishermen to catch seafood, ways to identify fresh and more sustainable seafood, and how to identify different species. We have held these sessions at Nochikuppam and Kasimedu, in Chennai. Participants of these sessions are also provided with printed outreach materials created through this and other projects at the Marine Programme. We interact with over 100 fishermen and fisherwomen through these programmes, and they are benefitted through increased contact with direct buyers, and improved sales of diverse species due to our recommendations. We have also facilitated value-added events for fishing communities, such as creating opportunities for consumers to learn seafood recipes, as well as to see the making and repair of fishing gear.

Additionally, we continued distributing the colouring books that were created by InSeason Fish during the COVID-19 pandemic to students across various coastal districts of Tamil Nadu including 150 children from the fishing community who were studying at the Narambai Primary School, ~600 children from schools supported by the Vanavil Trust in Nagapattinam and ~600 children supported by the Kanavu Trust in Cuddalore.

Chaitanya Krishna teaching seafood consumers about fish identification. Image credit: Divya Karnad.

Observing regular processes in a fish market. Image credit: Abhishek Gerald.

No more shark bites

Project period: July 2020 to March 2022
Budget: Euro 10,000
Supporting agency: Prince Bernhard Nature Fund, Natherlands
Principal investigator: Divya Karnad

This project focussed specifically on the consumption of shark and ray meat, including critically endangered species like the great hammerhead shark (*Sphyrna mokarran*) and scalloped hammerhead (*Sphyrna lewini*) shark. Building on previous research that showed how shark fisheries in the north western part of India are increasingly supplying household consumers, this project examined the scale of local consumption as a driver of fisheries. Shark meat consumption has typically been a part of coastal communities' diet, with India's increasing population especially along the coasts. With declines in shark populations, shark meat consumption is becoming an increasing threat. Further, anecdotal evidence suggests that declines in shark populations are causing meat to become increasingly expensive.

Starting with the monitoring of targeted shark and ray fisheries in Andhra Pradesh and Goa, this project went on to examine consumption of shark meat across restaurants in India.

Project Objectives

1) Identify the scale of shark meat consumption across restaurants in India

2) Support long-term commitments to reduce shark harvest and consumption by networking 'shark-friendly' fishermen to responsible chefs and seafood consumers.

3) Monitor targeted shark and ray fisheries in Andhra Pradesh and Goa

Status

We identified over 200 restaurants across 10 states with online menus that featured shark meat dishes. We conducted interviews with restaurant owners, and identified the profile of consumers who request for shark meat. Goa led all the other states in terms of number of restaurants whose online menus advertised shark meat. We conducted an online and in-person intervention with restaurant owners and managers in Goa to identify why they continue to serve shark meat and what it would take to make them stop. We also identified that most restaurants in the medium and high price category are willing to remove shark meat from their menus, provided that they receive some kind of recognition or incentives.

Fresh catch segregated and displayed for sale. Image credit: Divya Karnad.

We also identified a targeted Mobula ray fishery in Kakinada, Andhra Pradesh, a seasonal targeted shark fishery in Goa and an incidental guitarfish fishery in southern Goa. While the Mobula ray fishery lasts throughout the fishing season, the seasonal shark fishery lasts for a very short period and is unpredictable in terms of start date every year. We monitored the fishery in Andhra Pradesh through regular visits to the fish landings and market site to identify species involved and other biological details. In Goa, however, we missed observing the main shark fishery since it lasted for only one week last year. Instead, we focussed on collecting local ecological knowledge about the fisheries for sharks and rays in Goa.

In order to support our objective about creating long-term commitments to reduce shark harvests we created a poster about the sharks of India, for display in restaurants that serve shark meat, especially in Goa. A website is being developed along the same lines to reach wider audiences across India and spread the message about the need for the conservation of sharks.

Maculabtis bineeshi landed at Pattinapakkam landing site. Image credit: InSeason Fish.

Carcharhinus limbatus landed at Patinapakkam fishing harbour. Image credit: InSeason Fish.

Women selling fish at Kasimedu harbour. Image credit: InSeason Fish.

Beyond fins: Monitoring elasmobranch landings and consumption

Project period: October 2021 - Ongoing
Budget: USD 28,940
Supporting agency: Stichting Burgers Zoo Conservation, Netherlands
Principal investigator: Divya Karnad

Fisheries are understood to be one of the major threats to sharks and rays around the world. India has the world's third largest catches of sharks and rays in the world, hence regulating shark and ray fishing in India is key. However, India also has very diverse fisheries, that are driven by very different values and incentives. Policy regulations to conserve sharks and rays have primarily focussed on fisheries that target sharks and rays. However, previous research has also shown that incidental catches of sharks and rays are also quite significant in India. It is therefore unclear whether the larger problem is incidental catch or targeted catch. Through this project we aim to answer this question by monitoring different types of fisheries and comparing them with data collected through other projects on targeted fisheries for sharks and rays.

