

# Annual Report

## 2008-2009



*That which was wild, run wild again*

Foundation for Ecological Research, Advocacy and Learning





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## **Mission Statement**

*To apply ecological research to solve issues in natural resource management, conservation and advocacy through building capacities of individuals, communities and agencies.*

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Foundation for Ecological Research, Advocacy and Learning (FERAL)

P.O.Box 28,

Pondicherry - 605 012, India

Tel: 91 -413-2671566, 2225441

<http://www.feralindia.org>

Cover Photo: Coffee estates bordering the Bhadra Tiger reserve were originally shola forests. The only remnants of these forest are in coffee estates with natural shade. Grass lands still exist while the rest of the forests have been converted to coffee and silver oak. © Srinivas.V.

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# MANDATE

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Our mandate is to provide a base and support for researchers to follow their interests and priorities. Furthermore to impart training in ecological survey techniques and tools. And finally, to use ecological data to solve issues in natural resource management, conservation and advocacy.

*FERAL – that which was wild gone wild again.*

**F**oundations of our organisation are based in that goal; finding ways to help natural processes return to a more natural or less degraded state.

**E**cology, as we define it, is the study of the interactions of organisms within and across species in a shifting landscape of communities subject to the physical environments they inhabit. Our brand of ecology primarily focuses on biological ecology and the relationships of human beings therein. It is that interface which is the primary focus of our work.

**R**esearch is the key ingredient to our understanding of ecological systems. We do not believe that ecological science is established well enough to make broad prescriptions that apply universally. Thus each ecological dilemma needs rigorous analysis that can then provide guidelines for local action.

**A**dvocacy for appropriate natural resource management is the fourth lynchpin of our organisation. For us this is a mix of negotiation, facilitation and mediation where possible, but as a last resort litigation is also a potential option.

**L**earning is the final head on our chimera. To keep abreast of developments in this young science, we will continuously strive to learn more and pass on these learnings. Newer techniques for analysis, new tools and new developments in the field of ecology, action research and advocacy keep us constantly on our toes.

FERAL is a non profit Trust formed on the 22nd of July 1997. We are a team working on various topics of ecological research, natural resource management, environment education and training. Our activities are co-ordinated from the field office close to Pondicherry and our Bangalore office. An administrative office in Pondicherry town provides support to all the projects.

## The Year That Was

This year saw the successful conclusion of a number of projects even as we solicited support for initiatives in wildlife research and conservation and environmental sanitation. Among the concluded projects were the FAO supported work on artisanal fisheries, the DST supported programme on women technology and the UNDP supported work on coastal habitat restoration and vulnerability. Of these the latter two projects were extended for the period of six months and a year respectively.

Among the new efforts initiated were a UN-HABITAT supported project to study unique challenges and demonstrations of appropriate water and sanitation in coastal and vulnerable areas. This initiative will assess existing interventions in terms of their suitability from an environmental and social perspective and suggest and demonstrate alternative models for drinking water supply and sanitation. On the wildlife and conservation front we were supported for two projects in the Western Ghats which evaluated the potential for re-building wildlife corridors through privately owned areas using the payment for ecosystem services as a framework. Our interventions with local communities continued with the initiation of a project in the Nicobar islands that introduces a manually operated coconut oil extractor to supplement the production of virgin coconut oil by the Nicobari tribal community at Nancauri. Another project explores various entrepreneurial activities among women self help groups.

Apart from the two projects that were granted extensions, the NRDMS supported study on how landscape processes influence water resources in Kalivelli continues as does the work on gastrointestinal parasites of langurs among Nilgiri Langur in the Western Ghats. We held a total of sixteen projects this year which further enhanced our work in the core areas of conservation and wildlife biology, gender and community based natural resources, education and learning and restoration and action research.

In an effort to comply with the Ministry of Science and Technologies requirements for scientific and industrial research organisations (SIRO), some organisational changes were made to the way FERAL is governed and managed. Among these was the constitution of an academic advisory board, a management board and changes to our trust deed which re-enforced our primary focus on scientific research and education.

Read on for more details....

# PROGRAMME AREAS AND PROJECTS

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We have four programme areas which correspond to our long term priorities. Each of these is headed by a senior research scholar and comprise of one or more projects. These are:

1. Conservation and wildlife biology.
2. Gender and development.
3. Education and training and
4. Restoration and Action research.



A glimpse of some of our activities.

We take pride in our objective and quantitative approach to project implementation. We are also committed to equitable and community based interventions which are gender sensitive and pro-poor.

At FERAL, the use of sophisticated spatial analysis goes hand in hand with grassroots action and mobilisation. Our apparently diverse programme areas are in fact highly complementary and there is a constant process of learning and improvising on methods and techniques at FERAL. Our linkages with other organisation facilitate this process in no small measure.

The table below summarises the projects that were implemented during the period 1st April 2008 to 31st March 2009. Subsequent sections present a summary of each project.

Sl. No.	Programme Area/Project	Supporting Institution	PI/Head	Budget (INR)
<b>Conservation and Wildlife Biology</b>				
1	Gastrointestinal parasites in langurs: the influence of human settlements within a Protected Area in the Western Ghats, India	Multiple: Primate Conservation Inc., USA	Sunita Ram	1,13,216/-
2	Identifying critical areas for a landscape level wildlife corridor in the southern Western Ghats	Rufford Foundation	Aditya Gangadharan & Srinivas V	4,68,500/-
3	Baseline surveys for designing and implementing payments for ecosystem services in the Western Ghats, India	Environmental Economics Unit, Department of Economics, Göteborg University	Srinivas V	9,72,942/-
4	Elephant Corridor Project	Institute for Global Warming, New Delhi.	Rauf Ali	2,50,000/-
<b>Education and Training</b>				
5	Marine Science in India	AIIS-BCA-Juniata	Neil Pelkey & Anupama Pai	17,41,427/-
6	Summer Courses	Juniata College, Huntingdon, Pennsylvania	Neil Pelkey & Anupama Pai	3,20,775/-
<b>Gender and Development</b>				
8	Technology Applications in Natural Resource Management	Science and Society Division, DST.	Anupama Pai	8,09,050/-
9	Establishing small scale coconut extraction units in the Nicobar Islands	Science and Society Division, DST.	Rauf Ali	9,98,480/-
10	Skill Based Micro-enterprise Development for Women from Scheduled Caste	Science and Society Division, DST.	Anupama Pai	10,00,000/-



