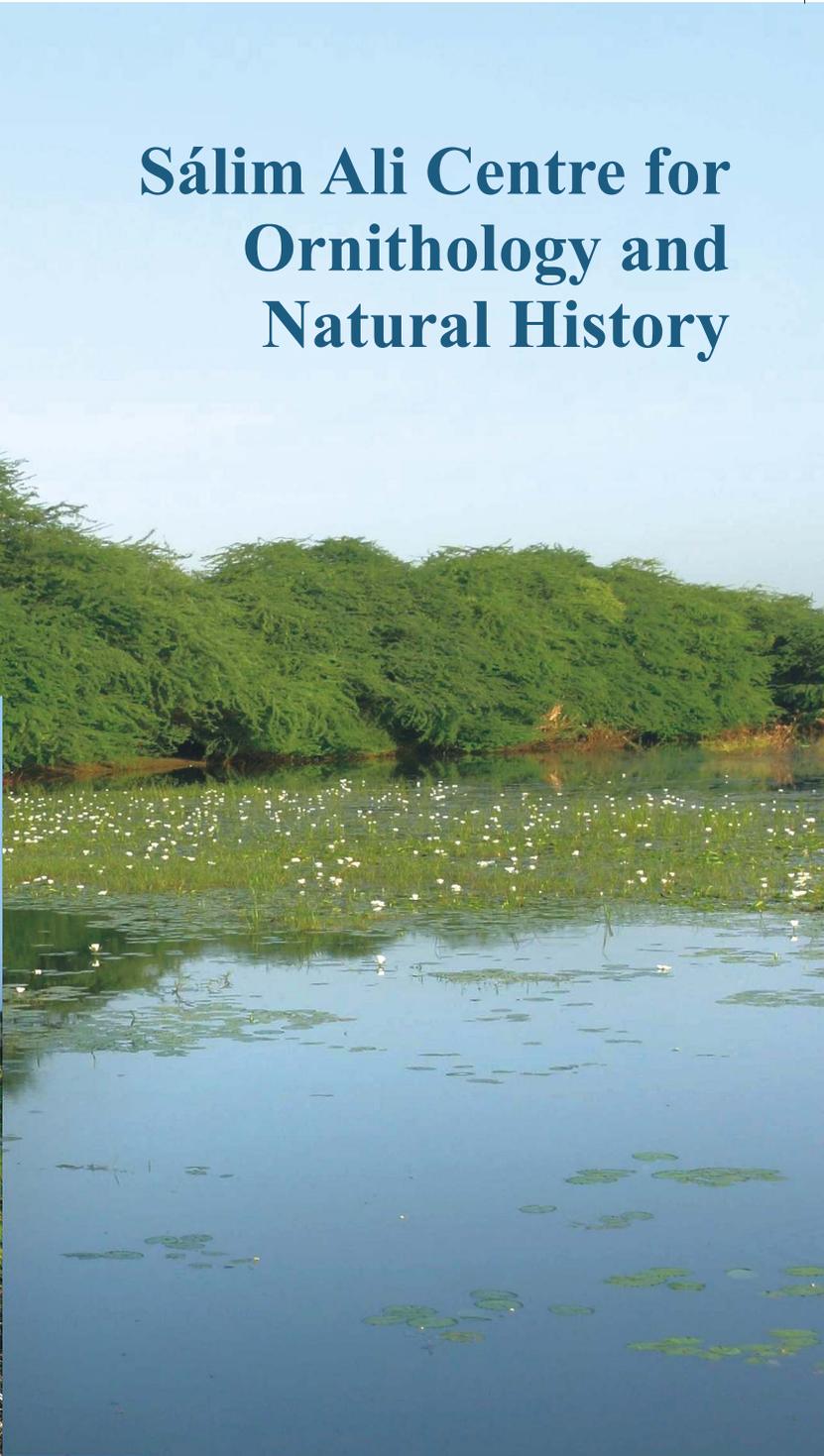
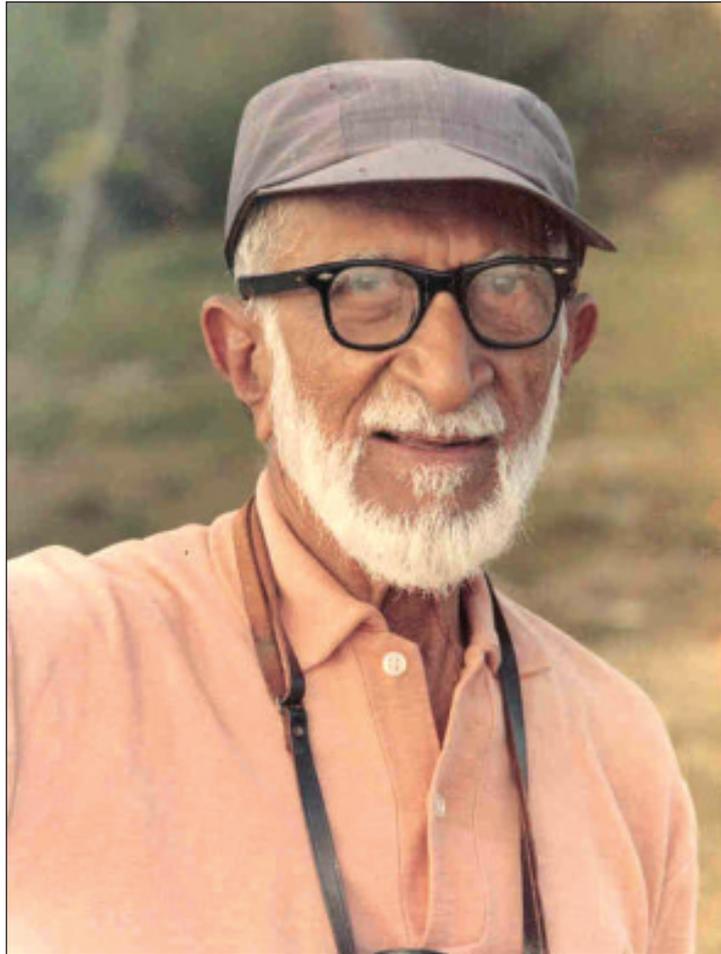


Sálim Ali Centre for Ornithology and Natural History



**Annual Report
2007-2008**





Dr. Sálim Ali
(1896 - 1987)

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BACKGROUND

Sálim Ali Centre for Ornithology and Natural History (SACON) was established in 1990, with financial support of the Ministry of Environment and Forests (MoEF), Government of India. The centre is an autonomous organisation registered under the Societies Registration Act 1860. The management of SACON is vested in a Governing Council comprising 16 members and its Chairman is the Secretary to the Government of India, Ministry of Environment and Forests. The SACON Society has 30 members and its President is the Honorable Minister for Environment and Forests, Govt. of India.

SACON came into being at a time when the twin issues of sustainable use and conservation of natural resources figured prominently in the global agenda. Realising the indispensability of holistic approach in avian studies and conservation, the major objectives of SACON have been envisaged encompassing the entire Natural History with Ornithology at the centre stage.

Sacon's Mission

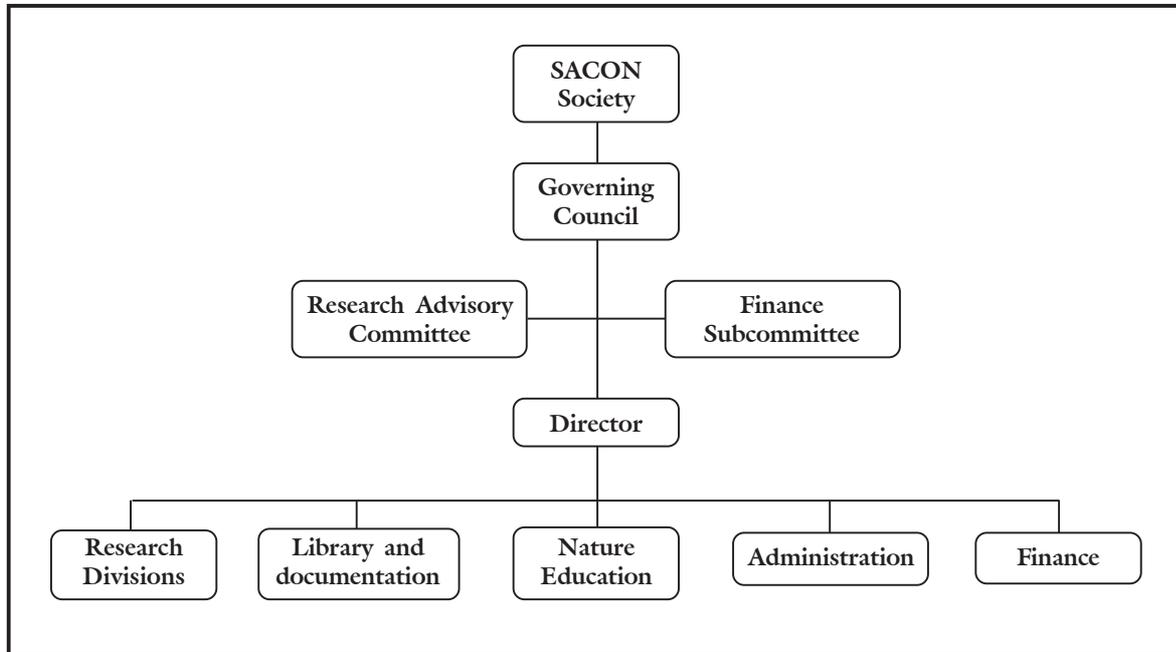
"To help conserve India's biodiversity and its sustainable use through research, education and people's participation, with birds at the centre stage"

Objectives

- ❖ Design and conduct research in Ornithology covering all aspects of biodiversity and Natural History.
- ❖ Develop and conduct regular courses in Ornithology and Natural History for M.Sc M.Phil and Ph.D and also, short-term orientation courses in related subjects.
- ❖ Create data bank on Indian Ornithology and Natural History, and
- ❖ Disseminate knowledge relating to Ornithology and Natural History for the benefit of the community.



Organizational Structure for SACON



Field Stations

1. Port Blair, Mayabunder (A & N Is)
2. Bharatpur (Rajasthan)
3. Hyderabad (Andhra Pradesh)
4. Upper Bhavani (The Nilgiris, TN)
5. Silent Valley National Park (Kerala)
6. Tuensang, (Nagaland)
7. Vaigai, (Tamil Nadu)
8. Attapadi (Kerala)

ORGANIZATION

SACON Society

To make the SACON Society more compact and effective, the Governing Council suggested changes in the constitution. Further to this, an Extraordinary General Meeting of the SACON Society held on 5th October 2007, presided by Mr Namo Narayan Meena (Honorable Minister of State for Environment and Forests, Govt. of India) reconstituted the Society. The membership of the Society has been decided as 29.

Governing Council (GC)

Administration of SACON is vested in a Governing Council, the Chairman of which is the Secretary/ Spl. Secretary/ Addl. Secretary, MoEF, Govt. of India. The GC has 15 members; Financial Advisor, MoEF, Jt. Secretary (CS) or nominee, MoEF; four ex-officio members, eight nominees of the Governing Council and the Director, SACON (member Secretary). The GC is advised by Rules Sub-Committee, Finance Sub-Committee, Research, Monitoring and Advisory Committee. It also has a Building Subcommittee to advice on the construction activities at SACON.

Members of the Governing Council

| | |
|-----|--|
| 1. | Ms Meena Gupta, IAS, Secretary to the Govt. of India Ministry of Environment and Forests, New Delhi (Chairperson) |
| 2. | Mr Raghu Menon, IAS, Addl. Secretary and Financial Advisor Govt. of India, Ministry of Environment and Forests, New Delhi |
| 3. | Mr A K Goyal, IFS, Jt. Secretary, Government of India Ministry of Environment and Forests, New Delhi |
| 4. | Mr P R Sinha, IFS, Director, Wildlife Institute of India, Dehra Dun |
| 5. | Dr G Thiruvagasam, Vice Chancellor, Bharathiar University, Coimbatore |
| 6. | Dr A R Rahmani, Director, Bombay Natural History Society, Mumbai |
| 7. | Dr R Sukumar, Chairman, Centre for Ecological Sciences Indian Institute of Science, Bangalore |
| 8. | Prof H S A Yahya, Dept. of Wildlife Sciences, Aligarh Muslim University, Aligarh |
| 9. | Prof P C Bhattacharjee, Head, Dept. of Zoology, Guwahati University, Assam |
| 10. | Mr R G Soni, IFS (Retd), Principal Chief Conservator of Forests, Rajasthan |
| 11. | Dr P Pushpangadan, Hon. Director General, Amity Institute for Herbal and Biotech Products Developments, Trivandrum |
| 12. | Dr C K Varsheney, Professor (Retd), Jawaharlal Nehru University, New Delhi |
| 13. | Dr S K Dutta, Professor, PG Department of Zoology, North Orissa University |
| 14. | Dr Krishna Kumar, Director, Indian Institute of Management, Khozikode |
| 15. | Dr P A Azeez, Director Incharge, SACON (Member Secretary) |

Research activities have been organized under four research divisions, namely Conservation Ecology, Landscape Ecology, Ecotoxicology and Environmental Impact Assessment. Apart from this, SACON has a Division for Nature Education established with an aim to develop environmental awareness among school and college students and general public by organizing nature clubs, camps, seminars, field trips, trekking, exhibitions and competitions for school children on conservation issues and themes. The core scientific staff strength of the year was eight with three Senior Principal Scientists,



four Senior Scientists, and one Nature Education Officer. Dr. PA Azeez, Senior Principal Scientist of the Division of Environmental Impact Assessment continued to be the Director Incharge of the Centre during the period i.e. 2007-2008.

The administrative section of SACON has Finance Officer, Junior Administrative Manager, Personal Assistant to Director, Accountant, Administrative Assistant, Office Assistant, Stenographer and Receptionist, two Drivers and two Office Attendants.

Research, Monitoring and Advisory Committee (RMAC)

The Research, Monitoring and Advisory Committee is an advisory body constituted by the Governing Council to have its advice on the research programmes of SACON with the following terms of reference:

(1) Identification of priority areas for research (2) selection of new projects in the light of process laid down by the Governing Council, and (3) Monitoring and review of ongoing research projects. The duration of the committee is for three years. The Committee met on 19-20 June 2007 in SACON, Coimbatore under the chairmanship of Dr Robert B Grubh, Director, Institute for Restoration of Natural Environment, Nagercoil.

Members of the Research, Monitoring and Advisory Committee (RMAC)

| | |
|----|--|
| 1 | Dr Robert B Grubh, Director, Institute for Restoration of Natural Environment, Nagercoil (Chairman) |
| 2 | Dr B M Parasharya, AINP on Agricultural Ornithology Biological Control Research Lab, Anand Agricultural University, Anand |
| 3 | Dr V C Soni, Professor, Department of Biosciences, Saurashtra University, Rajkot |
| 4 | Dr N V Joshi, Centre for Ecological Sciences, Indian Institute of Science, Bangalore |
| 5 | Dr J S Samant, Professor (Retd), Development Research, Awareness and Action Institute (DEVRAAI), 'RAAI' - 379, R K Nagar, Kolhapur 416 013 |
| 6 | Dr P S Roy, Dy. Director, National Remote Sensing Agency, Hyderabad |
| 7 | Dr Parikshit Gautam, Director, Freshwater Wetlands Programme, WWF-India, New Delhi |
| 8 | The Chief Wildlife Warden, Tamil Nadu |
| 9 | The Chief Wildlife Warden, Kerala |
| 10 | The Chief Wildlife Warden, Karnataka |
| 11 | Dr Ramakrishna, Additional Director, Zoological Survey of India, Kolkata |
| 12 | Director (I/c Wetlands), MoEF, New Delhi |
| 13 | Dr T Sundaramoorthy, Senior Educational Officer, CPR Foundation, Chennai |
| 14 | Senior Principal Scientist, SACON, Coimbatore nominated by the Governing Council |
| 15 | Senior Principal Scientist, SACON, Coimbatore nominated by the Governing Council |
| 16 | Director / Director Incharge, SACON, Coimbatore (Member Secretary) |

Executive Summary

During 2007-2008 SACON undertook 19 research projects, several nature education programmes and other nature conservation activities.

The study on **Status and ecology of the Andaman Crane** that was initiated in 2004 was completed and final report submitted. The study recommends revising the status of this species from data deficient to the vulnerable category of the Red-listed birds under IUCN. The study on **Mumbai trans-harbor sea link project: Study of Flamingos and migratory birds**, funded by Maharashtra State Road Development Corporation, Mumbai emphasizes that the mudflats at the Sewri - Mahul mudflats is an Important Bird Area (IBA) harboring a large population of birds including small waders and 2-15% of the entire south Asian population of the Lesser Flamingo (*Phoenicopterus minor*). Interim recommendations include reducing the levels of PAHs (from petrochemicals) in the area, relocating the ship repair activities from Sewri and construction of the bridge to be done in the flamingo area when the birds are absent or in fewer numbers. The project on **the biodiversity of Attappady with GIS aid** was undertaken to inventory the major components of biodiversity of the area, especially butterflies and birds, which can be used for monitoring the changes in the area and to use the data to decide upon strategies for management and development of the area. Another study under taken on the **Ecology and Conservation of the Spot-billed Pelican in Andhra Pradesh** was funded by University Grants Commission for a Ph.D programme. The study aims documentation of the birds and their ecology at Uppalapadu, Andhra Pradesh.

A study for **Identification and mapping of Lesser Florican breeding sites to develop a fodder producing grassland network in western India**, initiated in 2003 was also concluded during the year. The **In-situ & Ex-situ conservation of the Edible-nest Swiftlet *Collocalia fuciphaga* in the Andaman & Nicobar Islands**, initiated in 1999 was continued during the year. The study has the dual objective of developing protection systems at select nesting caves where sustainable harvesting regimes will be initiated as well as developing the ranching of the species in houses, thereby significantly building up populations in these islands, and providing an alternate source of livelihood for nest collectors, farmers, and poorer sections of the community as well as forming an important source of revenue for the islands. Another study **'Strengthening community conservation efforts in Nagaland; A programme to impart technical support on biodiversity conservation and livelihood options to**

communities (Phase I: Phek, Tuensang and Mon Districts)' was initiated in 2007 in collaboration with the Nagaland Empowerment of People through Economic Development (NEPED), Kohima. The programme aims to develop mechanisms by which the community conservation efforts in Nagaland, wherein many communities have set aside areas within their village lands with restrictions on hunting, fishing, and tree felling by way of resolutions passed by the Village Councils, are strengthened and expanded and lead to livelihood benefits.

A study on the **Ecology of the Endangered Indian Rock Python (*Python molurus*)** was initiated at the world famous Keoladeo National Park. The project aims to study aspects of ecology of the Indian python, assess the impact of tourists on the basking and movement patterns, and develop conservation plan for pythons in Keoladeo National Park, Bharatpur, and Rajasthan. A three-year study on the **Herpetofaunal communities in the Upper Vaigai Plateau, Western Ghats** was also initiated, and aims to document the taxa in the area and to identify conservation measures required for the taxa.

The ENVIS center Wetlands of India continued functioning during the year. **Some of the major activities** were revamping ENVIS wetland website and developing simple prioritized maps on Inland Wetlands of India using DjVu plug-in technology. A **Multilevel and multiscale analysis of wetland systems to evaluate balance in ecosystem services and sustainability concerns - Kolleru Wildlife Sanctuary, a Ramsar site in Andhra Pradesh** was also undertaken during this period in collaboration with International Water Management Institute (IWMI). SACON also undertook developing a **GIS for Rajahmundry Parliamentary constituency** funded under the Member of Parliament Local Area Development scheme. The project is participatory and has no explicit software purchase costs, and hence can be replicated in most parliamentary constituencies on the path of e-governance.

With funding from the Tamil Nadu Forest Department's Research Wing a study on **Pollination and seed dispersal by animals in the dry deciduous forests of southern Eastern Ghats** was initiated. This two-year study aims to document reproductive phenology of arborescent flora and animal visitation, and to identify and suggest native plant species that can attract pollinators and seed dispersers, for afforestation in the degraded sites. The study on **Ecology of Indian Grey Hornbill (*Ocyrceros birostris*) with special reference to its role in seed dispersal in southern Eastern Ghats,**



initiated in 2006 was continued during 2007-08. The study on '**Plant-bird interactions with special reference to identification of bird-attracting plants for afforestation of Attappady valley, Kerala**' that was started in 2006 was completed in 2008. These studies generated valuable information relevant to afforestation programs.

The investigation of **Impact of agricultural pesticides on the population status and breeding success of select species of fish-eating birds in Tamil Nadu** initiated in 2006-was continued. Field surveys were conducted between March and September 2007 in 41 heronries in 14 districts and survey of pesticides were conducted. It was found that the organochlorine pesticide levels detected in the present study are not alarming.

A Rapid Environmental Impact Assessment of the India-Based Neutrino Observatory Project, Singara, Nilgiris, Tamil Nadu conducted during the last year observed that due to the need for technology development of the country, the proposed project assumes global importance. Nevertheless, the project construction and operation is likely to have notable impact in the area, especially on wildlife and it may be possible to lower the impact on the environment, with proper planning and implementing appropriate measures. A **Management Plan for the Eco-restoration of Pallikaranai Reserve Forest** was prepared for the Department of Environment and Forests, Government of Tamil Nadu, which takes into account protection, ecosystem restoration, transfer of land, research and monitoring and outreach/ nature education. Detailed financial allocation required for the eco-restoration of the area in 10 years time frame has been submitted which has been accepted for execution. An exploration of the **Status of Blewitt's Owl in Araku Valley** was undertaken during the year that aimed at developing an **Environmental Management Plan in View of the Proposed Bauxite Mines** if the species was found to be present in the area. However, the target species of study the Blewitt's Owlet *Heteroglaux blewitti* was not recorded in the proposed mining sites or from the whole study area during the study period spanning over one year, although the valley is rich in owl species; 11 species were encountered from the area, several of which were nesting. Even though Blewitt's Owlet was not encountered, a general EMP for the conservation of the valleys and slopes, which are rich in biodiversity has been proposed.

During the year SACON continued with its **Nature Education Programmes** intensively. Activities of Sálim Ali Nature Clubs in disseminating the love for nature,

conservation concerns, scientific temperament and curiosity to learn among the student members were continued. Thirty five nature camps were conducted in SACON campus for 1756 students from a wide variety of educational institutions. **Sálim Ali Trophy Nature Awareness Competitions, Young Bird watcher of the Year contest, Sálim Ali Birth Anniversary Celebrations, World Wetlands day Programme, and Training programme for monitoring wetland biodiversity** were other important activities undertaken during the year. Department of Biotechnology, Govt. of India has launched a programme called DNA clubs for making the students aware of the importance of our natural resources and to conserve the fast depleting resources. SACON is the local partner in the program. The main aim of this programme is to establish DBT's Natural Resources Awareness Club (DNA Club) in the schools to create awareness about natural resources among students in order to equip them with relevant skills for bioresources conservation. SACON also conducted **Brainstorming session on 'Planet Earth'** in commemoration of the Year of Planet Earth and for the development of an activity guide for the National Children's Science Congress 2008 and **Training Programme** on Instrumentation and Analytical Techniques.

