

ANNUAL REPORT

2006-2007



**Sálim Ali Centre for Ornithology and Natural History
Coimbatore**

Published by:

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**Dr. Sálim Ali
(1896-1987)**

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Background

One of the long-cherished dreams of late Dr Sálím Ali to establish a National Centre for Ornithology and Natural History, was fulfilled in 1990, thanks to the efforts by the ‘Bombay Natural History Society (BNHS), the country’s oldest NGO, and the financial support of the Ministry of Environment and Forests (MoEF), Government of India. The centre, befittingly named as **Sálím Ali Centre for Ornithology and Natural History (SACON)**, is an autonomous organization 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/ Additional Secretary to the Govt. of India, Ministry of Environment and Forests. The SACON Society has 90 members and its President is the Hon’ble Minister for Environment and Forests, Govt. of India.

SACON came into being at a time when the twin issues, namely the sustainable use and conservation of natural resources figured prominently in the global agenda as development. Realizing the indispensability of a 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 peoples’ 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 MSc, MPhil and PhD and also, short-term orientation courses in the above subjects.
- Create a data bank on Indian Ornithology and Natural History
- Disseminate knowledge relating to Ornithology and Natural History for the benefit of the community

ORGANIZATION

SACON Society

The SACON Society comprises the President, all members of the Governing Council (16); six nominees of BNHS; two faculty members of SACON and 100 members nominated by the Governing Council every three years. The honorable Minister for Environment & Forests, Government of India is the President of the society and, Director, SACON the Member Secretary (Appendix I).

The Society during 2006-2007, had 90 members. Mr. A. Raja, Honorable Minister for Environment and Forests, Government of India was the President.

The 16th Annual General Meeting and an Extraordinary General Meeting of the Society were held on 6th December 2006 at the MoEF, New Delhi. The President, Mr. A. Raja chaired the meeting.

Governing Council (GC)

Administration of SACON is vested in a Governing Council which has 16 members; Jt. Secretary & Financial Advisor, MoEF, Jt. Secretary (CS) or nominee, MoEF; four ex-officio, eight nominees of the Governing Council and the Director, SACON member Secretary. The Chairman of the GC is the Secretary/ Spl. Secretary/ Addl. Secretary, MoEF, Govt. of India.

The Governing Council met on 28th September 2006 under the Chairmanship of Dr. Prodipto Ghosh, IAS, Secretary to the Govt. of India, MoEF, New Delhi.

The Governing Council was reconstituted by the SACON Society at its Extraordinary General Meeting held on 6th December 2006. The reconstituted Governing Council includes Secretary, MoEF (Chairman), Jt. Secretary & Financial Adviser, Jt. Secretary (CS) or nominee, Secretary to the Govt. of Tamil Nadu, Dept. of Environment and Forests, Vice Chancellor, Bharathiar University, Director, Bombay Natural History Society, Chairman, Centre for Ecological Sciences, Renowned Ornithologists (3 numbers), Renowned Ecologists and experts in other disciplines of natural history (3 numbers), Member from Faculty of management institutes, Public Sector/ Enterprises/ Banks and Director/ Director Incharge (Member Secretary)

The Governing Council 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.

Research activities have been organized under five research divisions, namely Conservation Ecology, Ecotoxicology, Environmental Impact Assessment, Landscape Ecology and Restoration Ecology. The scientific staff strength of the year was eight with three Senior Principal Scientists, four Senior Scientists, and one Nature Education Officer. Dr. P. A Azeez, Sr. Principal Scientist of the Division of Environmental Impact Assessment was appointed as Director Incharge since 8th August 2006 following the reversion of Dr. Lalitha Vijayan from the position of Director Incharge back to her earlier position of Sr. Principal Scientist as per her request.

The administrative section has Senior Finance Officer, Junior Administrative Manager, Personal Assistant to Director, Administrative Assistant, Accounts Assistant, Office Assistant, Stenographer and Receptionist, two Drivers and an Office Attendant.

Members of the Governing Council

(From 1 April to December 2006 and from January 2007 to March 2007)

Members	April - December 2006	January – March 2007 (reconstituted members of the Governing Council from Jan2007)
Chairman	Dr. Prodipto Ghosh, IAS, Secretary (From December 2005 to May 2007) Ministry of Environment and Forests New Delhi	Dr. Prodipto Ghosh, IAS, Secretary (From December 2005 to May 2007) Ministry of Environment and Forests New Delhi
Joint Secretary & Financial Adviser	Mr. P. K Mishra, IAS, Addl. Secretary and Financial Advisor (from March 2005 to October 2006)	Mr. Raghu Menon, IAS (since November 2006), Addl. Secretary and Financial Advisor, Ministry of Environment and Forests, Govt. of India, New Delhi
Jt. Secretary (CS) or nominee	-	Mrs. Veena Upadhyaya, IAS Jt. Secretary (CS), MoEF
Secretary to the Govt. of Tamil Nadu, Department of Environment and Forests	Mr. Vishwanath Shegaonkar, IAS (from May 2006 to 3 Jan 2007) Secretary to the Govt. of Tamil Nadu Chennai – 9	Mr. R. Rajagopal, IAS (since 4 Jan 2007), Secretary to the Govt. of Tamil Nadu, Chennai – 9
Vice Chancellor, Bharathiar University	Dr. G. Thiruvassagam	Dr. G. Thiruvassagam
Director, Bombay Natural History Society	Dr. A. R Rahmani	Dr. A. R Rahmani
Chairman, Centre for Ecological Science, Bangalore	Dr. R. Sukumar	Dr. R. Sukumar
Renowned Ornithologists	-	3 (vacant).. to be nominated
Renowned ecologists and experts in other disciplines of natural history	-	3 (vacant).... To be nominated
Outstanding Scientists Category (3)	1. Dr. Uma Shannker 2. Dr. Erach K. Bharucha 3. Vacant	Deleted
Management Expert	Vacant	Member from faculty of management institutes . Vacant (to be nominated)

Members	April - December 2006	January – March 2007 (reconstituted members of the Governing Council from Jan2007)
Chief Executive of a lead bank in the southern India	Vacant	Public Sector/ Enterprises/Bank (To be nominated)
Representatives of the corporate bodies/ public sector undertakings (4)	Vacant	Deleted
Nodal Officer of SACON in the MoEF	Dr. S. Kaul	Deleted
Director Incharge, SACON (Member Secretary)	Dr. Lalitha Vijayan (up to 7 th August 2006) Dr. P. A Azeez (since 8 th August 2006)	Director / Director Incharge (Member Secretary)

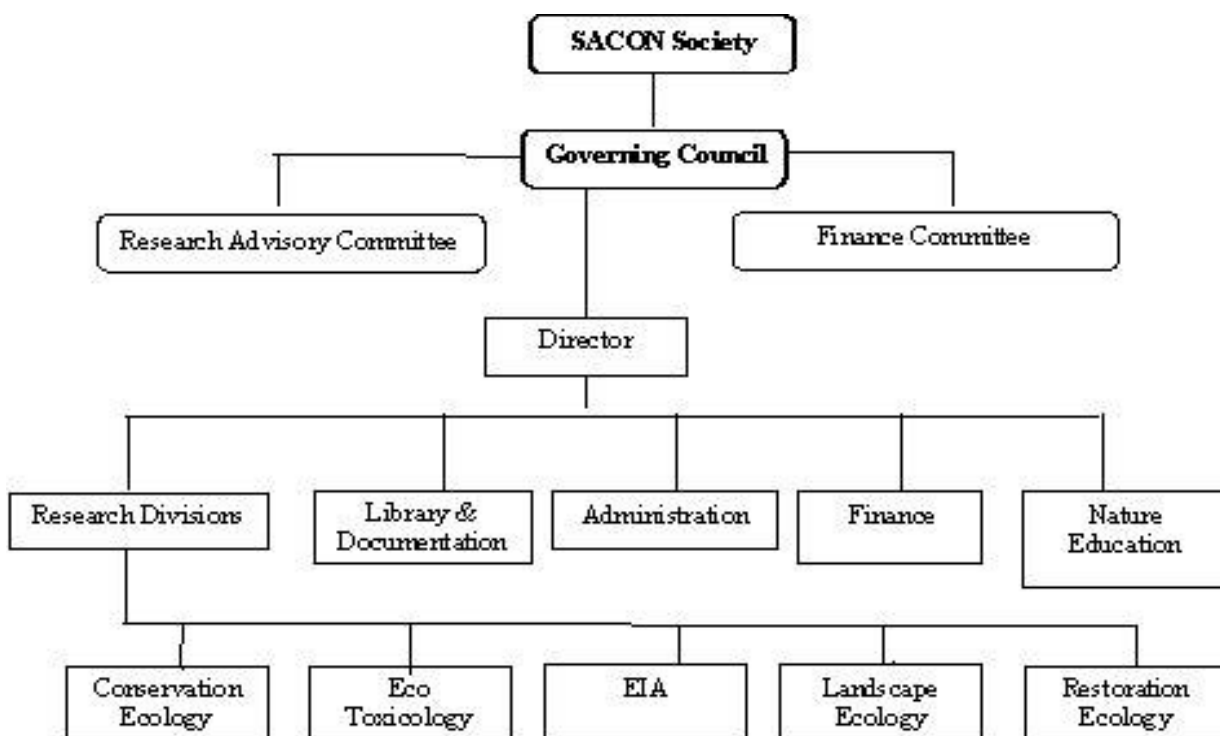
Research, Monitoring and Advisory Committee (RMAC)

The Ministry of Environment and Forests, Govt. of India during February 2006 reconstituted the Research Monitoring and Advisory Committee of SACON with the following objectives: (1) Identification of priority areas for research, (2) Selection of new research projects in the light of process laid down by the Governing Council, (3) Monitoring and Review of ongoing research projects. Since the reconstitution, the committee met on 14th September 2006.

