



# Annual Report 2015 - 2016



**FERAL**



Foundation for Ecological Research, Advocacy and Learning (FERAL)

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# Contents

<b>Mandate</b>	<b>1</b>
<b>Wildlife Biology and Conservation</b>	<b>3</b>
Bridging the Shencottah gap . . . . .	4
Identifying barriers and optimising restoration of large mammal connectivity . . .	6
Exploring sustainable landuse practices in rubber in a critical wildlife corridor . .	8
Frontier elephant programme . . . . .	10
Parapatary between the common Langur and the Nilgiri Langur . . . . .	12
<b>Learning and Study Abroad</b>	<b>15</b>
Introduction to geographical information systems and global positioning systems	16
Introduction to statistical programming in R . . . . .	17
<b>Natural Resource Management</b>	<b>19</b>
Hydrologic and carbon services in the Western Ghats . . . . .	20
Capacity building in stream flow assessment and monitoring . . . . .	22
Building coastal resilience in south & southeast Asia . . . . .	24
<b>Marine science</b>	<b>27</b>
Finding spaces for coexistence . . . . .	27
<b>Events</b>	<b>29</b>
Bird watching trips . . . . .	29
Students conference on conservation science – Bangalore . . . . .	30
Events held under the NRM programme . . . . .	31
Visits by other institutions . . . . .	33
<b>Publications</b>	<b>35</b>
Journal Articles . . . . .	35
Reports . . . . .	35
Conference Papers and Presentations . . . . .	37
Newspaper Articles . . . . .	38
<b>Administrative Information</b>	<b>39</b>
Advisory Board . . . . .	40
Board of Trustees . . . . .	40
Partners . . . . .	40
<b>The FERAL Team</b>	<b>41</b>
Remembering Rauf and Pratibha . . . . .	41
Researchers . . . . .	42
Research Support . . . . .	43
Administrative Support . . . . .	45
Balance Sheet for the year 2015–2016 . . . . .	46

## List of Abbreviations

- AGU American Geophysical Union
- ATREE Ashoka Trust for Research in Ecology and the Environment
- CEPF Critical Ecosystems Partnership Fund
- CSR Corporate Social Responsibility
- GPS Global Positioning Systems
- KMTR Kalakad Mundanthurai Tiger Reserve
- MoES Ministry of Earth Sciences
- NERC Natural Environment Research Council
- PA Protected Areas
- SCCS Students conference on conservation science
- TCP Tiger Conservation Plans



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## Mandate

**O**ur mandate is to address issues of resource management, conservation, environment and health at the grassroots and the policy level. To do this we undertake both implementation and research based projects and teach a wide range of courses. We collaborate with other research and development institutes in India and abroad and engage with stakeholders through awareness campaigns, workshops and seminars.

We are a non-profit trust founded in 1997 to address the need for applied research and training in ecology and the environment. Since then, we have contributed substantially to research and policy in wildlife biology and conservation, natural resources management and in education and skill building in these and allied areas.

We use data driven ecological research based on modern technology to involve major stakeholders and the society at large and come up with solutions to real world problems. We believe in training and building the skills and capacities of the stakeholders, researchers and students to evolve local and durable solutions to challenges.



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## The year that was

**T**he year 2015–2016 was one of consolidation and wrapping up. A number of projects were concluded this year. This included the CEPF funded projects and our field based projects on marine fisheries on both the east and west coasts. As always, the completion of the project signalled the conversion of the reports into peer reviewed journals and presentations at conferences. Thus most of the year, our teams were “hunkered down” with data crunching, analysis and writing up.

Towards the end of this financial year we were hit by the loss of two dear friends and mentors. Pratibha Pande, who had joined FERAL as a trustee in 2013 passed away in the middle of March after a long illness. Two weeks later our seniormost founding trustee, Dr.Rauf Ali passed away. Their absence leaves a large vacuum in the lives of both the organisation and its staff.

As we move on, we hope to continue the work that Rauf and Pratibha initiated and urged us to take to fruition.





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## Wildlife Biology and Conservation

The focus of this programme is to undertake scientific research on wildlife and use the outputs to steer conservation interventions. In the year gone by, we completed three projects under this programme and an equal number of collaborative studies are being initiated or are in their planning stages.

In the Periyar-Agasthyamalai landscape our projects, supported by the Critical Ecosystem Partnership Fund, to address connectivity across the Shencottah Gap, involving a wide range of stake holders were completed. A Payment for Ecosystem Services approach to procure conservation services from individual landowners was successfully implemented. Results from our pilot payment to enhance biodiversity clearly indicate improvement in both biodiversity and ecosystem services on lands that were under agreements.

Our work on addressing connectivity for large mammals across infrastructure routes in the Shencottah Gap saw another year of interesting collaborations between biologists, behavioural ecologists, conservationists, Forest Departments and engineers. Inputs from these collaborations had led to the design of two mitigation structures that need be placed across the NH-208 to ensure that connectivity is restored across the Shencottah Gap.

The collaborative project with Rainforest Alliance to address connectivity issues for large mammals through commercial rubber plantations by means of certification was also successfully completed. Some of the key findings from this initiative have been adopted by the management of the estates, especially to address issues of soil and water conservation.

A long-term, multi-institution collaboration, The Frontier Elephant Programme, was initiated to conserve individuals and populations of wild elephants in human-dominated landscapes. Other research collaborations include understanding impacts of land-use change on persistence of pathogens in small mammal community and understanding distribution of three sympatric carnivores in human-dominated landscapes.

Continuing our training efforts this year, we trained over a hundred ecologists, conservation practitioners and Forest Department staff working the Western Ghats in the use of GPS and GIS to analyse data. These training programmes have built capacities of end-users to use spatially explicit data from a variety of sources to address conservation and management challenges. Additionally, we continued to provide support to many researchers pursuing their Masters and PhD programmes.

## Bridging the Shencottah gap: How payments for ecosystem services can restore biodiversity outside protected areas in India

**Project Period:** October, 2009 to June, 2015

**Budget:** \$ 499,443

**Supporting Partner:** Critical Ecosystems Partnership Fund

**Principal Investigator:** Srinivas Vaidyanathan

**Web Page:** <http://www.feralindia.org/drupal/node/144>

Protected areas constitute only about 4% of the land area of India. Many ecologically rich and sensitive regions are outside this network, thus providing a potential for enlarging the protected area network through incorporation of additional land into the protected areas. While such inclusions are possible with Government owned land, incorporating privately owned land can be expensive and time consuming. Thus immediate steps are required to maintain and enhance biodiversity in areas identified as corridors on both state owned forests and privately owned land. This project established protocols and built experience in using a payments for ecosystem services approach to restore and conserve biodiversity in such areas and also rationalized the existing PA network to incorporate areas within multiple use reserve forests critical to long term sustenance of wildlife and their habitat. The project was implemented in the Shencottah gap, a mosaic of remnant moist and dry deciduous forests interspersed with rubber, tea, teak, and other farms.

The key results from this project include:

- a) Two potential corridors were identified for conservation which would facilitate large mammal movement across the Shencottah Gap.
- b) Contributed towards developing the buffer and corridor management plan which has been included in the Tiger Conservation

Plans (TCP) for the Kalakad Mundanthurai Tiger Reserve (KMTR).

- c) Also contributed towards framing the corridor management plan for the Periyar Tiger Reserve's TCP.

- d) The project helped in developing a systematic monitoring program for the Shendurney Wildlife Sanctuary, during the management plan discussions that were held by the Forest Department of Kerala.

- e) Baseline data collected from this project has contributed towards several campaigns to enhance protected area network in the study site. Two of these initiatives were successful, namely the upgradation of the Tirunelveli Forest Division to Nellai Wildlife Sanctuary and the inclusion of Courtallam Range into KMTR.

- f) We developed a payment mechanism to collaborate with a forest dependent community by engaging them in regular monitoring. This pilot exercise successfully operated for a year and the community covered about 72 km<sup>2</sup>. Payments in kind and cash benefited more than 20 households.

- g) We developed and tested individual agreements with private landowners to enhance biodiversity. This pilot was a significant success and we were able to sign agreements which covered 49 hectares. Results show significant improvement in biodiversity and ecosystem services in farms under this agreement.