SACON effectively contributes to human resource development in ecological studies and environmental conservation. During 2007-08 four of our research fellows were awarded Ph.D degree by the Bharathiar University. Of these Mr. Debanik Mukherjee, has been awarded "**Maniben Kirtilal Mehta Endowment - Gold Medal**" whose Ph.D. thesis was adjudicated as the best Ph.D thesis in Zoology submitted during the year 2007. Three Ph.D and 2 M.Phil theses were also submitted during the year. We also assisted several more students in undertaking their M.Sc projects under the guidance of the faculty here.

We have also continued publishing our research findings; 36 papers in peer reviewed journals, 38 papers in conferences / seminar / proceedings / edited volumes, 4 articles in newsletters, 2 edited volumes, 10 project reports, 4 popular articles and chapters in 5 edited books. SACON faculty delivered 14 invited lectures and participated in another 12 seminar/ conferences.

SACON was selected by M/s Residents Awareness Association of Coimbatore (RAAC), in association with the British Scholars Coimbatore Chapter, as 'Eco Friendly Office-2008'. Regarding infrastructure development, SACON's laboratory, computer systems, and library were strengthened considerably during the 2007-08.

RESEARCH HIGHLIGHTS

A. CONSERVATION ECOLOGY

1. Status and ecology of the Andaman Crake

| | |
|--|------------------------|
| Principal Investigator | : Lalitha Vijayan |
| Research Fellow | : N. Ezhilarasi |
| Duration | : 3 and half years |
| Start date | : February 2004 |
| Funding Agency | : MoEF, Govt. of India |
| Total sanctioned amount | : Rs. 8.19 lakhs |
| Funds available for the reporting period | : 1.92 lakhs |
| Status | : Completed |



and indirect methods, but mostly by direct observation of the birds.

Background

The Andaman Crake *Rallina canningi* is a data deficient bird endemic to the Andaman Islands. Except some occasional sighting records, no detailed information was available on the ecology and biology of this crake which are very vital for its conservation.

Objectives

1. Assess the status of the Andaman Crake and its distribution in the Andaman islands
2. Understand the ecology and biology of the Andaman Crake, and
3. Identify crucial areas for the conservation of this species and suggest probable measures for conservation and management.

Methods

Fieldwork was conducted from February 2004 to March 2007 in the Andaman Islands with two intensive study areas, namely Chidiyatapu (c 40ha) in South Andaman and Pathilevel (c 30ha) in North Andaman. Surveys were carried out throughout the Andaman Islands covering the main as well as outer islands using direct observation and calls, mainly playback. Feeding and breeding biology and other behavioural studies were conducted by direct

Results

- Most of the detection (65%) of the Andaman Crake was of pairs, occasionally solitary and rarely in family groups. In all, 521 individuals of the Andaman Crake were observed in 2196 points counted in the four main islands, namely Little Andaman, South Andaman, Middle Andaman and North Andaman and 37 outlying islands; the mean encounter rate was 0.24 bird/ point. Among the main islands, the mean encounter rate was 0.28 ± 0.10 bird / point and showed no positive correlation with the size of the island. Percentage sighting had positive correlation with the area covered (points). Habitat-wise analysis showed the maximum encounter rate in the semi-evergreen forests followed by moist deciduous, evergreen, and minimum in mangrove, which did not have any correlation with the area available or surveyed showing its preference for the semi-evergreen and evergreen forests. The survey results also showed a clumped distribution. No crake was recorded in littoral forest, plantation and cultivated areas.
- A total of 2714 observations was made on activity. During non-breeding season, it spent most of the time for foraging (69%) followed by calling (21%) and maintenance (7%),



whereas during breeding, calling was recorded more. They roosted in pairs on thin branches of small trees. The principal food items included earthworms, beetles, caterpillars, ants, termites and snails with variations among seasons. The frequency of food intake by the Crake corresponded well with the invertebrate abundance or availability showing the opportunistic nature of its feeding. The principal feeding techniques was pecking (91%) followed by flake method (7%). Foraging habitat of the Andaman Crake was forest area dominated by trees with undergrowth of different species and ground having fine soil with leaf litter of around 4cm above ground. The location of foraging area was characterized with tall trees, moderate canopy cover (55%), low ground cover (30.53%), moderate light intensity (44.61%) and high number of small trees (GBH < 20cm)

- We found 155 nests of the Andaman Crake among which only 22 had eggs. One pair made more than four nests and chose one nest for egg laying and others for roosting with chicks. The Andaman Crake nested during June - September. Nests were located in four different locations, most of them between the buttresses on ground (86.6%). Nest - site variables showed four factors as significant, namely the number of big trees around the nest, distance from water, canopy cover and concealment. The Crake showed a higher preference for deciduous species which have large buttresses for nesting. Breeding biology was studied; both parents took part in incubation and rearing chicks; nesting success was only 22% in 32% of nests. The fledgling success could not be studied. Failure of nests were because of predation followed by abandoning and damage, the later two partly because of human disturbance.

Discussion/ Recommendations

- Andaman Crake is a habitat specialist of moist forests with clumped distribution. Habitat destruction, hunting and introduced

predators are the major threats. It was extremely difficult to estimate the population because of low visibility and difficulty in estimating the distance of calls in the different types of forests. Taking into consideration of the IUCN criteria, such as the restricted range of distribution and a fragmented population with declining locations, area of occurrence estimated to be <5000km² (around 4000 km²), area of occupancy of around 700 km², this species needs to be considered as Vulnerable under threatened category.

- Population of this species is low, naturally fragmented with low nesting success and lost from many localities. Considering all these factors, management regimes should ensure that adequate protection is given to this species, especially during the breeding season, and full protection of the crucial areas from any kind of human and related disturbances. Major localities of occurrence and abundance of this species are reported and the localities without full protection may be declared as Sanctuaries or Conservation Areas delineating the boundaries depending on the status of the land and feasibility.

2. Mumbai trans-harbour sea link project: Study of Flamingos and migratory birds

| | |
|----------------------------|--|
| Principal Investigator | : Lalitha Vijayan, |
| Co-Principal Investigators | : S.N. Prasad, S Muralidharan |
| Research Associate | : S. Somasundaram |
| Research Fellows | : A. P. Zaibin R. Jayakumar Dhananjayan V |
| Duration | : 28 Months |
| Start Date | : August 2006 |
| Funding Agency | : Maharashtra State Road Development Corporation, (Consultancy), Mumbai. |

Background

The Mumbai Trans Harbour Link (MTHL) alignment of 22 Km proposed by the Mumbai State Road Development Corporation (MSRDC) mainly passes over the sea (Thane Creek) and a stretch of about 5 km over the land at Sewri and Nhava ends including the mudflats area for a length of 1.5 km at Sewri and 0.6 km at Nhava. This area is a major concern for the environmentalists as the Sewri-Mahul mudflats have been identified as an Important Bird Area (IBA) by the Indian Bird Conservation Network. This area harbours a large population of birds including small waders and 12-15% of the entire south Asian population of the Lesser Flamingo (*Pheonicopterus minor*), a near threatened species. Hence, a study has been commissioned by MSRDC.

Objectives

- Study the population of birds with emphasis on the Flamingos and their behaviour
- Assess the quality of the habitat and
- Suggest necessary steps for the protection of the birds and the area.

Methods

The present study encompasses three major components, namely i) Bird studies, ii) Habitat evaluation including mapping (classification and quantification) using modern spatial technology tools such as Remote sensing and GIS and iii) Water quality and levels of contaminants.

At least two counts of flamingos and other birds were done in each month. The abundance estimates were arrived at by direct and photographic enumeration of flamingos. Activities of the flamingos were recorded by scan sampling. Water and soil samples were analyzed from Flamingo feeding and non-feeding areas using portable water analysis kit. Contamination levels in water, sediment and fishes were studied following standard methods using Atomic Absorption Spectrophotometer (AAS) for heavy metals, GC-ECD for Organochlorine pesticides and Polychlorinated

biphenyls (PCB), and HPLC for Polycyclic aromatic hydrocarbons (PAH).

Results

A total of 56 species of birds have been recorded in Sewri-Mahul region and their population ranged from 20988 to 23,347. In Nhava only 27 bird species were recorded. The flamingos reached the mudflats only in late November 2007, and left the area in July 2008. For habitat evaluation the satellite data of 5.8 m resolution was used, which gave only broad land use classes. The data generated was not found adequate for a scientifically sound assessment and hence, the project was given extension up to August 2008.

The first record of flamingos for this season at Sewri was at the end October 2007 which comprised fifty individuals. The population started increasing and by January 2008 there were about 5000 individuals, and the population further grew to about 14000 individuals by the end of March 2008. The majority were adults (80.8- 85.5%), the activity budgets of the Lesser flamingo were deduced from 1059 individuals from 224 scan samples. The birds spent 58.7 - 62 % of total time feeding. An analysis of water quality revealed that turbidity was highly variable, followed by salinity and conductivity. pH varied the least across the sites. The flamingos occupied most of the areas in Sewri - Mahul region.

To examine the contamination of the area, two sets of seasonal samples (sediment, water and fish) were collected from three coastal regions (Sewri, Mahul and Nhava) along harbour line, Mumbai. All the samples were processed and analyzed for Polychlorinated Biphenyls, Organochlorine pesticides, Polycyclic Aromatic Hydrocarbons, physicochemical parameters and heavy metals. Most physicochemical parameters examined were close to, or higher, than the guideline values. The pH and temperature of the water samples were within the limits prescribed by EPA (1986). However, dissolved oxygen levels were less, possibly due to the greater input of industrial and domestic wastes. Mahul recorded very high turbidity, COD, TOC



concentration of total PCBs was less than the levels recommended by the National Academy of Sciences and National Academy of Engineering for (the protection of aquatic biota (500-1000 ppb NAS-NAE 1972). The PAHs concentration also exceeded the sediment guideline values suggested by above referred. The overall concentration of organochlorine pesticides PCBs and PAHs in Sewri samples were comparably higher and this may have some impact on resident organisms over a period of time.

compared to other locations, which could be plausibly due to high suspended particles and organic materials present in the domestic and industrial effluents. Fishes collected from Nhava had the highest levels of Cu, while fishes from Sewri had the highest Fe. Nhava and Sewri had near equal levels of Cadmium. Organochlorine pesticides and PCBs detected in sediments in the present study were compared with the existing sediment quality criteria suggested by various statutory agencies. Among the study areas, PCBs concentration recorded in the sediment samples of Sewri was almost equal to the sediment quality guidelines (total PCB 277ppb) above which adverse effects on aquatic biota are expected to occur. The total PCB concentration in water samples was below the water quality criteria (WQC) and equal to the Ecotoxicological Assessment Criteria 1.0- 10 ppb (OSPAR commission, 2000). Further the

Discussion / Recommendations

The interim recommendations given were mainly for taking necessary action for reducing the levels of PAHs (from petrochemicals) in the area; shifting the ship repair activities from Sewri; construction of the bridge to be done in the flamingo area when the birds are absent or in fewer numbers.



3. Inventory of the biodiversity of Attappady with GIS Aid

| | |
|--|---|
| Principal Investigator | : Lalitha Vijayan |
| Co-Investigators | : S N Prasad & P.Radhakrishnan (AHADS) |
| Senior Research Fellow | : S. Somasundaram |
| Duration | : 29 Months |
| Start date | : July 2006 |
| Funding Agency | : Attappady Hill Area Development Society (AHADS) |
| Total sanction amount | : Rs. 3 Lakhs |
| Funds available for the reporting period | : Rs. 0.73 Lakhs |
| Status | : Ongoing |

Background

Attappady lies in the foothills of the Nilgiris adjacent to the world famous Silent Valley National Park in the Mannar ghat forest division in Kerala. The area has been largely clear-felled and has settlements and cultivation on the hills that are terraced. The settlements are mainly of Kurumba, Muduga and Irula tribes, who are largely socioeconomically deprived. This region is also classified as a restoration zone in the Nilgiri Biosphere Reserve and needs habitat improvement. The AHADS has been working in this region for improvement and restoration of the habitats and also the upliftment of the living conditions of the tribes. It is essential that baseline information on various aspects is available on any area of interest and is documented using GIS, so that areas can be identified and used for conservation and sustainable development.

Objectives

- Inventory of the major components of the biodiversity of the area, especially



butterflies and birds which can be used for monitoring changes in the area

- Documentation of the biodiversity for immediate use in deciding strategies for management and development of the area

Methods

Stratified random sampling method has been followed for data collection.

- Birds & Butterflies: General surveys and variable width line transect were used for sampling.
- GIS application: Base map of the area will be used with habitat classes. Data collected on various taxa will be overlaid on to the map and analyzed using GIS tools.

Results

- A total of 143 species of birds including 10 Western Ghats endemics (out of 16) and 76 species of butterflies including 8 endemics to south India were recorded. The data have to be overlaid on to the map to understand areas of species richness.
- The satellite maps were to be provided by AHADS for further analyses with GIS layers. As this was not provided till March, these analyses were not done. The project is extended for 6 months during which the report will be prepared and submitted.





4. Ecology and conservation of the spot-billed Pelican in Andhra Pradesh

| | |
|--|--------------------------------|
| Principal Investigator | : N. Sheeba |
| Research guide | : Lalitha Vijayan |
| Co-guide | : S. N. Prasad |
| Duration | : Five years |
| Start date | : August 2006 |
| Funding Agency | : University Grants Commission |
| Total sanctioned Amount | : Rs. 10.2 lakhs |
| Funds available for the reporting period | : 1.5 lakhs |
| Status | : Ongoing |

Background

The Spot-billed Pelican (*Pelecanus philippensis*) is one of the globally threatened species, resident in freshwater wetlands of the Indian Subcontinent. In India, it breeds in Andhra Pradesh, Assam, Karnataka, and Tamil Nadu. This bird is subject to local migration for food and for breeding sites. Recent studies showed drastic decline of its population. No breeding was reported in 1999-2000. But, in the case of Uppalapadu (16° 16' 26" N, 8° 0' 21' 58" E) the breeding population has been increasing since 1999. Specific site preference of this species for breeding makes it more vulnerable. It is urgent that a systematic study of this species on the population, ecology, and impact of common resident bird population is conducted.

Objectives

- Assess the current status and regional population of this species and ecological value of Uppalapadu wetland, a progressing haven for the Spot-billed Pelican
- Study its habitat selection, social organization and association with other species.
- Understand its foraging and breeding ecology.
- Examine potential threats to the population of this species and suggest conservation measures.



Methods

The fieldwork was started in the end of February 2007, the later part of the breeding season of the species, at Uppalapadu and nearby areas including a private fishing tank called "Ecdoure seruvu". A survey was conducted partly by vehicle in Kolleru which is a very large and important wetland and the population estimated by counting the birds using the bunds as transects. Major activities were recorded using scan and focal animal sampling.

Results

The Uppalapadu village tank (2.24 ha) recorded over 55 species of water birds. Population of the Spot-billed Pelican ranged from 80-100 in September 2007, to about 400 in October 2007, and over 1500 birds in February 2008. The main activity of the Pelican was feeding. While several birds fed in the tank, the majority fed elsewhere. The main food of the Pelican was fishes and very rarely mollusks. The birds fed mostly in flocks. Some times, they foraged along with the Painted Storks and Cormorants. The islands in the tank are used by birds to rest.

About 560 nests were observed in January 2008 at Uppalapadu. Towards March the number declined and in the 3rd week all left the tank as the water receded due to draining of the pond to plant nest trees.

A newly established breeding colony of the Spot-billed Pelican and Painted Stork was found at Ramachadhrapalayam (16° 17' 11.2" N, 80° 29' 44.2"E) about two km from Uppalapadu.

5. Identification and mapping of Lesser Florican breeding sites to develop a fodder producing grassland network in western India

| | |
|--|--|
| Principal Investigator | : R Sankaran |
| Research Fellow | : Shirish Manchi (August 2007 - January 2008) |
| Duration of the Project | : 3 years |
| Start date | : July 2003 |
| Funding Agency | : Ministry of Environment and Forests |
| Total outlay of the project | : Rs. 7.86 Lakhs |
| Funds available for the reporting period | : Rs. 4.5 Lakhs |
| Status | : Completed |

Background

Once common and wide spread, hunting pressures and loss of habitat has resulted in the Lesser Florican *Syphoetides indica*, being critically endangered today. The Lesser Florican breeds during the south-west monsoon, in Western India in grasslands where the grass is allowed to grow long. Such grassland sites, known as *beed*, *vidi*, *rakhhal* or *jod*, are owned by individuals, collectively or singly, and by the Government. The grass *beed* has traditionally been protected from livestock grazing during the monsoon and the grass is harvested, baled, stored and used during the summer or during droughts. These protected grasslands are therefore crucial to the well being of agrarian and pastoral economies. Less than 7000 km² of grass *beed* is now left (less than 2000 km² of which is suitable to the Lesser Florican) and is seriously threatened by conversion into agriculture or degradation into grazing lands.

While surveys in the past have identified many of these grassland sites there was a need to map these areas so as to better manage them. Maps of these grasslands can also form the basis on which legislation can be enacted that prevents the conversion of valuable fodder producing grasslands to other uses.

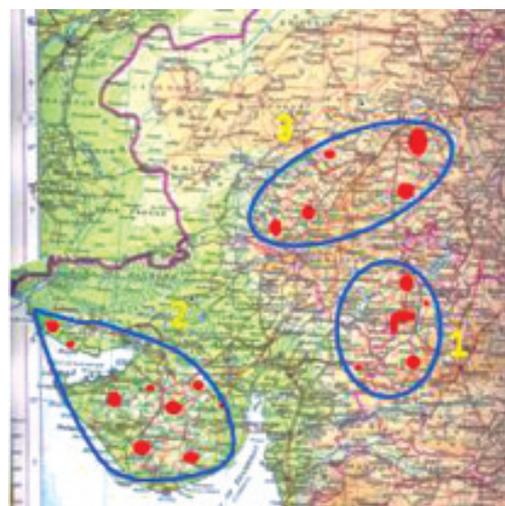
Objectives

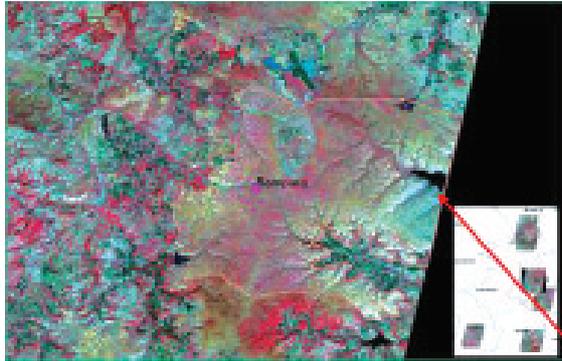
- Identifying new grassland sites where significant populations of the Lesser Florican breed, so as to develop a comprehensive conservation area network for this species and other grassland dependent species.
- Defining the boundaries of grassland clusters where the Lesser Florican breeds to develop pragmatic and well-defined sites for this species and other grassland dependent species.
- Advocate the management and restoration of grasslands for people and the Lesser Florican.

Results

The final report of the project has been submitted. The report collates data collected on the Lesser Florican in Western India between 1985 and 2007, gives a detailed account of the issues facing this critically endangered species, and prescribes management and conservation measures that will lead to the increase in fodder production in western India. The report also maps the grasslands in which the species currently breeds.

- The Lesser Florican breeds in three distinct clusters of grasslands in Western India. These clusters are (1) the Malwa Plateau, (2) Saurashtra and Kachch, and (3) Central Rajasthan. The most consistent breeding





takes place within the Malwa Plateau. Breeding is less consistent in Suarashtra and the least consistent in Kachch and central Rajasthan since these areas are more drought prone and inter year variability in the monsoon is high.

- In the Malwa Plateau, there are four distinct sub-clusters of grasslands in which the floricans breed: (1) Panchmahal District, Gujarat; (2) Jhabua and Dhar Districts, Madhya Pradesh; (3) Ratlam District, Madhya Pradesh; (4) Pratapgadh Tehsil, Chittaudgadh, Rajasthan. In Central Rajasthan, the Lesser Florican breeds both east and west of the Aravallis, and there are three sub-clusters: (1) in Ajmer district, the Lesser Florican breeds in the grasslands and croplands mosaics; (2) Around Shahpura, in Bhilwara district. (3) In Palli District, very few florican are found scattered in mosaics of grassland and cropland. The Lesser Florican breeds in a number of places in Suarashtra and Kachch, and four distinct sub-clusters are evident; (1) Velavadar National Park, Bhall, Bhavnagar, (2) Junagadh District; (3) Rajkot and Jamnagar districts, and (4) the Nalliya / Vengaber / Konathia / Bachunda don in Abdasa taluka in Kachchh where over 100 displaying males have been recorded.

Discussion

There has been little change in either quality or extent of Government owned grasslands between 1989 and 2007. The situation with privately owned grasslands is however alarming. In the Malwa Plateau, it is probable that between 50 and 70% of private grasslands have

been converted to agriculture or leased to grazing between 1989 and 2007. This of serious concern sine: a) the Malwa Plateau is the most important part of the breeding range of the Lesser Florican, and b) the majority of the florican's grassland breeding habitat in the Malwa plateau are privately owned. In Rajasthan, apart from the loss of privately owned grasslands, whose extent appears to be similar to that of the Malwa Plateau, the Government owned grasslands have been considerably degraded due to infestations of the weed *Prosopis juliflora*. There has been loss of privately owned grasslands in Gujarat, but the Government owned reserved *vidis* continue to be in very good health.

6. In-situ & Ex-situ conservation of the Edible-nest Swiftlet *Collocalia fuciphaga* in the Andaman & Nicobar Islands

| | |
|------------------------|---|
| Principal Investigator | : R Sankaran |
| Research Fellow | : Shirish Manchi |
| Duration | : Long term |
| Start Date | : December 1999 |
| Funding Agency | : Ministry of Environment and Forests & Dept. of Environment and Forests, Andaman & Nicobar Islands |

Total sanctioned amount : 10 Lakhs

Funds available for the reporting period : Nil

Status : Ongoing

Collaboration with : Dept. of Environment and Forests, Andaman & Nicobar Islands



Background

The nests of the Edible-nest Swiftlet *Collocalia fuciphaga* are a valued item in Chinese cuisine and pharmacy, and the international demands on the nests of this species are very high. As a result of which, populations of swiftlets have declined in numbers across their range. In the A & N Is, due to excessive and unsustainable nest collection pressures, populations of the Edible-nest Swiftlet have undergone serious reduction in numbers, and if conservation measures are not implemented immediately, the species is likely to become extinct in most islands in a few years. Based on an intensive survey of the Edible-nest Swiftlet in by SACON, between 1995 and 1997, two conservation measures, both in-situ and ex-situ were proposed.