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, Department of Zoology, Gujrat 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, Dept. of Environmental Sciences, Shivaji University, Kolhapur
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	Senior Principal Scientist, SACON, Coimbatore nominated by the Governing Council
14	Senior Principal Scientist, SACON, Coimbatore nominated by the Governing Council
15	Director/Director Incharge, SACON, Coimbatore (Member Secretary)

ORGANIZATIONAL STRUCTURE FOR SACON



Field Stations

1. Port Blair, Mayabunder (Andaman and Nicobar Islands)
2. Singtam (Sikkim)
3. Bharatpur (Rajasthan)
4. Hyderabad (Andhra Pradesh)
5. Upper Bhavani (The Nilgiris),
6. Kukkal (Kodaikannal in TN)
7. Silent Valley National Park (Kerala)

EXECUTIVE SUMMARY

In SACON currently there are four research divisions and a division for nature education. A brief of the research and other activities undertaken by the divisions of SACON during 2006-2007 is given below.

The data deficient and rare endemic **Andaman Crake** was studied, with funding from MoEF, in Andaman and 33 outer islands. In total 120 nests of the species with 17 nests having eggs were recorded. A study on the **Ecology and Conservation of the Spot-billed Pelican** with financial assistance from University Grants Commission was initiated in Andhra Pradesh to assess the status, understand ecology of the species and to document conservation problems. 145 nests with 649 adults and 282 young ones of this species were recorded during February-March of this year. A short study funded by Oriental Bird Club Conservation grant on **the population and habitat use of the Grey - breasted Laughing thrush** recommends no further expansion of plantations and restoration of grasslands and shola forests in the Palni hills to protect the species. A brief investigation of the **status of the Black-and-orange Flycatcher in the upper Nilgiris, Western Ghats** found that habitat protection and restoration are the immediate conservation needs for the species. In the immediate vicinity of SACON, we are working on inventorying **the Biodiversity of Attappady** with the aid of GIS. This project is funded by the Attappady Hill Area Development Society (AHADS) SACON.

In Silent Valley National Park we have undertaken a project to **evaluate butterfly**

communities as bioindicators. The study funded by Wildlife Trust (USA), could record 133 species belonging to five families. This included nine species endemic to Western Ghats. Very rare species such as Blue oak leaf, Southern duffer, Grey count and Black Prince were also recorded.

Our work on **Conservation of the Edible-nest Swiftlet *Collocalia fuciphaga* in the Andaman & Nicobar Islands** with funding from Department of Environment & Forests, Andaman & Nicobar Islands continues. The programme includes giving round the clock protection, providing special houses in which the Edible-nest Swiftlet will breed, developing scientifically managed nest harvesting as a means of providing sustainable livelihoods as well as forming an important means for the conservation of the species. A detailed project proposal to continue the programme into Phase III has been submitted to the Ministry of Environment and Forests by the Forest Department, Andaman & Nicobar Islands. Another study undertaken during the period on **Identification and mapping of Lesser Florican breeding sites to develop a fodder-producing grassland network in western India**, funded by NNRMS, Ministry of Environment and Forests will be continued to conduct one more status survey and mapping of three clusters.

Towards the early 2007 a **study on the Herpetofaunal Communities of the Upper Vaigai Plateau, Western Ghats, India** funded by MoEF (Eastern and Western Ghats Programme) was initiated. So far 84 species that included 26 species of amphibians and 58 reptiles were recorded.

Under the program of **ENVIS center on the theme Wetlands of India** district wise distribution of wetland categories and overall area statistics of Gujarat and Tamil Nadu are completed and thematic maps for 49 districts of the states completed. A study on **Structural and functional attributes of the wetlands of Indo-Gangetic plains with reference to Uttar Pradesh** was undertaken in collaboration with IIRS (Dehradun) and NRSA (Hyderabad). The project funded by ISRO-GBP, reports a tremendous and significant reduction in the wetlands of Rae Bareilly and Hardoi districts.

A study of the **Ecology of Indian Grey Hornbill (*Ocyrceros birostris*) with special reference to its role in seed dispersal in southern Eastern Ghats** is in progress. The study funded by MoEF, Government of India will continue for three years. So far the phenology of select species in the hornbill habitat, the fruits in the diet of the species and details on breeding are documented. A project researching **Pollination and seed dispersal by animals** in the dry deciduous forests of Southern Eastern Ghats funded by the Tamil Nadu Forest Department was also initiated during early 2007. The major aims of the study are to document the animal visitors to flowers and fruits, identify the pollinators and seed dispersers of dry deciduous forests, and suggest indigenous trees that attract key pollinators and seed dispersers, for afforestation. A study on **Plant-bird interactions with special reference to identification of bird-dispersed plants in Attapady hills, Kerala** initiated during the early 2007 is in progress. The findings of the study is also expected to help in identifying tree species for plantation

A research project funded by MoEF on **Impact of agricultural pesticides on the population status and breeding success of select fish-eating birds in Tamil Nadu** was initiated during the year and preliminary surveys were conducted. SACON received 275 dead birds (belonging to 28 species) that are being processed for analysis under a program to **monitor environmental contaminants in Indian Avifauna**.

A study on **adaptation and tolerance of birds to urbanization** was funded by International Foundation for Science (IFS), Sweden. The project initiated in February 2007 is in progress. The project examines certain hypotheses relating birds under urbanization. Another study on **habitat and development of EMP for Blewitt's owl in Araku Valley**, funded by Andhra Pradesh Mineral Development Corporation has documented details on 11 species of owls inhabiting the Araku area.

During the year two studies were undertaken under CSIR Senior Research Fellow scheme. Of which one was on use of **biomarkers in evaluation of heavy metal contaminants in marine fishes**. As part of the study five commercially important species were analyzed for heavy metals (copper, zinc, cadmium and chromium) and biomarkers (Metallothionein and Mt-like proteins and Glutathione S-transferase enzyme). The second study under the scheme was on **role of soil organic matter in trace metal dynamics in Keoladeo National Park, Bharatpur**. The study is a continuation of the detrital dynamics component of an earlier project taken up by SACON, and is aimed at the chemical characterization of soil and sediment of the Park.

Upon the request of Tamil Nadu electricity board a **rapid Environmental assessment of the Kundah pumped storage hydro electric project** in the Nilgiris was completed. The study concluded that proper scheduling of the project execution, certain realignment of the project structures away from ecologically important vegetation, stringent control on traffic and access to roads, proper management of debris and wastes, reduction in blasting to the bare minimum, and control of workers can considerably help in reducing the negative impacts.

Another EIA project **Mumbai trans-harbour sea link project: Study of Flamingos and migratory birds** funded by the Maharashtra State Road Transport Corporation is in progress and is to be completed in September 2007. A six month study funded by the Institute for Social and Economic Change, Bangalore **Andhra Pradesh Community Based Tank Project Environmental and Social Assessment Study** was also completed. The study was related to the community based action plan to rehabilitate about 4 lakh ha of command area under minor irrigation tank systems to improve tank-based livelihoods initiated by the Government of Andhra Pradesh.

In 2006-2007, the nature education division conducted several programmes. A one month residential **vacation training programme on Bioresources for School children** was sponsored by NBDB (DBT). The program **People's Biodiversity Register through School Children**, involving five local schools, in collaboration with the Centre for Ecological Sciences, Indian Institute of Science, Bangalore was continued.

Other nature education programmes conducted during 2006-07 included **Nature Camps for students of Coimbatore, Wildlife Week Celebrations, Salim Ali Trophy Nature Awareness Competitions and awards, Young Bird Watcher of the Year contest, Salim Ali Birth Anniversary celebrations, Student research programmes, World Wetlands day Programme, The 3rd Children's Ecology Congress (CEC) and Naming common butterflies in Tamil. "Song of Sparrow: Nature Education e-Newsletter"** a bimonthly e-newsletter was also published and circulated to the Salim Ali Naturalists Forum during the period.

The SACON continued to be affiliated with the Bharathiar University. 26 students are enrolled for PhD and 2 for M.Phil. One PhD degree was awarded and three theses for PhDs submitted.

During 2006-2007, SACON conducted a **"Workshop on Conservation and Management of Biodiversity in Teesta Valley, Sikkim, 16 - 17 October 2006** at Forest Secretariat, Gangtok, Sikkim. A **"National Conference on Biodiversity Conservation and Human Well-being"** was conducted jointly with the Department of Zoology, Osmania University from 8th to 10th February, 2007. During the year, SACON also conducted short term training programmes on instrumentation and analytical techniques and also offered Analytical Service to Industries and Academic Institutions.

Several research communications were made during 2006-2007 by the researchers of SACON. This included 12 scientific reports, 28 research papers, 8 chapters in edited books and 5 articles in technical newsletters. We have also participated and



presented papers in 58 national and international conferences, workshops and seminars and delivered 13 invited / plenary lectures.

There was no increase in the faculty strength during the period. Some of the vacancies in the administration could be filled up. The Governing Council of SACON met on 28th September 2006 under the Chairmanship of Dr. Prodipto Ghosh, IAS, Secretary to the Government of India, MoEF, New Delhi. The Governing Council was reconstituted by

the SACON Society at its Extraordinary General Meeting held on 6th December 2006 presided over by the Honorable Minister of Environment and Forest Thiru A. Raja.

Director Incharge

Date:

RESEARCH HIGHLIGHTS

I. DIVISION OF CONSERVATION ECOLOGY

1. Status and ecology of the Andaman Crake

Principal Investigator : Lalitha Vijayan
 Research Fellow : N. Ezhilarasi
 Project Period : 2004-2007
 Date of Commencement : December 2003
 Expected date of completion : March 2007
 Budget : Rs. 8.19 lakhs
 Funding source : MoEF, Govt. of India

Objectives

Studies on the Ecology of the data deficient and endemic Andaman Crake was continued to:

- Assess the status of the Andaman Crake and document its ecology and biology and
- Identify crucial areas for the conservation of this species and suggest probable measures for conservation and management.

Methods

Intensive studies were done at the Chidiyatapu Biological Park in South Andaman and ChalisEk in North Andaman, which has dominantly moist deciduous and semi-evergreen forests with edges of mangroves. Unlimited-distance point count was carried out in selected areas in different months for general bird abundance and the study species. The population of the Andaman Crake was surveyed using sightings, calls and play back methods. Habitat details of the area

of occurrence were recorded. To study the bird activity, focal animal and scan sampling methods were adopted. Breeding density and biology were studied by nest searching, direct observation of bird's activity and territory mapping. Details of nesting and incubation were also recorded.