Project Objectives

1) Monitoring incidental shark and ray catches from non-selective fishing gear at a major fishing harbour

2) Monitoring incidental shark and ray catches from more selective fishing gear at a small-scale fishing site

3) Assessing the impact of these fisheries, by comparing with targeted fisheries for sharks and rays

Status

Through this project, FERAL has been monitoring the landings of elasmobranchs (sharks, rays, and skates) across two landings sites in Chennai, Tamil Nadu. Kasimedu, the major fish landing harbour in Chennai, has close to 600 vessels, 250 of which are deep sea vessels, while the majority of the rest of them operate bottom trawl gear. It is one of the oldest fish landing sites in Chennai where elasmobranchs (sharks and rays) are also landed in huge numbers. We have identified a large species diversity of elasmobranchs from this landing site. Our preliminary findings suggest that various elasmobranch products are exported internationally from the harbour. Other elasmobranch products are

Fish for sale at the Kasimedu Fishing Harbour. Image credit: InSeason Fish.

transported to different states across India. They are also eaten locally, hence residents, retailers and restaurants also buy them.

Patinapakkam is a small-scale fishing village where fishermen generally use gill-nets or other manual fishing gear. Here, catch diversity is much lower, along with catch abundance. However the frequency is higher. The fishermen in the area go out on small boats during early morning and return with the catch which are then sold locally. There is no export of elasmobranch products from this landing site. These two sites offer an interesting contrast in terms of the impact of market links and fishing technology on elasmobranch catches. The project compares the shark and ray species diversity that are landed in both these landings sites that operate at different scales and use different fishing techniques. Informal interviews with fishermen are also being conducted to understand the traditional fishing practices, their fishing location and the different types of nets used.

As this project is still ongoing, the third objective is still to be realised.

Brevitrygon walga (scaly whipray) at the Pattinapakkam small scale fishing harbour in Chennai. Image credit: InSeason Fish.

Sampling of ***Scoliodon laticudus*** (spadenose shark) at Pattinapakkam fishing site in Chennai. Image credit: InSeason Fish.

FERAL staff conducting a questionnaire survey in Ududbrani Village. Ududbrani is a remote village in Tamil Nadu where farmers and elephants share space. Image credit: Nicole Pinto.

Financial resilience for conservation efforts during Covid-19

Project period: May 2021 to March 2022
Budget: INR 14,22,174
Supporting agency: Mohamed bin Zayed Species Conservation Fund, UAE
Principal investigator: Y. Chaitanya Krishna

The overall objective of this project is to sustain our conservation activities targeted towards endangered species and habitats across India's biodiversity hotspots. Our work involves implementation of on-ground ecological and conservation action with local community participation. Presently, we work with 300 fishermen to promote "shark-friendly" fishing practices; we engage with 1000 farmer households in 10,000 km^2 of elephant habitat; and approximately 300 households along the Tuivang river, a tributary of the Chindwin River. Therefore, our continued presence at these sites is critical to establish behavioural change among communities for our conservation objectives to be fulfilled. This grant will ensure that we can continue to engage with local communities. Additionally, it will help us make progress with our field based conservation initiatives across our field sites.

Objectives

1) Sustain field research activities.

2) Sustain Awareness and Advocacy.