Objective

Develop protection systems at Edible-nest Swiftlet nesting caves where sustainable nest harvesting regimes will be initiated and developing the farming of the species in houses.

Methods

The in-situ conservation measures gives round the clock protection to some caves in the Andaman Islands, during the nesting season of the Edible-nest Swiftlet. A cave at Interview Island has been protected since December 1999, and a complex of over 28 caves at Pathi



Level, North Andaman has been protected since January 2001. The ex-situ conservation measures proposed includes providing special houses in which the Edible-nest Swiftlet will breed, thereby significantly building up populations in these islands, and providing an alternate source of livelihood for nest collectors, farmers, and poorer sections of the community as well as forming an important source of revenue for the islands.

Results

- The population, at the cave on Interview Island which was declining at the rate of about 30% per annum, had stabilized by 2006, and counts in 2008 indicate that there was has been growth. At Chalis Ek, preliminary counts indicate that the population continues to grow, and the colony has now doubled as a result of protection during the first year.
- At the pilot programme 'house' at Tugapur, where eggs of the Edible-nest Swiftlet have been transferred into nests of the Whitebellied Swiftlet, breed were selected and experimental transfer of Edible-nest Swiftlet eggs were undertaken.

First egg laid by Edible-nest Swiftlet under ex-situ conditions.



7. Strengthening community conservation efforts in Nagaland. A programme to impart technical support on biodiversity conservation and livelihood options to communities. Phase I: Phek, Tuensang, Kiphire, Longleng and Mon Districts

A collaborative programme between the Nagaland Empowerment of People through Economic Development (NEPED), Kohima and SACON.

| | |
|--|--|
| Programme coordinator | : Vengota Nakro, Project Administrator, Projects Operations Unit, NEPED |
| Associate coordinator | : R Sankaran |
| Research Associates | : Amay Angami, Bikramjit Sinha (Till March 2008) |
| Resource persons | : Shubham Datta, A P Zaibin, Navonil Das, Joya Thapa, Aparajita Datta, Pranjit Sarma |
| Duration of the Project | : 3 years |
| Start date | : April 2007 |
| Funding Agency | : Sir Dorabji Tata Trust, Mumbai |
| Total outlay of the project | : Rs 287.13 Lakhs |
| Funds available for the reporting period | : Rs. 43.62 Lakhs |
| Status | : Ongoing |

Background

The Eastern Himalayas in Northeastern India, is the western extremity of the Indo-Burma hotspot and is a distinct biological entity. It accounts for just 8% of India’s geographical area, but contains more than one-third of the country’s total biodiversity. With over 285 groups and subgroups of people, both tribes as well as latter day immigrants, Northeastern India is amongst the most heterogeneous regions in India. Culturally distinct, geographically unique, and biologically immensely wealthy, the hills and mountains of northeastern India is universally recognized as a region that requires urgent conservation action. There are three major factors that directly affect biodiversity in the region:



- Jhum or slash and burn cultivation is the prevalent agricultural practice. While Jhum has significant values for a wide variety of cultivars as well as species of fauna and flora that occur at the various stages of succession within the cycle, the values inherent to primary forests are, however, severely compromised by Jhum, which also does not allow secondary forests to evolve into primary forests.
- Hunting for food, pleasure and commerce is widespread and excessive, directly depleting populations of animals, and has already resulted in rarity and localized extinction.
- Timber extraction has been excessive and unregulated and has resulted in the deterioration of many forested stands.



While factors such as deforestation, fragmentation, consumption and trade of wild flora and fauna and the introduction of exotics that threaten species and ecosystem diversity are akin to those operating elsewhere, Northeastern India has distinct conservation issues. Unlike the rest of India, where the majority of natural habitats are owned and managed by the state, in this region, between 30% (Assam) and 93% (Nagaland) of forests are owned by individuals, clans, village councils, district councils and other traditional community

institutions. In the absence of alternate livelihood options, most economic activity in the area is natural resource use based. Most forests under the control of traditional institutions are over-exploited, exacerbated by the weakening influence of these institutions over the land and people. As a result, barring a few, these forests are now severely degraded, and several of the floral and faunal species that they host are threatened.

The classical response to threat to species and habitats, that of legally established Protected Areas where anthropogenic exploitation are prohibited or restricted, is therefore of little conservation value, as much of these forests are not owned by the state and will continue to be extensively used by local communities. Conservation actions in much of north eastern India will have to be based upon self imposed or community prescribed limitations on resource use.

Objective

To develop mechanisms by which the community conservation efforts in Nagaland, wherein many communities have set aside areas within their village lands with restrictions on hunting, fishing, and tree felling by way of resolutions passed by the Village Councils, are strengthened and expanded and lead to livelihood benefits.

Methods

The approach is that of training a core group of individuals from different tribes who will facilitate a resource group with expertise in biodiversity conservation and livelihood options in:



- The development of biodiversity registers for community areas,
- Identifying technical, developmental and financial requirements of community conservation areas,
- Providing necessary technical support and linkages to developmental and financial support,



- Advocating the establishment of conservation areas where such efforts are currently lacking. Legitimacy for such conservation areas will be given by the Village Councils, through their traditional processes, which is the effective method for implementing any programme in Nagaland,
- Using the Blyth's Tragopan which is the state bird of Nagaland as a flagship species in enhancing conservation reach.





Results

- The programme commenced in April, 2008.
- Recruitment of personnel (2 Research Associates, and 30 Facilitators of Community Conservation, FCCs) and purchase of equipment took until July / August.
- A workshop of resource persons (WCS, NCF, Aranyak, ATREE, SACON and NEPED) to develop data sheets, followed by three training workshops in September for the FCCs where resource persons from various institutions (NCF, Aranyak, SACON and NEPED) introduced the FCCs to biodiversity conservation and in the methodology to be used.
- Field work started in October 2007, with a pause for about a month in February 2008, due to elections.
- In the first year data collected included (1) preliminary survey to locate forest patches and introduce programme to villages, (2) GPS readings of forest patches, and (3) free listing of plants and animals known to the communities.

Preliminary assessment of Community Conservation Areas in eastern Nagaland

| District | No of villages (Surveyed) | No of Community Conserved Areas | | Forest Type | |
|--------------|------------------------------|---------------------------------|------------------------|-------------|-----------|
| | | By resolution | Informal understanding | Primary | Secondary |
| Phek | 55 | 47 | 7 | 24 | 30 |
| Kiphre | 49 | 30 | 17 | 41 | 6 |
| Tuensang | 90 | 21 | 47 | 52 | 16 |
| Mon | 75 | 11 | (484) | 7 | 2 |
| Total | 269 | 109 | 64 | 125 | 54 |

Note : This is a tentative listing based on data collected as of March 2008, and is not definitive.



8. Ecology of the Endangered Indian Rock Python (*Python molurus*) in Keoladeo National Park, Bharatpur, Rajasthan, India

Principal Investigator : S. Bhupathy
 Research Fellow : C. Ramesh
 Duration : Three years
 Start date : August 2007
 Funding Agency : Ministry of Environment and Forests (Wildlife Division)
 Total sanctioned amount : Rs. 11.06 Lakhs
 Funds available for the reporting period : Rs. 4.41 Lakhs
 Status : Ongoing

Background

The Indian Rock Python (*Python molurus*) is one of the largest non-venomous snakes of the world. It is distributed throughout most of the Indian subcontinent, its range extending from Sind and Punjab in Pakistan to Bengal in India to the North, and southward throughout the entire Indian peninsula and Sri Lanka. It occupies a wide range of habitats from dry and rocky scrub to moist forests. The non-availability of information makes species management and conservation decisions difficult. The Indian python has been listed in Schedule I of the Indian Wildlife Protection Act 1972, and it is listed under CITES subsequent to severe habitat loss and abuse by the skin, pet, and meat trade. Ecological information on this species is scanty. Hence, the present study was initiated with the following objectives.

Objectives

- i. Study the population trend in python in KNP comparing results from earlier studies,
- ii. Gather data on aspects of ecology of Indian python such as population, basking, burrow fidelity and ranging, cohabiting species in the burrow and food habits,
- iii. Assess the impact of tourists on the basking and movement patterns of pythons, and
- iv. Propose conservation plan for Indian Pythons found in the drier zones, particularly in Keoladeo National Park, Bharatpur, Rajasthan.

Methods

The distribution of python burrows in KNP was mapped subsequent to a survey on foot covering the entire area of the park, during which the GPS locations (latitude and longitude) of the burrows were recorded. Ground burrows with python signs (tracks, sloughs, snakes) were considered python burrows.

In KNP, pythons thermoregulate during the winter by basking diurnally, and this behaviour has been effective in estimating python population in the past. This method involves repeated visits to python burrows, and is being followed in this study. The number of snakes observed at each burrow during each survey is recorded. The maximum number of sightings of pythons at a given burrow during various surveys is considered as the number of snakes dwelling there. The sum of this figure from all burrows account for the population. The size of the individual snakes was estimated visually on having a full view of the pythons. The length data of snakes have been categorized in to various size classes for analyses. Locations (latitude and longitude) are marked on a Global Position System (GPS) on the sightings and re-sightings of individually identified pythons (using natural markings). The re-sightings of these individually identified snakes would provide fair amount of information on the ranging, movement and activity pattern.

Tracks and signs of (co-habiting) animals visiting the python burrows were identified and quantified. Camera traps will be used in the

forthcoming season to identify species cohabiting with pythons in the burrows and their interactions, if any, in select burrows. The behaviour of basking of pythons at four burrows each, of those often visited by tourists and those found in remote undisturbed burrows are being monitored each month from morning till evening to estimate basking duration of the snakes, especially during the tourist season (November 2007– February 2008). Scat samples are being collected to determine and quantify the food of python. Mammalian prey species will be identified using micro-histology technique.

Results

• Population Assessment

A preliminary assessment of the population of Pythons and their burrow has been completed (October 2007 to March 2008). About 60 pythons inhabiting 29 ground burrows have been observed during this year, and this excludes temporary burrows in aquatic areas. Python burrows were marked on a map (Fig. 1) and submitted to the Forest Department. The number of burrows used during 1986-87 and 1999-2000 was 38 and 22 respectively, and this has increased (Table 1). The number of python appears to have declined from about 110-120 (during 1986-87 to 1999-2000) to about 60 snakes at present. As *Prosopis* eradication programme was in progress in the park, including in the python habitat, the presence of the large number of labourers would have forced the pythons to retreat into the burrows resulting in an underestimation of



its number. The *Prosopis* eradication programme should be completed by May 2008. The assessment of pythons in the 2008-2009 would provide us with a better picture on the population of pythons in KNP. Two pythons were found dead during the period under report.

• **Basking Pattern**

Some data on the basking behaviour of pythons have been collected. From the limited data set (10 days each in disturbed and undisturbed python burrows), it is found that average the basking duration of snakes

in the undisturbed area ranges from 5 to 6 hours/ day, which is only 1-2 hours/ day in snakes inhabiting areas visited/disturbed by tourists. As python is a poikilotherm, regular basking is required for proper reproduction out put to maintain a sustainable population. Large data set is required in this regard to propose visitor management strategy. It is to be noted that large number of tourists visit Keoladeo National Park and over 75% of them are interested to observe/see pythons in the wild. It is hoped that field work during 2008-2009 (winter) would generate required data in this regard.

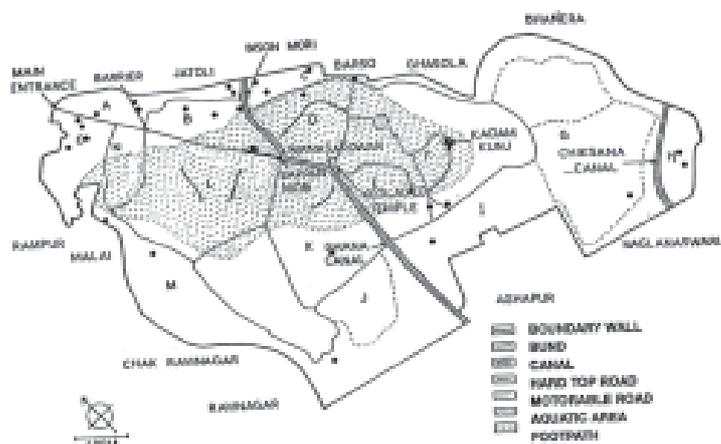


Fig. 1 Distribution of Python burrows (marked as large black dots) in Keoladeo National Park in 2007-2008.

Table I. : Comparative account of Python burrows and snake population in Keoladeo National Park during 1986-87, 1999-2000 and 2007-08 based on sum of maximum number of pythons seen in each burrow in a block.

| Block | 1986-87 | | 1999-2000 | | 2007-2008 | |
|--------------|---------------------|------------------------|---------------------|-----------------------|---------------------|-----------------------|
| | # of python burrows | # of python # recorded | # of python burrows | # of pythons recorded | # of python burrows | # of pythons recorded |
| A | 5 | 11 | 5 | 7 | 3 | 4 |
| B | 5 | 15 | 1 | 2 | 7 | 10 |
| C | 2 | 13 | 1 | 15 | 4 | 7 |
| F | 4 | 20 | 2 | 14 | 2 | 6 |
| G | 1 | 3 | 0 | 0 | 1 | 1 |
| H | 3 | 2 | 2 | 7 | 2 | 3 |
| I | 5 | 15 | 3 | 34 | 1 | 2 |
| K | 3 | 14 | 1 | 3 | 1 | 1 |
| M | 3 | 6 | 3 | 16 | 3 | 10 |
| N | 1 | 0 | 1 | 0 | 1 | 1 |
| O | 6 | 6 | 3 | 13 | 4 | 7 |
| Aquatic area | 5 | 6 | 3 | 8 | 3 | 7 |
| Total | 43 | 111 | 25 | 119 | 32 | 59 |

- **Python Size Structure**

Size Structure of pythons in Keoladeo National Park shows that about 34% (n=50) of the snakes were 8 to 10 ft long. No juveniles or hatchlings were observed during this study which indicates poor / absence of breeding during last season (May-August 2007). Pythons over 13 feet were also not observed during this year (2007-2008).

- **Ranging Pattern**

Observations to study burrow fidelity and ranging pattern of pythons have been initiated during this year. Of the 60 snakes observed during 2007-08, 38 have been identified individually based on blotch pattern (photo documentation of which done) and their GPS points have been recorded. During winter, most of the snakes did not move away from burrows and were highly parochial to the burrows till March. With limited data of re-sightings of identified pythons (n=3), the average distance moved from original sightings is about 400m in a straight line. The observations on the movement of individually identified snakes are being monitored and accurate data on the ranging pattern, distance travelled and home range will be available next year.

- **Cohabiting Species**

The surveys of cohabiting species with pythons in the burrows show that out of

29 burrows found on land, Indian porcupines (*Hystrix indica*) were present in 25. This indicates the importance of Porcupine for the survival of pythons in KNP, as this park does not have larger trees with hollow, rock burrows or crevices for pythons to inhabit. However, three pythons had porcupine quills embedded externally indicating interactions between these species. Other animals such as Jackal (*Canis aureus*), and Monitor lizard (*Varanus bengalensis*) were found in three burrows each. The number of python burrows in which bats (*Hipposiderous fulvus*) cohabits with pythons needs to be investigated. Observations in two burrows during dusk (1900-2100 hrs) showed that 3-5 porcupines and 300-350 bats dwell in the same burrow along with pythons. Further surveys during dusk is planned to generate data on the populations of bat and porcupines.

- **Food Habits**

Only three faecal samples of pythons were collected during this year and all of them had mammalian remains (hair, hoof). The prey species in the sample has to be analysed using micro-histology technique.

Recommendations/ Discussions

Only one year has been spent in the field and the study is in progress. Recommendations will be provided in the next report.





9. A study on the Herpetofaunal communities of the Upper Vaigai Plateau, Western Ghats, India

| | |
|--|--|
| Principal Investigator | : S. Bhupathy, |
| Research Fellows | : G. Srinivas, A. Madhivanan (up to May 2007) and N. Sathishkumar (From June 2007) |
| Duration | : Three years |
| Start date | : February 2006 |
| Funding Agency | : Ministry of Environment and Forests (Eastern & Western Ghats Programme) |
| Total sanctioned amount | : Rs. 10.37 Lakhs |
| Funds available for the reporting period | : Rs. 2.24 Lakhs |
| Status | : Ongoing |

Background

Forestry practices of the last few centuries resulted in the habitat loss and forest fragmentation in the Western Ghats through conversion of the natural habitats into monoculture plantations and reservoirs. Though reptiles and amphibians occur with higher diversity and endemism in this region, most of them are threatened due to their anomalous distribution pattern. Community structure and distribution patterns of Herpetofauna of the region are poorly known due to the lack of systematic studies and inadequacy in the data. Hence, the present study is being conducted.



Objectives

This study on the herpetofaunal communities have the following objectives:

- Determine the distribution patterns of herpetological communities in various natural and man-made forests, and altitudinal gradients,
- Assess the conservation value for plantations such as tea, coffee and cardamom with respect to the endemic herpetofauna, and
- To propose strategies to conserve rare and little known fauna such as reptiles and amphibians.

Methods

Considering the nature of the terrain, various forest types and accessibility, it was decided to use transect with stratified random plots for sampling at 200m altitude intervals. Transects were selected considering at the availability of



various forest types at broader level (Tropical thorn forest, Tropical Dry deciduous, etc.). Area availability in each altitudinal category was considered to decide on the intensity of sampling (i.e. proportion of sampling depends on the area availability at a particular altitude). In the stratified random plots various time and area constrained sampling protocol are being used. It is hoped that this procedure would minimize the bias with respect to sampling in a particular altitude and forest types. The estimated area availability for sampling in various altitudinal categories is given in Table I. Lower altitudes (400- 800 m) have as much as 40% with respect to geographical extent, and high altitude (>1600 m) has minimal area. The above three transects totaling 21.17 km (1 km width) were seasonally sampled (December-May: Dry season; June-November: Wet Season). On each transect during each seasonal sampling 100 hours (X3 men) i.e. 300 man hours of Visual encounter survey and 100 quadrats (10X10m) i.e. 1 ha was sampled. Data presented herein include one sampling each for Wet and Dry season: 1800 man hours of survey and 6 hectares of quadrat sampling. Description on the microhabitats was recorded on sighting a reptile or amphibian, and the same was clumped into broader categories to know the pattern of use. Similarly, vertical position (from ground) of animals when first sighted was noted, and later clumped into various vertical strata.

Results

• Herpetofauna Diversity

Including opportunistic observations a total of 33 species of amphibians and 68 species of reptiles were observed between April 2007 and March 2008. This is about one fourth and one third of the amphibian and reptile fauna reported from the entire Western Ghats. Amphibians had relatively higher number of endemic species compared to reptiles. Visual encounter survey yielded higher number of species and individuals of herpetofauna compared to quadrat sampling.

• Herpetofauna Abundance

Data generated using standard sampling protocol (Quadrat, VES) was used for

analyzing community structure, microhabitat and vertical strata use by herpetofauna. This includes 1800 man hours of VES and 6 hectares of quadrat sampling. Density of 34.7 amphibians/ ha and 1.01 amphibians/ man hour effort was found. Similarly, density of 34.8 reptiles/ ha and 1.03 reptiles/ man hour was sighted during this period.

• Herpetofauna Community

Four Amphibian Families were observed during this study. The amphibian community of the area was dominated by the Family Ranidae in number (14/25) of species and individuals (1550/2030). Microhylids contributed minimum number of species (1/25) and individuals (11/2030). Among species, *Rana temporalis* contributed the maximum (447/ 2030, 22%) and minimum (1/2030, 0.05%) by three amphibians (*Rana curtipes* and 2 species of *Philautus*) to the community. Twelve reptile families (1 turtle, 6 lizards, and 5 snakes) were observed using standard sampling protocol. On the whole, members of Colubrid snakes dominated the reptile community by number of species (15/48 species) and Scincids by number (1013/2063). Among snakes, Colubrids contributed highest number of species and individuals. With respect to lizards, highest number of species was contributed by the Family Gekkonidae and number by Scincidae.

• Microhabitat Use

Only 18% of the amphibians observed were found in water and the remaining on land. Eleven microhabitats were used by the amphibians in Vaigai catchments, among





them, Grass, Ground (open) and litter were highly used. Higher number of microhabitats was used by reptiles compared to amphibians. Area with litter and rock substratum was highly used by reptiles.

About 96% of the amphibians used ground layer, indicating largely terrestrial community. Reptiles were versatile in vertical strata use compared to amphibians. Only about 70% of them were found on ground.

Table 1.

Estimated area availability at various altitudinal categories based on three transects in the catchment area of Vaigai River, Western Ghats, Theni Forest Division.

| Altitudinal category | Altitude range (m) | Transect-I | Transect - II | Transect-III | Total length (km) | Area Availability-% |
|----------------------|--------------------|------------|---------------|--------------|-------------------|---------------------|
| 1 | 400 – 600 | 3 | 1.34 | 0 | 4.34 | 20.5 |
| 2 | 600 – 800 | 1.11 | 1.95 | 1.47 | 4.53 | 21.4 |
| 3 | 800 – 1000 | 1.31 | 0.52 | 1.53 | 3.36 | 15.9 |
| 4 | 1000 – 1200 | 0.98 | 0.83 | 0.68 | 2.49 | 11.8 |
| 5 | 1200 – 1400 | 1.04 | 1.84 | 0.98 | 3.86 | 18.2 |
| 6 | 1400 – 1600 | 0.56 | 0.38 | 0.97 | 1.91 | 9.0 |
| 7 | 1600 – 1800 | 0 | 0 | 0.68 | 0.68 | 3.2 |
| | Total | 8.00 | 6.86 | 6.31 | 21.17 | 100 |

Transect I : Vannathiparai to Vattathotti ;

Transect II : High Wavy to Suruli, Transect III : 85th Velakku to 29th Mile (Vellimalai)

Table 2.

*Summary of Herpetofauna observations in Vaigai catchments, Theni Forest Division during June 2006-December 2007; * including opportunistic observations*

| Taxa | Measurement | Sampling Method | | Total |
|------------|--------------------|-----------------|-------------------------|-------|
| | | Quadrat | Visual encounter survey | |
| Amphibians | No. of species | 10 | 25 | 33* |
| | No. of individuals | 208 | 1813 | - |
| Reptiles | No. of species | 24 | 48 | 68* |
| | No. of individuals | 209 | 1854 | |

Recommendations

The study is in progress and the recommendations for species conservation will be provided in the next report. Two range extensions have been obtained during this study; Anamalai Salea (*Salea anamallayana*) and Malabar False Tree Frog (*Rhacophorus pseudomalabaricus*), and both these reports have been accepted for publication.