Results and discussion

The Andaman Crake is found both inside the forest and edges, mainly near streams in the moist deciduous, semi-evergreen and evergreen forests. The Andaman Crake was surveyed in select areas in the main islands and outlying islands of different sizes, which included 15 very small islands, 7 small islands, 4 medium size islands, 4 big islands, 2 large and 1 very large islands. Among the main islands a total of 56 localities or sites were sampled in four main regions, namely



N Ezhilarasi

Nest of Andaman Crake

South Andaman (SA), Middle Andaman (MA), North Andaman (NA) and Little Andaman (LA). No Crakes were recorded in very small (0-1 sq km) and medium sized (5-10 sq km) islands. However,

according to local tribes Andaman Crakes were present in medium sized island but not in very small islands. Compared to the outlying islands, main islands have higher population. The habitat-wise distribution showed similar numbers of the Andaman Crake in evergreen, semi- evergreen and moist deciduous forests.

Breeding

Breeding season of the species is from June to September with peaks in June and August. 120 nests were observed during this year. A pair of crakes made three to four nests as recorded in some other rallids. The nest is cup or cap shaped, made up of leaves and twigs placed between the buttresses of trees, while a few nests were on trees and on termite mounts. Two types of nests were recorded; i) nest with leaves and twigs used for egg laying ii) nest with only leaves (nursery nest) to roost with the chick. Nests were located mostly within 200m from the edge of the forest nearer to water and were highly concealed. 23 species of trees were used to place the nests with the maximum being *Tetrameles nudiflora* (23.3%) and *Pterocarpus dalbergioides* (23.3%) followed by *Terminalia bialata* (13.33 %) and *Pterygota alata* (11.33%).



Chicks of the Andaman Crake at the nest

N Ezhilarasi

Both the sexes took part in nest building activities. Of 120 nests recorded, 17 had 5-6 eggs. Out of the 17 nests, eggs hatched only in 7 (41%) and in the rest (59%) failed. Hatching success was 22.2%. The failure of the nest was because of abandoning, human disturbance, harsh weather, predation by monitor lizard, snakes and Crow-pheasant and other unknown reasons. The chicks and the females roosted in the nest while the male roosted in a nearby tree. Juveniles roosted with parents for 30-32 days (N=2). Afterwards they were chased away from the territory. The fate of the young could not be ascertained in many cases, as only a few could be observed very rarely in the dense undergrowth.

In the case of the nests in which no eggs were laid, 85.71% were abandoned of which 67% happened before completion of the nest. Abandonment after laying the first was rare (23%) than abandonment prior to laying eggs (77%). Among the abandoned nests, only 5 had eggs; 4 with one egg and one with five eggs.

The project work was completed with an extension for three months at no extra cost. Data analyses and preparation of the final technical report are progressing.

Summary

The rare endemic Andaman Crake was studied during this year, concentrating on its breeding biology at Chalis Ek and Chidiyatapu, and its status. Altogether 56 localities in South Andaman (SA), Middle Andaman (MA), North Andaman (NA) and Little Andaman (LA) and 33 outer islands of various sizes were surveyed. We recorded clumped distribution of the species in selected areas with the encounter rates being higher in main islands. A total of 120 nests were recorded with 17 having eggs. Hatching success was low (22%) and failure mainly due to predation and abandoning of nests.

2. Ecology and Conservation of the Spot-billed Pelican in Andhra Pradesh

Principal Investigator : N. Sheeba
Research guide : Lalitha Vijayan
Co-guide : S. N. Prasad
Project Period : Five years
Date of Commencement : December 2006
Expected date of Completion : November 2011
Budget : Rs. 10.2 lakhs
Funding Source : University Grants Commission

Objectives

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. A study conducted by Dr Nagulu in Nellapattu wetlands during 1981-83 and BNHS during 2001-2003 showed drastic decline of its population. No breeding was reported in 1999-2000. But, in the case of Uppalapadu (16° 16' 26" N, 80° 21' 58" E) the breeding population has been increasing since 1999. Specific site preference of this species for breeding makes it more vulnerable. To better understand the threats to this species in inland wetlands of south India and to conserve this species, immediate attention is needed to understand their status, and ecological requirements for feeding, breeding and other vital activities. It is urgent that a systematic study of this species on the population, ecology, and impact of common resident bird population is conducted. Specific objectives of the project are:

- 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, such as habitat loss and degradation, pesticide contamination, human disturbances and suggest conservation measures.

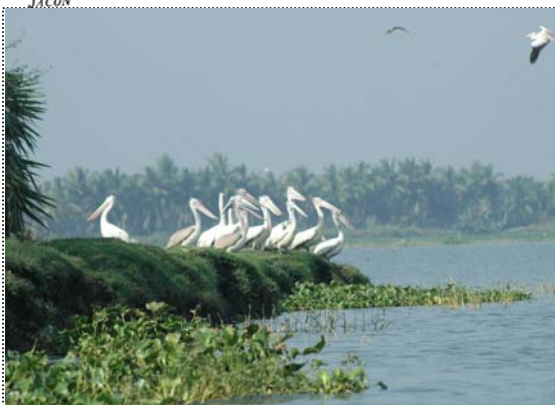
Methods

The fieldwork was started in the end of February, the later part of the breeding season of the species, at Uppalapadu, a fresh water inland wetland which supports the species throughout the year 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. Habitat details and plant species were recorded. Disturbances at the feeding and nesting locations are also recorded. Major activities were observed by scan and focal animal sampling methods.

Results

Uppalapadu and nearby areas

Initial observation along with a reconnaissance survey was conducted at the beginning of the study in February 2007. The Uppalapadu tank area covers 6 acres and have 14 mounds or islands occupied by *Prosopis juliflora* and *Pithecellobium dulce* which are mainly used by the birds for nesting. Other plants seen here are *Ipomoea aquatica*, *Ipomoea*



Umamaheshwar Rao

Spotbilled Pelican at Koleru

carnea, *Cyperus alopecuroides*, *Cynodon dactylon*, *Paspalum distichum*, *Polypogon monspeliensis*, and *Eichhornia crassipes*.

In total 1583 birds belonging to 40 wetland species and 20 species of land birds were recorded in and around Uppalapadu. Of these dominant species were Painted Stork, Spot-billed Pelican and Night Heron. 283 Nests of the Painted storks, 959 adults and 828 young were also recorded in and nearby area outside the tank.

In total, 145 nests of the Spot-billed Pelican were active and had nestlings. Many fledglings were seen waiting on the nesting trees for the parents to feed them. The counts done in March 2007 showed 649 adults and 282 young ones. Nesting details including site preference, human disturbance, and association with other species inside the tank were also observed.

The main activity of Pelicans was feeding. Many birds used the islands in the tank while many others went out for feeding. The main food item was fish and very rarely mollusks. Major fish species identified are *Labeo rohita*, *Cirrhinus mrigala*, *Katla katla* and *Chanda nama*. Pelicans mostly preferred feeding early morning when human disturbance was low. They formed groups of 6 to 19 to

hunt fish either by straining from the water surface or by submerging their necks. They used gular pouch to net the fish, crushed the prey with the bill for 2 or 3 minutes, and then tossed it in the air and swallowed. Crushing of small shells was also observed. Feeding frequency of young was high in midday and evening.

Kolleru

Non-breeding season survey was conducted twice in Kolleru in March 2007. The Lake covers 990 Sq. km of which nearly 116 km was surveyed. At Kaikallure nearly 280 Spot-billed pelicans with 66 chicks were observed. The shallow fish tank at Atapaka had *Acacia nilotica* and palm trees (nesting trees). Here Pelicans were observed along with Cormorant and Painted Storks.

Summary

The Spot-billed Pelican, a resident and locally moving, globally threatened species, was selected for the study to assess its status, understand its ecology and conservation problems at Uppalapadu and other sites in Andhra Pradesh. Initial study at Uppalapadu during February- March showed 145 nests with 649 adults and 282 young ones of this species. The species fed mainly from the tank at Uppalapadu, but also went out to private fish tanks for the purpose. Forty other wetland bird species including Painted Storks were observed in and around the area. A short visit to Kolleru showed 280 Spot-billed pelican with 66 chicks.

3. An assessment of the population and habitat use of the Grey - breasted Laughing thrush

Investigator : S. Somasundaram
 Consultant : Lalitha Vijayan
 Duration : February 2006 – July 2006
 Budget : 500 £
 Funding Agency : Oriental Bird Club- Conservation Grant

Objectives

The Grey-breasted Laughing Thrush *Garrulax jerdonii* is a globally near threatened endemic bird of the Western Ghats. It shows a very narrow range of distribution in the upper reaches of the southern Western Ghats inhabiting the montane wet temperate (shola) forest. Islam (1985) studied the ecology of this species concentrating at Poombarai and Paricombai in Kodaikkanal forest division. Habitat loss, fragmentation and degradation of forests in the Western Ghats have been reported with losses of 25% forest cover in Palni hills during the 1972 – 80.

Under-storey birds are known to be highly sensitive to disturbance in the forest structure as they are most adapted to specific microhabitats. In this backdrop, this short-term project was undertaken with the objectives to (i) assess the status of the globally near threatened Grey-breasted Laughing Thrush with respect to its population, habitat use and availability, compare it with the earlier data, (ii) identify threats to the habitat and species, and suggest conservation measures.

Methods

Standard methods were adopted for the study (Bibby *et al.* 1992); circular plot

method for census and territory mapping in a rough scale for estimating the breeding population. Sample plots were selected in the areas studied earlier by Islam and adjoining areas with different grades of disturbance.



S Somasundaram

A view of undisturbed Shola forest

Results

Surveys were conducted from February to April 2006 at selected sites in the Kodaikkanal forest division, namely Kodaikkanal Botanical garden, Golf course, Berijam, Mannavanur, Kukkal, Poombarai and Paricombai. At Poombarai and Paricombai most of the natural shola vegetation is replaced with wattle and pine. Grey-breasted Laughing thrush was recorded at all locations except at Mannavanur. The bird density was high at Kukkal (1.4 bird / ha) followed by Poombarai (0.5 bird / ha), Kodaikkanal Botanical garden (0.33 bird / ha), Golf course (0.16 / ha), and Paricombai (0.22 / ha). 18 nests of the species were found, all except two in shola shrubs. The two nests were seen in wattle plantation nearer to the shola in Kukkal area. Details of nests were recorded. Territory size at Paricombai was larger than that reported in the earlier study by Islam (1985), showing the degradation of habitat affecting the breeding population.