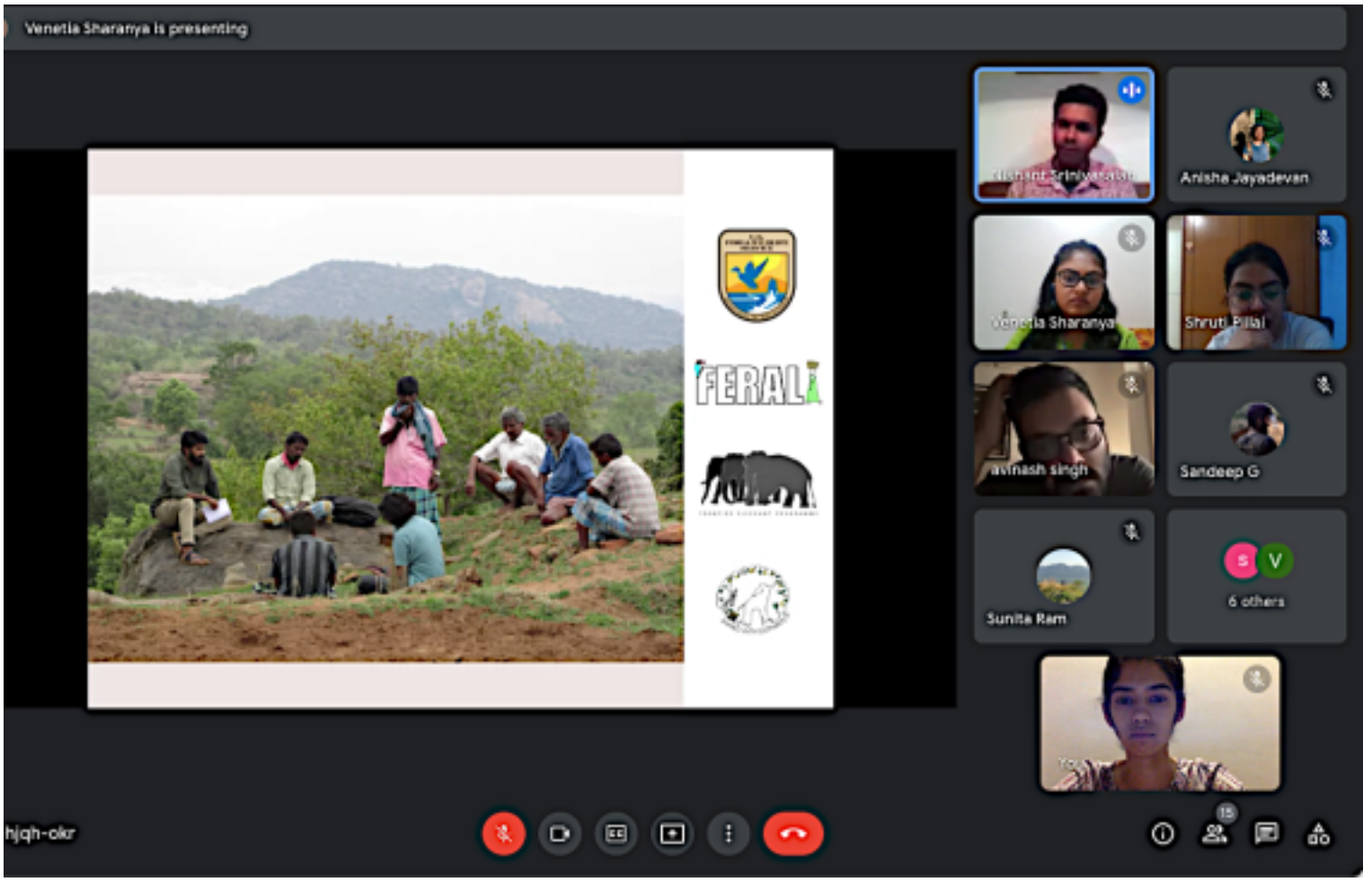
3) Sustain field-based conservation initiatives.

Status

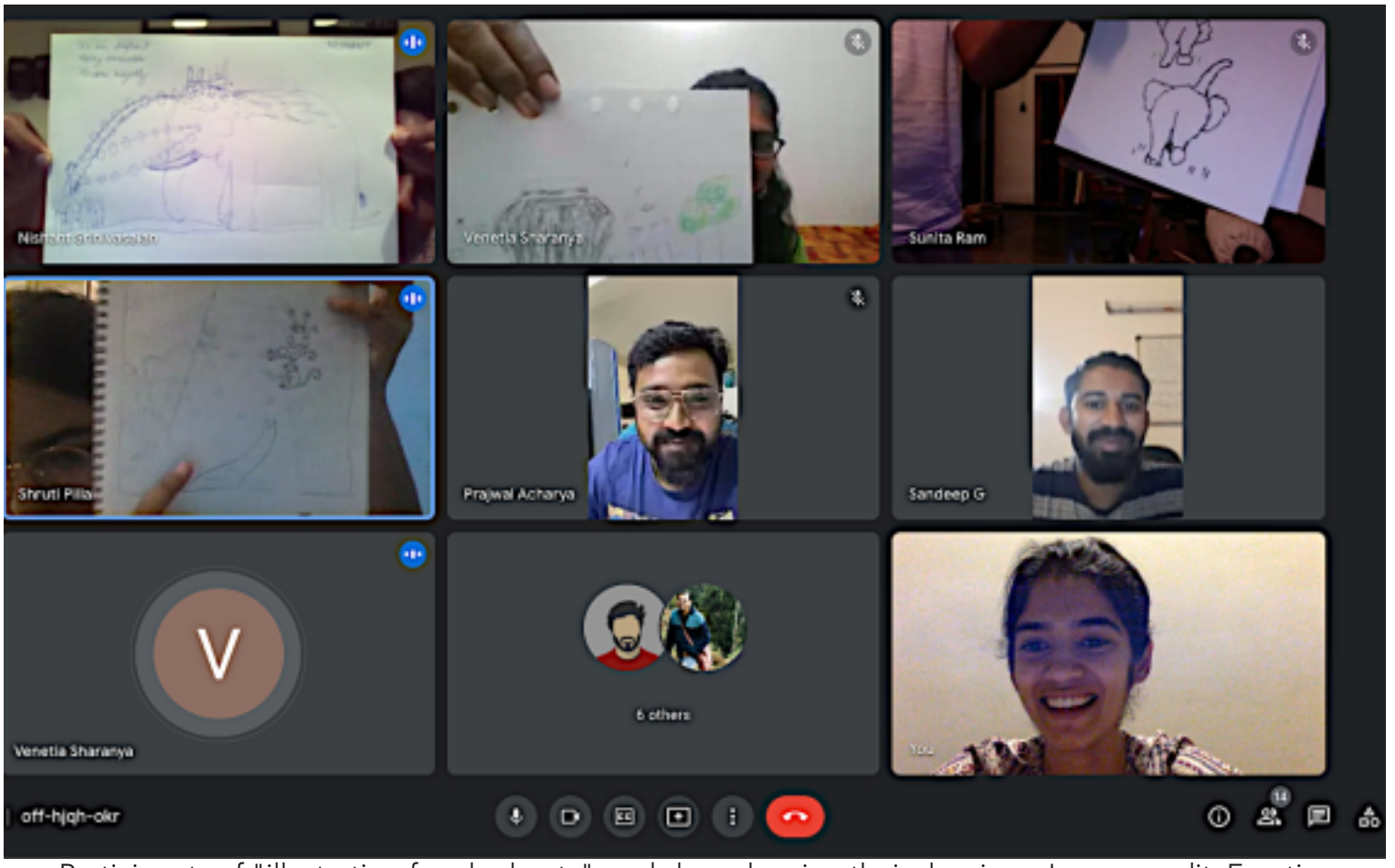
This project supported activities under four conservation-oriented projects that are being implemented by FERAL.