B. LANDSCAPE ECOLOGY

10. ENVIS Center on Wetland Ecosystem

| | |
|---|--|
| ENVIS Coordinator | : S.N. Prasad |
| Co-Editor of the Newsletter | : Lalitha Vijayan |
| Project Staff | : Chiranjibi Pattanaik, Santosh Gaikwad, Madhu Routhu |
| Duration | : One year- project renewed yearly by ENVIS Secretariat, MoEF. |
| Funding Agency | : Ministry of Environment & Forests, Govt. of India |
| Total sanctioned amount | : Rs.4.80 lakhs |
| Funds available for the reporting period | : 4.80 lakhs |
| Status | : Ongoing |

Background

The previous ENVIS node of SACON was primarily devoted to Inland wetlands. Subsequent to the review of progress of the work on Inland wetlands, it has been upgraded into ENVIS Centre in 2004.

Objectives

- i. Creation of a Web site on Wetland Ecosystem with regional language interface
- ii. Monthly compilation of news items on Wetland ecosystem
- iii. Identification of information /data gaps in the specified subject areas and action taken to fill these gaps
- iv. Creation of a database on Wetland Ecosystem to be put on web site
- v. Contribution of news items of ENVIS newsletter on quarterly basis
- vi. Establish and operate a distributed clearing house to answer and channel queries related to wetlands
- vii. Establish linkages with information users, carriers and providers from among government, academia, business and non-governmental organizations including that with ENVIS

Methods

Satellite data of different time periods and different resolution are used for the extraction of wetlands. Initially, the ortho-rectified data from Landsat Thematic Mapper data (from 1990 to 1992) was downloaded from the Global Land Cover Facility (GLCF) website. The digital image processing was carried out on WINDOWS workstation using ERDAS IMAGINE 8.6 and ARSGIS 8.0 softwares. An interactive classification approach using both supervised and visual techniques is adopted to delineate various wetland categories viz., Lakes, Ponds, Reservoirs, Mangroves, Saltpans, other aquatic vegetation etc., of the study area.

Map portal (Web- GIS) is developed for wetlands of India by creating simple maps and interactive maps. Previously, the Internet connected public could view digital wetlands data, in the form of simple JPEG / PDF maps only.

For **simple maps**, DjVu technology from lizardtech (<http://www.lizardtech.com>) is used.

For **Interactive maps** ALOV (<http://alov.org>) software is used.

Currently we are using ALOV software, which is a freeware for Web-GIS purpose. We tried Geoserver, which is an open source software for Web-GIS. Geoserver, has several advantages over ALOV, and these include: It is Open Source Server; it is useful for publishing vector and raster maps using clients like mapbuilder or chameleon; It stores spatial data in to PostGIS a spatial extension for the open source PostgreSQL database, allowing geospatial queries; It allows users to update, delete, and insert geographic data using software like UDig, OpenJump etc which is rather difficult with ALOV; GeoServer supports KML and KMZ output for WMS requests so data can be served up to Google Earth.

Result

- Revamped ENVIS wetland website
- Simple maps were developed on Prioritized Maps on Inland Wetlands of India using DjVu plug-in technology



- Wetland Forum is added new to the home page.
- More records were added in publication databases
- World Wetland Day celebration report was published on the Ramsar Website (http://www.ramsar.org/wwd/8/wwd2008_reports.htm).
- Development of user guide on “How to use this website” under “This website” menu which also includes site map for wetlands of India.
- ENVIS centers are listed as per 7 thematic areas.

- In Database section, Experts database (subject experts) is added.
- Important news items were added to Blog features.

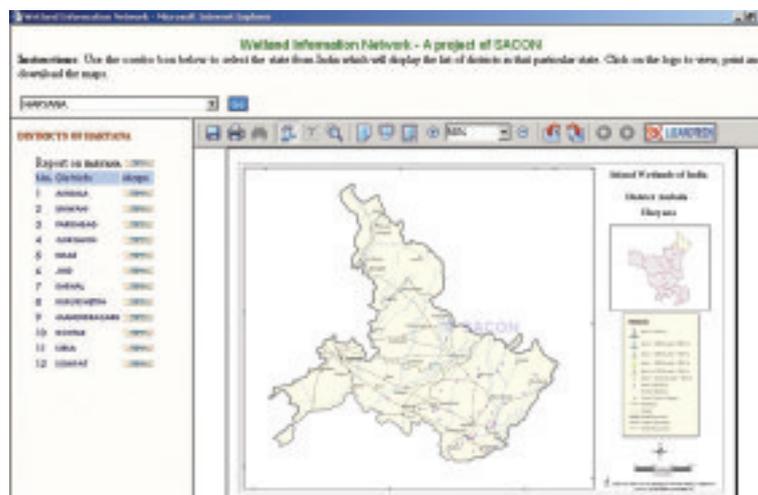
Remote Sensing & Wetlands

The spatial data on wetlands using Landsat TM data for 1990 finished for the state of Kerala and Orissa. Wetland maps and area statistics were generated for 14 districts of Kerala and 30 districts of Orissa. Database generated on wetlands is first kind of its region giving importance of below 56 ha wetland areas. Wetlands maps will be uploaded in the ENVIS website.



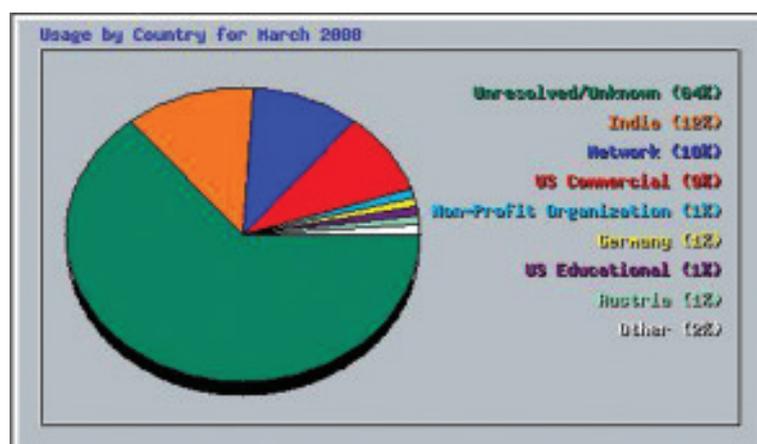
Revamped wetlands of India website

Wetlands of India forum network



| Summary by Month | | | | | | | | | | |
|--------------------------|-----------|-------|-------|--------|----------------|----------------|--------------|--------------|---------------|---------------|
| Month | Daily Avg | | | | Monthly Totals | | | | | |
| | Hits | Files | Pages | Visits | Sites | kBytes | Visits | Pages | Files | Hits |
| Apr 2008 | 1773 | 1312 | 423 | 134 | 582 | 227255 | 404 | 1269 | 3936 | 5321 |
| Mar 2008 | 2438 | 1263 | 313 | 146 | 3943 | 2062590 | 4552 | 9718 | 39177 | 75602 |
| Feb 2008 | 1766 | 1101 | 323 | 131 | 3101 | 1495633 | 3815 | 9395 | 31942 | 51238 |
| Jan 2008 | 1603 | 1044 | 258 | 127 | 2999 | 1526925 | 3938 | 8008 | 32389 | 49711 |
| Dec 2007 | 1082 | 768 | 211 | 115 | 2501 | 1133111 | 3577 | 6541 | 23834 | 33547 |
| Nov 2007 | 1212 | 830 | 242 | 124 | 2708 | 1239906 | 3743 | 7285 | 24928 | 36368 |
| Oct 2007 | 851 | 577 | 172 | 88 | 1948 | 672716 | 2733 | 5355 | 17901 | 26405 |
| Sep 2007 | 397 | 255 | 88 | 46 | 892 | 304232 | 1405 | 2667 | 7667 | 11918 |
| Aug 2007 | 111 | 83 | 12 | 1 | 4 | 5395 | 9 | 61 | 443 | 555 |
| Totals | | | | | | 8667763 | 24176 | 50299 | 182217 | 290665 |

Web Statistics from August 2007 to March 2008



Country wise usage of wetlands of India website for the month of March 2008

Recommendations

These following recommendations will be added in the website in future.

- Wetlands of India website can be a central hub for all wetland related information in India.
- Development will be done using FOSS or as per the requirement.
- Formation of Indian Wetland Species Directory (IWSD). This will have taxonomic data, images, geographic locations etc.
- Developments of data acquisition tools and make the available to other organizations to digitize data related to the wetland.
- All the databases (currently available or will be developed in future) will be inter-linked.
- Interoperability feature using web services so to promote data exchange or sharing.
- More Regional Language interfaces for Wetlands of India.
- Intensive education activities for creating awareness among the local people on wetlands.



II. Multilevel and multiscale analysis of wetland systems to evaluate balance in ecosystem services and sustainability concerns - Kolleru Wildlife Sanctuary, a Ramsar site in Andhra Pradesh

Principal Investigator : SN Prasad
 Research Fellow : Chiranjibi Pattanaik
 Duration : Six months
 Start date : May 2007
 Funding Agency : International Water Management Institute (IWMI), Colombo
 Total sanctioned amount : Rs. 0.55 Lakhs
 Funds available for the reporting period : Rs. 0.55 Lakhs
 Status : Completed

Background

The remote sensing based study coupling with ground truth is essential for better delineation of land use and land cover and change assessment of any particular area. There has been considerable changes in the Kolleru wildlife sanctuary with the removal of aquaculture tanks for the conservation of this internationally important wetland.

Objectives:

- i. Temporal monitoring of the famous freshwater Kolleru Lake using multi-temporal satellite data.
- ii. The possible impacts of demolition of aquaculture tanks on the livelihood of the people, and
- iii. Multi-level analyses to address the wetlands representivity at global and regional level

Methods

Landsat Multi Spectral Scanner data of 1977, Landsat Thematic Mapper of 1990. Landsat ETM of 2000 and IRS P6 LISS III data of April 2007 were analyzed in the present study. IRS P6 LISS IV MX was also used for reference purpose. IRS P6 LISS III satellite data of 23.5 m spatial resolution is compatible for mapping land use/land cover on 1:50,000 scale. After rectification

of the data, the area of interest was separated. Supervised classification was done taking separate training signatures for each land cover. Finally, the classified land use and land cover map was generated for 1977, 1990, 2000 and 2007. After, thorough ground truthing, all the required information were incorporated to get a more corrected classified map of the area.

Results

1. The study has analyzed the land use land cover mapping of the Kolleru Lake. The results of the study are significant in terms of different land cover assessment (Table 1). There is a significant increase of areas under aquaculture (158 sq km of 377 sq km study area, Fig-1). After demolition of the aquaculture ponds by honorable Supreme Court order, most of the lake area is invaded by aquatic vegetation of *Typha angustata*, *Eicchornia crassipes*, etc. A considerable decrease in agriculture areas and increase in aquaculture activities from 1977 to 2007 clearly depicts the conversion of agriculture land to aquaculture ponds. The area of settlements also decreased 5.5 sq km because of emigration of people searching other livelihood options. The water body area is almost doubled after demolition of aquaculture ponds.

| Class | 1977 | 1990 | 2000 | 2007 |
|--------------------|------------|------------|------------|------------|
| Aquatic vegetation | 72.4 | 33.6 | 65.3 | 106.9 |
| Marshy land | 114.6 | 177.6 | 56.1 | 64.3 |
| Open land | 15.1 | 29.8 | 32.0 | 46.6 |
| Agriculture | 128.0 | 47.9 | 46.6 | 44.1 |
| Water body | 31.0 | 25.8 | 13.5 | 66.7 |
| Aquaculture | 0.0 | 57.0 | 158.5 | 15.0 |
| Settlement | 12.4 | 5.3 | 5.3 | 26.2 |
| Cloud | 3.5 | 0.0 | 0.0 | 6.9 |
| Total | 377 | 377 | 377 | 377 |

Table 1 : Area statistics of three study sites (in sq km)

2. The SACON database and GIAM were jointly used to demarcate the wetlands falling under agricultural zones. The 'wetland priority habitats' defined in the SACON database are the suggested potential sites for conservation prioritization at national level.

In this context it is important to make the proposed sites representative in relation to 'units' or 'zones' viz., the agro-ecological regions and sub-regions and the biogeographic regions] that potentially govern the country's conservation and planning process. Each agro-ecological zone is broadly classified into sub-regions based on diversity in ecological and the agrarian variables; however it is appealing to note that the AG regions having defined sub-regions have good representation in the defined wetland priority habitats. However the homogenous region behaves in the reverse way. It can therefore be concluded that the diversity in resource system is well characterized in defining the priority habitats. The multi-scalar analyses explain the potential of geospatial applications for evaluating the distribution, extent and status of wetlands at global and

regional scale largely with an intention to explore the wetland-agriculture-biodiversity nexus. Additionally, the 'representivity evaluation' of 'Ramsar sites' and 'priority wetland habitats' at regional scale reflect the strengths and gaps of the prioritization process. The information would pertinently contribute to improve the existing information on the status and trends in multiple wetland systems at differing levels viz. global to regional level.

Recommendations

- Further intensive study to find the active aquaculture ponds using high-resolution satellite data.
- A strategic management plan is needed at local level by considering the socio-economic data with spatial technology.

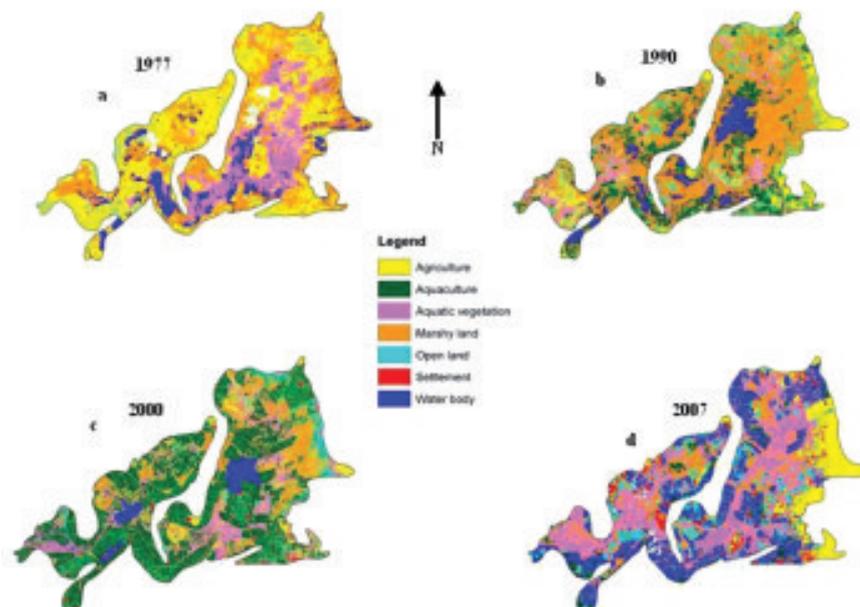


Figure - 1. Classified map of Kolleru wildlife sanctuary
(a) Landsat MSS 1977; (b) Landsat TM 1990; (c) Landsat ETM 2000; (d) IRS P6 LISS III 2007



12. GIS for Rajahmundry Parliamentary constituency

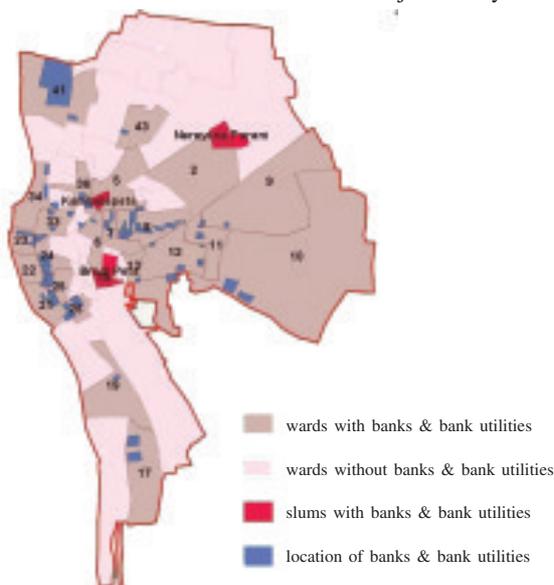
Principal Investigator : S. N. Prasad
 Project Staff : N Sreenivasa Rao & Prasahant Narayanan (up to Jan 08)
 Duration : 9 months
 Start Date : August 2007
 Funding : Member of Parliament Local Area Development scheme, Rajahmundry Parliament constituency East Godavari District, Andhra Pradesh
 Total sanctioned amount : 8.44 Lakhs
 Funds available for the reporting period : Rs. 6.75 Lakhs
 Status : Completed

A Geographic Information system is sought to be developed for the entire Rajahmundry parliamentary constituency.

Objectives

- i. To prepare a LU/LC cover map for the Rajahmundry PC using Liss IV imagery at 1:25000 scale
- ii. Preparation of 1:10000 scale LU/LC maps using Cartosat and Liss iv imagery
- iii. Preparation of a map of water bodies for the entire constituency at 1:25000 scale

Wardwise location of Banks & Bank utilities in Rajahmundry



- iv. Train a cadre of students of the Local University in making use of the Open source geospatial tools for their curriculum, and
- v. Training various line agencies in the use of GIS

Methods

Satellite data of IRS Liss IV MX with a ground resolution of 5.8 m in multispectral mode and orthorectified Cartosat-I data (panchromatic) at 1:10000 scale were used. The details as are follows:

- i. Liss IV/ Cartosat-I & 2 of 2006-07 period
- ii. SOI Mapsheet - 65 G 16 & 65 H 13

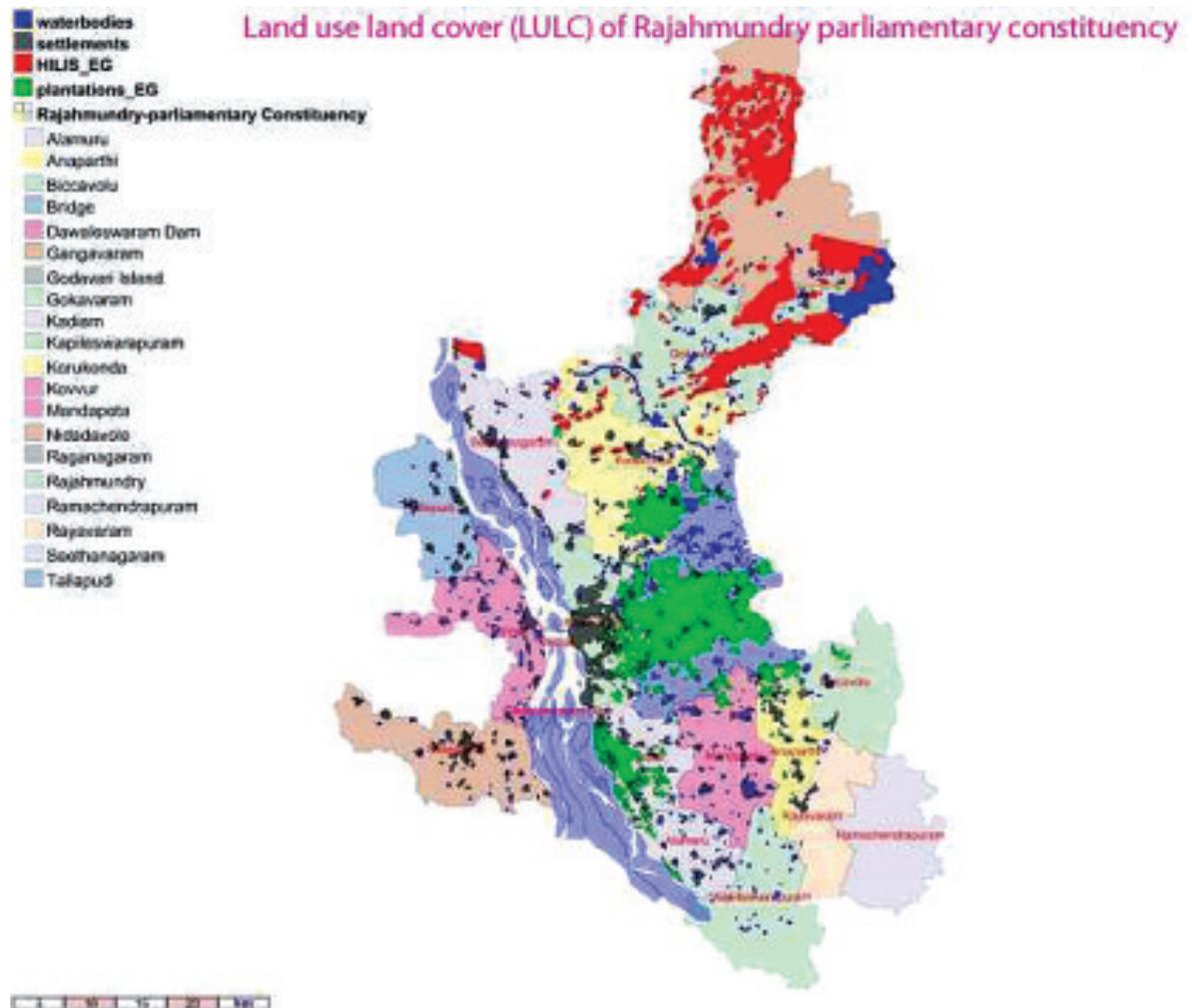
GPS sets were used to collect locational information of the important thematic features listed above. Extensive ground based information and official data and information on all above will be sought from various government agencies.

Results

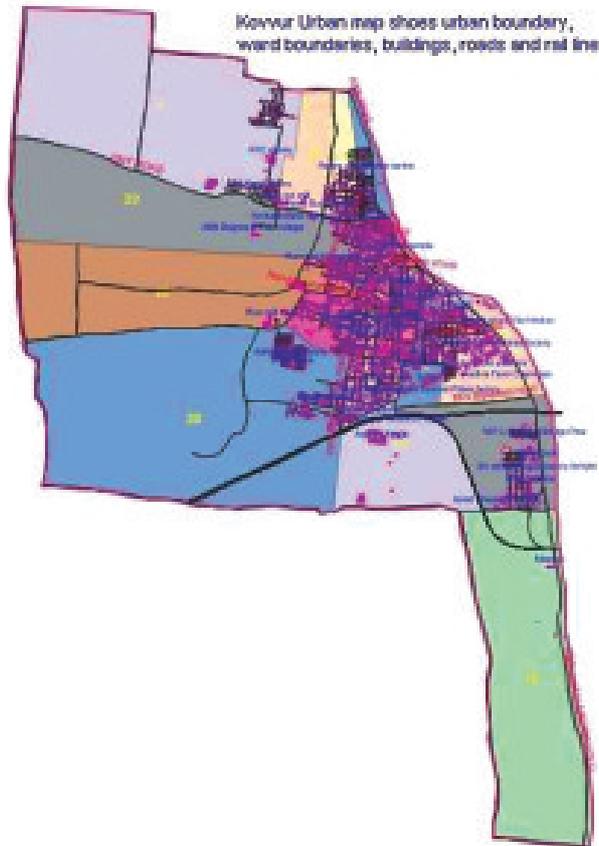
The project has achieved several mile stones in the penultimate stage of its completion. A vigorous field work and digitization of several layers of thematic content was done.