Recommendations

- No further expansion of plantations and restoration of grasslands and shola forests in the Palni hills.
- A GIS database may be created with thematic details including information on flora and fauna. This would help monitor this globally near threatened species.
- In Palni Hills, none of the areas are fully protected; the larger shola forests of Kukkal and Mathikettan (Berijam) may be declared as bird sanctuaries. Better protection needs to be ensured for the proposed Palni Hill Conservation Area.
- A strong nature education programme is required regarding the importance of natural vegetation in biodiversity conservation and watershed management of Palni Hills.

Summary

The Grey-breasted Laughing Thrush *Garrulax jerdonii*, a globally near threatened endemic bird of the Western Ghats, was studied at selected sites in Kodaikanal in 2006 to assess the present status and to compare it with that of 1980s. Good population of the species was seen only at Kukkal and Poombarai. The decline was discernible at most of the sites requiring urgent conservation action including full protection for the sholas.

4. An assessment of the status of the Black-and-orange Flycatcher in the upper Nilgiris, Western Ghats

Principal Investigator : Lalitha Vijayan
 Co- Investigator : S.Somasundaram
 Research student : D. Anitha (M.Sc
 Project /
 Dissertation)
 Project Period : August 2006 to

March 2007

Funding Source

: Student

Objectives

The Black-and-orange Flycatcher is a globally near threatened species endemic to the Western Ghats. The occurrence of this species is found to be not as common in the upper Nilgiris as it used to be. Hence, a study was taken up with the specific objectives to examine the present status of this species and to compare it with the data of Khan (1974-77) in the Nilgiris to assess the changes in the population.

Methods

A general bird survey was carried out in all the habitats; species sighted / heard and area covered were recorded. Each month from September 2006 to January 2007 an average of ten days was spent in the field. Trek paths, main roads, foot and bridle paths cutting across or skirting the sholas and other types of habitats were used for the survey. Number and sex, whenever possible of the species sighted and or heard were noted. Analysis of the data was done separately for different locations and habitats and compared these with those reported by Khan during 1974-77.



Lalitha Vijayan

Disturbed Shola forest in the Upper Nilgiris

Results & Discussion

The Black-and-orange Flycatcher was observed in many localities in upper Nilgiri during the study. The species inhabits shola forests and plantations in the upper part of the Nilgiris mostly above 1500 m. The mean density of the species was 5 bird /10 ha. Maximum birds were recorded in Naduvattam (8 / 10 ha) and minimum in Ooty Botanical Garden (1 / 10 ha). The habitat most used by the species was shola forest followed by Tea plantation. During the survey, the Black-and-orange Flycatcher was seen in very low numbers mainly because of disturbances. Comparison with the earlier data shows that the population of the species has declined drastically in all places except Naduvattam. The presence of streams and mosses inside the shola with dense undergrowth canopy cover and minimum human disturbance are the most important factors for their existence. The present study shows that the Black-and-orange Flycatcher may face local extinction in a few places in the immediate future.



Black and Orange Flycatcher

S Somasundaram

There are only two protected areas within the upper Nilgiris, namely Mukurti National Park in Tamil Nadu and Silent Valley National Park in Kerala. A small part of the species range is covered by the upper reaches of the Silent Valley

National Park in Kerala. Regarding the Nilgiri Laughing thrush recommendations have been given by SACON for additional areas to be added to the Mukurthi National Park, stopping of alteration of forests and grasslands remaining in the Nilgiris, and restoration of these natural habitats with peoples' participation. Prohibition of all toxic chemicals, felling of trees and grazing have also been recommended

Summary

The Black-and-orange Flycatcher, a globally near threatened species of the shola forests endemic to the Western Ghats and studied during 1970s, was surveyed for assessing the present status in a few selected areas in upper Nilgiris. The mean density was about 0.5bird/ha ranging between 0.1 in Ooty to 0.8 in Naduvattam with a trend of decline in most locations. Habitat protection and restoration are the immediate conservation needs for the species.

5. Evaluation of butterfly communities as bioindicators, in Western Ghats, India

Principal Investigators: K.S. Anoop Das
& Lalitha Vijayan

Duration : One Year

Date of

Commencement : July 1, 2006

Expected date of
completion : June 30, 2007

Budget : 4816 USD,
(2, 22,601 INR)

Funding agency : Wildlife Trust,
USA

Objectives

An important aspect of forest management entails the use of reliable, practical, and inexpensive indicator taxa to monitor ecosystem changes. Here, butterflies are proposed as indicator taxa due to their high diversity, abundance in the tropical forest ecosystem and sensitivity to changes in macro and microclimates. The Silent Valley National Park (SVNP) and its surroundings were selected as the study area. The SVNP is one of the largest contiguous pristine wet evergreen forests in the Western Ghats internationally known for high floral and faunal diversity. The study was taken up with the following objectives:

- What is the relationship of forest gap dynamics and butterfly community assemblages? How does butterfly diversity change from the natural forest, and forest gaps? How significant is age and size of the gap?

- What specific ecosystem information is provided by the presence/absence and abundance data of particular species of butterfly?
- What are the conservation measures needed for the butterfly community in the context of overall park management?

Methods

Butterfly diversity has been studied using transect and point counts, and trapping techniques. Regular sampling was carried out in different habitats, namely shola forest, grasslands, mid elevation broad-leaved forests, riverine forests, savanna woodlands, and evergreen forests in lower altitudes. Sampling design gave special attention to the forest fringes and gaps of various age and size classes. A modified fruit bait trap was used for sampling the butterflies.

Results and discussion

During this year, the sampling techniques were standardized and different locations, such as tree fall gap, shade, open and canopy, were selected to install the traps. During the study we have encountered six, eleven and two species of butterflies that fall under the Schedule I, II, and IV of Indian Wildlife Protection Act 1972, (WPA) respectively (Table 1). The rare red listed butterfly Malabar Tree Nymph (*Idea malabarica*) was recorded from several localities.

Table 1: Status of butterflies in Silent Valley national Park

Family	Species	Endemic to Western Ghats	Schedule I WPA, 1972	Schedule II WPA, 1972	Schedule IV WPA, 1972
Papilionidae	18	3	4	-	-
Pieridae	18	1		2	1
Nymphalidae	58	5	1	8	-
Lycaenidae	17	-	1	-	1
Hesperiidae	22	-	-	1	-
Total	133	9	6	11	2

Butterflies counted

In total 133 species belonging to five families were recorded. This included nine species endemic to Western Ghats. Common Five Ring was the most abundant species followed by Common Grass Yellow. The Common Evening Brown showed a negative trend with increasing altitude, although it is very abundant in the wet evergreen forest throughout the year. Highest species richness was found in the wet evergreen forest sites. Species richness was significantly lower in broad-leaved hill forest than montane wet temperate (shola) forest and other habitat types.



Black Prince, a rare butterfly

Butterfly abundance varied across habitats, and altitudes. Their distribution appears related with the structural complexity of

the habitats, tree cover and disturbance. Butterfly diversity followed the same pattern, broad-leaved hill forest having the lowest. The butterfly abundance was higher during the post monsoon period which must be mainly due to plenty of sprouting host plants after the rain. Sites with the greatest degree of disturbance and lowest level of tree cover had the lowest number of individuals and species of butterflies.

Butterflies trapped

Very little attempt has been made to reveal the responses of butterflies to changes such as tree fall gaps occurring in forest ecosystems. The modified fruit bait trap, as it has not been tested elsewhere in this region, took time to fabricate and try in the field. In our preliminary observations, the traps yielded several butterflies, of which very rare ones such as Blue Oak Leaf, Southern Duffer, Grey Count and Black Prince were found. We observed a general pattern of the traps in the open areas yielding more representatives from the common taxa while traps in the gaps inside the forest yielded more rare species. During the study a mark-recapture method was tested and found successful. The fruit bait traps proved to be an effective tool for estimating the species richness of butterflies in pristine environments such as SVNP. It can be used in impenetrable

forests where the difficult terrains make surveys tedious. Very few reports are available on Black Prince *Rohana*



K A Subramanian

Installing fruit –bait trap in the field

parisatis from the Western Ghats over the past one century, and recorded as rare in Sikkim Himalayas. The trapping of the species demonstrates the efficacy of the fruit bait traps. Such observations also warrant immediate requirements to intensively sample the dense evergreen patches of the Western Ghats.

Training programmes

Butterfly identification training camps for students from Peeves Public school, Nilambur and M.R.C. School, Mukkali were conducted that included a field trip to the transects in SVNP followed by lecture and slide show. These camps yielded very good responses as the participants showed great enthusiasm and excitement in identifying the butterflies.

Summary

Butterfly communities were studied in the Silent Valley National Park during this year with focusing on various habitats, fringes of forests and gaps of different sizes. Visual counts and fruit bait traps were used; 133 species belonging to five families were recorded which included nine species endemic to Western Ghats and, six, eleven and two species falling in the Schedule I, II, and IV of Indian Wildlife Protection Act. Very rare species such as Blue oak leaf, Southern duffer, Grey count and Black Prince were found in the traps which in the open areas yielded more common species while in the gaps inside forests yielded more of rare ones.

6. Inventory of the Biodiversity of Attappady with GIS Aid

Principal

Investigator : Lalitha Vijayan

Co- Investigators : S.N. Prasad and
P. Rathakrishnan
(AHADS)

Project Personnel : S Somasundaram

Project Period : July 2006 to
December 2007

Budget : Rs. 3,00,000/-

Funding Source : Attappady Hill
Area Development
Society(AHADS)

Objectives

Attappady lies in the foothills of the Nilgiris adjacent to the world famous Silent Valley National Park in the Mannarghat 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 socioeconomic 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. With this background the study was taken up with the following 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 of the area has been followed for various components of the study in different habitats.

- a). Birds & Butterflies: General surveys and quantified sampling using variable width line transect method.
- b). 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 and discussion

Surveys were conducted during September 2006 to March 2007 covering 38 sites that included scrub, dry deciduous, moist deciduous and evergreen forests. The maximum sites (14) and area covered were

in dry deciduous and moist deciduous forests.