In the terrestrial ecosystems, we work on the endangered Asian elephants to enable their co-existence with people. In the Western Ghats, our work focusses on the critically important shola forests and grasslands, and in the Eastern Ghats of southern India, on the largest remaining scrub forest habitat. In the rivers of North East India, we work on endangered ray-finned fishes. In the marine system, the guitarfish, hammerhead sharks and wedgefish, which are all declared Critically Endangered by IUCN and use nearshore and offshore waters across India.

These projects are detailed separately under the specific programmes.



Nishant addressing the partcipants during the the online workshop on illustrating for elephants. Image credit: Frontier Elephant Programme.



Participants of "illustrating for elephants" workshop showing their drawings. Image credit: Frontier Elephant Programme.

Learning and Events

Our learning programme comprises of formal and informal courses which often overlap with other events. FERAL also conducts workshops in collaboration with other organisations.

Illustrating for elephants

We held a workshop on the 6th of September 2021 to discuss the illustrated handbook and the process through which we completed the same. Other researchers from FERAL also attended the workshop.

After a brief introduction by all the attendees of the workshop, we gave an overview of the "My Elephant in My Village" project. We spoke about our interactions and learning from farming communities who share space with elephants; why crop protection is important, how to go about it and why certain methods were adopted; and practicalities of adopting and spreading certain mitigation measures. After this, all the participants and the researchers took part in an illustration activity. The activity was meant to see how artists and researchers interpret and illustrate the same pieces of information given their varied exposure and backgrounds. The activity was inspired from Carson Ellis' Transmundane Tuesday art prompts. Every Tuesday, Ellis picks up three prompts from three different bowls mostly concerning an animal, an activity or an object and announces them. Illustrators then illustrate an image inspired from these three prompts. Participants had ten minutes to draw, after which each person described their drawings. Following the activity, we went through the comic book and each artist gave a brief overview of their respective chapters—what the story was and their experience illustrating it. The artists also spoke about some of the challenges they faced while illustrating the chapters. This was the first time most of the artists had worked on a comic book as well as on drawing wildlife, and they mentioned that due to the artistic freedom that was given to them, they were able to explore and express their own styles. The artists spoke about their inspiration for using various styles and the challenges they faced.

The comic book and the workshop helped bring artists who are interested in contributing to the field of conservation together. Artists shared knowledge about various methods and tools that they use in their craft. The workshop also helped bridge the gap between researchers and artists, presenting an opportunity to explore new ways in which they could work together.

Workshop on community based fish conservation was held at Khengjang Village, Manipur. Image credit: Srinivas Vaidyanathan.

Project staff interacting with the residents of Khengjang Village in Manipur to gather information regarding fish species found in the Tuivang River. Image credit: Srinivas Vaidyanathan.

Community-based fish conservation in rivers

A workshop on 'Community-based fish conservation in rivers' was conducted as part of the 'Saving the fish from Mekong to Meghalaya' project in Khengjang village, Manipur on December 22, 2021. The workshop was attended by researchers from Sikkim University, ATREE, FERAL, and stakeholders such as village chiefs and villagers from Khengjang, Yangoulen, and representatives from the local Police Department and the Indian Army.

The aim of the workshop was to present the success stories of community-co-managed fish conservation from South East Asia and other parts of the world and to encourage the local community to undertake more such conservation initiatives in their landscape. The success of the recently formed Khengjang-Yangoulen fish conservation zone (FCZ) along the Tuivang River was also presented in the workshop. As part of the workshop, we conducted a participatory fish identification exercise, where local villagers identified different species of fish found in the FCZ through photographs captured during the fish survey along the FCZ.