Sl. No.	Programme Area/Project	Supporting Institution	PI/Head	Budget (INR)
Restoration and Action Research				
11	Landscape Assessment of the Kalivelli Basin	Natural Resources Data Management Systems, DST.	R.S.Bhalla	19,95,900/-
12	UNDP-UNTRS Post Tsunami Environment Initiative	UNDP-UNTRS	R.S.Bhalla, Srinivas.V and Abraham V.A.	1,25,37,749/-
13	Co-Management and Livelihood Enhancement Planning in Coastal Artisanal Fisheries	FAO-UNTRS	R.S.Bhalla	17,69,004/-
14	Risk Assessment and vulnerability mapping for coastal areas of Pondicherry	UNDP-UNTRS	R.S.Bhalla	6,97,620/-
15	Maintenance and Monitoring of Restoration Sites	UNDP, New Delhi	R.S.Bhalla	15,52,402/-
16	Community-based Water and Sanitation Facilities and Capacity Building of Local Residents for Adaptation to the Calamity in Coastal Areas	UN-HABITAT, Nairobi	Abraham V.A.	84,00,000/-
Workshops, conferences and seminars held				
	Title	Related Project	Venue	Date
1	International workshop on Payment for Ecosystem Services	Baseline surveys for PES in the Western Ghats	Auroville	1st May, 2008
2	Assessing Opportunities for Livelihood Enhancement and Diversification in Coastal Fishing Communities	FAO-UNTRS/ICM, Kakinada	Chidambaram	14-16th May, 2008.
3	Workshop on risk and vulnerability mapping in coastal areas	UNDP-UNTRS, DRM	FERAL Campus	June 2008
4	Conference on co-management of artisanal fisheries.	FAO-UNTRS	Villupuram, Pondicherry & Cuddalore	June, August & September 2008
5	Workshop on spatial statistics and visualisation	Juniata College	FERAL Campus	16-18th July 2008
6	International conference on restoration of coastal habitats	UNDP-UNTRS, PTEI Phase 2	Mahabalipuram	August 2008
7	Use of GPS and GIS for wildlife management	FERAL	Parambikulam Wildlife Sanctuary	02-06th March 2009

## Conservation and Wildlife Biology

This programme is devoted to conservation issues and encompasses research and documentation of wildlife, their habitats and understanding issues related to landscape level changes. The Agastyamalai-Periyar landscape in the southern Western Ghats in the states of Kerala and Tamil Nadu has been the focus of our research and conservation activities. This year saw FERAL initiating two new programs in the realm of payment for ecosystem services and wildlife corridors. Two project were continued from the previous year.



Historically humans and government policies have modified landscapes which have become fragmented and ecologically degraded. For example the area adjoining Bhadra Tiger reserve, Vast tract of the surrounding landscape have been converted to shade grown coffee some under native trees and a large proportion under silver oak. © Srinivas.V.

### Gastrointestinal parasites in langurs: the influence of human settlements within a Protected Area in the Western Ghats, India

**Project period** 1 year

**Budget** Rs.1,13,216/-

**Supporting partner** Primate Conservation Inc., USA.<sup>1</sup>

**Coordinator** Sunita Ram

The Nilgiri langur (*Semnopithecus johnii*) and the common langur (*Semnopithecus priamthersites*) are colobines found in the southern tip of the Western Ghats. Changes in land use patterns and the loss of habitat due to the ever-increasing demand for land to meet anthropogenic requirements are major causes for these and other primates being critically threatened today. Data regarding patterns of parasitic in-

fections in langur populations in the wild are a critical indicator of the population health and will mark a beginning towards assessment and management of disease risks.

This is especially important for populations that are in proximity to human settlements as this can either have a direct effect through contagion from humans and indirectly due to increased stress. This project aims to fill in

<sup>1</sup>Part funding; applications for additional funding and permission for field work is still pending for this project.

the paucity of information on gastrointestinal parasites of langurs in the wild and help in our understanding of the influence of human settlements within Protected Areas on the parasitic loads of these primates. Permission for field work from the Tamil Nadu Forest Department is pending.



The Common Langur. © Sunita Ram.

A proposal titled "Study of the distribution of primates of the genus *Semnopithecus* and understanding factors that influence parapatry between the common langur and Nilgiri langur in the Southern Western Ghats, India" has been submitted to the Department of Science

and Technology for their Women in Science (WOS-A) grant to raise additional funds. The PI presented the proposal to the Technical committee, DST at a meeting held at the Sugarcane Research Station, Kunraghat, Gorakhpur on January 25th, 2009. Their final decision is awaited.



The Nilgiri Langur. Photo credits: Juniata College.

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## Identifying critical areas for a landscape level wildlife corridor in the southern Western Ghats, India

**Project period** 2008-09

**Budget** Rs.4,13,000/-

**Supporting partner** Rufford Small Grants Foundation

**Coordinator** Aditya Gangadharan and Srinivas.V.

The Agasthyamalai and Periyar-Srivilliputhur hills constitute the southernmost ranges of the Western Ghats. They contain unique ecosystems and species, and are acknowledged as high priority areas for conservation. Large mammal

movement between these ranges is increasingly rare owing to the rapid pace of habitat degradation and alteration in the intervening mosaic of multiple-use forests, estates and small settlements.

The current study is part of a long-term research and conservation programme aimed at assessing and preserving connectivity between large mammal populations in this region.



Lion-tailed Macaque, a highly endangered species.  
© Aditya Gangadharan.

The objectives of the study are:

1. Quantify animal occupancy and habitat use patterns over the landscape, and factors that affect these;
2. Quantify movement patterns for elephants;
3. Identify areas suitable for establishing corridors at the local and landscape level.

Currently sign-based occupancy surveys for herbivores and carnivores are being carried out and about 150 sq km has been sampled. The large mammalian diversity in the area is remarkable; thus far we have encountered 13 species during our surveys. The most frequently encountered species are sambar, barking deer and elephant. While the first two species are found throughout the study area, including rubber and tea gardens, elephants have a restricted distribution. Other endangered species encountered during our surveys include the tiger and lion tailed macaque.



Barking deer. © Srinivas.V.

## Baseline surveys for designing and implementing payments for ecosystem services in the Western Ghats, India

**Project period:** 2008-2009

**Budget:** Rs. 9,73,000/-

**Supporting partner:** Environmental Economics Unit, Department of Economics, Göteborg University, Sweden

**Coordinator:** Srinivas V

**Collaborators:** Somanathan E, (Indian Statistical Institute), Peter Bardsley, (University of Melbourne), Gary Stoneham (Department of Sustainability and Environment, Govt of Victoria)

The study is being carried out in the southern Western Ghats with a primary focus of improv-

ing habitat connectivity between the Agasthyamalai and Periyar-Srivilliputhur hill ranges. It



complements our study to identify critical areas for wildlife corridors. The project targets two conservation priorities: the first is to develop incentive based mechanisms to encourage land use changes by land holders in the area that would lead to a healthier and more productive forests facilitating large mammal movement and also an expansion of area under forest cover. The second is to develop incentive based mechanisms for local individuals and communities to mitigate anthropogenic ecosystem threats (fire, fuel wood collection, and poaching).