*The Shencottah gap is not only crucial for providing safe passage to dispersing tigers, but also supports a resident population of 3 -5 tigers in an area of ~350 km<sup>2</sup>, which play an important role in demographic and genetic rescue of tigers in the Periyar and Kalakad Mundanthurai Tiger Reserve landscapes.*



*Farmers erecting fences to protect grizzled giant squirrel habitat.*

# Identifying barriers and optimising restoration of large mammal connectivity across linear intrusions in the Shencottah gap

**Project Period:** June 2013 to December 2015

**Budget:** \$ 145,958

**Supporting Partner:** Critical Ecosystems Partnership Fund

**Principal Investigator:** Srinivas Vaidyanathan

**Web Page:** <http://www.feralindia.org/drupal/node/145>

India is amongst the fastest developing countries and large investments in infrastructure corridors has been seen as one of the pathways to sustain this growth. At the same time less than 4% of the land area is strictly protected within Protected Areas (PA). These PAs occur as small isolated management units within a matrix of reserve forest, forest plantations and production landscapes. Management efforts so far have been PA centric and only in the last few years, the focus has changed to managing our remaining wildlife and wild habitats as landscape units.

In India, minimal efforts have gone into identifying coarse scale corridors. This is, however, the first step towards a landscape level management. Corridors are crucial for many ecological processes, including dispersal, gene flow and demographic rescue. As a result, our current efforts have focused on mapping corridors and conserving areas that facilitate movement to maintain population connectivity. Until now, no systematic effort has been invested to identify important barriers to movement or to identify areas where restoration could most improve connectivity. This is particularly of importance where historical infrastructure routes have been established.

Thus understanding the impacts of barriers, complements corridor mapping, and will help broadening the range of conservation alternatives available to managers in restoring connectivity. It can inform decisions on trade-offs between restoration and protection; for example, land purchase may be substantially

more expensive than re-routing a road that blocks an alternate corridor. This project evaluated the impacts of linear barriers in the Shencottah Gap, a critical corridor for large mammals in the southern Western Ghats and used biological and infrastructure data to optimise selection of areas where connectivity could be restored

The key outputs of the project include:

- a) Two potential crossing points across linear intrusions in the Shencottah gap were identified to facilitate large mammal movement.

The project has shown dispersal of leopards across the Shencottah Gap, however currently linear intrusions remain a barrier for tigers and elephants, two important landscape species of conservation interest. The project identified two crossing points where mitigation structures need to be built to ensure connectivity is restored, not only for elephants, but also other herbivores and carnivores that are found within the Periyar Agastyamalai landscape.

- b) Developed potential mitigation structures that can be built by the State/Central Government to enhance connectivity for large mammals across the Shencottah Gap

The potential mitigation structures developed during the project period include a 30m wide wildlife overpass at Kottavasal and realignment of the NH-208 at MSL to create an underpass. The choice of location and structures were derived from biological and engineering surveys of existing linear intrusions in

the landscape.

c) Contributed to developing the corridor management plan, which has been included into the TCP for the Kalakad-Mundanthurai Tiger Reserve and Periyar Tiger Reserve.

d) Held a workshop, which was attended by various stakeholders including officials from the Kerala State Forest Department, Southern Railways, National Highway Authority of India, scientist, and conservation practitioners.

The workshop deliberated on the impacts of linear intrusions on wildlife, which included issues of mortality and disruption of movement. The mitigation structural designs developed by this project was also shared with concerned stakeholders in a meeting facilitated by other conservation organisations.

As part of this project we also developed protocols to measure the success of conservation investment in the Western Ghats using open source data and software. Key results showed no significant change in any of the three ecosystem services in nearly half of the Western Ghats. In the remaining region, results showed a declining trend in NDVI as a proxy for biodiversity, but an increasing trend was observed in carbon storage and hydrologic ser-

vices. When priority KBAs were compared with non-priority KBAs, a decreasing trend in NDVI was seen in a larger proportion of priority KBAs than non-priority KBAs. However, results from the carbon services indicate a greater proportion of area with increase in carbon sequestration in both priority and non-priority KBAs. The total amount of carbon sequestered by priority KBAs was almost twice that of non-priority KBAs. Results of the hydrological services show a greater proportion of area with increase in blue water services (streamflow, soil moisture and ground water recharge) for both priority and non-priority KBAs. The total amount of blue water provided by priority KBAs was almost twice that of non-priority KBAs.

It is not possible to attribute the observed trends to interventions made by a single programme. Hence our results represent a combination of conservation actions by different players. Our study suggests that freely available remotely sensed products like MODIS and Landsat can be used efficiently to analyse trends in ecosystem services as a response to conservation/anthropogenic factors at a given site. The framework provided in this study can be improvised to monitor impact of climate change on ecosystem processes and services, and in predicting future changes in the ecosystem.



*Proposed underpass along NH-208 at MSL complements the existing underpass along the railway line, thus providing safe passage to elephants and other mammals.*

## Exploring sustainable landuse practices in rubber plantations in a critical wildlife corridor

**Project Period:** January 2012 to June 2015

**Budget:** \$ 39,833

**Supporting Partner:** Critical Ecosystems Partnership Fund

**Principal Investigator:** Sunita Ram

**Co-Investigator:** Srinivas Vaidyanathan

**Web Page:** <http://www.feralindia.org/drupal/node/181>

It is well acknowledged in India that landscape-level corridors are as important as PA's for the long-term conservation of large mammals. In the southern Western Ghats, especially in the state of Kerala, rubber is a major crop and many plantations adjoin wildlife rich forests making them potential corridors. Rubber is also fast expanding into the biodiversity rich North-eastern states of India and northern parts of the Western Ghats. Rubber plantations are monocultures, devoid of ground vegetation and often the management practices are not biodiversity friendly. These aspects affect various ecological process, and there is a need to develop practices which are not only biodiversity friendly but also to ensure sustainable farm management which is beneficial in the long run.

In this project, we explored ecologically sustainable practices that can be adopted by rubber plantations. More specifically, we explored a certification process, linked to Corporate Social Responsibility and a market based approach that encourages landowners to manage their land in a more wildlife-friendly manner. The standards developed by the project are directly linked to markets and are considered best management practices based on ecological and social indicators. The ecological indicators fall in the realm of habitat restoration to re-establish connectivity while providing economic benefits and safeguarding agricultural production. Such long term mechanisms are needed to ensure that co-managed connectivity conservation initiatives

are successful and connectivity is enhanced in biodiversity hotspot areas.

Key milestones achieved include:

- a) A website aimed at disseminating information on ecologically sustainable practices and certification for rubber and rubber wood has been set up <<http://www.feralindia.org/ecoag>>. The website also has training material on certification useful for interested rubber growers. Other information that has been made available through this website includes a check-list of different taxa found in the southern Western Ghats in and around rubber plantations.
- b) We developed protocols to establish wind barriers in areas with high wind velocities. The protocol makes use of native vegetation in the landscape to establish a multi – species wind barrier.
- c) Managers of large rubber plantations in the Shencottah Gap were sensitised to the importance of biodiversity and conservation. Some have taken the initiative to make parts of their property more ecologically friendly. For example, positive steps towards soil and water management, exploring organic agriculture for some additional crops, and planting of species other than their primary crop. In addition to better weed management by allowing soft weeds to grow while removing hard weeds, Also, they have expressed an interest in implementing some of the sustainable practices for rubber plantations which was developed by the project team.



*Other than hydrological benefits, establishing native vegetation around perennial streams could additionally support biodiversity and act as refuge for dispersing wildlife.*



*Increasing the diversity of crops in a production landscape has many benefits, such as increasing the diversity of predators feeding on pests, reduction in spread of disease and pest attack, etc. Interplanting rubber with cocoa is one option that is being carried out.*

# Frontier elephant programme

**Period:** Initiated in 2015, ongoing

**Coordinator:** Nishant M. Srinivasaiah

**Web Page:** <http://www.frontierelephants.info/>

The Frontier Elephant Programme brings together researchers from the National Institute for Advanced Studies (NIAS), Asian Nature Conservation Foundation (ANCF), Indian Institute of Science (IISc) and FERAL, to conserve individuals and populations of wild 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 life styles that facilitate their coexistence with elephants in frontier-habitats, while ensuring food security and safety in the region.