- i. The Rajahmundry urban map of 1:10000 scale was completed. A large number of point coverage was achieved. The themes covered are slums, educational institutes, hospitals, Banks and ATMs, public toilets and other social infrastructure facilities.

- For the 17 rural mandals, 1:25000 scale mapping was done for Land use land cover, water bodies and delineation of transport net work. These mandals are Alamuru, Anaparthi, Biccavolu, Gangavaram, Gokavaram, Kadiam, Kapileswarapuram, Korukonda, Kovvur, Mandapeta, Nidadavole, Rajahmundry, Rajanagaram, Ramachendrapuram, Rayavaram, Seethanagaram and Tallapudi.



- For Kovvur town, a detailed map was generated using publicly available Digital Globe data on wikimapia as well as the fused cartosat and LISS IV data.
- An attempt was made to print the maps in open source programme called 'Inkscape' as it has SVG format.
- A short brochure was designed in Inkscape briefly to explain the GIS project.



Koverur Urban map shows urban boundary, ward boundaries, buildings, roads and rail line



Figure shows the 367 layout plans.



Figure shows the 335 identity plans.



Figure shows the 10 lodges & institutions.



Figure shows the 16 supplementary urban ward boundaries and number of plots.



Figure shows the APJEE certified status in Supplementary Urban, total number of plots and 76.



The Sálím Ali Centre for Ornithology and Natural History (SACON) is one of the centres of excellence of the Ministry of Environment and Forests (MoEF), Government of India. SACON's mission is "To enhance India's biodiversity and its sustainable use through research, education and people's participation with care at the joint's edge".

SACON's research activities are governed by a team of Research Advisory Council, comprised of renowned forest managers, wildlife scientists, environmental and policy makers. The scientific staff are organized into the division of Avian Ecology, Wetland Ecology, Landscape Ecology, Ecotoxicology, Environmental Impact Assessment, Conservation Biology Library and Information. A number of consultancy services are also provided.



Sálím Ali Centre for Ornithology and Natural History, Avinashi Post, Coimbatore-411 106 (Tamil Nadu)

SACON Chennai Regional Station,
G1-G16/6B, Rajapet Road, Chennai, Tamil Nadu,
Hyderabad-500 011, Ph: 9842711962
Web: <http://saccon.org>, <http://www.sacconindia.org>



The Open Source Geospatial (OSGeo) has been created to support and build the highest quality open-source geospatial software. The foundation's goal is to encourage the use and collaborative development of community-led projects.

Head office:
International Institute of Information Technology,
Gachibowli, Hyderabad, A.P.
Web: <http://www.osgeo.org/>

A Geographic Information System (GIS) for the Rajapetnam Parliamentary Constituency: Towards cost effective governance

Funded by IIRLDS of the Rajapetnam constituency of Shri V. Aruna Kumar, MP



Sálím Ali Centre for Ornithology and Natural History, in association with The Avinashi Veterinary, Rajapetnam and Open Source Geospatial (OSGeo) Hyderabad April 2008





6. A review meeting was held by Honourable Member of Parliament (Lok Sabha); Sh V Arun Kumar on 19 April at Rajhamundry. A presentation was made as well as a live demonstration of the GIS system.
7. It was decided that a final training programme will be held in the last week of May 08 to deliver the GIS system with the hard ware.

The project is a first of its kind in showcasing use of open source geospatial tools for decision makers. Because it is highly participatory and has no explicit software purchase costs, the model can be replicated in most parliamentary constituencies to move forward on the path of e-governance.

13. Pollination and seed dispersal by animals in the dry deciduous forests of southern Eastern Ghats

| | |
|--|--|
| Principal Investigator | : P. Balasubramanian |
| Research Fellows | : M. Murugesan, T. Selvarathinam and P. Manikandan |
| Duration | : Two years |
| Start Date | : March 2007 |
| Funding Agency | : Tamil Nadu Forest Department (Research Wing) |
| Total sanctioned amount | : 10 lakhs |
| Funds available for the reporting period | : 4 lakhs |
| Status | : Ongoing |

Background

One of the major habitat restoration initiatives of Tamil Nadu Forest Department has been tree planting in degraded forest sites of West-

ern and Eastern Ghats. Realizing the harmful effects of raising monoculture exotic plantations, the department wanted to raise polyculture plantations. In this regard, to identify suitable native tree species that can sustain or attract animal pollinators and seed dispersers, a research project was entrusted to SACON. The study is being carried out in the dry deciduous forests of Sathyamangalam Forest Division, Eastern Ghats.

Objectives

- a) Study the reproductive phenology and find out the flowering, fruiting periodicity of arborescent flora in the dry deciduous forests
- b) Document the animal visitation to flowers and fruits and find out the pollinators and seed dispersers
- c) Identify and suggest native plant species that can attract pollinators and seed dispersers, for afforestation in the degraded sites.

Methods

Phytosociological analysis of vegetation was done in two habitats, namely undisturbed dry deciduous and degraded dry scrub forests. Sites representing undisturbed dry deciduous forests and degraded scrub vegetation are located in Dhimbam and Hasanur respectively. Vegetation sampling was done by laying 1 ha plot in both the habitats. The 1 ha plot was subdivided in to 100 (10 x 10 m) plots. Trees measuring >20 cm GBH were recorded. A total of 400 individuals belonging to 40 woody species were tagged for phenological studies. Tagged plants were monitored fortnightly, for recording flowering and fruiting seasonality.



Direct observations were carried out on the inflorescences of select trees, using a pair of binoculars. Extended watches from 6 am to 6 pm were made at the focal flowering tree and the following details were noted: i) time of observation, ii) name of the flower visitors, iii) number of flower visitors, iv) time spent by the visitor in each flower, and v) whether they collect pollen or feed nectar. The flower visitors are captured by sweeping net and preserved. To document the avian pollinators, and frugivores, birds foraging on nectar yielding / fleshy-fruited plants were recorded during the transect walks.



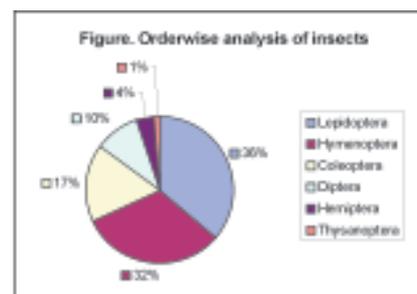
Results

* Phenological observations indicate the occurrence of seasonality.

Peak in flowering with 24 species was noticed in June. The fruiting phenology data indicated a peak with 28 species in fruiting during July 2007. Important plants that flowered in summer include *Bombax malabaricum*, *Bridelia crenulata*, *Buchanania axillaris*, *Butea monosperma*, *Capparis grandis*, *Erythrina stricta*, *Radermachera xylocarpa*, *Shorea roxburghii* and *Ziziphus rugosa*. Monsoon (South-west) flowering plants include *Albizia odoratissima*, *Ligustrum perrottetii*, *Pittosporum napaulense*, *Premna tomentosa*, *Vitex altissima* and *Tarennia asiatica*. *Anogeissus latifolia*, *Chionanthus paniculata* and *Ziziphus mauritiana* flowered during North-east monsoon. Major winter flowering plants are *Buchanania lanzan*, *Canthium dicoccum*, *Ixora arborea* and *Wendlandia thyrsoides*. Species such as *Diospyros montana*, *Feronia elephantum* and *Ligustrum perrottetii* fruited throughout the year. Highly seasonal fruiting species include *Canthium dicoccum*, *Capparis grandis*, *Celtis tetrandra*, *Clausena dentata*, *Naringi crenulata*, *Santalum album*, *Scutia myrtina*, and *Vitex altissima*.

- Butterflies and honey bees visited maximum number of plant species
- Among birds, Sunbirds visit the flowers most frequently

To document insects visiting the flowers and to identify the pollinators, 20 tree species were observed for 460 hrs. A total of 77 insect species of 6 orders were recorded (Fig. 1). Lepidoptera (27 species) and Hymenoptera (n=25) formed the major insect visitors to flowers. Butterflies (36%) followed by honey bees (32%) visited the maximum number of plant species. Thirty species of avian pollinators were recorded in the study area. Among the 30 bird species, sunbirds (Purple, Purple-rumped and Loten's Sunbird, 63%) followed by Tickell's Flower Pecker (6.6%) formed the major pollinators. Species that attracted large number of birds include *Butea monosperma* (20 species) *Bombax malabaricum* (19 species), and *Gmelina arborea* (15 species).



A total of 39 species of fruit feeding birds were recorded in the study area. Fruits of 30 plant species were consumed by birds. Important tree species that attracted fruit-eating birds included *Ficus benghalensis* (n=20), *Vitex altissima* (20), *Ficus microcarpa* (19), *Syzygium cumini* (16), *Premna tomentosa* (13), *Capparis grandis* (12) and *Santalum album* (10). Among the fruit eating birds, bulbuls (32.9%), followed by mynas (12.1%), and barbets (11.7%) were found to be the major frugivores in the study area. These species are expected play an important role in seed dispersal.

Recommendations

A total of 31 woody species are recommended for planting in the afforestation sites (TAP areas). Species suggested here are grouped under two major categories, namely nectar-yielding plants and fleshy-fruit yielding plants.

14. Ecology of Indian Grey Hornbill (*Ocyrocus birostris*) with special reference to its role in seed dispersal in southern Eastern Ghats

| | |
|--|---|
| Principal Investigator | : P. Balasubramanian |
| Research Fellow | : E. Santhosh Kumar |
| Duration | : 3 years |
| Start Date | : February 2006 |
| Funding Agency | : Ministry of Environment and Forests, Govt. of India |
| Total sanctioned amount | : Rs. 6.15 Lakhs |
| Funds available for the reporting period | : Rs. 0.95 Lakhs |
| Status | : Ongoing |

Background

The Hornbills are one of the most recognizable groups of all birds. They are the indicator of pristine habitats. Their unique breeding habits and frugivorous nature help in seed dispersal and regeneration of several forest trees. Among the four hornbill species known in southern India, the Indian Grey Hornbill is least investigated.



Objectives

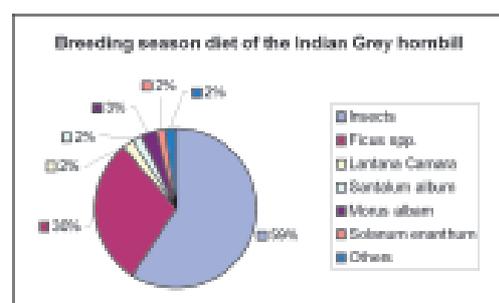
- Study the foraging ecology and breeding biology of Indian Grey Hornbill and determine the predominantly frugivorous habit of the Indian Grey Hornbill.
- Study the hornbill-plant interactions and establish the role of Indian Grey Hornbill in seed dispersal & regeneration of its food plants.

Method

During the breeding season, seeds deposited below the nest were collected and identified. In addition to that, active nests were monitored to record the food items delivered by male to nest inmates. Observations were carried out between 6 am and 6 pm. Details such as number of visits made by the male, fruit species and number of fruits delivered per visit were recorded. Methods described by Altmann (1974) were followed to document the food and feeding behaviour, during non-breeding season. Feeding observations were recorded along marked transects between 06.00-10.00 am and 04.00-06.00 pm. Fruit availability was monitored by tagging 10 individuals of 21 fleshy fruit yielding species. Tagged plants were monitored once in a fortnight. Percentage of ripe and unripe fruits was noted. Seed germination experiments were conducted to compare the germination efficiency of bird (hornbill) defecated and control seeds (fruits from plants). Also, midden depositions under the nest holes were monitored during subsequent seasons to record and monitor the germination of hornbill dispersed seeds. Seeds collected from the nest middens and roosts were sown in polythene bags with a mixture of soil and sand and observed for germination. This was compared with the germination of control seeds (collected from trees), which were grouped in to (i) seeds with pulp and (ii) pulp removed seeds. Observations indicate that the seeds dispersed by hornbills showed faster growth and high germination percentage.

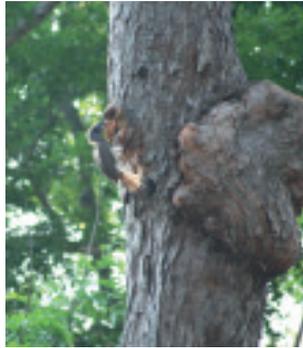
Results

* Food and Feeding habits indicate that it is predominantly a frugivorous species During the nonbreeding season, the Indian Grey Hornbill





mostly 95% feed on fleshy fruits. Twenty five fruit species were eaten. The percentage of feeding was highest on *Ficus* spp. (39%), followed by *Diospyros montana* (11%). Species such as *Vitex altissima* and *Santalum album* were also eaten. Insects comprised 5% of the non breeding season diet.



In the breeding season, the items delivered to nest inmates comprised both vegetable and animal matter. The animal matter 60% includes lizards, snakes, rats, insects such as cicada, larvae of butterflies and moths and beetles. The 40% of vegetable diet mainly comprised fruits, *Ficus* spp., and several non-figs. The percentage of animal matter was high in the breeding season probably due to the low availability of fruits in March and April, as noticed in the phenological observations.

Melia dubia forms an important nesting tree for Grey hornbill : During the current breeding season, 15 active nests were located and during the last breeding season (March-May 2007) nine active nests were located. Majority of the nests (55%) was placed in *Melia dubia*. All the nests were found aside the streams, where large trees with cavities are available. A total of 360 hours (72 hours per nest) was spent in the nests to record the frequency of male visitation and record the food deliveries.



Preliminary analysis indicate the occurrence of fruiting seasonality : It is well known that seasonal changes in climate bring about various types of growth patterns in the life of plants. Preliminary analysis of phenology data indicates seasonal variations of fruiting in the hornbill habitat. Highest fruiting activity was observed in July-August and was moderate during the remaining period.

Regeneration of hornbill's food plants observed under nests : Seedlings of hornbill dispersed plant species namely, *Santalum album*, *Drypetes roxburghii*, *Solanum erianthum*, *Lantana camara* and *Pithecellobium dulce* was noticed under hornbill nests. **Seed germination experiments have been initiated.**

Recommendation

In Hasanur and adjoining ranges, special protection should be offered to conserve the nest trees, as well as the stream habitat, which are important for breeding hornbills.



15. *Plant-bird interactions with special reference to identification of bird-attracting plants for afforestation of Attappady valley, Kerala*

| | |
|--|--|
| Principal Investigator | : P. Balasubramanian |
| Research Fellow | : R.Aruna |
| Duration | : 18 months |
| Start Date | : July 2006 |
| Funding Agency | : Attappady Hills Area Development Society |
| Total sanctioned amount | : 2.69 Lakhs |
| Funds available for the reporting period | : Rs.1.07 Lakhs |
| Status | : Ongoing |

Background

Attappady (10° 55' 10" and 11° 14' 19" North latitude and (76° 27' 11" and 76° 48' 8" East longitude) in southern Western Ghats is one of the important tribal tracts of Kerala. It is one of the two extensive east sloping plateaus in the Western Ghats. Attappady Hills Area Development Society (AHADS) launched various eco-restoration programmes to restore the degraded areas of Attappady. One such program was watershed development, a part of which include tree planting. A set of 30 species comprising both exotics and native have been chosen by AHADS for planting. Realizing the need for planting trees for attracting wildlife, particularly frugivorous birds and mammals, AHADS sanctioned a project to Sálím Ali Centre for Ornithology and Natural History to identify bird-attracting plants.

Objectives

- Study plant-frugivore interactions and document the bird-attracting plants in Attappady hills,
- Suggest suitable native bird-attracting plant species for afforestation of degraded habitats

Methods

Study sites were selected in Agali, Palliara, Kottathara, and Pattimalam, which is primarily the dry belt, predominated by dry scrub and mixed dry deciduous vegetation. In Attappady,

10 sites were selected comprising five AHADS plantation sites (1st, 2nd, 3rd, 4th and 5th year), and five AHADS's biomass sites (1st-5th year). In addition to these, three sites were selected in the adjoining Anaikatty Reserve Forests as control site, where the climax community, the southern dry mixed deciduous forest occurs. As this area is relatively less disturbed, a complete picture of vegetation composition and bird community structure can be obtained which could be compared with Attappady sites.

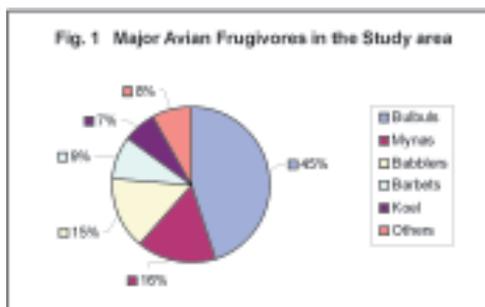
Bird population studies were done using fixed width line transect method. A kilometer length of transects was laid in each study site. During the census walk, all birds seen or heard in each transect were recorded. Foraging observation was made by two methods. In the first method, birds feeding on fruits were noted while walking along the transects. Most of the observations were done within four hours after sunrise, which is the most active foraging time for birds and also in the evenings between 3.00 pm and 6.00 pm. In focal animal sampling method, extended observations were made on fruit bearing trees to record the frugivore visitation and foraging. Observations were made between 6.00 and 9.00 am on the bird visitation to fruit-yielding plants, with the help of binoculars. The visit by each individual bird followed by pecking/swallowing of fruits was considered as a fruit-feeding visit. A total of 150 individuals of woody plants belonging to 30 species (24 tree species and 6 shrubs) were tagged and observed fortnightly for phenological studies. Plants selected for observation had drupes, berries or similar soft fruits having one or a few seeds or with composite fruits with many small seeds (Moraceae).



Results

* Undisturbed forests harboured the maximum diversity of birds

A total of 108 species of birds belonging to 36 orders were recorded from the study sites. Of these, 46 % were insectivores, followed by frugivores (18%) and omnivores (16%). Transects in control sites (undisturbed forests) harbor the highest diversity of bird species. In Attappady, biomass sites (T6-T10) recorded higher number of bird species than plantations. This could be due to the presence of different life forms such as small and medium sized trees, shrubs, climbers and several bird-attracting plants in the biomass sites.



* Bulbuls and mynas formed the major frugivores in the study area

Extended observations were made, spending a total of 640 hrs, on 32 fleshy-fruited plant species. Twenty eight bird species belonging to 13 orders were recorded to feed on



fruits. Among the avian frugivores, Bulbuls made the highest number of feeding visits (45%), followed by Mynas (16%, Fig. 1).

Our phenological study shows peak flowering to be in April when 36.6% of individuals bore flowers. Peak fruiting was observed in July when 54.6% of individuals had ripe fruits. A total of 48 bird-attracting plants were recorded in the study area. Important among these are *Santalum album*, *Premna tomentosa*, *Celtis philippensis*, *Streblus asper* and *Ficus* spp. Descriptions of 30 bird-dispersed species are provided in the report. Details such as local name, flowering fruiting period etc of all these species are furnished.

Recommendation

A total of 48 bird-attracting woody species are suggested for planting in the degraded dry deciduous forest sites of Attappady.



C. ECOTOXICOLOGY

16. *Impact of agricultural pesticides on the population status and breeding success of select species of fish-eating birds in Tamil Nadu*

| | |
|--|---|
| Project Investigator | : S. Muralidharan |
| Co-investigator | : C. Sivasubramanian, Lecturer, Dept. of Zoology, K M College, Adirampatinam, Tamil Nadu |
| Research Fellow | : V. Dhananjayan |
| Technical Assistant | : S. Jayakumar |
| Duration | : 3 Years |
| Start Date | : January 2007 |
| Funding Agency | : Ministry of Environment and Forests, Govt. of India |
| Total sanctioned amount | : Rs. 14.62 Lakhs |
| Funds available for the reporting period | : Rs. 1.80 Lakhs |
| Status | : Ongoing |

Background

The effects of pesticides on wildlife, particularly fish-eating birds have been extensively studied across the world. The studies also suggested that the fish-eating birds are highly susceptible to pesticide residues. In India there are only a few studies available and the information on birds, particularly fish-eating bird is very limited. Information on pesticide usage and the relationship between residue levels in eggs and the consequent breeding success is far from desired. It is needless to mention that unless there is a regular mechanism to keep track of the problem chemicals in eggs and their impact on the population status of key species of birds, it is difficult to assess the ill effects of chemicals on birds and environment. A study has been initiated with the following objectives.

Objectives

- Conduct surveys and locate heronries in Tamil Nadu
- Monitor breeding ecology, nesting success in select species of fish-eating birds

- Document the residue levels of persistent chemicals in water, fish, eggs and tissues of dead birds, and
- Attempt to find out their relation to eggshell thinning and population decline, if any.

Methods

Direct count method was followed to estimate the number of species and individuals in the study locations. Local people were enquired to know the nesting locations and breeding history of fish-eating birds. Information on agricultural practices, land use pattern and pesticide application were also recorded. Water and fish samples were collected as per standard operation protocol. Multi residue extraction method was followed with suitable solvents and cleaned up for pesticide residue estimation using Gas Chromatography equipped with electron capture detector.

Results and Discussion

- Higher concentration of heronries in Thirunelveli, Kanyakumari, and Ramanathapuram districts**

Field surveys were conducted between March and September 2007 in about 41 known heronries in 14 districts. The distribution of heronries shows that not all the districts in Tamil Nadu have ideal breeding location for fish-eating birds. Relatively more numbers of heronries have been recorded from Thirunelveli (8), Kanyakumari (7) and Ramanathapuram (6) districts. The remaining districts hold between one and three sites which is similar to what Subramanya (2005) had reported. This result need not indicate absence of breeding sites in other districts till we complete the next survey in the forthcoming year.

- Widespread distribution of select species of fish-eating birds**

With respect to species distribution Little Egret, Little Cormorant and Indian Pond Heron were found in nearly twenty heronries in Tamil Nadu followed by White Ibis, Darter, Cattle Egret, Asian Openbill,



Painted Stork and White Breasted Kingfisher. Black-crowned Night Heron, Common Kingfisher, Glossy Ibis, Great Egret, Grey Heron, Indian Cormorant, Intermediate Egret, Little Egret, Oriental Stork, Pied Kingfisher, Purple Heron, Grey Pelican and Eurasian Spoonbill were observed in less than 10 heronries. Black Ibis and Woolly necked Stork were found only in one place. Intensive sites, namely Vedanthangal, Vettangudipatty and Koonthakulam bird sanctuaries were monitored to know the status of breeding colonies of fish-eating birds.