The workshop was inaugurated by Dr. James Haokip from Sikkim University and he presented the success stories of community-managed FCZ in Laos and other parts of the world. Dr. Jagdish Krishnaswamy from ATREE spoke about the importance of conserving freshwater ecosystems and maintaining ecological flows in the rivers. FERAL's Rajat Nayak presented the trends in rainfall and streamflows that have been monitored since February 2021 along the newly formed Khengjang-Yangoulen FCZ. Srinivas Vaidyanathan from FERAL congratulated the villagers of Khengjang and Yangoulen for successfully establishing FCZ in their landscape. He initiated the participatory fish identification exercise.

Women and men from the villages enthusiastically participated in the fish identification exercise and shared folk stories about some fish and rivers with us. The workshop also provided a platform for the villagers to share their views regarding the established FCZ and the potential conflicts, threats, and measures to overcome them. The villagers also had the opportunity to interact with the Police and Army personnel to share their concerns about illegal logging and sand mining by people from Myanmar. The Chiefs of both villages congratulated the researchers from ATREE, FERAL, and Sikkim University. They expressed their interest in expanding the existing FCZ and conserving fish and forests in their landscape.

Briefing before the workshop on sustainable fishing. Image credit: Divya Karnad.

Workshop on sustainable fishing

We were invited to train students from the Azim Premji University about sustainable seafood as part of a three-day workshop (21st -23rd October 2022) on sustainable fishing practices organized by Kuddle Life Foundation. This was a part of the Master's Programme in Development and Management Studies. The students were accompanied by Dr John Kurien, a visiting professor at Azim Premji University. A four-member team from FERAL conducted a reconnaissance visit and met with local fishermen from Narambai. Students were taken to Narambai on 22nd October to observe small-scale fishing techniques. This was followed by a lecture on conserving our marine resources by just choosing to eat seasonally and by supporting small-scale local fisheries. We also facilitated a session with the village fishing representatives so the students could ask their queries on fisher wellbeing and the complexities that exist within the community and the effect that has on the marine environment and their day-to-day activities and work. Students also had the opportunity to observe the entire supply chain, by following the fish from landings to consumption (as their own lunch). They could then compare this to landings at the Puducherry harbour the next day, as well as visit the fish market to examine diversity of species, the role of supply chains and trade.

Students understanding the seafood landed and different fishing techniques. Image credit: Divya Karnad.

Mumbai Conference participants at Godrej Mangroves in Vikhroli, Mumbai.

Participants interacting with resource persons during the field trip to Kumbalgarh Wildlife Sanctuary. Image credit: Vishal Thakur.

Participants of the Rufford conference held at Udaipur, Rajasthan. Image credit: Vishal Thakur.

Fostering grass-roots conservation in India - A Rufford Initiative

Project Period: December 2021 to March 2022
Budget: GBP 10,499 and GBP 11,040
Supporting Agency: The Rufford Foundation, United Kingdom
Principal Investigator: Rajat Ramakant Nayak

FERAL in collaboration with the Rufford Foundation, UK, had organised two four-day conferences for the Rufford Small Grants recipients, in Mumbai, Maharashtra between 6th and 9th December 2021, and in Udaipur Rajasthan between 12th and 15th March 2022. The Rufford Foundation is an organisation based in the United Kingdom that supports nature conservation projects in various developing countries. Till date, the foundation has funded over 1,200 projects in the Indian sub-continent and over 5,790 projects worldwide. The Rufford Foundation also hosts conferences in collaboration with local organisations in various parts of the world to encourage communication and collaboration between grant recipients. Each conference is aimed at providing a forum to discuss ideas and problems and towards creating networking opportunities between grantees. A primary objective of this meeting was to explore different aspects of conservation, action research and capacity building for conservation at the local, regional and global levels. Due to the Covid-19 pandemic, the Rufford conferences were a mix of online and offline events, and participants had the option of attending the conference in-person or virtually.

During the Mumbai Conference, there were twenty-seven presentations by Rufford grantees, two plenary talks, and three popular talks. Participants were also taken to visit the Godrej Mangroves in Vikhroli, Mumbai. Presentations during the conference covered a wide range of species and landscapes from students to early career researchers to grantees who had received all five grants offered by The Rufford Foundation's Small Grants Programme.

The theme of the Udaipur Conference was "conservation in semi-arid and arid landscapes". This was the seventh conference that had been organised in collaboration with FERAL. This event provided an opportunity for the grantees to interact with the conservationists and researchers working in arid and semi-arid parts of Western India. There were a total of 21 presentations by researchers and four popular talks during the event. Participants also visited the Kumbhalgarh Fort and the Kumbhalgarh Wildlife Sanctuary. The Rufford conferences not only give grantees a chance to present their work and receive feedback, but it is also instrumental in giving researchers a platform to form collaborations and discuss ideas and potential solutions to pressing issue.

Publications

Below is a list of our publications including articles in scientific journals, books, book chapters and technical reports.