Currently, rapid socioeconomic surveys of settlements in the Shencottah gap have been completed. Settlements were identified and structured interviews conducted with residents of each settlement to collect baseline data. These cover topics including land use and cropping

patterns, economics of cultivation and human wildlife conflicts. As revenue maps for the taluk a total of 27 settlements covering ~ 9 km<sup>2</sup>, in the Ariankavu Panchayat have been mapped.



Shencotta a critical link between Periyar and Agasthiyamalai complex. © Srinivas.V.

The average landholding is 1-3 acres/household and nearly 70% of the settlements had encroached forest land or land leased to the railway department. The predominant crops grown in the area are rubber, pepper and coconut.

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## Elephant Corridor Project

**Project period:** April 2008- March 2010

**Budget:** Rs. 2,50,000/-

**Supporting partner:** Institute of Global Warming & Ecosystem Studies, NOIDA

**Coordinator:** Rauf Ali



Waterhole in the Chandaka Sanctuary, near Bhubaneswar.

FERAL was involved in mapping fire-prone areas in Northern Orissa and assessing the extent to which these affected elephant crop raiding, and their conflict with humans.

A preliminary conclusion is that repeated burning of forests for NTFP collection has resulted in almost no undergrowth in most of the sal forests observed. There is therefore no forage available for the elephants, and their use of the forest is limited to sheltering there during the day. Since the closest food resource in most cases are agricultural fields, they resort to crop raiding. We hope to validate this in the coming year.

## Education and Training

Learning is a core function of FERAL. We are constantly working towards improving our own skills and techniques as well building capacities of other organisations, students and professionals. The Education and Training programme of FERAL covers a range of topics, from participatory methods to spatial statistics and vegetation sampling to fish gut analysis.

This programme comprises of a mix of workshops, seminars and formal class room teaching, although the bulk of the courses conducted by us tend to have a significant “hands-on” component. Faculty from other institutions often participate in these programmes as occasionally, FERAL staff go as guest faculty to other institutions.



Some of the student activities during their stay here.

## Study abroad programme

Courses under this programme are designed to provide students academic cum experiential learning opportunities while exploring the field of natural and social sciences with an emphasis on issues of sustainable development. It provides them with the opportunity to interact with people from diverse backgrounds, those involved in research and those who try to take this research to the local communities.

## Marine Sciences

**Project period** 2006- ongoing

**Budget** Depending on participants

**Supporting partner** AIIS-BCA-Juniata

**Coordinator** Neil Pelkey and Anupama Pai

The AIIS-BCA-Juniata Marine Science semester in India program had eight students this year. Alongside the regular focus on academics and field studies, we introduced a stronger emphasis on cultural aspects within the field of fisheries management. Application of science skills in conjunction with a concern for local communities and their needs was addressed.



The rocky shores at Karwar, one of the locations visited.

In addition, the rich cultural heritage of each location was explored to understand the forces that have shaped each of these fishing societies.

Students were encouraged to interact, observe, reflect and learn the concepts, challenges and opportunities in each subject, thus helping them reflect upon the conflicting demands on society and environment.

Our partners in the program across all locations provided excellent support as always. At the Andaman Islands, some students completed their Open Water Dive certification while others moved on to the Advanced level. Tara, from our fisheries project, was part of the course contributing as a Teaching Assistant. She also received her Open Water Dive certification during this time. Lectures, laboratory sessions and field visits organised at the different Universities, Colleges and Research Institutions provided a well rounded background to the field of marine sciences. With FERAL, students focused on beach and jetty visits to understand the workings of small scale artisanal fisheries and the many challenges faced by this community. A new partnership was developed with the PG Centre in Marine Biology at Karwar.

One of our students, Ms. Takako Yamamoto, was also accepted for an internship at the National Institute of Oceanography at Goa.

**Summer courses****Project period** 2006- ongoing**Budget** Depending on participants**Supporting partner** Juniata College, Huntingdon, Pennsylvania**Coordinator** Neil Pelkey and Anupama Pai

The regular summer courses of Sustainable Agriculture and Culture, Class and Gender were cancelled do to lack of adequate number of students. Two new courses were added to our repertoire of summer courses. These were largely developed based on the interests expressed by students.



Students at a temple festival.

The first one on Wildlife Biology and Conservation, conducted by Sunita, introduced students to the several concepts in conservation biology, habitat management and field methods. With a mix of lectures and field exercises, the course was conducted not only on cam-

pus but also included visits to sites such as the Kolli Hills, Parmabikulam Wildlife Sanctuary, and Kalivelli wetlands. Emphasis was on a hands on approach to field methodologies and understanding complexities of conservation issues. General topics such as wildlife conservation history in India and the basics of wildlife photography added to the strength of the program.

The second one on Peace and Social Justice was conducted with Dr. Celia Cook-Huffman from the Baker Institution at Juniata College as the lead faculty. A new connection was also forged with Rajagiri College of Social Sciences, Cochin as part of the course. The course provides an overview of the philosophies, beliefs and paradigms that underlie the understanding of peace and justice. Theoretical frameworks, Indian social movements and working paradigms of local organisations are examined. Analysis is also done through readings of the works of well known (and lesser known) figures along with an overview of contemporary ones. We also look at community organising at the local level as a form of peacemaking, empowerment, and local governance.



## **Gender and Development**

FERAL continued its activities with the women groups it supports within the Tiruchitrambalam Panchayat. Building up on the experiences of the income generation activities taken up in the previous year, the next step of working towards setting up micro-enterprises was initiated. The Nicobar islands project focused on getting in place the machinery for coconut oil extraction.



Women's day was a mix of serious discussions and fun.

## Technology Application and Capacity Building in Natural Resource Based Income Generation

**Project period** 2006-2009

**Budget** Rs.8,09,050/-

**Supporting partner** Science and Society Division, Department of Science and Technology, New Delhi

**Coordinator** Anupama Pai

The project entered its final year and activities focused on monitoring and maintenance of the kitchen gardens and small scale ornamental fish rearing tanks.



Self help group members visit an organic farm. Kitchen gardens in our programmes are not treated as an income generation activity, but more as nutrient gardens.

The kitchen gardens performed well and some members expanded their activities to take up vermi-composting and simple composting. Produce from the gardens was used by each family. Wherever space was limiting, the methods of 3-D gardening was introduced. This concept of gardening is to create a three dimensional space for growing of herbs, small shrubs and creepers. It helps in maximising the space available and is particularly suitable for the village setting. Trel-

lis were built or existing trees were utilised for creepers. Micro-irrigation through the bucket and drum kits was also introduced to improve water efficiency. The initial kits were sourced through IDE (India) and were later fabricated in-situ. These consisted of a simple set up of a small bucket or drum placed at a height with a drip hose connected and supplying water to the garden plots.