## *Central themes of the frontier elephant programme*

- a) Scientific monitoring of ecological and anthropogenic factors underlying behavioural decision-making in elephants
- b) Aiding management of individuals and populations of elephants to address critical issues of human-elephant conflict and poaching
- c) Improving lives of people and elephants, affected by conflict, through citizen-science initiatives

## *Goals of the Frontier Elephant Programme*

- a) Learn to live alongside elephants by reducing uncertainty through predictive models of behaviour and conflict
- b) Alleviate conflict through improved farm-based practices guided by behavioural patterns of elephants and solicitous land use
- c) Enrich the lives of civil society members through capacity building in elephant monitoring and biodiversity conservation

The activities carried out so far include, an international workshop organised at NIAS for early career biologist and conservationists to familiarise them with issues and techniques of studying elephants in human-dominated landscapes. FERAL contributed by conducting training sessions, both in the field (hands on use of GIS for field surveys) and at NIAS (GIS/RS for elephant conservation, QGIS, Sign surveys and Occupancy surveys).

We also invested time in sensitising potential corporate donors on issues related to managing elephants in human-dominated landscapes and how they could support this initiative as part of their corporate social responsibility (CSR) efforts.



*Large herd of elephants in well protected bamboo and scrub habitat within the study area.*



*Field exercises in studying elephants for early career biologist and conservationists was organised at the programme's field station.*

## Parapatry between the common Langur (*Semnopithecus priam*) and the Nilgiri Langur (*Semnopithecus johini*)

**Project Period:** April 2010 – June 2016

**Budget:** \$ 3,401

**Supporting Partner:** Primate Conservation Inc., USA.

**Principal Investigator:** Sunita Ram

**Co-Investigator:** Srinivas Vaidyanathan

**Web Page:** <http://www.feralindia.org/drupal/node/140>

Natural hybridisation occurs in many animal species including many primate species. One of the importance of studying natural hybridisation is to understand species evolution. Further, determining species distribution and understanding factors influencing species occurrence at local and regional scales are the foundations for conservation planning for threatened species. In southern India, two species of langur occur. This includes the threatened Nilgiri langur (*Semnopithecus johnii*), which is endemic to the Western Ghats, south of the Brahmagiri hills, and the Hanuman langur (*Semnopithecus priam*), which is endemic to south India and Sri Lanka. In some parts of their range, these langurs are parapatric, showing some overlap in their distribution. Also, mixed groups and possible hybridisation have been reported

from some of these areas of overlap.

This project was conceived to understand the patterns of distribution of the two langur species, especially in the landscape covering the Anamalai hills. To maximise the limited resources available for surveying the entire study area, during this year, we spent time in distribution modelling using presence data collected during earlier field surveys. This was used to identify specific regions within the western side of the Anamalai hills where we were likely to find parapatry, and the results from this exercise were further used to design the surveys. The survey is planned for next year and will be completed before the onset of the monsoon. The data will then feed into an occupancy model, to further refine our results and identify environmental parameters that drive the distribution of these langur species.





*Nilgiri langur mother and infant.*



*A hanuman langur juvenile.*





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## Learning And Study Abroad

This was an unusually busy year for workshops at FERAL. In all, we ran a workshop almost every other month through the year. Some of these were not funded by any external agency. Participants paid a part of the costs while FERAL staff voluntarily took up the teaching and associated preparation of materials and updating of online courses. This allowed us to run the workshops at substantially reduced rates, particularly for full time students who were given large discounts.

The short courses held this year were introductory workshops covering GIS, global positioning systems (GPS), remote sensing and the R statistical programming language. Much of this was inspired by the hugely popular series of workshops we ran under the CEPF/ATREE/ Western Ghats Small Grants projects in previous years. These three day workshops were mostly held

during the end of the week to facilitate participation from persons otherwise occupied in work or studies. We hope to add additional courses to our “long weekend” workshops in the coming year. This is largely driven by requests from our participants. Among those under consideration are courses on data visualisation in R and use of cell phone and cloud based GIS and remote sensing technologies for field mapping and data collection.

Other workshops, covered in the [Events](#) section, were part of ongoing projects. These included capacity building in specialised areas such as wildlife monitoring and field hydrology.

We are looking to build our Learning programme in the coming year. Our plans include reviving the study abroad component and hiring a full time person to coordinate the activities of the programme.

# Introduction to geographical information systems and global positioning systems

**Workshop Dates:** 6th Nov 2015 to 8th Nov 2015  
13th Jul 2015 to 17th Jul 2015

**Resource Persons:** R.S. Bhalla and Kumaran K

**Web Page:** <http://www.feral.edu.in/course/view.php?id=2>

**K**nowing how to use a GPS and basic GIS operations are no longer considered “specialised” skills. These are essential tools for a range of applications spanning development, vulnerability analysis, conservation and natural resource management. Unfortunately, there are not many avenues outside a formal degree, to get a basic grounding in the GIS and GPS.

Introductory courses on GIS/GPS are by far the most popular of the short courses we run. These workshops are meant specifically to help nonspecialists to grasp the basic concepts and provide them hands on practical knowledge on using these technologies for real world applications. We use free and open source software for these workshops, principally [Quantum GIS](#), which is both powerful and user friendly. Data sets used for our tutorials and hands on sessions are also open sourced and contrib-

uted from our own projects or downloaded from other open sourced resources such as the [India Biodiversity Portal](#).

Feedback we receive from our courses is crucial. Not only does it give us encouragement to continue this work but, more importantly, it helps us respond to perceived needs of our participants. For instance, the latter courses in introductory GIS and GPS cover smart-phone based devices as well as traditional GPS units. We have also developed modules for the use of smart phones for designing survey forms to collect a wide range of data which is spatially explicit and can include media such as photographs, videos, sound as well as traditional survey schedules. The use of cloud based services such as [Open Street Maps](#) and [GoogleEarth](#) are other modules being added to the workshop.



*The workshop conducted in July 2015 included medical doctors interested in spatial epidemiology as well as conservation professionals.*



*The workshop held in November 2015 had a mix of students and researchers involved with wildlife conservation and ecological research.*

## Introduction to statistical programming in R

**Workshop Dates:** 5th Feb 2016 to 7th Feb 2016

**Resource Persons:** R.S. Bhalla and Kumaran K

**Participants:** 12

**Web Page:** <http://www.feralindia.org/moodle/course/view.php?id=13>

**R** the [Programming Environment for Data Analysis and Graphics](#) is now the mainstay of statistical analysis and data visualisation for the bulk of the scientific world. As an open source project, it is a boon to researchers in developing countries as it provides a free and in many ways, a superior replacement for expensive statistical analysis software. However, would be R users are often from a non-programming background. This can make it a challenge to learn R. This workshop's goal is to help non-programmers to use R for their work.

We used a series of exercises to bring home some of the basic concepts in R programming. Canned datasets were combined with

sample data from participants which included researchers involved with epidemiological research and ecologists. Throughout the workshop, participants used the R-Studio IDE for R and familiarised themselves with the basic operations of managing packages, accessing help and learned essentials of the R language. The workshop ended with an introduction to the RCommander GUI for R.

Participants for this workshop gave a number of valuable suggestions based on which new materials and modules are being written specifically for basic statistical analysis and visualisation through the GUI which will be used in subsequent workshops.



*The introductory workshop of R was well received even though the participants at the workshop were new to programming. Subsequent workshop will have a number of newer modules and richer set of online materials to assist participants.*





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## Natural Resource Management

**S**ustainable management of natural resources is a huge challenge confronting communities across the country. Breakdown or dilution of traditional management structures, the lack of baselines and monitoring systems combined with poor enforcement of regulations, has led to the overexploitation and depletion of a number of resources. In many regions this is combined with large scale environmental degradation and land use change. Climate change related shifts in rainfall regimes has exacerbated the impact of these changes and pushed a number of ecosystems to the brink - taking its toll on the goods and services they provide. This has had disastrous repercussions on numerous artisanal communities and the poor who rely the most on these resources.

This programme tries to address some of these challenges with an emphasis on the habitats and ecosystems which sustain our water resources and coastal fisheries. We seek ways to conserve, restore and manage ecosystem services with local communities under this programme whose objectives are:

- To unravel ecological processes which deliver important ecosystem services and to quantify these ecosystem services using mul-

tidisciplinary approaches.

- To demonstrate and develop research tools for decision support in the management of natural systems with specific focus on scenario building for impacts of climate change and tradeoffs between interventions.

- To use this research to identify strategies and inform and influence policy which will:

- Reduce the vulnerabilities of both stakeholders and the ecosystems on which they depend to natural disasters and climate change.