- **Vedanthangal :** During the breeding season (December - March), 15 species of fish-eating birds were observed. The total population was the maximum (21,231) during March 2008 and minimum (7,237) during December 2008. Of which Cattle Egret, Glossy Ibis, Painted Stork, Grey Pelican and Little Cormorant were the predominant species. White-breasted Kingfisher and Pied Kingfisher were only a few. Out of 15

species found in the sanctuary, 12 species were observed breeding. However, we monitored only eight species, namely Spot-billed Pelican, Asian Openbill, White Ibis, Painted Stork, Grey Heron, Little Cormorant, Darter, Eurasian Spoonbill and Night Heron. Altogether 2161 nests belonging to the referred eight species of birds were located. Among the species the maximum number of nests was of Grey Pelican (612) followed by Asian Openbill (418) and White Ibis (246). Nests of Darter and Grey Heron were a few.



- **Vettangudipatti Bird Sanctuary:** The population and number of species were relatively low when compared to Vedanthangal. Total population was maximum (1493) during December 2007 and minimum (763) during April 2008. Among the species observed Cattle Egret, Little Egret, Asian Openbill and White Ibis were more in number and White-breasted Kingfisher was less in numbers. Six species, namely Asian Openbill, White Ibis, Little Cormorant, Black-crowned Night Heron, Cattle Egret and Little Egret were observed nesting. However, we monitored only four species, namely Asian Openbill, White Ibis, Little Cormorant and Cattle Egret. Among them White Ibis (56) was the predominant.
- **Koonthakulam Bird Sanctuary:** During the breeding season (January onwards) 11,149 individuals comprising 17 species of fish-eating birds were observed. Among the species noticed Cattle Egret appeared to be

the highest in number followed by Painted stork and Spot-billed Pelican, while White-breasted Kingfisher and Grey Heron were less in number. Ten species of birds were observed breeding in Koonthankulam. However, we focused only four species. Among them Painted Stork (1095) was the predominant species.

- **Water carries varying levels of pesticide residues**

To quantify the residues in water, 13 samples were collected from three intensive study sites during non-breeding or pre monsoon period. Residues of *o*-HCH ranged between 0.152 and 6.21 ppb in water samples collected from different locations. Isomers, *α*-HCH was found to be the maximum (0.491 ppm), whereas *α*, *β*, *γ* isomers were less. Among the three locations, Koondankulam water detected the highest levels of *o*-HCH followed by Vettangudipatti and Vedanthangal. The total HCH reported in the present study are comparable with the concentration reported in Keoladeo National Park, Bharathpur, Rajasthan (Muralidharan, 2000). Their occurrence at more than trace levels in environmental samples indicates their recent usage and persistence. The total DDT ranged from BDL to 0.254 ppb. *p,p'*-DDE was detected only in water collected from Vedanthangal (0.009 ppb). The heptachlor

epoxide ranged between 0.02 and 0.12 ppb. Dieldrin and endosulfan ranged from BDL to 0.02 ppb and 0.02 to 0.223 ppb respectively. The organochlorine pesticide levels detected in the present study are not alarming.

- **HCH - the most frequently detected pesticide in fishes**

Twenty one individuals of fishes comprising seven species were collected from the three intensive study sites during October 2007. Among the organochlorines analyzed, HCH was most frequently detected. Significant variations ($p < 0.05$) in organochlorine levels could be observed among the species. The maximum concentration of *o*-HCH was recorded in *Cirrhinus mrigala* (3129 ppb) collected from Vedanthangal Bird Sanctuary and *Channa punctatus* (226 ppb) collected from Vetangudipatti Bird Sanctuary. DDT and its metabolites were not detected in the fishes collected from Koonthankulam Bird Sanctuary. The maximum average concentration of total DDT was detected in *Anabas testudineus* (55 ppb) and *Cirrhinus mrigala* (38 ppb) collected from Vedanthangal.

Samples of water, fishes and eggs of a few species and also a few dead birds have been collected from the study sites during the post monsoon or breeding season. Samples are being processed for pesticide residue analysis.



D. DIVISION OF ENVIRONMENTAL IMPACT ASSESSMENT

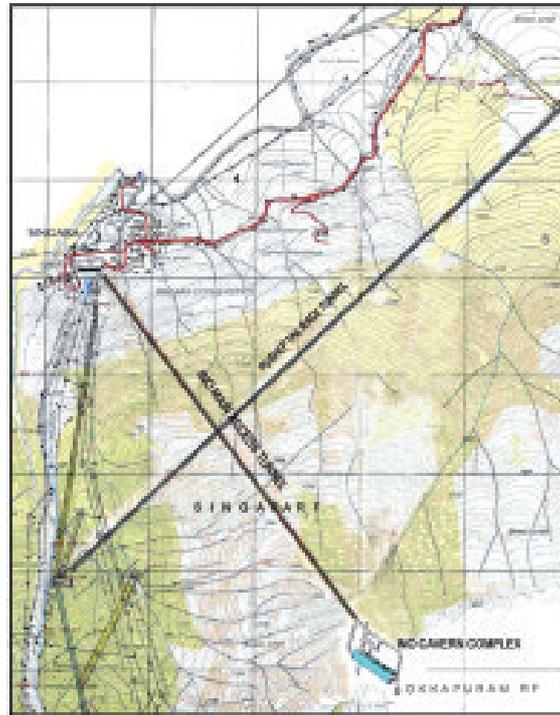
17. Rapid Environmental Impact Assessment of the India-Based Neutrino Observatory Project, Singara, Nilgiris, Tamil Nadu

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|--|---|
| Principal Investigator | : PA Azeez |
| Co Principals Investigators | : S Bhupathy & P Balasubramanian, |
| Research Fellows | : Rachna Chandra & PP Nikhilraj |
| Duration | : 6 months |
| Start date | : November 2007 |
| Funding agency | : Institute of Mathematical Sciences, Chennai |
| Total Sanction amount | : Rs. 1.86 Lakhs |
| Funds available for the reporting period | : Rs. 1.86 Lakhs |
| Status | : Completed |

Background

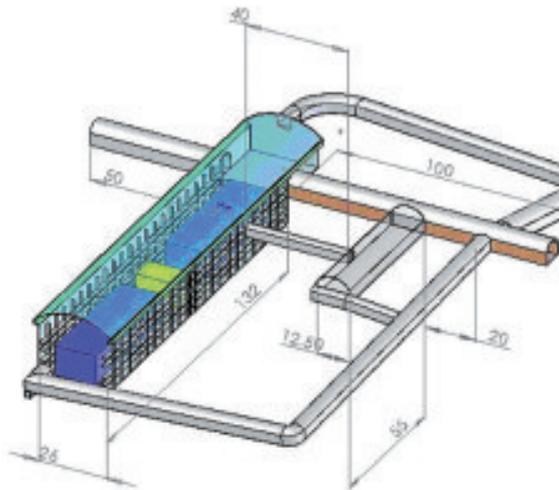
Neutrinos are tiny, neutral, elementary particles, which interact with matter via the weak force. The weakness of this force gives neutrinos the property that matter is almost transparent to them. The Sun, and all other stars, produces neutrinos copiously due to nuclear fusion and decay processes within their core. Since they rarely interact, these neutrinos pass through the Sun, and even the Earth, unhindered. There are many other natural sources of neutrinos including exploding stars (supernovae), relic neutrinos (from the birth of the universe), natural radioactivity, and cosmic ray interactions in the atmosphere of the Earth. In a sense, neutrinos hold the key to several important and fundamental questions on the origin of the Universe and the energy production in stars. Researchers are confident that non-zero neutrino masses have profound implications on various fields such as nuclear physics, geophysics, astrophysics and cosmology apart from being of fundamental interest to particle physics.

One of the earliest laboratories created to detect neutrinos underground in the world was located more than 2000 m deep at the Kolar Gold Field (KGF) mines in India. The first



atmospheric neutrinos were detected at this laboratory in 1965. Due to closure of the KGF by the Bharat Goldmines and Ministry of Mines, the study had to be terminated in 1992. Creation of an underground neutrino laboratory with the long term goal of conducting decisive experiments in neutrino physics and also other experiments which require such a unique underground facility was the purpose of the NCG. The proposed India-based Neutrino Observatory (INO) site is at Singara, Masinagudi, Nilgiris district in Tamil Nadu. With respect to the proposed establishment, the Institute of Mathematical Sciences (IMSc), Chennai, requested SACON to undertake a rapid environmental assessment with emphasis on ecological components.

The INO site at Singara is close to the PUSHEP tunnels and generator cavern. The tunnel portal of the proposed INO is to be located near the south portal of the PUSHEP access tunnel. The observatory will be located deep underground at about 1300 m below the 2207 m peak in the Nilgiris. The tunnel to the laboratory cavern will be nearly 2370 m long and 7.5 m wide in diameter. To detect the neutrinos and to get the neutrinos scattering pattern, which otherwise are



Vertical overburden above cavern complex : > 1300 M
The model of the proposed laboratory

difficult to locate, an Iron Calorimeter (ICAL) of about 50000 tonnes will be located in the cavern. The proposed INO location and model of the facilities are given in figures.

Objectives

The broad scope of the present study was to conduct a rapid survey and examine the impacts of the proposed INO project on the biological and ecological environment. The major objectives were: (i) Assessment of the flora in the project location and its environs (ii) Assessment of the fauna in the project location and its environs (iii) Identification of probable impacts arising from the execution of the project on the biological and ecological environs and (iv) Propose mitigation for minimal impacts, if any.

Methods

The present investigation focussed on the project area and its environs. Area falling within 5-10 km radial distance from the INO location was included for the field study. Taking note of the ecological and special proximity of the project site to Protected Areas (PAs) and the Mudumalai Wildlife Sanctuary, which is well known for its wildlife heritage, attempt was made to incorporate available information about these protected areas and their ecological significance. The Mudumalai Wildlife Sanctuary is one of the most popular and oldest wildlife

sanctuaries in India. The project was examined keeping in view of the long-term survival of the wildlife habitats and the increasing threats to it arising from the drastic anthropogenic activities and commercial activities in the Masinagudi area and the natural resources around. Apart from published information on the fauna and flora, various methods were used to generate primary data during November 2006- February 2007.

Results

- In all, 676 species of plants and 173 species of vertebrates (12 species of amphibians, 46 reptiles, 87 birds and 28 mammals) were recorded in the study area, which include several endemic and endangered flora and fauna.

Recommendations

- The proposed project location falls near the Mudumalai Wildlife Sanctuary which is rich in wild biodiversity. Immense care is needed during the construction as well as operation phase as the area is a corridor for the movement of large mammals such as Elephants. Unplanned human activities would affect their activity adversely.
- Most of the construction work of the proposed project work will be carried out deep inside the earth surface. However, the construction activities are likely to have impacts on the local environment especially wildlife. Proper work plan, debris and waste disposal, blasting activities to the bare minimum, controlled vehicular activity and limiting the number of workers may help to reduce the impacts. Various monitoring committees have been suggested.
- Looking at the need for technology development of the country, the proposed project assumes global importance. Nevertheless, the project construction and operation is likely to have notable impact in the area, especially on wildlife. It may be possible to lower the impact on the environment, with proper planning and implementing appropriate measures.



18. Management Plan for the Eco-restoration of Pallikaranai Reserve Forest

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|--|---|
| Principal Investigator | : PA Azeez |
| Co-Princiapl Investigator | : S Bhupathy, |
| Research Fellows | : J Ranjini, R Dhanya & PP Nikhil Raj |
| Duration | : 6 months |
| Start date | : March 2007 |
| Funding agency | : The Department of Environment and Forests, Government of Tamil Nadu |
| Total Sanction amount | : Rs. 1.98 Lakhs |
| Funds available for the reporting period | : Rs. 1.98 Lakhs |
| Status | : Completed |

Background

Wetlands are among the most productive life supporting systems of the world with immense socio-economic, ecological and bio-aesthetic importance. From time immemorial, river valleys and wetlands have played a critical role in fostering culture and civilization. However, wetlands did not receive due consideration and appreciation. Consequently wetlands have diminished in size and quality at alarming rates throughout the developed and developing countries. Apparently, they are considered almost synonymous with wastelands, to be filled up, occupied and diverted for various human needs, disregarding the ecological services these ecosystems offer to humankind. Wetlands are lost / degraded due to anthropogenic activities such as agriculture, aquaculture and urbanization as infrastructure such as roads and bridges requires larges space. Housing, business centers and other built up areas requires large extent of space, and therefore real estate activities around the urban centers, have grown to be a high-speed threat to the wetlands.

In India, momentous losses of wetlands have resulted from conversion to industrial, agricultural and various other developments. These have caused hydrological perturbations and its various reverberations, pollution and several after effects. Unsustainable levels of

grazing and fishing activities have also resulted in degradation of wetlands. Only a few ecologically sensitive regions are protected by various acts such as forest conservation and wild life protection acts, while rest of such areas especially wetlands have continued easy targets to anthropogenic pressures and damages. A survey of 140 major sites across various agro-climatic zones of the country identified anthropogenic interferences as the main cause of wetland degradation.

The state of Tamil Nadu is blessed with a number of water bodies and wetlands. Several of these are facing serious threats or are increasingly disappearing due to multifarious pressures. This is especially true for those wetlands located close to growing urban centers or bustling metropolises. Pallikaranai wetland located in the outskirts of Chennai is one such wetland that is very likely to disappear in near future, if active appropriate interventions are not made now. Realizing environmental and ecological significance of the area, state of concern in the context of the expanding metropolis, and recognizing the need to protect, the Tamil Nadu state government (Gazette notification GO. Ms. No. 52, dated 09/04/2007), declared a part of the Pallikaranai marsh (317.00 ha) as reserve forest (under section 4 of Tamil Nadu Forest Act, 1882). Systematic and serious actions are underway to conserve and rejuvenate this wetland ecosystem.

Objectives

Develop an Environment Management Plan (EMP) for Pallikaranaie marshiso.

Methods

Several rapid surveys were conducted in and around Pallikaranai marshes from March 2007 to December 2007. As the major objective of this study is to develop Environmental Management Plan for the area, both published and unpublished documents were extensively consulted.

Results and Recommendations

- **Ecological Services:** The reed-covered swamps and several associated smaller waterlogged areas located in the south

Chennai help in storing storm water and aiding groundwater recharge. It is reported that more than 500 truck loads of drinking water, obviously an outcome of the recharge of ground water effectuated by the wetland, is collected daily by private operators from the vicinity. Critical to existence of this wetland is exchange of fresh and saline water facilitated through various channels of the south Chennai and Okkium Maduvu in Thoraipakkam. The Pallikaranai marsh is also a source of income to many locals.

- **Biodiversity:** The wetland is rich with several plant species (61 species of flowering plants) and fauna (10 species of mammals, 112 species of birds, 21 species of reptiles, 9 species of amphibians, 46 species of fish, 7 species of butterflies, 5 species of Crustaceans and 9 species of Mollusks). The swamp also serves as heronry, and wintering ground for migratory birds.



The protected area showing proposed locations for management interventions

- **Threats:** The Pallikaranai wetlands, as common for most wetlands that are situated neighbouring growing cities, face serious threats from several sources. Major threats are (1) encroachments resulting in about 30% reduction of the wetland area within a span of 3 years (2) garbage dumping site (3) obstruction of drainage and flood control potentials of the wetland (4) incessant burning of garbage is a sight round the clock nearby the marshes (5) reduction in the quality of water and soil quality and (6) loss of biodiversity.
- **Conservation measures taken:** Recognizing the ecological and environmental significance of the area recently, the government of Tamil Nadu declared downstream portion of the wetland as a protected area; a very momentous step in the conservation of Pallikaranai wetlands. Action is underway to prepare Detailed Project Report (DPR) to be submitted to the Government of India for allocation of funds for comprehensive eco-restoration of selected lakes in and around the Chennai city including the Pallikaranai marsh (Environment and Forests Department, Policy Note 2006-2007, Demand No.15). The Government of Tamil Nadu, through the Tamil Nadu Pollution Control Board (TNPCB) has constituted a Local Area Environment Committee under the Environment Protection Act, 1986 to suggest means by which the problem could be solved. The TNPCB has banned dumping of waste and discharging sewage or industrial effluents into the Pallikaranai marshes. The TNPCB has also issued directions to the Commissioner, Corporation of Chennai to stop dumping of garbage at the Pallikaranai dump yard.
- **Environmental Management Plan:** Considering the threats and ground realities in the area, a detailed Management Plan is developed, that takes into account i) Protection, ii) Ecosystem restoration, iii) Transfer of land, iv) Research and monitoring and v) Outreach/ nature education. A detailed financial allocation required to execute this work in 10 years time frame has also been submitted with justifications for the respective items / heads.

19. Status of Blewitt's Owl in Araku Valley and Environmental Management Plan in View of the Proposed Bauxite Mines

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| Principal Investigator | : PA Azeez |
| Co-Princiapl Investigator | : S Bhupathy |
| Co-investigator | : S N Prasad |
| Research Fellows | : Rachna Chandra & T Selva Kumar |
| Duration | : 14 months |
| Start date | : October 2006 |
| Funding agency | : The Andhra Pradesh Mineral Development Corporation, Limited, Hyderabad |
| Total | : Sanction Amount : Rs. 11 Lakhs |
| Funds available for the reporting period | : Rs. 11 Lakhs |
| Status | : Completed |

Background

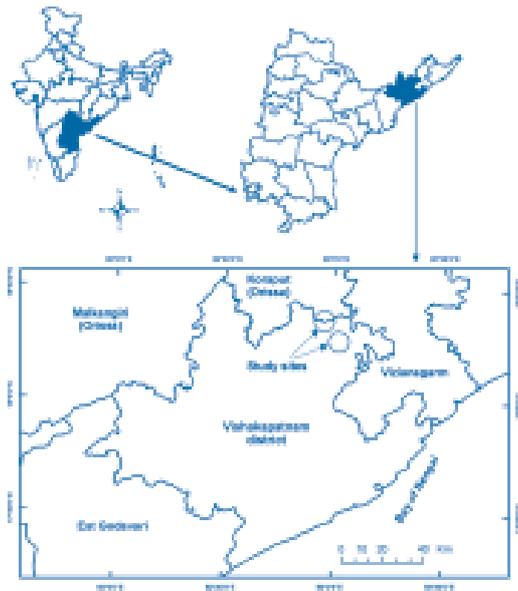
The bauxite deposits in India spread over mainly Orissa, Andhra Pradesh, Madhya Pradesh, Gujarat, Maharashtra and Bihar, of which Orissa alone constitutes over 42% of the total. 75% of the resource lies in the east coast of Andhra Pradesh and Orissa. The state of Andhra Pradesh has an estimated reserve of 550 million tonnes. In the district of Visakhapatnam the whole belt of Araku valley, which extends up to Orissa, has considerable deposits of bauxite. Andhra Pradesh Mineral Development Corporation Limited (APMDC) has proposed mining ventures at three bauxite-rich sites in the Araku valley namely Rakthakonda, Galikonda and Chittamgondi. There has been an unconfirmed report of a carcass of the Forest Owlet *Athene blewitti* (Forest Spotted Owlet or Blewitt's Owl), one of the least known endemic birds of India (Rasmussen and Collar 1998) from the valley. Hence, the APMDC commissioned a study to explore the presence of the species and propose an appropriate management of the area with reference to the *Athene blewitti's* habitats to the Sálim Ali Centre for Ornithology and Natural History (SACON).



Objectives

The major objectives of the present study were as follows:

- Explore the occurrence of Blewitt's Owl in Araku valley
- Assess the status and distribution of Blewitt's owl in the study area
- Study the habitat requirements of this species
- Examine the possible impacts of the mining activity on the long term survival of the species in the area, and
- Develop an Environmental Management Plan (EMP) for conserving/long term protection of the Blewitt's Owl, if present in the area.



Methods

Three locations namely Rakthakonda, Galikonda and Chittamgondi are identified for the bauxite mines, were the main focus of the study. However, we have covered the valleys and other areas that fall within approximately 10 km radial distance around these mine sites exploring for the target species as well as to document other ecological / habitat characteristics. SACON undertook the study during October 2006 to February 2008.

The study area was extensively surveyed to generate data on the occurrence, distribution, abundance and status of the target species, namely the Blewitt's owl, as well as other various plant and animal species. Standard methods were adopted for collecting all required data / information to develop an Environmental Management Plan (EMP) for the target species. To fulfill the objectives of the study it was essential that attempts were made to document the habitats and species composition of select fauna and floral taxa.

Results and Recommendations

- The target species of study the Blewitt's Owllet *Heteroglaux blewitti* was not recorded in the proposed mining sites. The species was also not recorded from the whole study area during the study period spanning over one year.
- The study area is rich in wild biodiversity. In all, 151 species of birds were recorded. 414 species of plants, 12 species of mammals, 70 species of butterflies, 8 species of spiders were also recorded there. It may be noted that the Araku valley is rich in owl species; 11 species are encountered from the area, several of which were nesting.
- The mine activities are likely to have impact on the local environment, especially on the biodiversity and wildlife. Proper work plan, management plan for debris and waste disposal, appropriately minimizing and scheduling blasting activities, controlled vehicular activity and safeguarding the slopes and valleys from the spill over impacts may help to mitigate the impacts.
- As the species targeted of the study was not encountered, an EMP for the conservation of the species seems redundant. However, it was felt that utmost care should be taken to eliminate stress on the slopes and valleys, and hence a general EMP is proposed. It is appropriate that the slopes and valleys are shielded from the impacts during mining. The large trees and rocky cliffs along the slopes of the hillocks are important for several species, especially the owls.
- From that standpoint of precautionary principle, we have supplemented some of the probable impacts of the mining activity and also deliberated upon applicable mitigation methods that may help to reduce the impacts.
- Looking at the need for resources in the country, the proposed project assumes importance. Nevertheless, the project construction and operation is likely to have notable impact in the area. It may be possible to lower the impact on the environment, biodiversity and wildlife with proper planning and implementing appropriate measures.





E. NATURE EDUCATION DIVISION

20. Nature Education Programmes for Coimbatore

| | |
|-------------|---|
| Coordinator | : P.Pramod, Nature Education Officer |
| Assistants | : J Gopal Samy, J. Reginald and K. Prabhu |
| Duration | : April 2007- March 2008 |
| Funding | : MoEF and Local Programme sponsors for selected programmes |

The following programmes were conducted under the head of 'nature education' for the period April 2007- March 2008.

Sálim Ali Nature Club Network

Sálim Ali Nature Clubs continued the dissemination of the love for nature, conservation concerns, scientific temperament and curiosity to learn among the student members in 100 schools. All the regular activities such as bird watching, nature camps, nature competitions and student research continued this year in about 100 schools and in SACON campus.