The small scale ornamental fish rearing continued with the initial set of women. It was not possible to expand the number of tanks due to lack of space in most households. An additional challenge faced was the need to identify new buyers for the fish as the regular buyer (cum trainer) closed down his venture. Thus FERAL has purchased the fish from the women and stocked them until such time as a new buyer can be identified. Growing some varieties of ornamental plants in small cement tanks was experimented with and the best results were obtained with *Phystia rosetti* which required very little maintenance. Additional fish species such as the pineapple guppies were also introduced. All women began to make fish feed at home using the simple recipe provided by IRTC and on which they had received training, bringing down the costs of fish feed substantially.

## **Skill Based Micro-enterprise Development for Women from Scheduled Caste**

**Project period** 2008-20010

**Budget** Rs.10,00,000/-

**Supporting partner** Science and Society Division, Department of Science and Technology, New Delhi

**Coordinator** Anupama Pai

The project intends to demonstrate the systems and methodologies required to build and sustain a small business venture. Based on the concept of micro-enterprise incubators, it will assist women from the SC population to successfully run their own businesses. The women would be provided with hands on training on issues such as quality control, material inventory, basic enterprise management skills, bookkeeping and development of new product ranges. They would also be helped in market identification and development. Two main activities are being selected

Food Processing - will look at hygienic production of local snacks which are popular in the rural and urban markets. In addition, flavours of jams, squashes and pickles would be produced for both the rural and urban markets. Some of the raw material for these items would

be sourced from the kitchen gardens that have been established by the women.

Aquarium Systems - which looks at the processes involved in setting up aquariums (both freshwater and marine) from the basics of tank building, localised fish food preparation, aquatic plants, ornamental fish rearing and finally setting up and maintenance of aquariums.

The project will experiment with several products and designs based on the principles of value addition, recycling and locally available raw materials. Networking with other SHGs for training and marketing as also setting up of local outlets will be part of the activities. Markets will also be explored in Pondicherry town with expansion to other nearby towns. The Women Technology Parks at CERD, Bahour and IRTC, Pallakad would be the main resources for technologies, training programs and exposure visits.

## Establishing small scale coconut extraction units in the Nicobar Islands

**Project period** April 2008-March 2010

**Budget** Rs. 9,98,480/-

**Supporting partner** Science and Society Division, Department of Science and Technology, New Delhi

**Coordinator** Rauf Ali and Aparna Singh

The main export of the Nicobar Islands is copra. The Nicobari tribals who live on these islands are almost entirely dependent on copra exports for all their external needs.



Nicobari women grate the coconuts prior to pressing them in the prototype machine.

At the moment, due to the low prices obtained the islanders are not self sufficient.

This project is to convert coconut kernels into virgin coconut oil. This is used as a health food, raw material for pharmaceuticals, and as a base for soaps and cosmetics. It fetches between 4-5 times the price of ordinary coconut oil. The Nicobaris prepare this for their household consumption, but its production on a large scale has so far not been done due to techni-

cal constraints. It should be noted that virgin coconut oil produced from this coconut is organic, and thus will command premium prices from the pharma and perfume industry. This includes agencies abroad who find it extremely difficult to source organic coconut oil. This project is therefore aimed at producing a low cost extractor for coconut milk (from which the oil is made), solving the social and technical issues that might arise, and enabling a marketing mechanism for this oil.

A low cost extractor has been designed, and a number of prototypes have been tested. The latest models are being field tested in Car Nicobar. The programme is being implemented in car Nicobar by partnering with a local youth group, Dosti. Each coconut is found to produce about 100 ml of coconut oil, making it a very profitable venture. Marketing arrangements have been made through an MOU with the Andaman & Nicobar Island Forest Plantation Development Corporation (ANIFPDC), a public sector company, through its branch in Hut Bay, Little Andaman. ANIFPDC will procure virgin coconut oil in bulk, package it, and market it after stringent quality control tests. In the next year, the efficiency of the presses will be improved.



## **Restoration and Action Research**

This programme area focuses on inter-disciplinary projects which have a strong community interaction and typically an element of natural resource or environment management. Six projects, three of which were initiated last year comprised our work in this component for the year 2008-09. Three projects were also successfully concluded this year, many of which involved workshops and conferences and the publication of a number of reports, data and awareness materials.



Our work with artisanal fishers explored livelihood enhancement and diversification in the sector.

This year we also launched our first major project dealing with environmental sanitation in partnership with UN-HABITAT and were able to get support to extend the protection and monitoring of restoration sites for the UNDP-PTEI project which was concluded. Other work included a risk and vulnerability mapping for Pondicherry and continuation of data collection and analysis of land use and land cover around Kalivelli.

## Landscape Assessments of the Kalivelli Basin

**Project period** November 2007- November 2010

**Budget** Rs.19,95,900/-

**Supporting partner** Department of Science and Technology, Natural Resources Data Management Systems.

**Coordinator** R.S.Bhalla and K.V.Devi Prasad (Pondicherry University)

The Kalivelli lake, a wetland of international importance, is fed through a series of interlinked irrigation tanks and channels, which crisscross a predominantly agricultural landscape. This study attempts to understand the landscape dynamics that govern the quality and volume of water that enters this lake. The primary objective of the project is to identify scientifically sound interventions that would restore the catchment and buffer or ameliorate the impacts of agricultural runoff into the wetland.

In continuation with the work done last year, the bulk of the work this year pertained to field data collection and installation of equipment and data loggers on site. Secondary data that had been collected earlier was analysed and a research manuscript submitted which is under review. Work was also initiated assessing the ecological "value" of riparian systems in the landscape. A series of surveys quantifying butterfly species and richness as well as associated flora were conducted across 6 minor irrigation tanks. These will be compared with patch char-

acteristics of these areas to identify a set of landscape metrics that best describe habitat quality.



Three meteorological stations with automatic loggers have been set up in the watershed.

## Post Tsunami Environment Initiative Phase II

**Project period** 2006-2008

**Budget** Rs.1,25,37,749/-

**Supporting partner** United Nations Development Programme

**Coordinators** R.S.Bhalla, Srinivas.V and Abraham V.A.

The primary goal of the FERAL component of the Post Tsunami Environmental Initiative was to build protocols for restoration of coastal habitats based on a combination of literature reviews and field experience.



Mangrove planting.

The objectives of the project were :

1. To conduct studies in coastal vulnerability at a spatial level.
2. A spatial analysis of land use change and social change on the Coromandel coast of India over the last three decades.
3. To identify sites for pilot restoration using and extending PTEI Phase I results; coastal sand dunes, mangroves and tropical dry evergreen forest habitats were covered.
4. To mobilise local stakeholders and built

local capacities at selected restoration sites.