Journal articles

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Srinivasaiah, N. M., Vaidyanathan, S., Sukumar, R., & Sinha, A. (2021). Elephants on the Move: Implications for Human–Elephant Interactions. In The Crisis of Climate Change (1st ed., p. 12). Routledge India.

Srinivasaiah, N., Vaidyanathan, S., Sukumar, R., & Sinha, A. (2021). The rurban elephant: Behavioural ecology of asian elephants in response to large-scale land use change in a human-dominated landscape in peri-urban southern india. In J. A. Diehl & H. Kaur (Eds.), New forms of urban agriculture: An urban ecology perspective (pp. 289–310). Springer Singapore. https://doi.org/10.1007/978-981-16-3738-4_16

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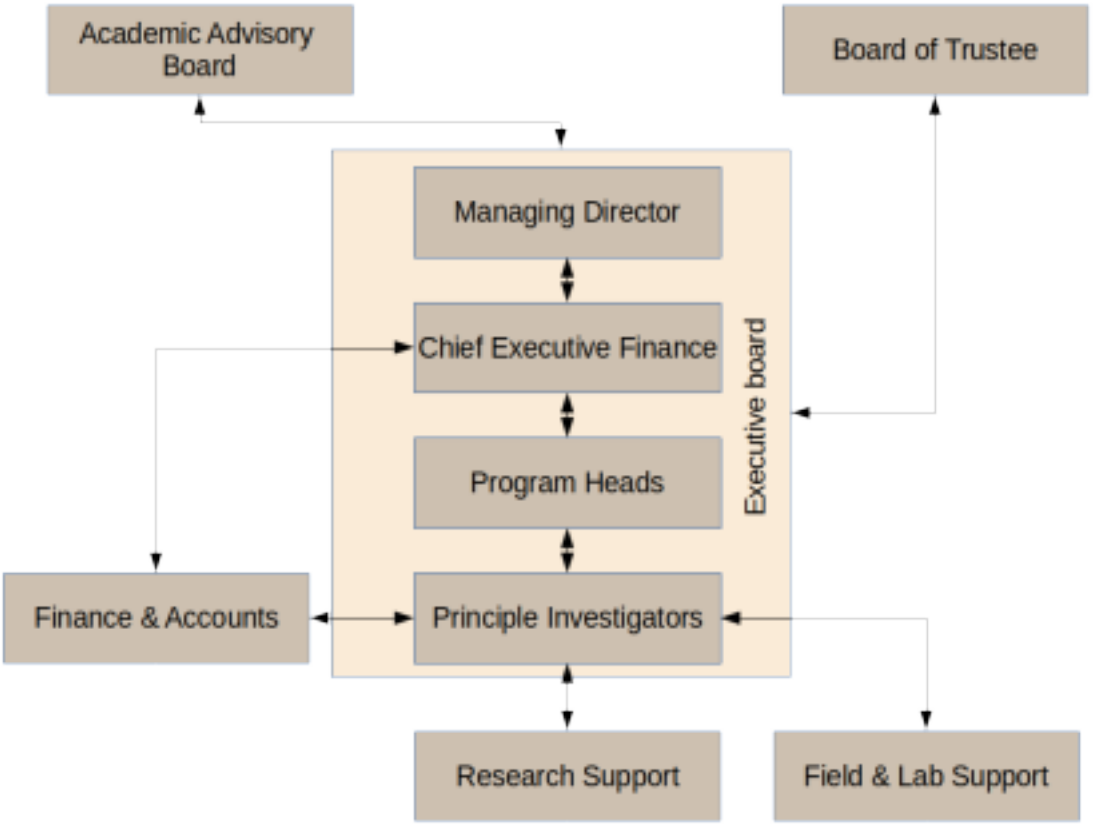
Administrative Information

FERAL is a non-profit trust founded under the Indian Trusts Act (1882), in July 1997. We are certified as a Scientific and Industrial Research Organisation (SIRO) by the Department of Scientific and Industrial Research (DSIR), Ministry of Science and Technology, New Delhi. Donations made to FERAL attract deduction under section 80G of the Income Tax Act, 1961 and we are registered and authorised to receive foreign funds under the foreign contribution regulation act (FCRA) 2010.

We have a simple organisational structure which provides a supportive framework for our researchers while ensuring them functional autonomy. As per the DSIR and Trust Act rules, we are advised by an academic advisory board for all scientific matters and governed by a board of trustees for overall administration and organisational policy.