Laurels achieved by the members of Sálim Ali Nature Clubs

- National Children's Science Congress: Student members from 10 schools of Sálim Ali Nature Club network has participated enthusiastically in the district level of National Children's Science Congress 2007 and three of them got selected at the State level. One of them got selected to the National level receiving high appreciation.
- National Teachers Science Congress: Two teacher coordinators of Sálim Ali Nature Club network presented papers in the National Teachers Science Congress at Dehra Dun. The paper by Mr. V. Rajagopal from Govt. High school, Devarayapuram was selected for the oral presentation. The paper by Ms. Selvi of Kadri Mills Hr. Sec. School was selected as one of the best 30 poster presentations of the congress.
- Membership: In appreciation of the various kinds of environmental education works carried out through Sálim Ali Nature Clubs, Ms. Selvi was invited to be a member of a

national committee to develop NCERT text book on Environmental education.

Nature Camps for students of Coimbatore

Thirty five nature camps were conducted in SACON campus for 1756 students from a wide variety of educational institutions. Nature walks, short treks, field lectures, audio visual shows, film shows, debates and discussions were the major events in the camps. A wide variety of participants such as rescued street children, school and college regular students, NSS volunteers, M.Sc, Wildlife, Zoology and environmental science students Engineering and Law college students, Students of catering technology, and business management attended these camps during this period. The theme of the camps and contents varied according to the participants.

Wildlife Week Celebrations

In the first week of October, on the occasion of World Wildlife Week, Sálim Nature clubs of various schools conducted a range of programmes in the schools. Slideshows, lectures, screening of wildlife films and tree planting were conducted by the school students. Nature Education Officer of SACON attended the programs at two of the relatively new and non regular schools in the network (Isha Home School, Poondi and Sri Nehru Vidyalaya, R. S. Puram).

Sálim Ali Trophy Nature Awareness Competitions and Awards

This year 1200 students from 28 schools attended the Sálim Ali Trophy Nature competitions conducted on 7th October 2007. The competitions were conducted in 16 different categories and 138 students bagged the prizes. The Sálim Ali Trophy for the best school has gone to G. D. Matriculation Hr. Sec. School. Coimbatore.

Young Bird Watcher of the Year Contest

Bharat Ravikumar of SBOA Mat Hr Sec School (Junior), Vignesh K.R. of Kadrimills Hr. Sec. School (seniors) and Poornima M of PSGG Kanyagurukulam Hr. Sec. School for girls (Super seniors) were selected as the Young bird watchers of the year 2007.



Sálím Ali Birth Anniversary Celebrations

SACON celebrated 111th Birth Anniversary of Late Dr. Sálím Ali on 12th November with hundreds of school children. Mr. R. Kannan IFS, Conservator of Forests, Coimbatore was the chief guest. Dr. V. Ramakantha IFS, Principal, State Forest Service College, Coimbatore presided over the function. Winners of Sálím Ali Trophy Nature Competitions were given awards on the occasion

Student Research Programmes

Reports of the fifteen research projects on biodiversity and other environment related topics conducted by the student members of Sálím Ali Nature clubs were received. A few more schools are continuing the work. As all the children are in an examination mood in February, the 4th Children's Ecology Congress was postponed to July 2008.

Sálím Ali Naturalist Forum

Ten meetings and twelve field trips were conducted for Sálím Ali Naturalist forum members during this period. Thematic discussions were conducted and wildlife movies were screened in the meetings.

Other Nature Awareness Activities

Five teams of trainees and course participants from State Forest Service College visited SACON and lectures were organized for their benefit.

World Wetlands Day Programme

SACON observed World Wetlands Day on 2nd February 2008. SACON scientists, research scholars and Sálím Ali Naturalist forum members conducted bird watching. On the World

wetlands day, a bird watching and public awareness programme was conducted in Singanallur Lake. Students from four schools, SANF members and public participated in the program.

Teachers Training Programme

One day training programme was conducted for the teachers of Sálím Ali Nature club network member schools on 30th August 2008. Two scientific lectures, slideshows, discussions and planning of student projects and nature club activities for the next year were the events.

Training programme for Monitoring Wetland Biodiversity

A special training programme to study and monitor the biodiversity of wetlands were conducted on 6th and 7th of September. On the first day, four lectures on birds, butterflies, plants and diatoms were conducted and the second day hands on training was conducted in five major urban wetlands of Coimbatore. The teachers and students conducted the study in the field supervised by accompanying scientists.

Exhibition

SACON showcased its studies and products in the national exhibition of 'Biodiversity India' arranged by Malabar Botanical Garden at Calicut between 9th and 13th of February 2007. Thousands of people visited the SACON's stall.

Nature Education in Collaboration

- SACON associated with the Outreach Foundation, Coimbatore and conducted 10 camps on environmental awareness for College students. More than 500 students participated in these camps.
- In association with Siruthuli, Coimbatore, SACON conducted one day nature camp for 200 students of Coimbatore in the campus on 21st April 2007
- On behalf of SACON, Sálím Ali Naturalist Forum members and students participated in many wild life censuses and camps arranged by Tamil Nadu Forest Department.



21. DBT's Natural Resource Awareness Clubs for Andaman

| | |
|---------------------|--------------------------|
| Project Coordinator | : P.Pramod |
| Project Assistant | : Raja Mamannan M.A. |
| Budget | : Rs. 1620000/- |
| Source | : Dept. of Biotechnology |
| Status | : Ongoing |



Department of Biotechnology, Govt. of India has launched a programme called DNA clubs for making the students aware of the importance of our natural resources and to conserve the fast depleting resources through SACON. The DBT has entrusted the task of functioning as the Regional Resource Agency for Andaman to SACON through MS Swaminathan Research Foundation, Chennai.

The main aim of this programme is to establish DBT's Natural Resources Awareness Club (DNA Club) in the schools to create awareness about natural resources among students in order to equip them with relevant skills for bioresources conservation. The following are the objectives of the program:

- To promote interest and knowledge about the natural resources and the environment among the emerging generation
- To foster concern to protect the bioresources and natural heritage
- To increase awareness of the economic, cultural, scientific and aesthetic values of fauna and flora

- To provide opportunities to acquire attitudes, values and skills needed to protect and improve the natural environment, and
- To make aware of the impact that emerging technologies (including biotechnology) have on maintenance and enhancement of Bioresources.

One school each was selected from North Andaman, South Andaman and Little Andaman and two from Middle Andaman. All these schools together represent geographical, socio - cultural, linguistic and economic diversity of Andaman Islands. One of these is Kendriya vidyalaya and the others are local Government schools.

The schools selected for the program were

- 1) Kendriya Vidyalaya No.1, Port Blair, South Andaman
- 2) Govt. Senior Secondary School, Diglipur, North Andaman
- 3) Govt. Senior Secondary School, Sabari Jn. Rangat, Middle Andaman
- 4) Govt. Model Senior Secondary School, Mayabundar, Middle Andaman
- 5) Govt. Senior Secondary School, Hut Bay, Little Andaman

Progress

The clubs were initiated in all the schools with 60 students in each school with a total of 300 students. Invited guest lectures were arranged in all the schools on the biodiversity and conservation issues specific to that area. An essay competition on the topic "Nurture Nature for our future" was conducted among the members of the DNA clubs in all the schools.

Orientation Workshop for Teacher Coordinators

Nine DNA club coordinators (teachers) from five selected schools participated in the three day workshop conducted in the Auditorium of Mini Zoo, Haddo, Port Blair. The programme was inaugurated by Mr. S.K. Sethi, Deputy Education

Officer (Science) in a function presided over by Mr. Graham Durai, Deputy Conservator of the Forests (Wildlife), Port Blair. Members were given lectures and field demonstrations on various bioresources and biodiversity by the Principal coordinator. The future programmes planned for DNA clubs were discussed in detail with objective and methods. Doubts of the participants clarified and a comprehensive plan of action for each of the schools were worked out taking into consideration of the specific location and facilities available and other factors faced by the schools. A common minimum programme and detailed programme list were developed. Equipment needed for conducting the programmes were charted out for each of the schools. The budgetary requirements for the

programme and the installments were also worked out. Third day of the programme the teachers were taken to Central Agricultural Research Institute, Botanical Survey of India and Zoological Survey of India in Port Blair for exposure. Lectures were arranged in all these institutes by the scientists, museums, field demonstration plots and facilities available in these centers were explained to the participants for future activities.

Thirty DNA club members of Kendriya Vidyalaya, Port Blair were taken for Laboratory visit to CARI and introduced the museum and Animal husbandry division. A lecture by Dr. George was given to them on the issue of life and conservation of Corals and coral reefs.



UNIVERSITY DEPARTMENTS



One more feather in the cap of SACON. Mr Debanik Mukherjee, a research scholar of SACON, has been awarded "Maniben Kirtilal Mehta Endowment - Gold Medal" as his Ph.D. thesis was adjudicated as the best Ph.D. thesis in Zoology submitted during the year 2007-2008. The Gold medal was awarded to Mr Debanik Mukherjee at the XXIII Convocation which was held on 8.2.2008 in the Bharathiar University, Coimbatore by the Honourable Governor of Tamil Nadu, Thiru Surjit Singh Barnala.

| Name of the Guide | Name of the student | Course | Topic of Research | Status |
|--|---------------------|--------|--|------------------|
| V.S. Vijayan Director (Retd.) | P. Balakrishnan | Ph.D | Status, distribution and ecology of the Grey-headed Bulbul <i>Pycnonotus priocephalus</i> | Thesis submitted |
| Lalitha Vijayan | S. Somasundaram | Ph.D | Status and ecology of the Nilgiri Wood Pigeon | Awarded |
| | Uma J. Vinod | Ph.D | Status and ecology of the Nilgiri Pipit | Awarded |
| | K. S. Anoop Das | Ph.D | Monitoring the bird community in the Silent Valley National Park | Thesis submitted |
| | Bhoj Kumar Acharya | Ph.D | Bird communities along the elevation gradient of Teesta Valley, Skim | Thesis submitted |
| | Raja Mamannan M. A. | Ph.D | Avifaunal diversity of the Andaman Islands | Ongoing |
| | Ezhilarasi N. | Ph.D | Status and ecology of the Andaman Crane | Ongoing |
| | Sheeba N. | Ph.D | Ecology and conservation of Spot-billed Pelican <i>Pelecanus philippensis</i> | Ongoing |
| | Deivanayaki. M | M.Phil | An assessment of the spatial distribution pattern and status of birds in the Nilgiris, Tamil nadu | Ongoing |
| Ravi Sankaran | Shirish Manchi | Ph.D | <i>In-situ & Ex-situ</i> conservation of the Edible-nest Swiftlet <i>Collocalia fuciphaga</i> in the Andaman & Nicobar Islands | Ongoing |
| | Madhuri Ramesh | Ph.D | Ecology of the Indian Spiny tailed lizard <i>Uromastyx hardwickii</i> in the Great Indian Desert | Ongoing |

| Name of the Guide | Name of the student | Course | Topic of Research | Status |
|------------------------------|-----------------------|--------|---|-------------------------|
| S Bhupathy | Debanik Mukherjee | Ph.D | Resource Utilization Patterns of Reptiles in the Tropical Dry mixed Forests of Anaikatty Hills, Western Ghats, India. Ph.D. Thesis. Bharathiar University, Coimbatore | Awarded (Gold medalist) |
| | Basundhara Chettri | Ph.D | Distribution and Resource Use Patterns of Reptiles along the Teesta Valley, Eastern Himalayas, Sikkim, India. | submitted |
| | Joya Thapa | Ph.D | Ecology of Small Mammals along the Teesta Valley, Siukkim, Eastern Himalaya | Ongoing |
| | J. Gokula-krishnan | Ph.D | Ecology of Sea turtles along the Nagapattinam Coast, Bay of Bengal | Ongoing |
| | G. Srinivas | Ph.D | Ecology of amphibians in High Wavy Mountains, Western Ghats | Ongoing |
| | N. Sathis Kumar | Ph.D | Ecology of Reptiles in High Wavy Mountains, Western Ghats. | Ongoing |
| | C. Ramesh | Ph.D | Ecology of Indian Python in Keoladeo National Park, Bharatpur | Ongoing |
| P Pramod | L. Josheph Reginald | Ph.D | Diversity and habitat preference of bats (Order Chiroptera) of Coimbatore | Ongoing |
| BOTANY | | | | |
| P Bala-subramanian | M Gunasekaran | Ph.D | Sthalavriksha practice in conservation of plant biodiversity in Tamil Nadu | submitted |
| | E Santhosh-kumar | Ph.D | Ecology of seed dispersal by Indian Grey Hornbill in Southern Eastern Ghats | Ongoing |
| | R Aruna | Ph.D | Studies on seed germination and nursery techniques of some bird- dispersed trees in Western Ghats | Ongoing |
| ENVIRONMENTAL SCIENCE | | | | |
| P A Azeez | B. Anjan Kumar Prusty | Ph.D | Humification and trace metal dynamics in a wetland sediment: The case of KNP, Bharatpur, India | Ongoing |
| | Baladhandapani | Ph.D | A Techno-economic evaluation of common effluent treatment plants (CETP) in Tiruppur | Submitted |
| | Nikhil Raj | Ph.D | Ecological evaluation of Bharatapuzha basin with emphasis on the hydel projects | Ongoing |
| | J Ranjini | Ph.D | Adaptation and tolerance of birds to urbanization - a critical evaluation with emphasis on life strategy | Ongoing |
| | R Dhanya | Ph.D | Urbanization and environmental transition: a study of the impact of developmental activities with special reference to EMR on the House Sparrows | Ongoing |
| | Balakumar | M Phil | Avian flu in the context of diminishing genetic diversity and increasing conflict of resource sharing among wild and domestic species | Ongoing |



| Name of the Guide | Name of the student | Course | Topic of Research | Status |
|-------------------|---------------------|--------|---|------------------|
| S Muralidharan | R Jayakumar | Ph.D | Heavy metal contamination in Inland Wetland of India | Awarded |
| | V. Dhananjayan | Ph.D | Impact of Environmental Contaminants in Indian Avifauna | Ongoing |
| | A. Alaguraj | Ph.D | Organic contaminants in the Marine fishes available in Coimbatore and their suitability for Human consumption | Ongoing |
| | P. Jayanthi | Ph.D | Organochlorine Pesticides residues in the commercial marine fishes of Coimbatore and their suitability for human consumption | Ongoing |
| | S. Jayakumar | Ph.D | Impact of agricultural pesticide on population status and breeding success of select species of fish-eating birds in Tamil Nadu | Ongoing |
| | S. Sindhu | M.Phil | Physico-chemical properties of water, sediment and accumulation of select heavy metals in fishes collected along the harbour line, Mumbai | Thesis submitted |
| | Vinny R Peter | M.Phil | Persistent Organochlorine Contaminants in Sediment, Water and Fishes from Harbour Line, Mumbai | Thesis submitted |



WORKSHOPS, CONFERENCES & TRAINING PROGRAMMES

BRAINSTORMING SESSION ON 'PLANET EARTH'



In commemoration of the Year of Planet Earth and for the development of an activity guide for the National Children's Science Congress 2008, a brain storming session on the theme was organized by SACON during 10-13th October 2007 in collaboration with NCSTC-Network supported by RVSP, Department of Science and Technology. Twenty-five scientists from 13 organizations participated in the session.

TRAINING PROGRAMME



Two training programmes on Instrumentation and Analytical Techniques were organized by the Division of Ecotoxicology during the year, Dr. Lakshmanaperumalsamy, Professor and Head, Bharathiar University, and Dr. V Ramakantha, IFS, Principal, State Forest Service College, Coimbatore inaugurated the programme. Altogether, 48 students from the premier academic institutions, namely Bharathiar University, PSG College of Arts & Science, PSGR Krishnammal College of Arts and Science, Sri Krishna College of Arts and Science, Kongunadu Arts and Science College, participated in the exercise. The course was designed to give the students theoretical and practical exposure to various analytical tools towards qualifying and quantifying many inorganic and organic constituents in a variety of biological and non-biological matrixes.



OTHER ACTIVITIES

Analytical Service to Industries and Academic Institutions

We continued to extend analytical service to industries and academic institutions. During the referred period DI Oils, Santhi Gears, Alpha Labs, Apparel Care Testing, Wildlife Institute of India, Kongu Nadu College of Arts and Science and NGP College availed our facilities.



PUBLICATIONS

A. Publications - Journals

Anitha. K. & S. N. Prasad (2007). Mass flowering and pollinators of *Strobilanthes consanguinea*. *Current Science*, 92: 1680-1681.

Anitha. K., P. Balasubramanian & S. N. Prasad (2007). Tree community structure and regeneration in Anaikatty hills, Western Ghats. *Indian Journal of Forestry*, 30 (3): 315- 324.

Anitha. K., S. Narendra Prasad & Shijo Joseph (2007). Meeting report on Ecosummit 2007 "Ecological Complexity and sustainability: Challenges and opportunities for 21st century". *Current Science*, 93: 600-601.

Azeez PA & BAK Prusty (2008). Transition metals in decomposing macrophytes in a wetland system. *Asian Journal of Water, Environment and Pollution*, 5: 27-36.

Basundhara Chettri & S. Bhupathy (2007). Reptile Fauna of Sikkim with Emphasis to Teesta Valley, Eastern Himalayas, India. *Journal of Hill Research*. 20 (1): 1-6.

Bhupathy, S, J. Subramanean & M. Vijay (2007). Nesting of *Lepidochelys Olivacea* along the South Chennai coast with emphasis on habitat characteristics. *Hamadryad* 31(2): 274-280.

Chandra R, BAK Prusty, D Mythily, SR Sarimol & PA Azeez (2007). Nutrients and alkali metal distribution in the top soil of bauxite rich hillocks in Araku Valley, Andhra Pradesh, India. *Environmental Science: An Indian Journal* 2(3): 145-153.

Mukherjee, D. & S. Bhupathy (2007). A New Species of Wolf Snake (Serpentes: Colubridae: *Lycodon*) from Anaikatti Hills, Western Ghats, Tamil Nadu, India. *Russian Journal of Herpetology* 14 (1) : 21-26.

Nixon, A.M.A. & S.Bhupathy (2007). Occurrence of *Melanobatrachus indicus* Beddome, 1878 in Mathikettan Shola, Western Ghats. *J. Bombay Nat. Hist. Soc.* 104(1): 105-106.

Pattanaik Chiranjibi & C. S. Reddy (2007). Need for conservation of wetland ecosystems: A case study of Ansupa Lake (Orissa, India) using remote sensing

based data, *National Academy Science Letters*, 30 (5&6): 161-164.

Pattanaik Chiranjibi, C. S. Reddy & A. K. Biswal (2007). Life forms and biological spectrum of Bhitarkanika National Park, Orissa, *Indian Journal of Forestry*, 30(3): 307-313.

Pattanaik Chiranjibi, C. S. Reddy & M. S. R. Murthy (2008). An ethnobotanical survey of medicinal plants used by the Didayi tribe of Malkangiri district of Orissa, India. *Fitoterapia*, 79(1): 69-71.

Pattanaik Chiranjibi, C. S. Reddy & P. Manikya Reddy (2007). Mangroves of Orissa coast: Status, exploitation and conservation strategies for sustainable development, *National Academy Science Letters*, 30 (7&8): 213-216.

Pattanaik Chiranjibi, S. N. Prasad & C. S. Reddy (2008). Warning bells in Ansupa Lake, Orissa. *Current Science*, 94(5): 560.

Pattanaik Chiranjibi, S. N. Prasad, Nidhi Nagbhatla & C. M. Finlayson (2008). Kolleru regains its grandeur. *Current Science*, 94(1): 9-10.

Prusty BAK & PA Azeez. Role of detritus on trace metals in wetland-terrestrial systems: A review. *Environmental Science: An Indian Journal*. 2 (2) : 109-129.

Prusty BAK & PA Azeez. Vertical distribution of Alkali and alkaline earth metals in the soil profile of a wetland ecosystem complex in India. *Australian Journal of Soil Research* 45:533-542.

Prusty BAK, PA Azeez & EP Jagadeesh (2007). Alkali and transition metals in macrophytes of a wetland system. *Bulletin of Environmental Contamination and Toxicology* 78: 405-410.

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Prusty BAK, R Chandra & PA Azeez (2008). Vertical and temporal variation of Zn in the soils of a multiple habitat system. *Journal of Food, Agriculture and Environment* 6(2): 381-387.



- Prusty BAK, R Chandra & PA Azeez (In Press). Biodiesel: freedom from dependence on fossil fuels?. *Journal of Environment and Energy*.
- Prusty BAK, R Chandra, PA Azeez & LL Sharma (2007). New additions to the ichthyofauna of Keoladeo National Park, a world heritage site in India. *Zoos' Print Journal* 22(10): 2848-2852.
- Reddy, C. S. & Chiranjibi Pattanaik (2007). *Argemone ochroleuca* Sweet (Papaveraceae) - A new record to Andhra Pradesh. *Zoos' Print Journal*, 22(12): 2949.
- Reddy, C. S. & Chiranjibi Pattanaik (2007). Mangrove vegetation assessment and monitoring in Balasore district, Orissa using remote sensing and GIS. *National Academy Science Letters*, 30 (11&12): 377-381.
- Reddy, C. S., Chiranjibi Pattanaik, A. Mohapatra & A. K. Biswal (2007). Phytosociological observations on tree diversity of tropical forest of Similipal Biosphere Reserve, Orissa, India. *Taiwania*, 52(4): 352-359.
- Reddy, C. S., Chiranjibi Pattanaik, E. N. Murthy & V. S. Raju (2008). Mapping and monitoring of *Calamus rotang* L. in the adjoining areas of Ramappa Lake, Andhra Pradesh using remote sensing and GIS. *Current Science*, 94(5): 575-577.
- Reddy, C. S., Chiranjibi Pattanaik, E. N. Murthy & V. S. Raju (2007). *Sirhookea latifolia* (Wight) Kuntze (Orchidaceae) – A new record for the Eastern Ghats, India. *Zoos' Print Journal*, 22(12): 2925.
- Reddy, C. S., K. N. Reddy, K. T. Rao & Chiranjibi Pattanaik (2007). Ethnobotanical studies on medicinal plants used by the Chenchus of Nallamalais in Kurnool district, Andhra Pradesh, India. *Research Journal of Medicinal Plants*, 1(4): 128-133.
- Reddy, K. N., Chiranjibi Pattanaik, C. S. Reddy, E. N. Murthy & V. S. Raju (2008). Plants used in traditional handicrafts in north eastern Andhra Pradesh, India. *Indian Journal of Traditional Knowledge*, 7(1): 162-165.
- Reginald, J L., Mahendran.C., Suresh kumar. S. & Pramod. P. 2007. Birds of Singanallur Lake, *Zoos, Print Journal* 22(12) 2944-2948.
- Sahu, S. C., N. K. Dhal, C. S. Reddy, Chiranjibi Pattanaik & M. Brahmam (2007). Phytosociological study of tropical dry deciduous forest of Boudh district, Orissa, India, *Research Journal of Forestry*, 1(2): 66-72.
- Seedikkoya K, PA Azeez & EAA Shukkur (2007). Cattle Egret as a biocontrol agent. *Zoos' Print Journal* 22(10): 2864-2866.
- Zubair M, EAA Shukkur, PA Azeez & EA Jayson (2007). Diurnal rhythm and movement pattern of Peregrine Falcon *Falco peregrinus* in captivity in United Arab Emirates. *Zoos' Print Journal* 22(11): 2888-2890.