5. To mobilise institutional support and financial sustainability of the work through linkages with local and district authorities and
6. To set up pilot demonstrations sites for restoration of native coastal habitats.

While the last two objectives covered the entire Coromandel coast, the restoration related activities were limited to patches of degraded native habitat lying within 50 km of the coast which extends from the South of Pulicat Lake to Point Calimere in Nagapattinam.

This is among the first efforts to collate and analyse information in a spatial framework that encompasses long term changes in coastal land use and consequent impacts on the vulnerability of communities and native habitats. This is also among the few attempts to document and build comprehensive restoration strategies for these habitats and involves partnerships with local communities, institutions and other agencies in the region. Our learnings emphasis the need for multidisciplinary approaches. The ability to use participatory tools and community organisation in conjunction with remote sensing, GIS, specialised nursery techniques and ecological assessments was a major strength of the project.



## Co-management and livelihood enhancement planning in coastal artisanal fisheries

**Project period** 2007-2008

**Budget** Rs.15,58,920/-

**Supporting partner** Food and Agriculture Organisation of the United Nations

**Coordinator** R.S.Bhalla

This multidisciplinary study documented livelihood opportunities and challenges and searched for answers to the complex issue of resource management in artisanal fishing on the Coromandel coast.



The Ring Seine rapidly spread from few villages in the Cuddalore Dt. to the entire project site raising concerns of over exploitation of fishery and equity imbalance in the artisanal fishery sector.

Covering the districts of Villupuram, Cuddalore and Pondicherry, this project was based on extensive documentation of artisanal fishing settlements and fisheries. A total of 62 artisanal fishing settlements were surveyed as part of the project. Among the studies that were taken up were a census of family composition, primary and secondary occupations and craft ownership covering 62 villages. This was followed by surveys of fish landing and craft/gear composition in a selection of 22 villages falling in three clusters that corresponded to the different districts. An assessment of livelihood enhancement and diversification opportunities was made in the same 22 villages. Additionally,

regular meetings were held with representatives of traditional fishing Panchayats in 62 settlements culminating in district level discussions between the representatives and officials from the district fisheries administration.

The use of banned nets and fine meshed nets was common among both artisanal and mechanised fishers as was the regular incursion of mechanised boats into artisanal fishing areas. Numerous instances of near shore and paired trawling and ring seine operations were observed. Catch composition indicated that a number of species are being harvested at pre-adult stages and there were many records of fingerlings of economically important species being caught. The gear/craft and catch surveys highlighted the urgency for fisheries management oriented reforms and interventions in the fisheries sector. Our findings also show that there is an over capacitation in artisanal fisheries in the surveyed villages.



Line fishing for eels is a seasonal affair. Their air bladders are used in the pharmaceutical industry.



## Risk and Vulnerability Mapping of Coastal Areas of Pondicherry

**Project period** May to August 2008

**Budget** Rs.6,97,620/-

**Supporting partner** UNDP-UNTRS/DRM

**Coordinator** R.S.Bhalla

The lack of expertise in risk assessment and vulnerability mapping at the time of disasters is a major constraint during such events. One of the ways this can be overcome is to have capacities of local communities and civil society organisations built for rapid and accurate risk assessment and vulnerability mapping.

The purpose of this project was to establish a scientific and multidisciplinary methodology for training in risk assessment and vulnerability analysis. Its specific objectives were:

1. To build capacities of VLVs in field surveys for risk and vulnerability mapping.
2. Build a spatial database for socio-economic, environmental and geomorphological vulnerability parameters.
3. Build capacities of EOC in the use of these spatial databases for decision support in DRM.
4. To conduct risk and vulnerability mapping of coastal settlements of Puducherry.

This project established a model for capacity

building of village level volunteers (VLV) at the community or settlement level and the emergency operations centre (EOC) at the district level.



Participatory risk mapping surveys were a core component of the programme.

10 non-governmental organisations were trained over three successive sessions spanning a period of three months. In addition, risk and vulnerability maps were prepared for 11 villages of Pondicherry and baseline data was collected for the same. All the information was transferred to a GIS for sharing digitally.

## Maintenance and monitoring of restoration sites

**Project period** March to December 2009

**Budget** Rs.15,52,402/-

**Supporting partner** United Nations Development Programme

**Coordinators** R.S.Bhalla

This is a followup of the PTEI project covered earlier, which was successfully concluded at the end of 2008. The project has three primary objectives;

1. to maintain and protect five restoration sites through established eco-restoration committees and replant and replace dead saplings where necessary;
2. to monitor sapling survival and growth in these sites to draw lessons about the

restoration strategies followed;

3. to build upon existing links with the Forest Department and District Administration and push for community based habitat restoration as at a policy level.

Most of all this project will strengthen established links with the local communities who have contributed substantially to the achievements of the earlier project and who ultimately control the fate of these sites.

## Community-based Water and Sanitation facilities and Capacity Building of Local Residents for Adaptation to the Calamity in Coastal Areas in Cuddalore District, Tamil Nadu, India

**Project period** March 2009-November 2011

**Budget** USD 1,68,000/-

**Supporting partner** UN-HABITAT

**Coordinator** Abraham V.A.

**Project Area:** Coastal areas of Cuddalore Dt. Tamil Nadu

The Water for Asian Cities Programme is supporting the implementation of the water and sanitation related Millennium Development Goals and targets (MDGs) in Asian cities, specifically promoting pro-poor governance, gender mainstreaming, water demand management, increased attention to environmental sanitation; and income generation for the poor linked to water supply and sanitation. The programme seeks to achieve this by mobilising political will,

raising awareness through advocacy, information and education; training and capacity building; by promoting new investments in the urban water and sanitation sector; and by systematic monitoring of progress towards MDGs.



Testing community water sources at coastal villages.

The overall goal of the project is to promote adaptation of communities living in natural calamity prone coastal areas of Cuddalore District in Tamil Nadu and its key objective of the project is to increase access of a minimum of 13,500 people, including children, women, men and people with disabilities to 'community owned and managed water and sanitation facilities' in urban and peri-urban areas of Cuddalore District.

# WORKSHOPS AND CONFERENCES

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A number of workshops, seminars and conferences were conducted by FERAL and partner organisations this year. While most of these were linked to ongoing projects, some were non-funded programmes which were run as part of our efforts to build capacities among ecologists in quantitative and spatial techniques. The majority of these events were low-key and focused on specific and varied tasks such as discussions on payment of ecosystem services among scientists, workshops on spatial statistics, disaster risk mapping, mobilisation of communities for coastal habitat restoration or fisheries co-management. Some of the material prepared and course content for the workshops is hosted on our web site and can be accessed via a guest log in. Visit <http://www.feralindia.org/learning> to find out more.