Balance Sheet

FOUNDATION FOR ECOLOGICAL RESEARCH ADVOCACY AND LEARNING
No .170/3, Morattandi Village, Auroville Post, Tamilnadu - 605101

BALANCE SHEET as at 31st March 2022

(Amount in Rs)

Particulars	Sch.Ref	As at 31.03.2022	As at 31.03.2021
SOURCES			
Corpus	1	12,51,670	7,25,803
Project Asset Reserve	2	2,01,015	2,01,015
Projects Account (Cr)	3	62,31,800	80,69,357
		76,84,485	89,96,175
APPLICATION			
Fixed Assets *(Less)* Depreciation	4	4,94,366	5,64,070
CURRENT ASSETS, LOANS AND ADVANCES			
Cash and bank balances	5	66,94,456	80,92,617
Loans and advances	6	33,149	96,528
Projects Account (Dr)	3	4,76,635	3,10,995
Interest accrued but not due	7	35,879	48,916
(i)		72,40,119	85,49,056
Less: Current liabilities	8	50,000	1,16,951
(ii)		50,000	1,16,951
Net Current Assets (i) - (ii)		71,90,119	84,32,105
		76,84,485	89,96,175
Notes on Accounts	13		

As per our report of even date attached
For ASA & Associates LLP
Chartered Accountants
Firm Reg No: 009571N/N500006

G N Ramaswami
Partner
Membership .No : 202363

Place : Chennai
Date : 16/09/2022

For Foundation for Ecological
Research Advocacy and Learning

Srinivas Vaidyanathan
Trustee

Advisory board

Deviprasad K. V., Ph.D., Jagdish Krishnaswamy, Ph.D., Ajith Kumar, Ph.D., Neil Pelkey, Ph.D., Senthil Babu, Ph.D. and Mahesh Sankaran, Ph.D.

Board of trustees

Mahesh Sankaran, Ph.D., Srinivas Vaidyanathan and Anand V.M.

Partners

FERAL's work is made possible through grants from the Government of India and international agencies. Often these grants are made to multi-institutional consortia of two or more partner organisations. The agencies who have supported our work and those who have collaborated in project implementation are listed below.

Supporting partners

Ashoka Trust for Research in Ecology and Environment (India), Bengaluru Sustainability Forum, Ministry of Earth Sciences, Government of India (India), National Centre for Biological Sciences (India), Optiv Solutions (India), Vanavil Trust (India), Critical Ecosystem Partnership Fund (USA), Denver Zoo (USA), Future for Nature (Netherlands), Mohamed bin Zayed Species Conservation Fund (UAE), Prince Bernhard Nature Fund (Netherlands), Quilt AI PTE Ltd. (Singapore), Ruffords Foundation (UK), Stichting Burger Zoo Conservation (Netherlands), The Wild Heart Trust (UK) and United States Fish and Wildlife Services (USA).

Individual donors

Dr. R. S. Bhalla and Ms. Anupama Pai.

Collaborating Institutions

Ashoka Trust for Research in Ecology and Environment (India), Asian Nature Conservation Foundation (India), Indian Institute of Science (India), Lancaster Environment Centre - Lancaster University (UK), National Centre for Biological Sciences (India), National Institute for Advanced Studies (India) and Sikkim University (India).

The FERAL Team

Feral's team is a mix of researchers and professionals from various disciplines who are supported by a small but competent and highly trained team. Below is a short introduction to the people who make FERAL tic (arranged alphabetically).

Research team

Anisha Jayadevan

Anisha is a Ph.D. student at the University of Maryland Baltimore. She is interested in understanding the drivers and consequences of habitat fragmentation, and how best to connect and restore fragmented landscapes.

Chaitanya Krishna

Chaitanya holds a Ph.D. in Wildlife Biology and Conservation. He currently works on a community-based natural resources management and marine programme. His work focuses on the anthropogenic impacts on wildlife, and he has consulted on environmental and social safeguards compliance for industry.

Divya Karnad

Divya works on a community based natural resources management programme and the marine programme. She holds a Ph.D. in geography with a focus on marine fisheries management. She works on sustainable fisheries, sustainable seafood trade and the conservation of threatened marine species, with a current focus on sharks and rays.

Kumaran K

Kumaran works as part of the field team in Pondicherry and in the Western Ghats. He has worked on land cover changes in the Nilgiris with a focus on invasive species in the shola grasslands. He is currently pursuing his Ph.D. at M.anonmaniam Sunderanar University.

Letkhosei Baite

Letkhosei has a Masters degree in Botany from Manipur University. He has worked as a biologist in the fish conservation zone, Manipur since 2020. He is keen on conserving riparian forests and currently handling a catchment restoration project in Manipur.

Nicole Pinto

Nicole is interested in raising awareness about the changing behaviour of animals and the communities that live alongside them. She primarily works with the Frontier Elephant Programme, helping communities implement strategies to co-exist alongside elephants and to raise awareness about the behaviour and lives of elephants.

Nishant Srinivasaiah

Nishant is instrumental in starting a multi-institution, multi-disciplinary collaboration to manage Asian elephants in India. Over the last decade he has been monitoring elephants, understanding their behaviour and interactions with humans to find solutions to conserve elephants.

Rajat Nayak

Rajat has completed his Masters in Wildlife Biology and Conservation. He has a special interest in grassland ecosystems, both low and high altitude, semi-arid and wet.