B. Papers in conferences / seminar / Proceedings / edited volumes

Anitha K, Shijo Joseph & S. N. Prasad (2007). Structural analysis of plant communities in human dominated landscapes using small-scale permanent plots in Western Ghats. Paper presented in *Ecosummit 2007* held at Beijing during May 22-27.

Anitha. K, Shijo Joseph & S. Narendra Prasad (2008). *Strobilanthes*: Promising Indigenous ornamental plants from Western Ghats, India. (In) Underutilised horticultural crops. (Ed) Peter K V. New India Publishing Agency, New Delhi. (In Press).

Anitha. K, Shijo Joseph, S. Narendra Prasad, E. V. Ramasamy & A. P. Thomas (2008). Regeneration assessment of human dominated low altitude mixed dry deciduous forest: a case study from Anaikatty Hills, Western Ghats. (In) Proceedings of National Conference on Biodiversity Conservation and Human well-Being organized by Osmania University – (In Press).

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Balasubramanian, P., Venkitachalam, R. & Santhoshkumar, E. 2007. Hornbill conservation in the Eastern Ghats. *Proceedings of the National Seminar on Conservation of Eastern Ghats*, EPTRI, Hyderabad.

Chettri, B., Acharya, B K., Bhupathy, S., & Vijayan, L. 2008. A proposal for the prioritization of conservation areas based on species in the Teesta Valley, Sikkim. International conference on

"Biodiversity conservation and management". 3-6 February 2008. Cochin University of Science & Technology. Abstract. Page 64.

Deivanayaki, M. & Vijayan, L. 2008. Diversity of birds in different habitats of Nilgiris, Western Ghats. Abstract. National level seminar on "Biodiversity of natural sholas and its conservation in Nilgiris". Emerald Heights College for Women, Udhamandalam. 27-28 March 2008.

Dhananjayan V & Muralidharan S (2007). Acetyl and Butyrylcholinesterase activity - A Tool to Assess Exposure to Environmental Contaminants in Birds. International Conference on "New Horizons in Biochemistry and Biotechnology" held at NIIST, Tiruvananthapuram, Kerala, 26-29 November 2007.

Dhananjayan V, Rajanandhini G & Muralidharan S (2008). Plasma Carboxylesterase As Non-Destructive Biomarker In Wild Life Studies. National Seminar on Thrust Research Areas in Modern Biosciences. Organized By Departments of Biochemistry, Microbiology & Biotechnology PSG College of Arts & Science, Coimbatore. 24-25th January, pp-9-10.

Dhanya R, J Ranjini & PA Azeez (2008). Conserving an urban wetland – the case of Pallikarai, Tamil Nadu, India. International conference on Biodiversity Conservation and Management, Cochin University of Science and Technology, Cochin, Kerala, 3-6 February 2008.

Ezhilarasi, N. & Vijayan, L. 2008. Habitat requirement for breeding of Andaman Crane and its conservation. International conference on Biodiversity Conservation and Management. 3-6 February 2008, Cochin University. Abstract. Page 173 -174.

Jayakumar R & S Muralidharan (2007). Elemental contamination in freshwater fishes of Tamil Nadu. In: Proceedings of International Conference on New Horizons in Biotechnology organized by Biotechnology Research Society and National Institute for Interdisciplinary science and technology (CSIR), Trivandrum, India. 26th – 29th November 2007.

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Karthik, C., Priyadharshini, S., Somasundaram, S. & Vijayan, L. 2008. Butterfly Diversity and Community Structure in the Upper Nilgiris, Western Ghats. In Proc. of workshop on "Recent trends in advances in zoology". Department of Zoology, Government Arts College, Coimbatore. Pp. 29-30 (abstract).

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Pattanaik Chiranjibi & S. N. Prasad (2007). Forest Biodiversity in Andhra Pradesh. One-day workshop on Forest Biodiversity Workshop organized by Andhra Pradesh Biodiversity Board, 7th December, Hyderabad.

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Pattanaik Chiranjibi & S. N. Prasad (2008). Attended the Evaluation workshop of ENVIS Centres in Southern Region, 2nd -5th January 2008, Indian Institute of Chemical Technology (IICT), Hyderabad.

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C. Newsletters :

Pattanaik Chiranjibi, L. Vijayan, and S. N. Prasad (2007). *SAROVAR SAURABH Newsletter*, Vol-3, No-3, pp 1-7.

Pattanaik Chiranjibi, S. Gaikwad, L. Vijayan, & S. N. Prasad (2007). 'Wetland Informatics', *SAROVAR SAURABH Newsletter*, Vol-3, No-2, pp 1-4.

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D. Books

Pramod, P, Sharma J.K, Kunhikrishnan E, Ravikumar, U.N, & Chathopadhyaya, S. (Eds) (2008) *Planet Earth : Our home, Explore, Care and Share*. Published by NCSTC Network and RVSP-DST, Government of India. Pp.

Pramod P, (Ed) (2008) *Eco-learning*. Published by Sálím Ali Centre for ornithology and Natural History, Coimbatore pp.

E. Reports

Azeez, PA S Bhupathy, J Ranjini and R Dhanya & PP Nikhilraj (2007). Management plan for the Eco-restoration of Pallikaranai Reserve Forest. Submitted to the Department of Environment and Forests, Government of Tamil Nadu, Chennai.

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Azeez, PA S Bhupathy, S N Prasad, Rachna Chandra & T Selva Kumar (2008). Status of Blewitt's Owl in Araku Valley and Environmental Management Plan in View of the Proposed Bauxite Mines. Report Submitted to: The Andhra Pradesh Mineral Development Corporation, Limited, Hyderabad.

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Lalitha Vijayan, Prasad SN, Muralidharan S, Bhupathy S, Zabin AP Dhananjayan V & P Jayanthi (2007). Mumbai Trans Harbour Sea Link (MTHL) Project: Study of Flamingos and Migratory Birds. Second Interim Report submitted to Maharashtra State Road Development Corporation (MSRDC), Mumbai, April 2007.

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Mariantony, P. Vijayan, L. & Somasundaram, S. 2008. Status and population ecology of the Black Kite *Milvus migrans* in Coimbatore, south India. Project report and M. Sc. Dissertation of Mr. Mariantony, P., AVC College, Mayiladuthurai, Bharathidasan University.

Muralidharan S, Sivasubramanian C, Dhananjayan V & Jayakumar S (2008). Impact of agricultural pesticides on population status and breeding success of select species of fish-eating birds in Tamil Nadu. Annual Progress Report. pp iv-32.

F. Talks Delivered

Balasubramanian P (2007) "Plant-Animal interactions". Tamil Nadu State Forest Academy, Coimbatore. 23 October, 2007.

Balasubramanian P (2007) "Plant animal Interactions". One day Seminar on Current Trends in Forest Botany. 19 March, 2008. Bharathiar University, Coimbatore.

Balasubramanian P (2007) "Plant-Bird interactions in Nilgiri Biosphere Reserve". In Seminar on Conservation Issues of NBR. Tamil Nadu Forest Department, Sathyamangalam. October 12, 2007.

Balasubramanian P (2007) "Plants and Avifauna of Shola forests, Upper Nilgiris". One day Workshop on Conservation of Shola forests. Tamil Nadu Forest Department, Ooty. 25 October, 2007.

Muralidharan S (2007) "Impact of Pesticides on Avifauna" lecture delivered at the training course on "Pesticides and Environment" organized by Tamil Nadu Agricultural University, Coimbatore - 1st February 2008.

Muralidharan S (2007) "Protocol for Toxicological Studies" delivered lecture on a General Refresher Course for the in-service SFSC, Coimbatore-24.07.2007.

Muralidharan S (2007) "Use of Gas Chromatograph in Wildlife Toxicological Studies" lecture delivered at the training course on Instrumentation and Entomological Research" organized by TNAU, Coimbatore - 27th March 2008.

Muralidharan S (2007) Environmental Toxicology to lecture delivery to UGC-ASC, sponsored at Bharathiar University-12.09.2007.

Muralidharan S (2007) EWC-USEFI attended the long meeting on environmental issues at Chennai. 21 September 2007.

Muralidharan S (2007) Impact of environmental contaminants on birds. Lecture delivered – Wildlife week celebration at the Avinashilingam University, Coimbatore – 14th December 2008.

Muralidharan S (2007) Impact of heavy metal pollution on species diversity in various ecosystems with special reference to wetlands" lecture delivered on ICAR sponsored short term course on heavy metal contamination in soil and their remediation by physico-chemical and biological methods organized by TNAU, Coimbatore - 14th December 2007.

Muralidharan S (2007). Impact of Environmental Contaminants on Indian Wildlife" for the Training cum Workshop on Biodiversity Conservation for the inservice SFSC, Coimbatore - 9.07.2007.

Pramod P (2007)"Animal adaptations". Isha Vidya International School, Coimbatore. 19 January, 2008.

Vijayan, L. 2007. Conservation of Wetlands and wetland birds. Invited lecture on 14.11.2007 in a National Seminar, "Geo-aqua Convention-'07".14-15 November 2007, Vimala College, Thrissur.

G. Popular Articles:

Pramod P: Remembering Sálim Ali: The Hindu 12thNovember 2007.

Pramod P. Think globally and Act locally: Don bosco magazine February 2008.

Kunhikrishnan E and Pramod P. Biodiversity: the celebration of the life on earth.Don Bosco magazine February 2008.

Joseph Reginald L, Pramod P. Wetlands and not wastelands Don bosco Magazine February 2008.

H. Chapters in books

Vijayan, L. 2007. The Sálim Ali I knew. In: V S Vijayan (Ed.) "Sálim Ali: a unique personality". Sálim Ali Foundation, Coimbatore.

I. Participation in Seminar / Conference /Meetings :

Pramod P. National Children's Ecology Congress of NCSTC-Network and RVPSP, DST 26th-31st December 2007 at Vidya Pradistan, Baramathi, Pune.

Pramod P. National Orientation Workshop on Planet Earth by NCSTC-Network & DST, at Sevakenda, Kolkata 14-16th March 2008.

Pramod P. National Seminar on Conservation of Sholas at Ooty; Lead paper 27th March 2008.

Pramod P. Orientation programme on Teaching Techniques / Pedagogical Methods to college teachers on 1st March 2008.

Pramod P. Vatavaran Environmental film Festival. 2007, at India Habitat Centre between 12 to 16th September 2007.

Pramod P. Discussion meeting on people's Biodiversity knowledge and Open forum on the occasion of the release of the book Forest plants of the Eastern Biosphere Reserve – an illustrated field guide; at Ooty on 9th April 2007.

Pramod P. International Summit on Climate Change: at India Habitat Centre, New Delhi on 13th September 2007.

Pramod P. National Seminar and Panel discussion on the Conservation and livelihood at India Habitat Centre New Delhi on 15th September 2007.

Pramod P. National Seminar on the state of Indian Rivers at India Habitat Centre New Delhi on 14th September 2007.

Pramod P. Stakeholder's workshop on Conservation of Southern Western Ghats Landscape at Munnar.

Pramod P. Workshop on Education for Sustainable development Organized by WWF India at Chennai on 3rd and 4th December 2007.

Pramod P. National Brainstorming workshop on Planet Earth for developing an activity guide for the National Children's Science Congress 2008. at Coimbatore 10th to 14th October 2007.





STAFF OF SACON

Scientific

| | |
|---------------------------------|--|
| Director Incharge | : Dr. P. A. Azeez |
| Conservation Ecology | : Dr. Lalitha Vijayan, Sr. Principal Scientist Dr. Ravi Sankaran, Sr. Scientist Dr. S. Bhupathy, Sr. Scientist |
| Landscape Ecology | : Dr. S. N. Prasad, Sr. Principal Scientist Dr. P. Balasubramanian, Sr. Scientist |
| Ecotoxicology | : Dr. S. Muralidharan, Sr. Scientist |
| Environmental Impact Assessment | : Dr. P. A. Azeez, Sr. Principal Scientist |
| Nature Education Division | : Dr. P. Pramod, Nature Education Officer |

Technical

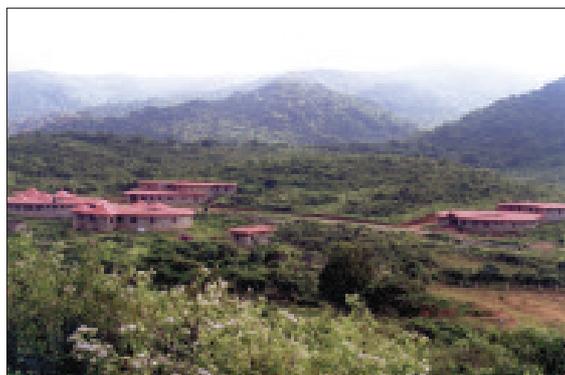
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| Library & Documentation | : Mr. M. Manoharan, Library Assistant |
|-------------------------|---------------------------------------|

Administration & Finance

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|--------------------------------|---|
| Senior Finance Officer | : Mrs. Jayashree Muralidharan (on EOL since I.I.2007) |
| Finance Officer | : Mr. P. Karupiah (Since I.I.2007 on contract) |
| Junior Admn. Manager | : Mr. R. Jayakumar |
| Personal Assistant to Director | : Mr. V. Vaidiyanathan |
| Administrative Assistant | : Ms. T. Rajapraba |
| Accounts Assistant | : Mrs. R. Sri Vidhya |
| Office Assistant | : Mrs. R. Rajalakshmi |
| Stenographer | : Mr. M. Eanamuthu |
| Receptionist | : Mrs. M. Jayageetha |
| Site Engineer | : Lt Col. N Sundararaj (On contract) |
| Computer Assistant | : Mr. A. Srinivasan (On contract) |
| Drivers | : Mr. R. Ravi and P. Subramanian |
| Office Attendant | : Mr. A. Devaraj and Mrs. V Santhalakshmi |

INFRASTRUCTURE

Campus



SACON's location at Anaikatty with the backdrop of the Western Ghats, one of the 'hot spots' of biodiversity in the world, offers endless opportunities to undertake long-term studies on various aspects of its varied avifauna and on the biological principles and phenomena involved in the functioning of the ecosystems. The tri-junction of Kerala, Tamil Nadu and Karnataka in the Western Ghats, one of the best wildlife areas in the country having a large extent of Protected Areas, is only a few hours drive away. SACON sets up field stations in various parts of the country according to the requirements of the research projects.

SACON was selected by M/s Residents Awareness Association of Coimbatore (RAAC), in association with the British Scholars



Coimbatore Chapter, as '**Eco Friendly Office -2008**' for its building at Anaikatty. The RAAC is a voluntary service organization formed for the purpose of generating public opinion and creating public awareness to increase the basic civic infrastructure of Coimbatore and to emphasize sustainable development not affecting the resources.

Laboratory facilities

Currently, the SACON laboratory is equipped with the following:

(1) UV Spectrophotometer, Perkin Elmer Model Lambda (2) HPLC Agilent Technology Model 1100 series with DAD and Florescence detector (3) Ultra Deep Freezer (-80° C), New Brunckswick (4) Flame Atomic Absorption Spectrophotometer (AAS) Perkin Elmer, Model 3300 with 13 lamps for analyzing metal residues (5) Graphite Furnace Atomic Absorption Spectrophotometer for analyzing metal residues (6) Mercury Hydride Generator for AAS, Perkin Elmer for analyzing mercury and other hydride forming elements (7) Gas Chromatograph, Hewlett Packard Model 5890 Series II with three detectors, (Electron Capture Detector - ECD, Nitrogen Phosphorous Detector -NPD and Flame Photometric Detector -FPD) for analyzing pesticide residues and organic pollutants (8) Microwave Digestion System, Milestone Model 1200 for digesting samples for analysis in the AAS (9) Dissolved Oxygen (DO) Analyzer (10) Biochemical Oxygen Demand (BOD) Incubator (11) Flame Photometer (12) Vertical Laminar Flow Chamber (13) High volume air sampler for sampling suspended particulate matters (SPM), Oxides of Nitrogen (NO_x) and Sulphur (SO_x) (14) Ultra Centrifuge (15) Walk-in cold room (16) Rotary Flask Evaporator (17) Micrometer (18) Digital Camera (19) Thermo-hygrometer (20) All Quarts Double Distillation unit (21) Millipore water purification system and (22) Water Quality analyzer- Multi Parameter TROLL - 9500.

For safeguarding the above equipment from frequent electricity fluctuations, an Uninterrupted



Power Supply (15 KVS) with five hours backup has also been installed in the laboratory.

Computer facilities

Under the E-governance funding scheme of the MoEF, Govt. of India, SACON has acquired computers and other accessories to the tune of Rs. 40/- lakhs. The leased-line internet connectivity was disbanded due to its ineffectiveness because of the terrain where SACON is located. In place, SACON has acquired round-the-clock uninterrupted Broadband (Dataone BSNL) internet connectivity facility with a speed of 512 kbps -2 mbps connected through a Local Area Network. Almost, all Scientists of SACON have been provided with a laptop computer. All research and administrative divisions of SACON are provided with desktop computers, scanners and software for automation of their work. The common computer facility of the centre currently has two servers, 10 desktop computers, and colour and ordinary scanner in addition to the existing facilities for the use of research students of SACON and visiting scientists. Apart from the above, we have purchased three 10 KVA UPS having three hours power back up.

Library

A total of 332 books, 127 Back volumes and electronic versions of high impact books/ journals/reports such as The Fauna of British India: Birds. Vol.1-4, The Journal of the Bombay

Natural History Society (Vol.1, 2, 4-6, 18 & 26) and 47 reports of Development Dialogue (1972-2007) have been added to the Library during 2007-2008.

The current holding of the library is 3145 Books, 2508 Back volumes of periodicals, 74 Current periodicals (Indian -43; International - 31), 2706 maps and 71 CD ROM/DVD of reference materials including, Birds of the World, Maps of India, Maps of World, 3D Atlas, World of Animals, Village Population of India, Population of Cities, Census of India etc..

All the documentary and non-documentary resources of the Library is being computerized with bar code facility. Online Public Access Catalogue (OPAC) and Digital Library are initiated with the help of Smart Library Software for reference and circulation control. Local Area Network (LAN) - Intranet connectivity of SACON has been linked with the server of the Library to facilitate online reference. Users have access to the CD-ROM databases in the library. A high resolution document scanning facility with the capacity to scan 70 pages per minute and a high speed digital multitasking photocopy machine are available in the Library for the use of researchers.

Facility for literature searches through internet has been provided to the staff and students. As in the previous years, the library facilities were kept accessible for students, scholars and scientists from other institutions as well.



APPENDIX - 1 MEMBERS OF THE SACON SOCIETY

| | | | |
|----|--|----|---|
| 1 | Shri Namo Narayan Meena, President – SACON Society Hon'ble Minister of State for Environment and Forests Ministry of Environment and Forests, Government of India New Delhi | 2 | Mrs Meena Gupta, IAS Chairperson – SACON (GC) & Secretary to the Govt. of India Ministry of Environment and Forests Paryavaran Bhawan CGO Complex, Lodhi Road New Delhi – 110 003 |
| 3 | Mr Bharat Bhushan, IAS Jt. Secretary & Financial Advisor Government of India Ministry of Environment and Forests Paryavaran Bhawan CGO Complex, Lodhi Road New Delhi – 110 003 | 4 | Mr A K Goyal, IFS Jt. Secretary to the Govt. of India Ministry of Environment and Forests Paryavaran Bhawan CGO Complex, Lodhi Road New Delhi – 110 003 |
| 5 | Mr P R Sinha, IFS Director Wildlife Institute of India P B No. 18, Chandrabani Dehra Dun – 248 001 Uttar Pradesh | 6 | Dr G Thiruvassagam Vice Chancellor Bharathiar University Maruthamalai Road Coimbatore - 46 |
| 7 | Dr A R Rahmani Director Bombay Natural History Society Hornbill House, Salim Ali Chowk Shaheed Bhagat Singh Road Mumbai - 400 023 | 8 | Dr R Sukumar Chairman Centre for Ecological Sciences Indian Institute of Science Bangalore – 12 |
| 9 | Prof Hafiz Shaeque A Yahya Professor Department of Wildlife Sciences Aligarh Muslim University Aligarh- 202 002 Uttar Pradesh | 10 | Prof P C Bhattacharjee Head Department of Zoology University of Gauhati Guwahati – 781 014 |
| 11 | Mr R G Soni, IFS (Retd) 40/74, Swarn Path Mansarovar Jaipur – 302 020 Rajasthan | 12 | Dr P Pushpangadan Sree Sailam, T.C.X/910 Mannammoola, Peroorkada Trivandrum – 895 005 Kerala |
| 13 | Prof C K Varshney 88, Vaishali Pitampura Delhi – 110 034 | 14 | Dr S K Dutta PG Dept of Zoology North Orissa University Sriramchandra Vihar, Takatpur Baripada – 757 003, Mayurbhanj, Orissa |



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|----|---|----|---|
| 15 | Dr Krishna Kumar Director Indian Institute of Management – Kozhicode II, Campus Post Kozhicode – 673 570 Kerala | 16 | Vacant (Public Sector /Enterprise/Banks) |
| 17 | One Representatives of the Research, Monitoring and Advisory Committee to be nominated by the GC (on rotational basis) | 18 | Principal Secretaries/ Secretaries, Dept. of Forests from One state, other than the states represented by PCCFs / CWW (WL) on rotational basis |
| 19 | Two faculty members (Junior, middle / senior levels) | 20 | Director, ZSI, Kolkata |
| 21 | PCCFs / CWW (WL) of one state other than the states represented by the Principal Secretaries / Secretaries. | 22 | Project Managers of Two Bird Sanctuaries (on rotational basis) |
| 23 | Project Managers of Two Bird Sanctuaries (on rotational basis) | 24 | Four experts from the field of ornithology and related areas in addition to those from GC |
| 25 | Four experts from the field of ornithology and related areas in addition to those from GC | 26 | Four experts from the field of ornithology and related areas in addition to those from GC |
| 27 | Four experts from the field of ornithology and related areas in addition to those from GC | 28 | Scheduled commercial banks which contribute Rs.5.00 lakhs to SACON (Any number) |
| 29 | Donors who are interested in the field of ornithology and natural history and contribute Rs.5.00 lakhs to SACON (Any number) | 30 | Dr P A Azeez Member Secretary/ Director Incharge SACON, Anaikatty Coimbatore 641 108 |