A view of the Attappady Hills

Totally 1243 individuals of 143 species of birds were recorded, which included ten endemic species of the Western Ghats. Insectivorous birds were the dominant group in both evergreen and deciduous forests. In deciduous forests the most common species was the White-browed Bulbul, while the Oriental White-eye was the common species in evergreen forest. Totally ten species of raptors were recorded during the survey. The species diversity (Shannon-Weaver index) was high in evergreen forests followed by deciduous forest. The highest diversity was observed in Muthikulam reserve forest (3.53) followed by Mukkali (3.28) and Chindakki areas (3.24).

A total of 78 species of butterflies was recorded including four species are endemic to South India, one to Peninsular India and three to the Western Ghats. The rare species recorded were Malabar Banded Peacock, Southern Birdwing, Malabar Raven, Plains Cupid and Yamfly. The pattern of butterfly diversity was similar to that of birds, more in evergreen

forests followed by deciduous forest. The maximum diversity was observed in Muthikulam reserve forest (3.48) followed by Mukkali (3.41) and Chindakki areas (3.13). Nilgiri Tiger which is endemic to South India was also recorded in all the forest types during the survey. Southern Birdwing and Malabar Tree Nymph endemic to the Western Ghats and the latter threatened were recorded mainly in the evergreen forests.

In evergreen forests, 60 ha were surveyed; the maximum number of species (84) as well as endemics (Birds – 6, Butterflies - 4) were recorded. In dry deciduous forests 250ha was surveyed and totally 68 species were recorded which includes two endemic birds and one South Indian endemic butterfly. In moist deciduous, in 288 ha area surveyed, 38 species of birds were recorded. The abundance of ground dwelling species such as thrushes was remarkably high in the evergreen forest. These results show the importance of moist forests especially the evergreen forests in maintaining the biodiversity of this region. Field work is in progress to cover the shola forests in the high altitude regions which will help in recording more species.

Summary

Surveys were conducted during September 2006 to March 2007 encompassing 38 sites covering scrub, dry deciduous, moist deciduous and evergreen forests. Totally 1243 individuals of 143 species of birds were recorded, which included ten endemic species of the Western Ghats. Totally 78 species of butterflies were recorded including four species endemic to South India, one to Peninsular India and three to the Western Ghats.

7. Status of wetland birds in Coimbatore district

Principal Investigator : Lalitha Vijayan
Co- Investigator : S.Somasundaram
Research student : M. Deivanayaki
(M.Sc dissertation)
Project Period : August 2006 to
March 2007
Funding Source : Student

Objectives

Wetlands play a vital role in maintaining the health of the environment and support a rich biodiversity. However, wetlands are not given deserving attention. The present study was undertaken with the objectives:

- To assess the status of the wetland birds in the selected wetlands in and around Coimbatore during the migratory season, and
- To examine the relationship of birds with the quality of wetlands based on the habitats and water quality.

Methods

The present study was conducted in four major wetlands in Coimbatore district, namely Ukkadam Lake, Kuruchi Lake, Singanallur Lake, and Suler Lake during September 2006 to January 2007. These wetlands were surveyed for the water quality (colour, pH, dissolved oxygen, and salinity), vegetation and birds at definite intervals. Data were analysed to understand the fluctuations in bird abundance in different months and its probable relations with various factors.

Results & Discussion

Water was colorless to brownish and water spread area was more than 85% in September and January i.e. the duration of

the study. Kruchi Lake was found to be more acidic (pH 4.5-5.25) while others were more or less neutral or at times alkaline (pH 6-7.5). Dissolved oxygen content varied in different months and wetlands, but the trend was similar in all the sites with a decrease in November. Maximum DO was seen in October in Singanallur (7.31mg/L) and minimum in September in Ukkadam (2.38 mg/L). Chloride content also was maximum in Singanallur in October (5.72 mg/L) and minimum in Ukkadam (0.75 mg/L).



S Somasundaram

Painted Stork in Singanallur Tank

A total of 16,164 birds of 34 species of fully wetland dependent birds were recorded during the study in the selected four sites. Besides these, 31 species of terrestrial birds were also recorded around

these wetlands. One globally threatened, Spot-billed Pelican and two near threatened birds (Painted Stork and Darter) were found here during the study. In Kuruchi the common resident bird was Common Coot while it was the Little Cormorant in other wetlands. The common migratory species were Common Teal and Pintail. The maximum number of birds recorded was in Kuruchi (8,039) followed by Ukkadam (3,556), Singanallur (2,390) and Sular (1,471). The maximum species was also in Kuruchi (27) followed by Ukkadam and Singanallur (24 each). The pattern of abundance varied in different wetlands. Bird species diversity (Shannon-Weaver Index) was maximum in Ukkadam ($H' = 2.198$) followed by Singanallur ($H' = 2.064$), and the least in Kuruchi ($H' = 1.389$).

Bird abundance did not show any correlation with pH, oxygen and chloride. Vegetation cover during September and January was mostly of localized floating and sub-merged plants. In most of the wetlands weeds such as Water Hyacinth and *Ipomea aquatica* were present.

The discernible decline in the extent of wetlands in the recent years not only affects the wetland biodiversity but also drinking water availability and quality of life of the people. Immediate measures need to be implemented for conservation of the wetlands involving all stake holders including Government and Non-government agencies and the public.

Summary

Four major wetlands in Coimbatore district, namely Ukkadam, Kuruchi, Singanallur, and Sulur were surveyed for the quality of the wetland and status of birds during September 2006 to January 2007. A total of 16,164 birds, 34 fully wetland dependent and 31 terrestrial species, were recorded during the study. The common migratory species were Common Teal and Pintail. One globally threatened, Spot-billed Pelican and two near threatened birds (Painted Stork and Darter) were found. The maximum number of birds (8,039) and species (27) recorded were in Kuruchi followed by Ukkadam and Singanallur.

8. In-situ and Ex-situ Conservation of the Edible-nest Swiftlet *Collocalia fuciphaga* in the Andaman & Nicobar Islands. Extension of Phase II.

Investigator	: R. Sankaran
Collaborating agency	: Department of Environment & Forests, Andaman & Nicobar Islands
Research Fellow	: Mr Shirish Manchi
Duration	: 2.5 Years
Date of Commencement	: April 2005
Expected date of completion	: August 2007
Budget	: About Rs.6,00,000/-
Funding source	: Department of Environment and Forests, A&N Is. SACON R & D Funds

The in-situ conservation measures initiated for the Edible-nest Swiftlet

includes giving round the clock protection to important swiftlet caves. The ex-situ conservation measures initiated includes providing special houses in which the Edible-nest Swiftlet will breed, thereby significantly building up populations in these islands. This programme intends to develop scientifically managed nest harvesting as a means of providing sustainable livelihoods for nest collectors, farmers, and poorer sections of the community.

Progress



Manchi Shirish

Edible-nest Swiftlet

The programme has had remarkable successes on some fronts, as well as setbacks. Significant achievements include (i) a greater than 45% growth in the population of Edible-nest Swiftlets under in-situ conditions and (ii) The commencement of nesting by the Edible-nest Swiftlet in the Swiftlet house in Tugapur under ex-situ conditions. The major set back was, however, the inclusion of the Edible-nest Swiftlet *Collocalia fuciphaga* in Schedule I of the Wildlife (Protection) Act, 1972. This precluded the establishment of a proper marketing system of nests harvested under in-situ conditions as well as in establishing house farming. The matter of de-listing the Edible-nest Swiftlet from the Schedules of the Wildlife (Protection) Act, 1972 has been taken up with the

Ministry of Environment and Forests, and it is expected that this will be done shortly, enabling us to establish marketing systems necessary to bring the programme to fruition.

While three nests of the Edible-nest Swiftlet were partially built under ex-situ conditions in the specially modified house at Tugapur in 2006, only one of these nests was completed in 2007. However, probably due to high temperatures within the house, egg laying did not take place. With the onset of the pre monsoon rains, and the cooling down of the islands, the first egg of the Edible-nest Swiftlet was laid in the completed nest on the 23rd of May 2007.

A detailed project proposal to continue the programme into Phase III has been submitted to the Ministry of Environment and Forests by the Forest Department, Andaman & Nicobar Islands. This is presented elsewhere in this volume.

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

Investigator	: R. Sankaran
Research Fellow	: One
Duration	: 1 Years
Date of Commencement	: April 2007
Expected date of completion	: November 2008
Budget	: Rs. 4,86,025/-
Funding source	: NNRMS, Ministry of Environment and Forests

The project duration had been completed. Since only the first installment of the project fund had been released, only the

field work of the project had been completed. Since satellite imageries could not be purchased, the mapping component of the project could not be undertaken. The Steering Committee of the NNRMS however felt that the mapping component should be completed and funds has been released to conduct one status survey and mapping of three clusters. It is expected to be completed this breeding season.

10. A study on the Herpetofaunal Communities of the Upper Vaigai Plateau, Western Ghats, India

Principal Investigator	: S. Bhupathy
Research Fellows	: G. Srinivas and A. Madhivanan
Duration	: Three years
Date of Project Initiation	: February 2006
Expected date of Completion	: January 2009
Budget	: Rs. 10,36,900/-
Funding Agency	: MoEF (Eastern and Western Ghats Programme)

Objectives

The present study is being executed in the catchments of the river Vaigai and its tributaries; High Wavy Mountains, Vellimalai, Meghamalai, Gudalur and Cumbum Valley. The major objectives of the proposed study are to;

- Determine the distribution patterns of herpetological communities in various natural and managed forests, and altitudinal gradient,
- 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.

With the joining of two Research Fellows, the project was formally initiated in February 2006. The newly recruited Junior Research Fellows were given training in field sampling techniques, species identification, data collection and analyses at SACON and in the field (Anaikatti Hills and Upper Vaigai Plateau, Western Ghats).

Various field methods such as quadrat, transect, road cruising and encounter surveys are available pertaining to herpetofaunal (reptiles and amphibians) sampling. Considering the nature of the terrain, various forest types and accessibility, it was decided to use transects with stratified random plots for sampling at 200m altitude intervals.

Three transects, i) Vannathiparai to Vattathotti (8 km), ii) High Wavy to Suruli (6.86 km) and iii) 85th Velakku to 29th Mile (Vellimalai, 6.31 km) were laid. The first transect covers natural forests, the second one partly comprises abandoned cardamom plantations and third transect (partially) cuts through tea plantations. From the transect line upto 500m on either side was considered for area estimation and herpetofaunal sampling. Area estimation at a particular altitudinal category was done as: length of transect at each altitudinal category X width of the transect (1km). Area availability in each altitudinal category was considered to decide on the intensity of sampling or effort (i.e. proportion of sampling depends on the area availability at a particular

altitude). In the stratified altitudinal categories various time and area constrained sampling protocol are used for data quantification. To understand the impact vehicular traffic on herpetofauna apart from the areas, a portion (6 km) of National Highway (No.49), adjacent to the study area (from Lower Camp, Tamil Nadu Electricity Board to Kumuly) is being monitored fortnightly.