- Help restore, and sustainably manage ecosystem services through community action in habitat restoration, protection and management.

During this year, we continued work on the Ministry of Earth Sciences funded project on which field work was extended for a year. Support from our UK partners at Lancaster University allowed the eco-hydrology work to extend into training and capacity building of our teams. We also teamed up with other research and conservation groups in an effort to raise resources for work on mangrove restoration and to expand our work on water resources.

## Hydrologic and carbon services in the Western Ghats: Response of forests and agro-ecosystems to extreme rainfall events

**Project Period:** January, 2012 to August, 2016

**Budget:** ₹45,20,744

**Supporting Partner:** Ministry of Earth Sciences, Govt.

**Principal Investigator:** R.S. Bhalla

**Co-Investigator:** Srinivas Vaidyanathan

Large scale changes in land cover can alter the hydrologic behaviour of catchments - this is known. What is less clear, however, is how land cover will mediate hydrologic response in a changing climate. In this project we are attempting to understand the links between carbon and water relationships in a changing climate and a forested catchment with a specific focus on extreme rain events. To do so we have set up gauging stations across nested catchments in two regions of the Western Ghats - near Avalanche in the Upper Nilgiris (Tamil Nadu) and near Sirsi in the Aghnashini Basin (Karnataka).

This project is part of the Changing Water Cycle programme funded to India-UK research teams where the Ministry of Earth Sciences (MoES) funds the Indian counterpart and the Natural Environment Research Council (NERC) supports the UK partners.

Data collection initiated in previous years continues with minor 'tweaks' to improve quality and constrain errors. An interesting new component exploring the impact of exotic invasive species on dry-season streamflow was added to the analysis. Preliminary results showed a distinct reduction of stream flow due to increased transpiration rates in catchments dominated by Wattle (*Acacia mearnsii*) and

Scotch Broom (*Cytisus scoparius*) and Gorse (*Ulex europaeus*) as opposed to natural grasslands.

The project also led to the completion of a MS thesis in Ecology. In his work, Kumaran took up Land use and land cover change analysis in the Upper Nilgiris site of the project. His research shows a distinct increase in areas under exotic invasive species in the region which is likely to have negative repercussions on dry season flows. Results from the analysis were presented in two oral and two poster presentations at the American Geophysical Union (AGU) Fall meet at San Francisco in December 2015.

As this projects inches towards wrapping up the field data collection, we have upped our engagement with local stakeholders. Last year we held stakeholder meetings and training workshops in both Nilgiris and Aghnashini and also undertook a workshop for the Govt. of Meghalaya's Agricultural Dept.

This project is implemented in close collaboration with Indian teams from Ashoka Trust for Research in Ecology and the Environment (ATREE) and National Centre for Biological Sciences (NCBS) and UK teams from the Lancaster Environment Center at the University of Lancaster.





*Clouds converging over the Avalanche reservoir at the end of the monsoon in 2015.*



*Prof. Keith Beven was one of the many distinguished hydrologists who visited our project site. Here he is being shown the v-notch at 'Lakdihalla' by the project PI, Dr.J.Krishnaswamy from ATREE and Dr.R.S. Bhalla from FERAL.*

## Capacity building in stream flow assessment and monitoring


**Project Period:** January, 2012 to August, 2016

**Budget:** £4,800

**Supporting Partner:** Lancaster Environment Centre

**Principal Investigator:** R.S. Bhalla

**Co-Investigator:** Srinivas Vaidyanathan

 Our partners in the ongoing “Changing Water Cycle” programme from the Lancaster Environment Centre supplemented our resources in training and capacity building of our field staff and other partners in the project. These funds were used principally for on-site capacity building in instrumentation of high resolution water quality monitoring equipment, particularly for the analysis of dissolved organic carbon.

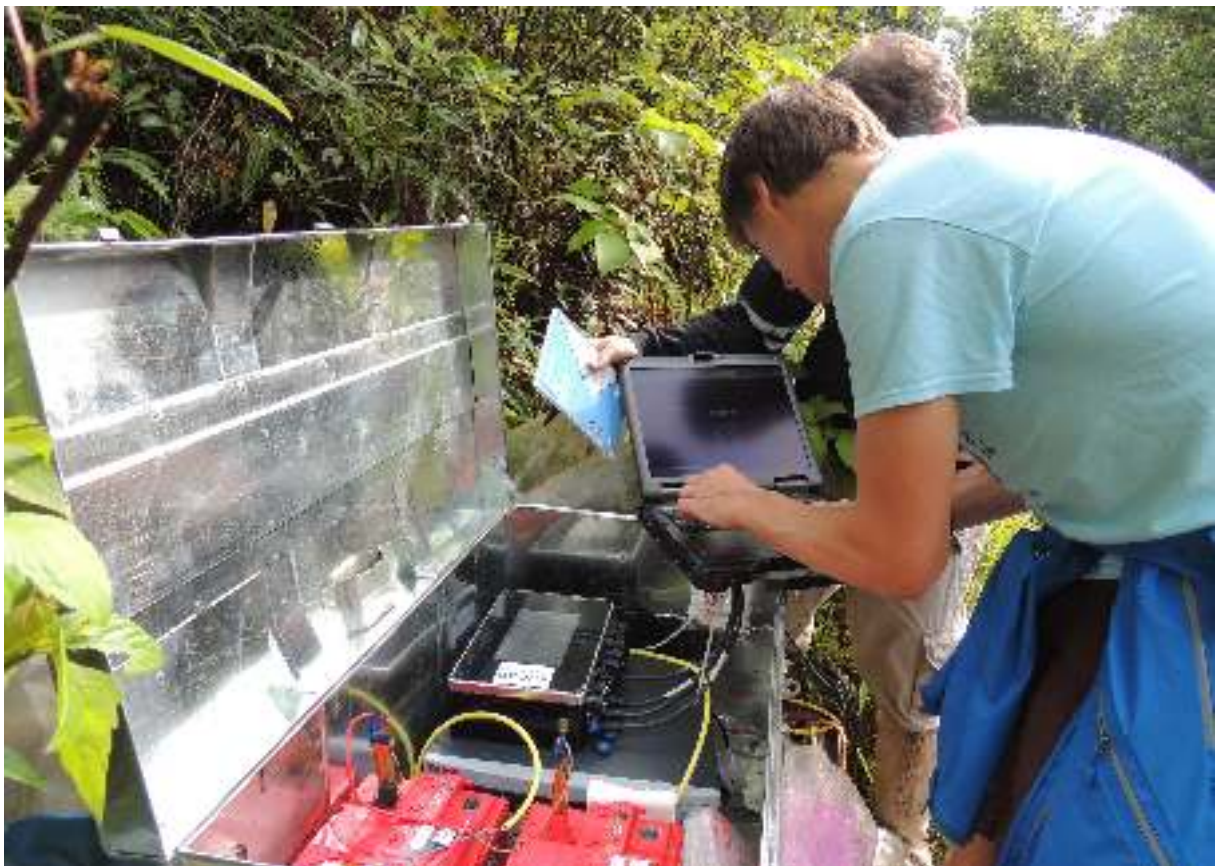
Another important component of the capacity building was the use of salt dilution gauging which allowed the accurate measurements of stream flow during high discharges. This is a crucial component of the

project as its goal is to understand the hydrologic impact of landcover during extreme rainfall events. Salt dilution gauging allows accurate estimates of discharge during high flows when the traditional velocity area methods are inaccurate or even too risky to apply.

Additionally, the funds enabled finer calibration and standardisation of field protocols for installation and maintenance of the various gauging stations in operation. This allowed us to further constrain errors and improve data quality throughout the project. The Indian field teams were also involved in the installation of a networked weather station which continuously measured and uploaded weather data.



*An impromptu meeting at the 'Hosagadde' stream in the Aghnashini basin during a joint field visit by the UK and Indian teams.*



*The UK team setting up the high resolution water quality monitoring station at the 'Saimane' stream, also in the Aghnashini basin.*

# Building coastal resilience in south & southeast Asia through mangrove restoration for risk reduction

**Project Period:** March 2015 to July 2015

**Budget:** \$ 15,204

**Supporting Partner:** Rockefeller Foundation and USAID via The Nature Conservancy

**Principal Investigator:** R.S. Bhalla

**Web page:** <http://www.feralindia.org/drupal/node/292>

**M**angroves are among the most threatened habitats in the world. The rates of mangrove degradation and disappearance are the highest in South and South East Asia. This happens to be the region most benefited by ecosystem services from Mangroves and other coastal ecosystems. Mangroves are known to be effective barriers against storm surges, but perhaps more importantly, they provide huge benefits to local communities by way of supporting livelihoods and in the long term, by sequestering carbon at higher rates than most other natural habitats.