## **Payment for Ecosystem Services**

**Dates** May 1st, 2008

**Concerned Project** Identifying critical areas for a landscape level wildlife corridor in the southern Western Ghats, India

**Host Institutes** University of Melbourne, Indian Statistical Institute and FERAL

The concept of Payments for Ecosystems Services is a relatively new paradigm being explored world over in various conservation efforts ranging from wildlife conservation to habitat improvement, watershed restoration and the conservation of marine resources. Given the present context where such processes are not part of the formal government regulatory process and given the continued decline in ecosystem services, the concept of payments for conservation is worth exploring as one of the means of preventing further decline. Currently there are very few studies or initiatives in India that makes use of such economic models in conservation and there is growing interest among government, non-governmental organisation and donor agencies in exploring the possibility of incorporating similar strategy into current conservation. This led the organising of a workshop seeking to

identify possible pilot projects for PES.

The workshop drew upon the lessons learnt from various PES schemes being successfully implemented by the Victoria Department of Sustainability and Environment, Australia and explored mechanisms for payment for biodiversity conservation and ecosystem services in the Indian context. The workshop examined how PES can fit into the Indian context with emphasis on the current legal and regulatory framework and land tenure systems, the economics of designing the incentive structure for those who participate in conservation, the development of monitoring systems which can track the performance of such initiatives incorporating both economic and ecological parameters, and what may be needed for the scaling up of such initiatives. The workshop brought together a group of ecologists,

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economists, administrators and representatives from the donor community with considerable years of experience in designing such projects. These proceedings of the workshop is avail-

able online ([http://www.feralindia.org/files/pes/PES\\_proceedings.pdf](http://www.feralindia.org/files/pes/PES_proceedings.pdf)) and contain abstracts of presentations, presentations and a summary of the discussions.

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## **Assessing Opportunities for Livelihood Enhancement and Diversification in Coastal Fishing Communities**

**Dates** 14-16 May 2008

**Venue** Chidambaram

**Concerned Project** Co-management and livelihood enhancement planning in coastal artisanal fisheries

**Resource Person** Venkatesh Salagrama, Director ICM

**Host Institutes** Integrated Coastal Management ICM, Kakinada, FAO-UNTRS and FERAL.

One of the major contributions of the FAO-UNTRS programme was the use of participatory tools and analytical techniques to develop a multidisciplinary understanding of the artisanal fisheries sector. A pioneer institute involved in this process is the Integrated Coastal Management institute at Kakinada, Andhra Pradesh who have developed a framework for collection and analysis of data pertaining to livelihood enhancement and diversification or LED.

The workshop was attended by partner organisations on the project and a representative of the Fisheries Department. Techniques that were learnt during this workshop were incorporated into the data collection and analysis for

the FAO-UNTRS project and were applied for a survey of 62 villages.



The field trial of LED framework was a crucial component of the workshop.

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## **Vulnerability and Risk Mapping**

**Dates** June 2008

**Venue** FERAL Campus

**Concerned Project** UNDP-DRM

**Host Institutes** UNDP-UNTRS, FERAL.



Risk and vulnerability mapping are among the fundamental requirements for long term management and mitigation of disasters. However such information needs to be collected and updated regularly, a task that is best done locally. In addition, risk and vulnerability are associated with micro-scale changes which can only be accurately recorded using appropriate survey methods. This workshop, spread over two sessions across three months, covered a range of participatory as well as field surveying techniques on risk and vulnerability mapping. The participants were entirely from non-governmental organisations working in disaster prone areas in Tamil Nadu and the exercise

was supported by the Disaster Risk Management component of the UNDP-UNTRIS programme.



Hands on training on GIS software and spatial data.

## Co-management meetings at district level

**Dates** June, August and September 2008

**Venue** Pondicherry, Anichankuppam and Chidambaram.

**Concerned Project** Co-management and livelihood enhancement planning in coastal artisanal fisheries

These conferences were the culmination of a series of village level meetings with representatives of artisanal fishing settlements and involved representatives of artisanal fishers, department of fisheries, FAO-UNTRIS team from Chennai, partner NGOs who facilitated FERAL in this project and representatives from FERAL itself. Three district level conferences were held in the districts of Cuddalore (September 2008), Villupuram (August 2008) and the U.T. of Pondicherry (June 2008).

The primary objective of these meetings was to develop a consensus on issues affecting artisanal fisheries and to agree on the kinds of interventions that local communities and the government, particularly the fisheries department can take. This was meant to be the first

step towards co-management as a possible option for fisheries resources management and tied into a larger policy initiative of the FAO and the Tamil Nadu Fisheries Department.



A co-management meeting in progress. Some of the discussions were quite animated given the conflicting positions of the participants.

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## Workshop on spatial statistics and visualisation

**Dates** 16-18 July 2008

**Venue** FERAL Campus

**Host Institutes** Juniata College and FERAL.

This hands on training targeted ecologists and covered analysis and visualisation of data as well as introductory spatial statistics. Participants included students from Pondicherry University, Wildlife Institute of India, Auroville

as well as research fellows from FERAL. The workshop introduced a number of open source tools for data exploration, visualisation and analysis including ORANGE, WEKA and R with its various spatial extensions and libraries.

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## Restoration of Coastal Habitats

**Dates** 20th - 21st August 2008

**Venue** Mahabalipuram

**Concerned Project** UNDP-PTEI

**Host Institutes** UNDP-UNTRS, Forest Department of Tamil Nadu and FERAL.

A two day conference entitled "Restoration of coastal habitats" was held on the 20th and 21st of August at Mahabalipuram. The event was jointly organised by FERAL along with the United Nations Development Programme and the Tamil Nadu Forest Department. This was part of the UN's Post Tsunami response under their coastal Environment programme. The Principal Chief Conservator of Forests of Tamil Nadu, Dr. Shreedharan, IFS, delivered the keynote address for the conference which was attended by scientists and agencies involved in ecological restoration and research from across the country and abroad. The deliberation identified challenges in restoration of coastal habitats with a focus on the Coromandel coast. Learnings from practitioners and scientists into the roles of these habitats and strategies for their restoration and conservation were discussed.



The Principal Chief Conservator of Forests, Tamil Nadu, Dr. Shreedharan (IFS), delivering the keynote address at the conference.

Among the papers presented were the results of a baseline survey on the status of coastal habitats outside the jurisdiction of the forest department. The presentation highlighted the loss of tropical dry evergreen forests along the Coromandel coast and the failure of existing institutions to protect coastal habitats.

Dr. Andrew Baird (James Cook University) reviewed the available data on the relationship between various environmental factors, the distance to tsunami run up and concluded that topography was the key variable in explaining inundation, whereas the presence of vegetation did not play a significant role.



A section of the participants in discussion.