As mentioned earlier, Area (quadrat) and Time Constrained (Visual Encounter Survey) sampling protocol is followed for data quantification. As the area is vast, remote and highly rugged, it was decided to conduct seasonal sampling. 100 quadrats (1 ha) and 100 hours (x3 personnel, 300 man hours) of VES is being conducted on each transect. Intensity at each altitudinal category is based on area availability. On sighting a reptile or amphibian, its GPS location, forest type, altitude, microhabitat, vertical position and vicinity to water and other relevant information are recorded.

Herpetofauna: Including opportunistic observations, 84 species of herpetofauna (26 species of amphibians and 58 reptiles) were observed during this reporting period (February 2006- March 2007). This included observations of 1735 reptiles and 951 amphibians. Amphibians had higher proportion (58%) of endemic species than reptiles (26%). Among three methods used (Quadrat, Visual Encounter Survey and Road Cruising), the VES yielded highest number of species with respect to both reptiles and amphibians followed by Road Cruising.

During this study (February 2006- March 2007), a total of 300 quadrats were examined (ie. 300q X 10m X 10m= 3 hectares). About 26% of the quadrats had reptiles and only 9% had amphibians. This

resulted in the observation of 144 reptiles and 149 amphibians. The sampled area had a density of about 48 reptiles/ ha and 49.7 amphibians/ ha.

Similarly, 300 hours (100 hoursX3 transects) of Visual Encounter surveys were conducted. Three personnel were involved in the survey, and hence a total of 900 man-hours were considered as sampling duration. A total of 1211 reptiles and 673 amphibians were recorded during this sampling. About 1.4 (~2) reptiles and 0.75 (~1) amphibians were encountered per man-hour search (effort). Among amphibians, highest number of species and individuals were from the family Ranidae. With respect to snakes, Colubridae was represented by highest number of species and individuals and among lizards, Gekkonids contributed highest number of species and individuals. At present, no analysis has been done with respect to the herpetofaunal communities, as data collected so far is insufficient. Faunal community analyses using data on habits, macro and microhabitat and altitude will be done later.

It is planned to continue herpetofaunal sampling on seasonal basis for the next two years (2007 & 2008). Segregation of data with respect to natural forest, abandoned and active plantations will be analyzed separately for evaluating the distribution and abundance of various endemic species in plantations. Analyses pertaining to community structure of herpetofauna would be undertaken with data set covering all seasons.

II. DIVISION OF LANDSCAPE ECOLOGY

11. Establishment of ENVIS center at SACON on theme 'Wetlands of India'

ENVIS

Coordinator	: S. Narendra Prasad
Co-Editor of the Newsletter	: Lalitha Vijayan
Staff	: Chiranjibi Pattanaik, Santosh Gaikwad & Madhu Routhu
Duration	: Annual
Budget	: Rs. 4.80 lakhs
Funding Agency	: MoEF, Govt. of India

Objectives:

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

Methods:

Satellite data of different time periods and different resolution were used for the extraction of wetlands. Initially, the ortho-rectified data from Landsat Thematic Mapper data (for 1990 to 1992) were 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 ARCGIS 8.0 softwares. An interactive classification approach using both supervised and visual techniques were adopted to delineate various wetland categories viz., Lakes, Ponds, Reservoirs, Mangroves, Saltpans, other aquatic vegetation etc., of the study area.

Results:

- Updated ENVIS wetland website
- Simple maps were developed on Prioritized Maps on Inland Wetlands of India using DjVu plug-in technology
- Development of mangrove atlases on Andhra Pradesh, Tamil Nadu, Orissa and state of art report on mangroves of India in DjVu format under mangroves section.
- Information on "Freshwater wetlands" were added under Forest wetlands section
- More records were added in publication databases
- Linking reports of Ramsar sites from WWF India website to wetlands of India website.
- Development of user guide on "How to use this website" which also includes a site map for wetlands of India.
- Font conversion for regional language interface
- XML technology is added to the website on trial basis

- Creation of Wetlands of India website in Hindi.

Discussion:

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 viewing simple maps, the user needs to install DjVu plug-in which is available on lizardtech website. The simple maps are best for those having low-speed internet connections or quick access to specific areas. Here user can save the maps or can take print of it.

1. DjVu is faster, smaller and clearer solution for maps / documents on the Web
2. Powerful tool for geographic data, document management, and web distribution
3. Converts any scanned paper document, catalog or book into super-small, high-quality images that can be instantly transmitted and viewed by anyone via a standard Web browser
4. As a result, users can efficiently scan, store, download and email crucial documents via corporate intranets or the Internet 150 times faster than Adobe® PDF and 20 times faster than JPEG or GIF
5. DjVu files can be panned, enlarged or reduced smoothly in real-time
6. DjVu is also a ideal format for growing e-book marketplace

The following web atlases are available in the DjVu format

- a. Tamil Nadu mangrove atlas
- b. Andhra Pradesh mangrove atlas
- c. Orissa mangrove atlas

There is also Mangroves of India: State-of-the-art report available in the Djvu format.

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

Blog for Wetlands of India is added in the wetland website.

Blog features:

1. Blog for Wetlands of India developed by using WordPress (<http://wordpress.org>) software.
2. A main content area with news on wetlands listed chronologically, newest on top. The news is organized into categories.
3. An archive of older news.
4. A way for people to leave comments about the articles.

Open Source Web-GIS:

Currently we are using ALOV software, which is a freeware for Web-GIS purpose. We tried Geoserver, which is open source software for Web-GIS. We found out the following advantages of using Geoserver.

Advantages:

1. It is Open Source Server
2. Useful for publishing vector and raster maps using clients like mapbuilder or chameleon.
3. Stores spatial data in to PostGIS a spatial extension for the open source [PostgreSQL](#) database, allowing geospatial queries.

4. It allows users to update, delete, and insert geographic data using software like UDig, OpenJump etc which is rather difficult with ALOV.
5. GeoServer supports KML and KMZ output for WMS requests so data can be served up to Google Earth.

XML technology:

This work is also under progress but we were successful in making XML databases and gaining the benefits of XML by using Xpath (Trials were

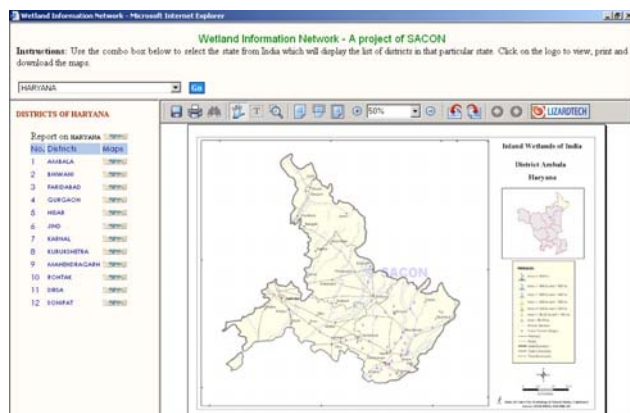
carried out on angiosperms database). Later on we will make data available for exchange using XML technology.

Remote Sensing & Wetland

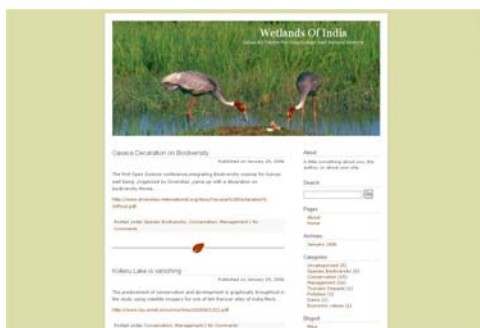
The spatial data on wetlands using Landsat TM data for 1990 finished for the state of Gujarat and Tamil Nadu. Wetland maps and area statistics were generated for 19 districts of Gujarat and 30 districts of Tamil Nadu. Database generated on wetlands is first kind of its region. Wetlands maps will be uploaded in the

ENVIS website.

Tables and Charts:



Simple map using Djvu Technology



Blog for Wetland of India



Wetlands of India (Summary by Month)										
Month	Daily Avg				Monthly Totals					
	Hits	Files	Pages	Visits	Sites	KBytes	Visits	Pages	Files	Hits
Feb 2007	601	416	307	74	554	0	747	3071	4163	6011
Jan 2007	444	311	245	66	1074	0	2066	7607	9654	13780
Dec 2006	314	206	184	69	825	0	2145	5707	6401	9734
Nov 2006	552	435	387	79	661	0	1825	8917	10010	12700
Oct 2006	254	142	118	41	605	0	990	2852	3421	6106
Sep 2006	288	166	127	6	1012	0	1820	3814	4996	8654
Aug 2006	302	160	134	54	1111	0	1694	4154	4990	9369
Jul 2006	288	177	137	61	745	0	1893	4271	5506	8928
Jun 2006	559	151	146	87	783	0	2622	4405	4548	16788
May 2006	567	238	225	74	784	0	2324	6976	7403	17585
Apr 2006	617	488	480	123	1130	0	3703	14403	14645	18523
Mar 2006	643	423	417	72	840	0	2248	12928	13123	19961
Totals						0	24077	79105	88860	148139

Web statistics from March 2006 to February 2007

Recommendations:

These following recommendations will be added to the Wetlands of India website in the future.

- Wetlands of India website will be the central hub for all wetland related information in India.
- The website will run on SACON's own server
- Development will be done using FOSS or free tools
- And other FOSS tools as per the requirement
- Indian Wetland Species Directory (IWSD). This will have taxonomic data, images, geographic locations etc.
- Wetland Markup Language (WML). This will guide all the other organizations working on wetlands to have uniform data which will facilitate easy data exchange.
- Development of data acquisition tools and make available to other organizations to digitize data related to the wetland.
- Digital Wetland Publication Project. Using DjVu plug in technology
- 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
- Education center for Wetlands of India.