FERAL was part of a multidisciplinary and multi-institutional team led by The Nature Conservancy (TNC) and Wildlife Conservation Society (WCS). Our team was successful in being shortlisted as finalists in the Global Resilience Partnership Challenge Award founded by the Rockefeller Foundation and other major aid agencies, including USAID. In the process of developing a full project, FERAL initiated a number of short studies to assess the status and strategies adopted in mangrove restoration in India.

Our findings were revealing, allowing us to identify a number of areas that required attention and newer opportunities where FERAL could contribute in the near future.

a) The involvement of local communities in mangrove restoration efforts has been limited and/or peripheral in many projects.

b) Virtually none of the agencies engaged in mangrove restoration have adequately assessed the impact of upstream hydrologic modifications of river systems.

c) Ecosystem services from mangroves are poorly understood, and barring a few exceptions, there have been no scientific attempts in valuation of these services.

d) The vast majority of mangrove restoration efforts have failed to take environmental and ecological conditions into consideration. This leads to a high proportion of failures in restoration attempts.

e) There is a tendency of restoration programmes to use species which are easily available and tolerant to high levels of salinity. This is primarily to reduce costs while ensuring higher survival rates among saplings. The species diversity in the resulting mangrove patch is therefore significantly different from natural mangroves.

f) The potential of mangroves to arrest erosion and restore regions has been overlooked even though this is a huge opportunity in areas such as the Khazan lands in Goa.

While we were not successful in being shortlisted for this particular challenge, our work will provide the basis for new efforts to resume our work on community based restoration of coastal habitat as a strategy to build resilience of local communities.



*The impact of mangroves on fisheries and their role in sustaining livelihoods of poor and marginal communities is a vital component of how they provide resilience to disasters and sustain coastal fisheries.*



*Upstream alteration of rivers has led to major changes in the inflow of fresh water, sediment and nutrients into India's estuarine ecosystems. This has fundamentally altered the species composition in many mangroves across India. The ecological ramifications of these ecological changes are still not understood.*



## Marine science

**M**arine sciences research at FERAL largely focuses on traditional and artisanal fisheries along both the East and West coast of India. We work closely with the fishing community while collecting data and regularly present and receive their feedback on our findings. Scientific co-management and conservation are two linchpins of our fisheries research work which we

hope will lead to breaking the vicious cycle of resource overexploitation and ecological degradation.

This year we wrapped up the last of our ongoing projects and focus shifted to analysing data and preparing manuscripts for publications as articles in both popular press and journals.

### Finding spaces for coexistence: fishing communities and threatened marine species conservation in India

**Project Period:** January 2014 to April 2015

**Budget:** € 4,808

**Supporting Partner:** Rufford Small Grants | Chester Zoo Conservation Grants

**Principal Investigator:** Divya Karnad (Rutgers University)

**Web page:** <http://www.feralindia.org/drupal/node/210>

**T**his project looked at the ways in which fishing interacts with threatened marine species and to document community based fisheries management initiatives. The research focused on the fisheries in the Ratnagiri and Sindhudurg districts of Maharashtra

and examined the impact of a range of fishing techniques from purse and shore seining to trawl and gill netting. This research has also helped to update the list of threatened marine species encountered in the area.





## Events

This section of the report summarises events held outside the purview of the Learning programme. These are usually workshops, meetings and conferences organised under ongoing projects or those attended by our team elsewhere.

Given that 2015-2016 saw many projects come to conclusion, it was also filled with wrap-up events such as concluding workshops and meetings. Additionally, a number of project held capacity building workshops to share their learning and experiences with other stakeholders. Many of these workshops were held on site which took us to beautiful parts of the Western Ghats and to Shillong as well.

Finally, we were visited by students and faculty from other institutes at our field sites. During these visits, researchers from FERAL interacted with the visitors and discussed ongoing field research activities.

### Bird watching trips

#### Pre-monsoon bird count at Kalivelli and Ousteri

**Venue and dates:** Kalivelli and Ousteri Lakes, 1st Sep 2015

**Participants:** Students from Pondicherry University (Dept. of Ecology and Env. Sciences), bird watching enthusiasts from Pondicherry and FERAL.

This event was a prequel to the Great Backyard Bird Count, and held with the intent to build a pre-monsoon dataset on birdlife in Kalivelli and Ousteri. Students from the Dept. of Ecology and Environmental Sciences were key to the event as they had both the expertise and the numbers to cover both the sites. The Forest Department of Tamil Nadu and Pondicherry were very supportive and willingly extended their permission to hold the event.



*Painted storks spotted at Kalivelli.*

## Backyard/Campus Bird Count 2016

**Venue and dates:** Kalivelli, Ousteri and Bahour lakes, 13th Feb and 14th Feb 2016

**Participants:** Students from Dept. of Ecology and Environmental Sciences - Pondicherry University, Teacher volunteers associated with CERD - Pondicherry, bird watching enthusiasts from Pondicherry and FERAL.

**Web Page:** <http://www.birdcount.in/events/gbbc2016/>

The Great Backyard Birdcount is the Indian version of an annual event in which groups across the world participate in creating a bird-list for their respective regions and uploading it to a global database at the [EBird site](#). It is coordinated by Bird Count India collective in India and FERAL, a member of this collective, facilitates this event in Pondicherry. Students from the Dept. of Ecology and Environmental Sciences play a leading role as resource persons during the GBBC events. The Forest Departments of both Pondicherry and Tamil Nadu have consistently provided permissions and support to the event.



*Birders at Kalivelli during the GBBC event.*

## Students conference on conservation science

FERAL runs workshops during the SCCS which is run at the Indian Institute of Science, Bangalore each year. This year we ran two workshops, one in collaboration with Dr.Uma Ramakrishnan and her lab at NCBS on landscape genetics and another one by ourselves on introductory GIS.

### Introduction to GIS and remote sensing using Quantum GIS

**Date:** 8th Sep 2015

**Resource Persons:** R.S. Bhalla and Rajat Nayak

This is a one day introductory workshop where we try to familiarise participants with the basics of GIS using the Quantum GIS package. Participants are provided sample datasets and walked through a series of exercises meant to give them a 'leg up' in using GIS for most basic operations such as referencing, digitising and geo-processing. The workshop has a "hands-on" approach with a few small talks and presentations covering basic concepts.



*The introduction to GIS workshop at SCCS was fully booked as usual.*

## Introduction to landscape genetics

**Date:** 9<sup>th</sup> Sep 2015

**Resource Persons:** Srinivas Vaidyanathan and Uma Ramakrishnan (NCBS)

Landscape genetics rests at the interface of landscape ecology and population genetics, and seeks to understand how real space and associated landscape features affect connectivity between populations. The relatively novel method used in this field have been applied to several endangered species to investigate possible impacts of land-use change, environmental change and to propose corridors for potential movement. In this short workshop we introduced the basics of dispersal and geneflow, followed by simple population genetics of how gene flow (or lack thereof) results in similarities/differences between populations. Students worked in groups to understand the effects of landscape given a putative species, simulated genetic data, and a possible landscape.

## Events held under the NRM programme

### Training on global positioning systems (GPS) to Forest Department Staff

**Venue and dates:** Interpretation Centre Cairn Hill - Ooty, 26<sup>th</sup> and 27<sup>th</sup> Oct 2015

**Participants:** Forest Dept. Staff from the Nilgiri South Division (32 persons)

**Hosted by:** Forest Departement of Tamil Nadu District Forest Office Nilgiri South

**Related project:** Hydrologic and carbon services in the Western Ghats

**Resource persons:** R.S. Bhalla, Saravanan S. and Kumaran K.

This was a two day training workshop for forest department staff covering the basics of using hand held GPS units. The workshop covered the basic concepts of global positioning systems and involved detailed, hands-on exercises which included collection of waypoints and tracks and creation of routs. The workshop culminated in a treasure hunt using the GPS units.