A discussion on this ensued, and it was suggested that interplanting the casuarina bio-shields with native species would be a way to enhance their ecological value. Aurofilio from the Pondicherry Coastal Action Network made a compelling case for soft instead of hard options in controlling beach erosion. His presentation on coastal erosion around Pondicherry illustrated the damage done to both people and coastal ecology by hard erosion control measures. Various officers from the Tamil Nadu Forest Department shared their experiences and challenges faced in restoring and conserving coastal habitats. Presentations, selected photographs and details of the conference have been hosted on the website: <http://www.feralindia.org/?q=node/297>.

## Workshop on use of GPS and GIS for wildlife management

**Dates** 02-06 March 2009

**Venue** Parambikulam Wildlife Sanctuary

**Host Institutes** Kerala Forest Department and FERAL.

This hands on training was targeted at enabling ground staff of the forest department and wildlife trackers in systematically collecting GPS data which would feed into the spatial decision support system for park management. Additionally existing GIS capacities and needs were identified and training to forest department biologists was provided in maintaining databases. A follow up workshop and training is planned in the coming year which will cover use of open source software, setting up of decision support systems and wildlife monitoring programs.



Forest guards operating GPS units.



# PUBLICATIONS

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A number of reports and few journal articles were published during this year. Most of these can be downloaded from our website and hard copies can be obtained from our offices on request.

## Peer Reviewed Articles in Journals and Books

1. Restoration of coastal habitats (Meeting Report). (2008) *Current Science*, 95(11):1519<sup>2</sup>.
2. V. Srinivas, P. Dilip Venugopal and Sunita Ram. (2008) Site occupancy of the Indian giant squirrel *Ratufa indica* (Erleben) in Kalakad–Mundanthurai Tiger Reserve, Tamil Nadu, India *Current Science*, 95:7, 889-894.<sup>3</sup>
3. Rauf Ali. (2008) "Biological invasions in the Indian context". *Current Science*, 95:3, 10, 296<sup>4</sup>.
4. R.S.Bhalla and K.V.Devi Prasad. (2008) "Neem cake-urea mixed applications increase growth in paddy" *Current Science*,94:8, 1066-1070<sup>5</sup>
5. Benjamin Larroquette and Gaspard Appavou, (2008) A Factory in a Paddy Field in Pondicherry: Is Berger Paints Polluting Pandalozhanallur? in *Water Conflicts in India: A Million Revolts in the Making* (ed) K J Joy; Gujja, B; Paranjape, S; Goud, V; and Vispute, S. Routledge, New Delhi. pp 168 - 170
6. Benjamin Larroquette and Gaspard Appavou, (2008) Sand Mining in Coastal Tamil Nadu: A Threat to Local Irrigation Sources in *Water Conflicts in India: A Million Revolts in the Making* (ed) K J Joy; Gujja, B; Paranjape, S; Goud, V; and Vispute, S. Routledge, New Delhi. pp 223 - 226.

## Reports

1. R. S. Bhalla, Sunita Ram and Srinivas V., 2008. Studies on Vulnerability and Habitat Restoration along the Coromandel Coast: A Post-Tsunami Environment Impact Report. Pondicherry, India: FERAL/UNDP-UNTRS<sup>6</sup>.
2. R.S.Bhalla, 2008. Co-management and Livelihood Enhancement Planning in Coastal Artisanal Fisheries: Final Project Report. Pondicherry, India: FERAL, FAO-UNTRS<sup>7</sup>.

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<sup>2</sup><http://www.ias.ac.in/currsci/dec102008/1518.pdf>

<sup>3</sup><http://www.ias.ac.in/currsci/oct102008/889.pdf>

<sup>4</sup><http://www.feralindia.org/files/publications/notallgreen296a.pdf>

<sup>5</sup><http://www.ias.ac.in/currsci/apr252008/1066.pdf>

<sup>6</sup><http://www.feralindia.org/?q=node/318>

<sup>7</sup><http://www.feralindia.org/files/FAOfisheries/Final.pdf>

3. Gaspard. A., Tara N. Lawrence and R.S.Bhalla, 2008. Co-management and Livelihood Enhancement Planning in Coastal Artisanal Fisheries: Micro-planning Report. Pondicherry, India: FERAL, FAO-UNTRS<sup>8</sup>.
4. Tara N. Lawrence, S. Kumaran and R.S.Bhalla, 2008. Co-management and Livelihood Enhancement Planning in Coastal Artisanal Fisheries: Report on Status of Artisanal Fisheries. Pondicherry, India: FERAL, FAO-UNTRS<sup>9</sup>.
5. R.S.Bhalla, 2008. Co-management and Livelihood Enhancement Planning in Coastal Artisanal Fisheries: Report of the preliminary survey to micro-plans. Pondicherry, India: FERAL, FAO-UNTRS<sup>10</sup>.
6. R.S.Bhalla, 2008. Co-management and Livelihood Enhancement Planning in Coastal Artisanal Fisheries: Report of the preliminary survey to micro-plans. Pondicherry, India: FERAL, FAO-UNTRS<sup>11</sup>.

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<sup>8</sup><http://www.feralindia.org/files/FAOfisheries/Microplanning.pdf>

<sup>9</sup><http://www.feralindia.org/files/FAOfisheries/FisheriesStatus.pdf>

<sup>10</sup><http://www.feralindia.org/files/FAOfisheries/Baseline.pdf>

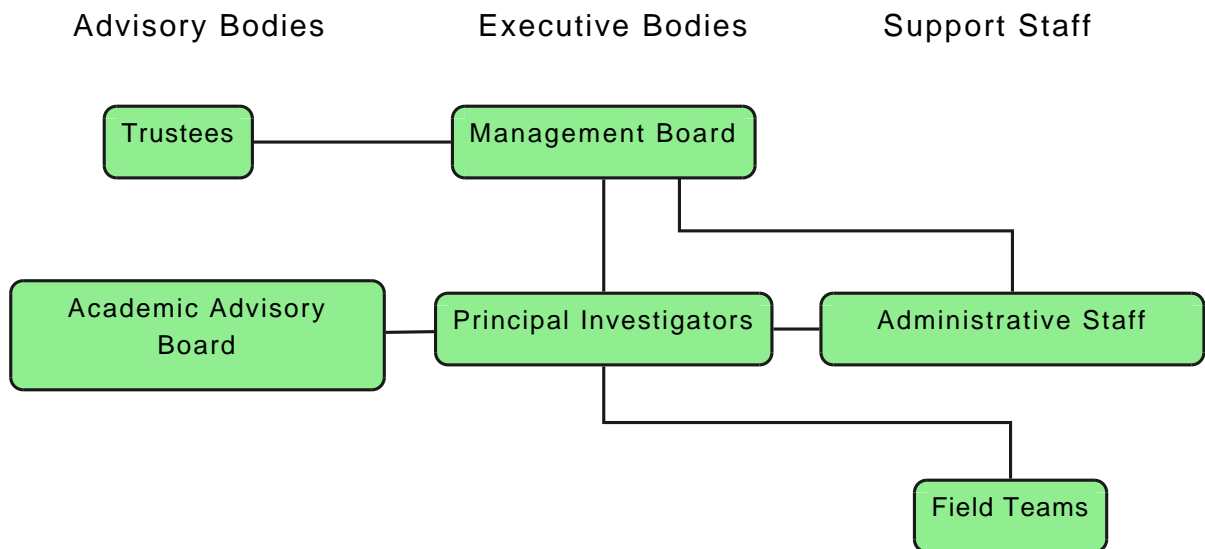
<sup>11</sup><http://www.feralindia.org/files/FAOfisheries/Baseline.pdf>