Summary:

Wetlands of India website is updated with many features. Wetlands of Gujarat and Tamil Nadu were extracted from Landsat Thematic Mapper data of 1990 using remote sensing and GIS. The district wise distribution of wetland category and overall area statistics of two states are finished. Wetland thematic maps are finished for 49 districts of Gujrat and Tamil Nadu.

12. Structural and functional attributes of the wetlands of Indo-Gangetic plains with reference to Uttar Pradesh

Principal Investigator : S. N. Prasad
 Co-Investigators : V. Hari Prasad (IIRS, Dehradun),
 P. S. Roy (NRSA, Hyderabad) and
 Lalitha Vijayan
 Project Personnel : Prasanth
 Narayanan S. and
 Prashob Raj V.M.
 Duration : 2004-2007
 (September)
 Budget : Rs. 25.30 lakhs
 Funding agency : ISRO-GBP

Objectives:

- Assess the loss of wetlands over a period of 20 years from 1980-2000
- An appraisal of the causes and consequences of the losses on the biodiversity and functional values.

Methods

Wetland features such as river, lake, reservoir, perennial, non-perennial and swamps were extracted from thirty-seven toposheets of the scale 1:250,000

published by Survey of India (SoI) in 1972 for UP. The satellite imageries used are Advanced Wide Field Sensor (AWiFS) of Indian Remote Sensing satellite (IRS) P6, Resourcesat-1, and Wide Field Sensor (WiFS) of IRS 1-D. Visual interpretation technique was used initially to extract wetlands from satellite imageries. Wetland statistics of 33 districts were extracted from AWiFS 2004 image by visual interpretation technique. After the temporal maps are prepared, it is proposed to do the change detection analysis. Catchment areas of the most dynamic wetlands are being delineated to analyse the reasons for changes in the wetlands.

Results

Completed field work at Allahabad, Mirzapur, Sultanpur, Varanasi, Pratapgarh, Etawah, Mainpuri, Lakhimpur, Sitapur, Baharaich, Etawah, Rae Bareli, Jaunpur, Etawah, Sravasti, Farrukhabad, Gorakhpur, Hardoi, Barabanki, Fatehpur, Hardoi, Budaun, Shahjahanpur, Maharajganj. Delineation of Watershed boundary has been completed and the soil map of Uttar Pradesh has been prepared. Data base generation for hydrological modeling is in progress. Ninety species of wetland and wetland dependent bird species have been recorded from the different wetlands of Uttar Pradesh. Details of the districts visited including biodiversity and wetlands have been prepared. A database on wetland birds in excel spread sheet were prepared. Niche wise categorization of wetland birds reported from UP is in progress.

Major factors, which contribute to the loss of wetlands, are conversion or draining of wetlands - The key threat factor is the conversion of wetlands into the agricultural fields of crops such as sugar

cane, paddy, wheat etc. Some of the wetlands are totally drained by unscientific construction of canals.

Discussion

Human interferences are the major reason for reduction in the wetlands. According to Prasad *et al.* (2002) agricultural conversion and hydrological alterations are the two acute reasons for the loss of wetlands in India. In a few cases canals are made either to protect the villages from floods during the monsoons or to irrigate the agriculture fields. Then drying wetlands were converted to agricultural fields. Changes in agricultural patterns have a major significance in the decline of wetlands of these districts. Less rainfall and uncontrolled use of ground water is reducing the capacity of water holding capacity of the wetlands. Other factors are conversion of wetlands for commercial constructions, settlements and to aquaculture farms of vegetable (*Trapa natans*) and exotic fast growing carps and catfish like *Ariyochthys nobilis* and *Clarias gariepinus*.

Recommendations

Conversion of wetland areas to agriculture fields must be halted by law. Banned exotic species of fishes must not be used for aquaculture practices especially in the natural wetlands.

Summary

A tremendous and significant reduction in the wetlands has happened, Rae Bareilly and Hardoi districts having greatest reduction. Compared to perennial wetlands maximum loss has happened to non-perennial wetlands. Aerial extend of the wetland have reduced further from that reported by SAC.

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

Principal Investigator : P. Balasubramanian
Project staff : E. Santhosh Kumar
Duration : Three years
(February 2006-January 2009)
Budget : 6.2 lakhs
Funding agency : MoE&F, Govt. of India

Indian Grey Hornbill (*Ocyrceros birostris*), also known as Common Grey Hornbill, is distributed in India, Pakistan and Nepal. This species is known to occur in deciduous biotopes, open thorn forests, and many rural areas with cultivation. This species has been reported locally extinct from Kathiawar region, including Gir forest and is likely to go extinct in several regions due to habitat destruction and other human interferences. In South India, Indian Grey hornbills are mainly occurring in the Eastern Ghats. This species co-exists well with humans and appears reasonably adapted to rural environments. Although considered common, various threats are mounting on its prime habitat, dry deciduous forests, and therefore needs conservation attention. In addition, this species being a frugivore is expected to play a prominent role in seed dispersal of its food plants and aid in natural regeneration of forests. In order to study these aspects, the present study was proposed.

Objectives

- study the foraging ecology and breeding biology and determine the predominantly frugivorous habits of the Indian Grey Hornbill

- establish the role of Indian Grey Hornbill in seed dispersal and forest regeneration



E Santhoshkumar

**A male Indian Grey Hornbill
at its nest**

Methods

A rapid reconnaissance survey revealed the presence of two major populations in Tamil Nadu Eastern Ghats, i) Sathyamangalam Forest Division, and ii) Dharmapuri Division. Hasanur range in the former division has been chosen for intensive study. Two major parameters namely, fruiting phenology of fleshy-fruited trees, and frugivorous habits of Indian Grey hornbill were studied during the project period. A total of 210 individuals belonging to 21 fleshy fruit yielding plant species were marked along a transect for phenology study. Phenology survey was conducted twice a month. Percentage of ripe and unripe fruits was noted. To assess the fruit utilization by the hornbills in the non-breeding season,

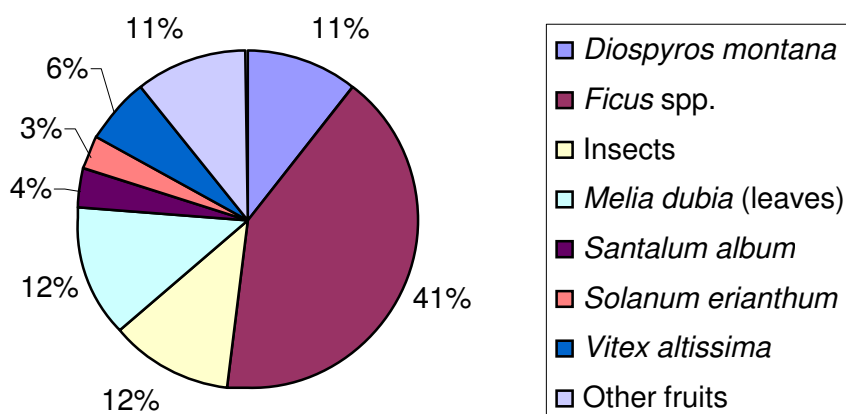
foraging flocks were followed from morning to evening and fruit species consumed were recorded. During the breeding season, hornbills bring a large load of food items, particularly fruits to the nesting site to feed the incarcerated female and chicks. Therefore, nests were monitored from 6 am to 6 pm on several days during the breeding cycle. Number of visits by male, and food items delivered to nest inmates was recorded by observing them from a hide.

Results and Discussion

The phenology data indicates the seasonal variations of fruiting in the hornbill habitat. High fruiting activity was observed in July-August and it was moderate during the remaining period of the year. Extended fruiting activity was observed in *Vitex altissima* and *Santalum album*. In the case of *Ficus* spp one or the other individuals had fruits in all season.

The diet of Indian Grey Hornbill comprised fruits, insects and tender leaves. In the non-breeding season, 20 species of fruits, leaves of *Melia dubia* and insects were recorded in the diet (Fig. 1). Of 1214 feeding observations made, about 40% were on *Ficus* spp. Other favoured fruits of the hornbill comprised of *Diospyros montana*, *Vitex altissima* and *Santalum album*. Insects formed 12% of the non-breeding season diet. Highest number of foraging hornbills (n=16) were seen on a fig tree, *Ficus microcarpa*. The foraging observations indicate that the Indian Grey Hornbill usually spent maximum time, about an hour, on fig trees.

Fig 1. Proportion of various food items consumed by Indian Grey Hornbill during non-breeding season



Towards the end of last breeding season (June 2006), one active nest was observed for Twelve hours (6 am to 6 pm) continuously. Nest inmates were mostly fed with figs. The midden deposits contained seeds of several non-figs. During the current breeding season which started in March 2007, nine active nests have been identified, majority of which (55%) were located in *Melia dubia*. A total of 120 hours were spent on five active nests, to document the diet of the birds in breeding season. The male visited the nest 168 times to deliver food items to the nest inmates. Fruits, mainly figs, followed by insects and lizards were fed to the nest inmates. Midden deposits beneath the nest trees have been collected and seeds in them were identified.

14. Pollination and seed dispersal by animals in the dry deciduous forests of Southern Eastern Ghats

Principal

Investigator : P. Balasubramanian

Project Staff : M. Murugesan,
T. Selvarathinam &
P. Manikandan

Duration : 2 years
(February 2007-January 2009)

Budget : Rs. 10 Lakhs

Funding

Agency : Tamil Nadu Forest
Department
(Research wing)

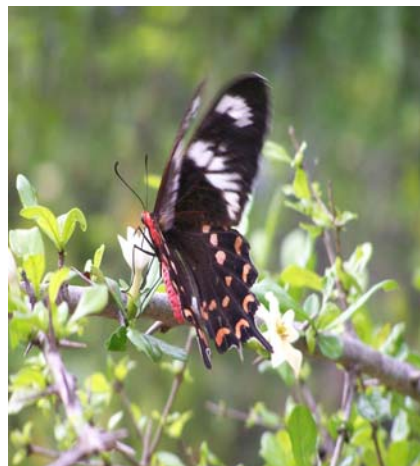
Pollination and Seed dispersal are important events in the life of plants. Animal pollinator of flowers or disperser of seeds is termed as “mutualist” In the mutualistic relationship, the reward to animals is food, in the form of pulp or nectar and for the plants it is the benefit of cross pollination or seed dissemination. The failure of mutualisms may accelerate the erosion of biodiversity in disturbed and fragmented forests. Plants that depend on the services of animals are expected to be in great danger, because, the vulnerabilities of the mutualists are added to the plants. Flower-dependent animals may be equally vulnerable to changes in flower supply resulting from deforestation, logging and influence of climatic change on plant phenology. Hence, information on pollination and seed dispersal are very essential for the better management of forests.