*Forest Department staff participating in the hands on GPS training.*

## Stakeholders Meeting, Nilgiris

**Venue and dates:** Hotel Gem Park, Sheddon Road, Ooty, 7th Feb 2016

**Participants:** Local stakeholders including Government officials and research institutes

**Related project:** Hydrologic and carbon services in the Western Ghats

This meeting, held at the concluding phase of the project, was an attempt to connect with other stakeholders in the region and to inform them of the present state of the project. The primary objective of the meeting was to get their insights so the analysis and reporting done on the project is relevant. Teams from FERAL and ATREE presented the major outcomes of the project and shared the initial findings by way of posters. Discussions held during the meeting highlighted the need for the project to compile analyse and present findings and data in ways it could be meaningfully used by local communities.



*Participants interacting with the ATREE and FERAL teams during the workshop. Photo credits: ATREE.*

## Field hydrology

**Venue and dates:** IATC, Upper Shillong, 22nd to 24th Feb 2016

**Participant:** Staff from the Dept. of Water Resources, Govt. of Meghalya

**Resource persons:** PIs, Co-PIs and project technical staff (ATREE and FERAL)

**Related project:** Hydrologic and carbon services in the Western Ghats

This three day hands on workshop was run at the behest of the Govt. of Meghalya and was part of the outreach efforts of the project. The participants of the workshop walked through a range of exercises which covered both concepts and practical applications in basic hydrology. Measurement of stream discharge took up the bulk of the workshop. In addition, participants learned how to demarcate catchments using topographical sheets, the use tipping bucket rain gauges and basic use of GPS units.

The highlight of the workshop was the day of fieldwork where participants had to measure stream discharge using Manning's equation, velocity area and salt dilution gauging.

## Visits by other institutions

We are often asked to facilitate visits by other institutions. This year we had students and faculty from two colleges visit our field sites. These visits do not involve any formal teaching or grading by FERAL or its partners, and are tours organised and administered by the visiting institute.

### Kings College London visit to Nilgiris

**Venue and dates:** Avalanche Forest, Nilgiris

**Participants:** College students and faculty

**Related project:** Hydrologic and carbon services in the Western Ghats

A group of about 13 undergraduate students from Kings College London, led by their professor, Dr. Mark Mulligan spent a few hours at the field site near Upper Bhavani where the project field staff showed them the operation of the hydro-meteorological equipment and loggers.



*The students at the instrumentation site.*

Later the students helped in setting up a soil moisture logger based on the low cost Arduino microcontroller. This visit was facilitated by the Forest Department of Tamil Nadu.

### Juniata College visit to Pondicherry

**Venue and dates:** Pondicherry and surrounding villages

**Participants:** College students and faculty

**Budget:** \$ 2,547

Dr. Neil Pelkey visited Pondicherry between the 8th and 12th of January with students from Juniata College, Huntingdon. FERAL assisted this visit by organising field visits and discussions with resource persons from different organisations working in and around Pondicherry. While the students stayed at Pondicherry, the FERAL campus was the venue for meetings and discussions which often extended late into the evening.

Among the field visits made, were trips to fishing and agricultural villages where the students interacted with the local communities and members women self-help groups.

Patterns and L...  
nant in the ...  
Lakshminarayana, K. Lakshminarayana  
July 24, 2015 • Nilgiris

# Non-stationary and non-linear influence of El Niño Southern Oscillation on the Indian monsoon and Indian Ocean Dipole

Jagdish Krishnamoorthy, D. Srinivas Reddy  
Article  
First Online: 25 August 2014  
DOI: 10.1371/journal.pone.0120840



## Abstract

The El Niño Southern Oscillation (ENSO) is recognized as major drivers of interannual variability (IEV) in precipitation events (IEV). We analyze the influence of ENSO on the Indian monsoon and Indian Ocean Dipole (IOD) using a non-linear and non-stationary approach.

# Sanctuary

- Events
- Magazines
- Photography
- Travel
- People
- Conservation
- Campaigns
- Resources

## A Note On The Nilgiris

Wildlife biologist N. Lakshminarayana pays tribute to the rich biodiversity of the Nilgiris, even as he highlights the challenges of conservation.

# Animal Conservation



## Categorizing species by niche characteristics to clarify conservation planning in rapidly-dynamic landscapes

A. Gangadharan, S. Vaidyanathan, C. C. St. Clair  
First published: 11 March 2015  
DOI: 10.1111/acv.12262

## Abstract

In biodiversity-rich landscapes that are undergoing rapid land use and prioritize conservation activities in response to anthropogenic activity. We analyzed a few flagship, indicator species, which are highly sensitive to land use change, to understand their response to land use change.

Early view

யாதும் ஊரே எல்லா உயிரினங்களும் கேளிர் ; ஜார்ஜ் வு...

சுமந்திரன், சுமந்திரன், சோமுந்திரன், ச. இளங்குடி நாராயணன்.

Jan 9 2015

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## Challenges



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## Publications

Below is a list of publications for this financial year covering articles, both in scientific journals and popular magazines and news papers followed by technical reports prepared for donors and conference papers and presentations made by the team at both national and international events.

### Journal Articles

- (1) A. Gangadharan, S. Vaidyanathan, and C. C. St. Clair. Categorizing species by niche characteristics can clarify conservation planning in rapidly-developing landscapes. *Animal Conservation*, pages n/a–n/a, March 2016.
- (2) Jagdish Krishnaswamy, Srinivas Vaidyanathan, Balaji Rajagopalan, Mike Bonell, Mahesh Sankaran, R. S. Bhalla, and Shrinivas Badiger. Non-stationary and non-linear influence of ENSO and Indian Ocean Dipole on the variability of Indian monsoon rainfall and extreme rain events. *Climate Dynamics*, 45(1-2):175–184, July 2015.
- (3) N. Lakshminarayanan, Krithi K. Karanth, Varun R. Goswami, Srinivas Vaidyanathan, and K. Ullas Karanth. Determinants of dry season habitat use by Asian elephants in the Western Ghats of India. *Journal of Zoology*, pages n/a–n/a, November 2015.

### Reports

- (1) Senthil Babu, Sunita Ram, Ignatius Peliyas, K Kumaran, V Selvaganesh, Vikrant Jathar, Rajat Ramakant Nayak, and Srinivas Vaidyanathan. Experiences and learnings from pilot payments made to local residents to enhance and conserve biodiversity. Technical Report, Foundation for Ecological Research, Advocacy and Learning, Puducherry, India, 2015.
- (2) Sunita Ram, Flavia Abraham, and Srinivas Vaidyanathan. Market for eco-certified rubber and rubber wood in India. Final Technical Report, Foundation for Ecological Research, Advocacy and Learning, Puducherry, India, 2015.
- (3) Sunita Ram, Rajat Ramakanth Nayak, Nitya Satheesh, and Srinivas Vaidyanathan. A guide to establish a natural wind barrier. Technical Report, Foundation for Ecological Research, Advocacy and Learning, Puducherry, India, 2015.