Ravinder S Bhalla

Ravi works on community based natural resources management and ecosystem services. Monitoring and building resilience among communities to mitigate impacts of climate change on these resources and services is another aspect of his research. He holds a Ph.D. in GIS and remote sensing based tools and models on water resources and watershed management.

Sandeep G

Sandeep mainly works on field based projects, carrying out biodiversity surveys and helping communities live peacefully alongside wildlife. He also works towards raising awareness about different landscapes and their biodiversity. Sandeep has a PG Diploma in Science and Management for Sustainable Living.

Shruthi Kottillil

Shruthi Kottillil has completed her Master's in Environmental Studies and Resource Management. She is interested in the conservation of sharks and rays along the Indian coast and has been studying different aspects of elasmobranch conservation such as the post-capture survival and the catch composition in different fisheries and gears.

Srinivas Vaidyanathan

Srinivas is an ecologist with an interest in understanding changes in landscape-level processes and structure and how they affect large mammal populations. Srinivas uses spatial approaches for finding innovative and practical solutions to conservation problems.

Sudha Kottillil

Sudha Kottillil has a master's degree in Environmental Studies and Natural Resource Management. She has worked on the genetic diversity of sharks and rays along the Indian coast and on global Phylogeography. Currently, she is looking at developing projects to identify ways to improve public engagement and support for shark and ray conservation in India.

Sunita Ram

Sunita has an. M.Phil. in Biological Sciences from Fordham University, USA. Her research interests lie in understanding the ecology and distribution of primates and finding long term conservation strategies in the southern Western Ghats.

Venetia Sharanya

Venetia has completed her Masters in Environmental Studies and Resource Management. She is interested in animal behaviour, social structures and human-animal interactions. She currently works with the Frontier Elephant Programme towards creating shared spaces for elephants and humans.

Research support

Kamalraj S

Kamal started off at FERAL as a field assistant about a decade ago. He is adept at handling a range of equipments and data loggers. He is a reliable driver in tough forest terrain and is good with managing field staff and taking over running of field stations at a pinch.

Philip

Philip is a farmer by profession, but he also works in Khengjang, Manipur, as a field assistant.

Saravanan S

Saravanan holds a masters in human resources development and coordinates field activities and manages the teams at the Emerald field station in the Nilgiris. He is also the liason between the project and various officials in the Nilgiris and is a resource person for GIS and GPS workshops conducted at FERAL.

Interns

Akanksha Vemana

Akanksha has graduated with bachelors in psychology, sociology and economics. She is interested in conservation, human-elephant conflict, and how cropping patterns and farming practices influence elephant movement. She is working with datasets to understand elephant movement patterns and resource sharing between various animals.

Avirup Sinha

After completing an Integrated master's in biotechnology, Avirup discovered that his true interests lie in ecology and conservation biology revolving around the Gentle Giants. During his time with FERAL, he studied the musth phase of Asian elephants with respect to body conditions.

Harsha K R

Harsha has a masters in environmental studies and resource management. Her research interests include behaviour and distribution of elephants. During her internship, she studied the spatiotemporal distribution of Asian elephants in a human-dominated landscape. She also contributed to ongoing studies on musth in elephants.

Harshit Kathayat

Harshit interned at FERAL for his master's dissertation. He analyzed the seasonal changes in the occurrence of the Asian elephant in dry and wet seasons along with the historical changes in their occurrence in a human-dominated area and in the fragmented forest landscapes in Southern India. He also assisted with collecting data which included surveys and camera trapping.

Niranjan B

Niranjan worked on his Master's thesis with the Frontier Elephant Programme. He studied how waterholes were being shared between elephants, people, domestic and wild animals. He also studied whether there are any significant behavioural patterns shown by elephants towards the presence of other species at these waterholes.

Shafia Fathima

Shafia Fathima is pursuing a bachelor's degree in environmental science and botany, and is interested in studying elephant behaviour and conservation strategies. She is currently working on existing data sets to better understand resource sharing between elephants, livestock and people.

Swaathi N A

Swaathi has completed her bachelor's degree in Advanced Zoology and Biotechnology from Ethiraj College for Women, Chennai. Her interest lies in learning more about large mammals and working towards creating a human-wildlife conflict-free environment. She worked extensively on testing the early warning system used to mitigate human-elephant conflict.

Administrative support

Anupama Pai

Anupama has been associated with FERAL since inception and has wide interests ranging from gender and development, natural resource management and developing study abroad programs. She is the Chief Executive Finance and supports project management.

Shanthi R

Shanthi is our finance manager handling the day-to-day accounting responsibilities of the organisation. She has a postgraduate degree in commerce and is versatile in the use of a range of accounting softwares.

Sumathi

Sumathi manages the upkeep of the FERAL campus at Morattandi which includes handling the boarding and lodging arrangements during training programmes and events.

Foundation for Ecological Research, Advocacy and Learning (FERAL)

Web Page: https://www.feralindia.org

Email: feral@feralindia.org