# ADMINISTRATIVE INFORMATION

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## Organisational Structure

FERAL is registered as a trust under the Indian Trust Act in 1997 (reg. no. 1327/97), as a non profit with an 80G certification for receipt of contributions and the FCRA clearance for foreign funds. It has applied for recognition as a Scientific and Industrial Research Organisation under the Department of Scientific and Industrial Research (DSIR), Ministry of Science and Technology which is likely to be given for the subsequent year. The simple organisational structure we follow ensures a high level of autonomy within projects with principal investigators or coordinators in charge. This structure is in compliance with the requirement of DSIR.



The FERAL organogram.

## Feralidae

The people behind FERAL are a diverse group with specific interests in the wide field of ecology. This team is responsible for formulating and co-ordinating the organisations activities and comprises of eight persons.

**Dr.Rauf Ali** - Founding Trustee of FERAL. Rauf is involved in various research efforts in the Andaman and Nicobar islands with a focus on assessments and impacts of exotic species. A primatologist by training, Rauf is active in policy advocacy for conservation efforts and is part of the researcher network across the country and worldwide.

**Dr.Neil Pelkey** - A Founding Member of FERAL and currently Senior Advisor, Neil is an Assistant Professor at the Juniata College, Pennsylvania, USA. He is an expert on GIS and remote sensing and environmental studies. He is an advisor on many of the projects and research proposals of FERAL. Neil is also responsible for developing the ongoing collaboration with the Juniata College for facilitating their undergraduate study abroad program in India.

**R.S.Bhalla** - Founding Trustee, Ravi's area of interest is natural resources management with specific interest in water resources management and artisanal marine fisheries. He is presently pursuing his PhD in landscape ecology. He conducts occasional training programs on participatory GIS and remote sensing.

**Srinivas V** - Srinivas, the third trustee of FERAL is a wildlife biologist with particular interest in understanding changes in landscape level processes and structure and how the same affect large mammal populations and distributions, in particularly wide ranging mammals. expertise lies in monitoring animal populations using a variety of advanced sampling techniques and the use of GIS and remote sensing to develop decision support systems for conservation initiatives.

**Sunita Ram** - Sunita is a PhD scholar currently working on the behaviour and distribution of Langurs. Her interests lie in the identification of habitats of these shy primates so that conservation efforts may be improved.

**Anupama Pai** - Anu is the Managing Director of FERAL and also co-ordinates the educational activities. She plays the role of administrator combined and logistics organiser. Appreciation and understanding of the environment among school students, developing the overall Study Abroad Program and teaching the gender and development component on this program are the focus of her work. She also overlooks the Gender Initiative in the organisation.

**Abraham Varampath** - Aby has expertise in the areas of water and sanitation. He has worked in several regions including with the UNICEF in the Nicobar Islands after the tsunami. He is currently heading the UN HABITAT project.

**Gaspard Appavou** - Gaspard has been coordinating the field surveys and data collection for the FAO-UNTRS project. He holds a master's degree in human resources management and a bachelors degree in law. His ability to moderate during meetings and discussions and manage multiple field teams during surveys has been a boon to the organisation.

**Tara Lawrence** - is a research associate and a new member into the FERAL fold. With a master's degree in marine science she is involved in the FAO project.

**Aditya Gangadharan** - Aditya is currently interested in evaluating connectivity for large mammals and is involved in our wildlife corridor program. He is particularly interested in measuring functional connectivity in human modified landscapes. Other than collecting field data he also runs our field station at Ariankavu and provides inputs to wildlife sampling techniques and analysis.

**Ignatius Peliyas** - Ignatius is interested in understanding human dimensions of conservation. He is currently working in the Agastyamalai complex assessing the role human settlements and community based organisation play in conserving wild habitats. Other than talking to people he is also interested in watching wild animals and accompanies us during our field surveys.

**Administrative Staff** - FERAL has a small administrative support system which includes Rajendran our Manager, who also helps with the activities under the Gender Initiative and overall logistics support. Shanthi, our accountant also play the dual role of logistics support and helps in the gender initiative. In addition FERAL has a team of field assistants who are employed on the various projects.

## Balance Statement

## FOUNDATION FOR ECOLOGICAL RESEARCH ADVOCACY AND LEARNING

No.27, 2nd Cross,  
Appavou Nagar,  
Vazhakulam,  
Pondicherry - 605 012.

## BALANCE SHEET AS ON 31-03-2009

LIABILITIES

Capital Fund:	
Opening Balance	3,471,985.12
ADD: Excess of Income Over Expenditure	1,190,266.66
	<u>4,662,251.78</u>
ADD: IT Refund	4,672,719.78
Loans & Advances (As per Schedule)	276,230.67
Outstanding Expenditure (As per Schedule)	369,120.00
	<u>5,318,070.45</u>



For FOUNDATION FOR ECOLOGICAL RESEARCH  
ADVOCACY AND LEARNING

TRUSTEE

ASSETS

Fixed Assets: (As per Schedule)	1,953,960.49
Loans & Advances: (As per Schedule)	207,468.53
Deposits:	
Deposit - Gas Student Fund	1,900.00 25,685.00
Cash in hand	12,007.71
Bank Balance	
SBI - 30111433991	339,572.26
SBI - 320276	1,163,434.46
SBI - 168238 FC	1,614,042.00
	<u>5,318,070.45</u>

AS PER OUR REPORT OF EVEN DATE

For MODI SANGARANARAYANANE & Co.,  
Chartered Accountants



(VIJAY. N. MODI)  
PARTNER



***Registered Office***

No.27, 2nd Cross, Appavou  
Nagar, Vazhakulam,  
Pondicherry 605 012

Phone: (+91) 413 2225441

***Field Office & Campus***

170/3, Morattandi Village,  
Auroville P.O. 605 101  
Tamil Nadu

Phone: (+91) 413 2671566 &  
2671567

***Bangalore Office***

170/B, 14th Main  
1st Block East, Jayanagar,  
Bangalore 560 011

Phone: (+91) 80 22442462