- (4) Sunita Ram, Mehta Shreema, and Srinivas Vaidyanathan. Existing guidelines for eco-certification of natural rubber and rubber wood. Technical Report, Foundation for Ecological Research, Advocacy and Learning, Puducherry, India, 2015.
- (5) Sunita Ram, H.S Sushma, Nitya Satheesh, and Srinivas Vaidyanathan. Distribution and Status of Endangered Mammals in the Shencottah Gap. Technical Report, Foundation for Ecological Research, Advocacy and Learning, Puducherry, India, 2015.
- (6) Sunita Ram and Srinivas Vaidyanathan. Current ecological and social status of rubber estates in the Shencottah Gap. Final Technical Report, Foundation for Ecological Research, Advocacy and Learning, Puducherry, India, 2015.
- (7) Sunita Ram and Srinivas Vaidyanathan. Ecologically sustainable land-use practices for rubber plantations. Technical Report, Foundation for Ecological Research, Advocacy and Learning, Puducherry, India, 2015.
- (8) Sunita Ram and Srinivas Vaidyanathan. Key ecological indicators for developing standards for certification of natural rubber. Technical Report, Foundation for Ecological Research, Advocacy and Learning, Puducherry, India, 2015.
- (9) Srinivas Vaidyanathan, R. S. Bhalla, and Rajat Ramakant Nayak. Monitoring changes in ecosystem services in key biodiversity areas in the Western Ghats biodiversity hot-spot. Final Technical Report, Foundation for Ecological Research, Advocacy and Learning (FERAL), Pondicherry, 2015.
- (10) Srinivas Vaidyanathan, Rutuja Dhamale, Ajith Ashokan, Vikrant Jathar, and Rajat Ramakant Nayak. Influence of land-use and land-cover on carbon stocks: Baseline estimates to develop a PES approach to restore degraded lands. Technical Report, Foundation for Ecological Research, Advocacy and Learning, Puducherry, India, 2015.
- (11) Srinivas Vaidyanathan, A. J. T. Johnsingh, Nishant M Srinivasiah, Naveen Bhat, and Selva Kumar. Wildlife Crossing Structures for the Shencottah Wildlife Corridor. Technical Report, Foundation for Ecological Research, Advocacy and Learning, Puducherry, India, February 2016.
- (12) Srinivas Vaidyanathan, Keshavamurthy Karthik, Aditya Gangadharan, and Sunita Ram. Protocols and techniques to monitor habitat use by large mammals in multiple use landscapes. Technical Report, Foundation for Ecological Research, Advocacy and Learning, Puducherry, India, 2015.
- (13) Srinivas Vaidyanathan and Nishant M Srinivasiah. Insights into individual movement and dispersal using camera trap data and conservation implications at the population-level. Technical Report, Foundation for Ecological Research, Advocacy and Learning, Puducherry, India, 2015.
- (14) Srinivas Vaidyanathan, Nishant M Srinivasiah, Rajat Ramakant Nayak, and Sunita Ram. Identifying Barriers and Optimizing Restoration of Large Mammal Connectivity Across Linear Intrusions in the Shencottah Gap. Final Technical Report, Foundation for Ecological Research, Advocacy and Learning, Puducherry, India, 2016.
- (15) Srinivas Vaidyanathan, H.S Sushma, and Sunita Ram. Rationalizing Protected Area Network in the Periyar-Agasthyamalai Landscape. Technical Report, Foundation for Ecological Research, Advocacy and Learning, Puducherry, India, 2015.



## Conference Papers and Presentations

- (1) Ravinder Singh Bhalla, K Kumaran, Srinivas Vaidyanathan, Jagdish Krishnaswamy, Nick A. Chappell, and Timothy Jones. Estimating Evapotranspiration Demands of Different Land Covers. In *American Geophysical Union Fall Meeting 2015*, San Francisco, CA, USA, December 2015. AGU.
- (2) Aditya Gangadharan, Srinivas Vaidyanathan, and Collen St Clair. Within and among-individual variation may determine tiger occupancy and connectivity in human-dominated landscapes. Montpellier, France 2 - 6 August 2015, August 2015.
- (3) Jagdish Krishnaswamy and Srinivas Vaidyanathan. La Nina and Indian Ocean Dipole Influence on Distribution of Daily Rain Intensities in India. In *American Geophysical Union Fall Meeting 2015*, San Francisco, CA, USA, December 2015. AGU.
- (4) Aritra Kshetry, Srinivas Vaidyanathan, and Vidya Atreya. A Leopard In Your Tea-Cup: Diet And Habitat Use Of An Adaptable Felid In A Forest-Production Landscape Mosaic. Bengaluru, India, 8 - 11 September 2015, September 2015.
- (5) N Laxminarayanan and Srinivas Vaidyanathan. Monitoring Elephant Populations: Application of Occupancy Based Approach. In Nishant M Srinivasaiah and Anindya Sinha, editors, *Studying Elephants in Human-Dominated Landscapes A Workshop for Early-Career Biologists and Conservationists*, Bengaluru, India, 2015. The Frontier Elephant Programme, National Institute of Advanced Studies.
- (6) Rajat Ramakant Nayak. Fire in forests: Short and long term Impacts. In *Science Based Wildlife Conservation in India: Challenges and Opportunities*, Sirsi, March 2016. WCS-India.
- (7) Prachi Thatte, Aditya Joshi, Srinivas Vaidyanathan, and Uma Ramakrishnan. How connected will tiger populations be in the future? Montpellier, France 2 - 6 August 2015, August 2015.
- (8) Srinivas Vaidyanathan, Rajat Ramankant Nayak, and Laxminarayanan N. Applications of Geographic Information System and Remote Sensing in Monitoring Elephant Ecology and Behaviour. In Nishant M. Srinivasaiah and Anindya Sinha, editors, *Studying Elephants in Human-Dominated Landscapes A Workshop for Early-Career Biologists and Conservationists*, Bengaluru, India, 2015. The Frontier Elephant Programme, National Institute of Advanced Studies.
- (9) Srinivas Vaidyanathan, Sunita Ram, Rajat Ramankant Nayak, Laxminarayanan N, and A.J.T Johnsingh. Bridging the Shencottah Gap: Status of elephant corridors between the Periyar and Agastyamalai elephant populations. In Nishant M Srinivasaiah and Anindya Sinha, editors, *Studying Elephants in Human-Dominated Landscapes A Workshop for Early-Career Biologists and Conservationists*, Bengaluru, India, 2015. The Frontier Elephant Programme, National Institute of Advanced Studies.

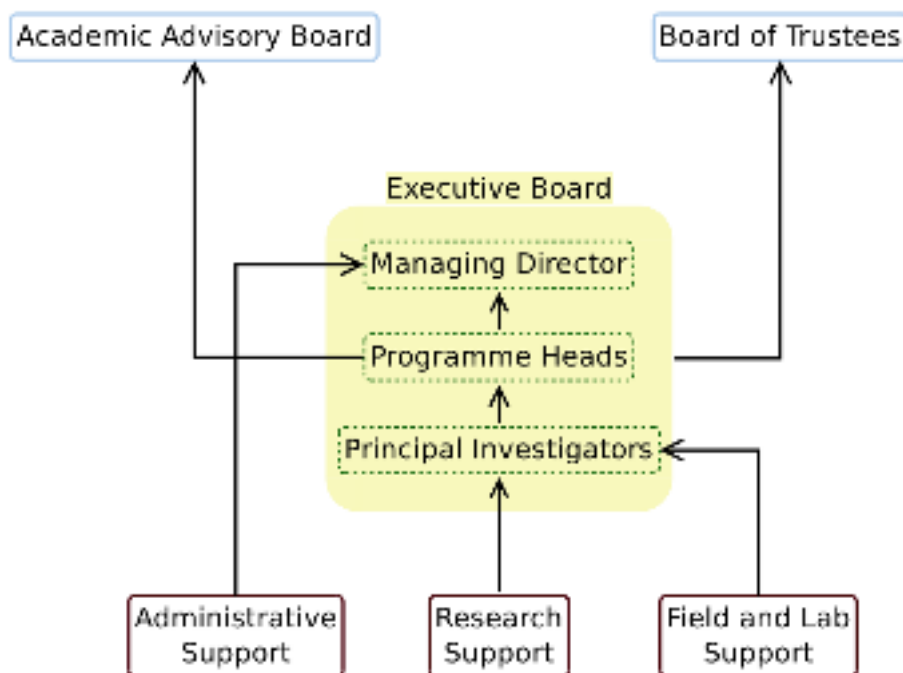
## Newspaper Articles

- (1) S Bharathidasan and N Lakshminarayanan. Dr. Schaller: Five Decades of Untiring Research on Endangered Species. 2016.
- (2) Divya Karnad. To study what lies beneath oceans. *Deccan Herald*, March 2016.
- (3) N Lakshminarayanan. A Note On The Nilgiris. 2016.
- (4) N Lakshminarayanan. Snaring Wildlife Creates "Problem" Animals. *The Hindu*, 2016.

## Administrative Information

**F**ERAL is a non-profit trust founded under the Indian Trusts Act, 1882 on July 1997. We are a certified 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 board of trustees for overall administration and organisational policy.



*FERAL's organisational structure.*

## Advisory Board

Deviprasad K. V., Ph.D.  
Jagdish Krishnaswamy, Ph.D.  
Ajith Kumar, Ph.D.  
Neil Pelkey, Ph.D.  
Keshavnath Perar, Ph.D.  
Mahesh Sankaran, Ph.D.  
Kartik Shanker, Ph.D.  
Arjun Sivasundar, Ph.D.

## Board of Trustees

Rauf Ali, Ph.D.  
R.S. Bhalla, Ph.D. (Managing Trustee)  
Pratibha Pande  
Mahesh Sankaran, Ph.D.  
Srinivas Vaidyanathan

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## Partners

FERAL's work is made possible through grants from both Indian government 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

Critical Ecosystem partnership fund,  
USA.  
Ministry of Earth Sciences, Govern-  
ment of India, New Delhi.  
Ruffords Foundation, UK.  
The Rockefeller Foundation and US  
Agency for International Develop-  
ment via The Nature Conservancy.  
Wildlife Conservation Society India.

### Collaborating Institutions

Ashoka Trust for Research in Ecology  
and Environment, Bangalore, India.  
Centre for Wildlife Studies.  
Lancaster Environment Centre, Lan-  
caster University, UK.  
National Centre for Biological Sci-  
ences, Bangalore, India.  
The Nature Conservancy, USA.  
Wildlife Conservation Society - India  
Programme.

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## The FERAL Team

**F**ERAL'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 tick (arranged alphabetically).

### Remembering Rauf and Pratibha

We lost two of our trustees towards the end of this year. Pratibha and Rauf were both dear friends and mentors to the FERAL team. They were full of ideas, advice and could be relied on for help, be it of a personal or official nature. Their passing leaves a void in the organisation and our lives.

Rauf was the seniormost founding trustee of FERAL, and in many ways the core around which FERAL was founded. Rauf often created the image of a mischievous, provocative and eccentric scientist. However, he was a person of intellect with incisive logic and depth of knowledge in the subject.

Rauf worked tirelessly towards addressing challenges unique to the Andaman and Nicobar Islands. He started the Island and Reefs programme in FERAL towards this, taking on projects and studies addressing incomes and livelihoods of tribal communities and simultaneously raising awareness of the large scale ecological degradation being caused by invasive species of plants and animal in the islands.



*Dr. Rauf Saad Ali  
1954–2016*

Pratibha joined the board of trustees at FERAL in 2013. She brought with her heaps of positive energy and experience which enthused and revitalised FERAL. Perhaps best known for her work on the directory of protected areas in India, Pratibha worked tirelessly towards modernising and strengthening forest management in India's protected areas.

She was also an avid bird watcher and drew beautifully, a skill she brought to her work with the meticulous maps of protected areas carefully extracted from available topo-sheets. This was before GIS and digitising maps became commonplace. Pratibha pushed us to take up the exercise of digitising the working plans of protected areas to see how these new tools could be used to improve and streamline these crucial records.



*Pratibha Pande  
1952–2016*

## Researchers



*Senthil Babu*

Babu has an M.Phil. in History of Science. He is interested in issues affecting the coastal communities in general and the fishing community in particular. He has worked along the east coast on various issues for the last several years. He has been actively involved with our work in the Shencottah Gap, working on the social aspects of payment for ecosystem services.



*R.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.



*Divya Karnad*

Divya is a marine ecologist working on fisheries and threatened fish species along the west coast of India. She recently completed her PhD at the Rutgers University, USA for which she studied sustainable livelihoods of fishermen and conservation of threatened marine fish species in the West Coast of India.



*N Lakshminarayanan*

N Lakshminarayanan is a wildlife biologist. He completed his Post-Graduation in Wildlife Science and Conservation from National Centre for Biological Sciences, WCS-India Program, Bangalore. He is particularly interested in applied research and conservation of large mammals. He actively engages with local advocacy groups working on large mammal conservation in the Western Ghats.



*Rajat Ramakant Nayak*

Rajat has completed his Masters in Wildlife Biology and Conservation. He has a special interest in grassland ecosystems, both low and high altitude, semiarid and wet. He is currently part of the team focusing on the biology and conservation of ecosystems and connectivity for large mammals in the Shencottah Gap.



*Sunita Ram*

Sunita has an MPhil in Biological Sciences from Fordham University, USA. She is currently working on factors delineating distribution of langurs in southern India. Her research interests lie in understanding the ecology and distribution of primates and finding long term conservation strategies in the southern Western Ghats.



*Srinivas Vaidyanathan*

Srinivas is a wildlife biologist with an interest in understanding changes in landscape level processes and structure and how they affect large mammal populations. He is a guest faculty at the M.Sc course in Wildlife Biology and Conservation at NCBS, where he has been co-guiding students for their Master's thesis. Srinivas uses spatial approaches for finding innovative and practical solutions to conservation problems.

## Research Support



*Vikrant Jathar*

Vikrant completed his masters in zoology from Mumbai University. He is interested in studying butterflies and their role in biodiversity assessments. He is also interested in studying parasites infecting butterflies in their different life stages.



*Kumaran K.*

Kumaran has been working as part of our field teams in Pondicherry and in the Western Ghats. He recently completed his Masters degree in Ecology at Pondicherry University and has worked on land cover changes in the Nilgiris with focus on invasive species in the shola grasslands.



*Vinod M.*

Vinod works as part of the field team in the Agastyamali landscape. Along with Karthik, he coordinates field activities.



*Ignatius Peliyas*

Ignatius is interested in understanding human dimensions of conservation. He works in the Agastyamalai complex assessing the role human settlements and community based organisations play in conserving wild habitats.



*Saravanan S.*

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



*Kamal.S*

Kamal started off at FERAL as a field assistant about a decade ago. Since then, he has become an invaluable part of our research support through his ability to pick up techniques and accepting responsibilities in field. Kamal is adept at handling a range of field equipment and data loggers and downloading data. 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.



*Selvaganesh*

Ganesh is a postgraduate, and has largely been helping the WASH team with the implementation of the projects.



*Sivakumar Sankar*

Sivakumar has an MTECH in GIS and RS. He is interested in applying these skills to understand coastal zone changes.



*Nitya Sathish*

Nitya has a BE in Electronics and Communication Engineering. She is currently assisting with data management and analysis.



*Siva T*

Siva is a postgraduate from forestry college in Coimbatore. He works as part of the field team in the Nilgiris.



A number of field assistants worked for varying periods on our projects. We couldn't possibly manage all our field equipment and collect the wide range of data for our research without their help and enthusiasm.



Shanker.N



Jagan.S



Krishnakumar



K.Ganapathy



Moses



Sivakumar.A



Sathish.V



M.Senthilkumar

## Administrative Support



Rajendran K.

Raji is our Office Manager and is engaged in keeping the campus operational and helps organise workshops and events for various projects. The former involves facilitating the entire range of projects operating out of the campus.



Shanthi R.

Shanthi is our Accounts Manager handling the day to day accounting responsibilities of the organisation. She is a postgraduate in commerce and is versatile in the use of a range of accounting software.



Sumathi

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

# Balance Sheet for the year 2015–2016

**FOUNDATION FOR ECOLOGICAL RESEARCH ADVOCACY AND LEARNING**  
 No .170/3, Morattandi Village, Avroville Post, Tamilnadu - 605101  
**BALANCE SHEET AS AT 31.03.2016**

( Amount in Rs )

Particulars	Sch.Ref	31.03.2016	31.03.2015
<b><u>SOURCES</u></b>			
Corpus	1	10,43,853	(9,07,172)
Project Asset Reserve	2	36,35,623	45,59,239
Projects Account (Cr)	3	-	5,54,472
		<b>46,79,476</b>	<b>42,06,539</b>
<b><u>APPLICATION</u></b>			
Fixed Assets less Depreciation	4	23,77,783	27,72,381
<b>CURRENT ASSETS, LOANS AND ADVANCES</b>			
Cash and bank balances	5	19,49,225	12,32,969
Loans and advances	6	4,47,733	4,64,983
Projects Account (Dr)	3	2,70,744	-
	(i)	<b>26,67,702</b>	<b>16,97,952</b>
Less: Current liabilities	7	3,66,009	2,63,794
	(ii)	<b>3,66,009</b>	<b>2,63,794</b>
Net Current Assets (i) - (ii)		23,01,693	14,34,158
		<b>46,79,476</b>	<b>42,06,539</b>
Notes on Accounts	10		


As per our report of even date attached

For **FOUNDATION FOR ECOLOGICAL RESEARCH ADVOCACY AND LEARNING**

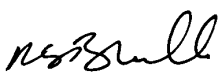
FOR **ASA & ASSOCIATES LLP**

Chartered Accountants


Firm Reg No: 009571N/150006

  
**K.VENKATRAMAN**  
 Partner

M.No:200/21914



**R S BHALLA**  
 Managing Trustee

  
**SRINIVAS V**  
 Trustee

Place : Chennai

Date : September 21, 2016