The Tamil Nadu Forest Department has undertaken a major eco-restoration program in southern Eastern Ghats. As a part of this program, the department has

been planting trees in various degraded sites of the Eastern Ghats under the Tamil Nadu Afforestation Project (TAP). Realizing the need to plant native species that sustain pollinators and seed dispersers, the Tamil Nadu Forest Department entrusted a project to SACON, with the following objectives.

Objectives

- Document the animal visitors to flowers and fruits and identify the pollinators and seed dispersers of dry deciduous forests in the Eastern Ghats
- Identify and suggest indigenous trees that attract key pollinators and seed dispersers, for afforestation of TAP sites in Eastern Ghats.



P Balasubramanian

Butterflies are the major pollinators in the dry deciduous forests

Methods

The southern Eastern Ghats consists of several broken hill ranges, viz., Javadi, Yealagiri, Melagiri, Shervaroy, Chitteri, Kalrayan, Kolli, Pacchamalai and Bodamalai, extending to Erode district (Sathyamangalam Forest Division), and merging with the Western Ghats in the

Nilgiri region. Five potential sites were identified for the preliminary survey; i) Hasanur, ii) Andhiyur, iii) Kolli hills, iv) Shervaroy hills and v) Javad hills. A rapid survey was conducted in the hill areas except Javad hills. Javad hills were visited by the principal investigator for the survey of hornbills during previous years. The dry deciduous forests in Sathyamangalam Forest Division were selected for intensive study as the area harbors undisturbed dry deciduous forests and rich wildlife. Forty woody species were selected for detailed study. Ten individuals of each of these species have been tagged for phenological studies. Fortnightly observations are done to record, flowering and fruiting schedule of various plant species. Animal visits to flowers and fruits were recorded. Extended observations on flower bearing and fruit bearing plants were made and visitor frequencies and mode of foraging recorded.

Results & Discussion

During the rapid reconnaissance survey, a total of 156 woody species belonging to 43 families were recorded. Observations indicate that the following are summer flowering and pollinator attracting species, *Butea monosperma*, *Erythrina stricta*, *Bombax malabaricum*, *Radermachera xylocarpa* and *Albizia odoratissima*. Intensive study began in March 2007 and three plant species (*Zizyphus rugosa*, *Ligustrum perrottetii*, and *Capparis grandis*) were investigated for pollinator visitation. Animal visitors to these species include 50 insect species and three bird species (2 species of sunbirds and 1 flower-pecker). Species belonging to Hymenoptera (n=14) followed by Coleoptera (n=10) and Lepidoptera (n= 8) were the frequent visitors to flowers. Honey bees followed by beetles and

butterflies appear to be the legitimate pollinators. Observations on fruit yielding trees revealed the occurrence of 10 avian frugivores in the study area. Bulbuls, barbets, Koel, Indian Grey Hornbill, starlings and mynas were the major frugivores.

15. Plant-bird interactions with special reference to identification of bird-dispersed plants in Attapady hills, Kerala

Principal Investigator : P.Balasubramanian
Co-Investigator : Santhosh Jacob (AHADS)
Project staff : R. Aruna
Duration : 1 year & 6 months (July 2006-December 2007)
Budget : Rs. 2, 69,000/=
Funding agency : Attappady Hills Area Developmental Society (AHADS)

Introduction

Attappady is one of the two extensive east sloping plateaus in the Western Ghats, which stretches from Mukkali to Anaikatty and Thazhemully to Muthikulam over an area of 745 sq. km. The Attappady degraded forestland is a multiple-use ecosystem that performs a number of protective, productive and economic functions, to sustain the ecological and livelihood securities of various indigenous communities. The need for conservation of biodiversity significantly increases in degraded and fragile ecosystems, to restore productivity and to arrest further degradation of such areas and conservation of existing biodiversity. One of the major steps involved in eco-restoration is tree planting. The Attappady Hills Area Development Society (AHADS), Agali, Kerala runs a major eco-restoration

programme in Attappady and as a part of this program, AHADS wanted to identify bird attracting trees. In order to identify the suitable bird-dispersed native species, the AHADS entrusted a project to SACON with the following objectives.

Objectives

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

Methods

In 10 transects were selected comprising five transects in plantation sites (T1 – T5) and five transects in biomass sites (T6 – T10) in Attappady. These sites are maintained by AHADS. In addition to these, three transects were selected in the adjoining Anaikatty forests, as control sites (T11 – T13), where the climax community of the mixed dry deciduous vegetation occurs. Bird census was conducted once a month in all the transects, by fixed width line transect method. Focal observations were made on plants bearing fleshy fruits and the avian frugivores were recorded. In addition, transect walks were carried out to document frugivorous birds and their feeding behaviour.

Results & Discussion

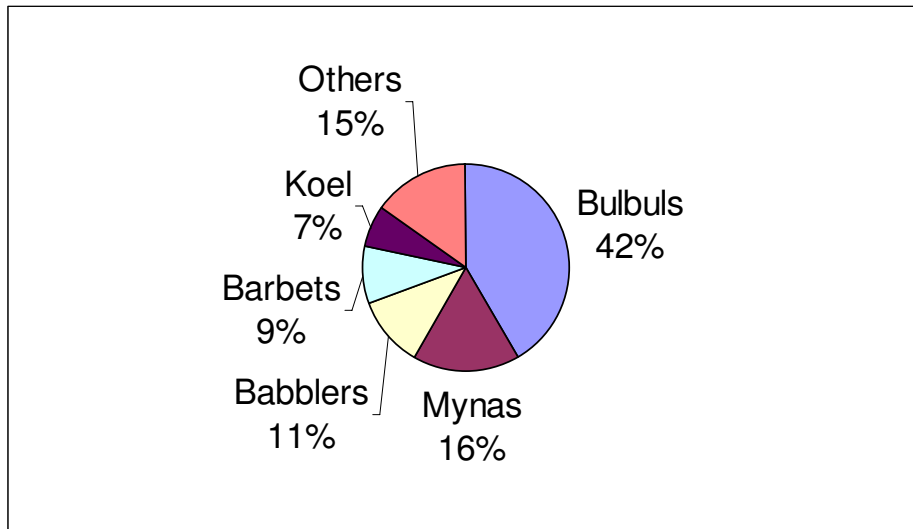
In total 87 species of birds were recorded from the study sites. Bird species richness indicate that the undisturbed sites support the highest number of species (n=87)



***Ficus benghalensis* – a pivotal bird-attracting species**

followed by biomass sites (n=82) and plantations (n=70). While the highest number (n=24) of frugivorous bird species was recorded in the undisturbed forest, lowest in the plantations (n=15). Phenological observations indicate the seasonal variations of flowering and fruiting in the mixed dry deciduous forests. Flowering activity was seen to peak in November-December and dip in January. Peak fruiting was observed in May and least in December. A total of 25 bird-attracting plant species have been identified so far from the study area. Maximum number of frugivorous bird species visited *Ficus benghalensis* (n=21) followed by *Ficus religiosa* (n=17) and *Zizyphus oenoplia* (n=14). Other important bird-attracting plants of the study area include *Santalum album*, *Premna tomentosa*, *Canthium dicoccum* and so on. Of the 23 fruit-eating bird species recorded, bulbuls (42%) followed by mynas (16%), were the most frequent visitors to fruit bearing plants (Fig.).

Figure. Avian frugivores recorded in the



study area

III. DIVISION OF 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. Siva
Subramanian
Research Fellow : V. Dhananjayan
Technical Assistant : S. Jayakumar
Duration : 3 Years
Budget : Rs.14,62,000/-
Funding Agency : MoEF

Objectives

- Conduct surveys and locate the heronries in Tamil Nadu
- Monitor breeding ecology, nesting success in select species of fish-eating birds
- Identify factors responsible for population decline and or breeding failure
- Generate database on the residue levels of persistent chemicals in the tissues, eggs and eggshell thickness

Methods

Direct observations were made to estimate the number of species and individuals in heronries. Officials of the forest department and local people were enquired to gather historical information on breeding. The agricultural practices, land use pattern and information on pesticide application were recorded on a datasheet. Standard operating protocols were adopted for the analysis of residues of agricultural chemicals in water, fish and tissues.

Results and Discussion

Field surveys were made in Udayamarthandapuram Bird Sanctuary and Vaduvor Lake - Thiruvavur district. Among the fish-eating birds recorded, Asian Open bill, Oriental Stork, Indian Pond Heron, Black Crowned Night Heron, Gray Heron, Little Egret, Cattle Egret, White-breasted Kingfisher, Small Kingfisher, Little Cormorant and White Ibis were notable. More areas will be surveyed before intensive study sites and species are chosen.

Summary

The study is just initiated. Project personnel have been recruited and trained. The preliminary field survey has been conducted in a few sites. We propose to continue the survey in rest of Tamil Nadu and select three potential breeding sites, and conduct intensive studies to assess the impact of pesticides on the breeding outcomes.

17. Monitoring of environmental contaminants in Indian Avifauna

Project
Investigator : S. Muralidharan
Research Fellow : V. Dhananjayan
Duration : Long term
Budget : Nil
Funding agency : SACON

Objectives

- Monitor residue levels of persistent chemicals in birds and generate database.
- Identify chemicals responsible for mortality of birds across the country.

- Assess the effectiveness of guidelines on usage of major chemical pesticides in the country.

Methods

On receipt of birds at the laboratory, postmortem examinations were conducted. Brain, liver, muscle and kidney, and food contents were preserved at -20°C for future analysis. The samples were processed for pesticides and PCBs using specific solvents and analyzed in GC-ECD. Acetylcholinesterase activity was measured using UV-Vis Spectrometer.

Results and Discussion

A limited number of samples on priority basis were processed and analyzed for organochlorines, organophosphates and PAHs. Varying levels of OCs have been documented in the tissues of select species of birds. Reduced brain AChE activity supported by the presence of residues of methyl parathion confirmed that methyl parathion was responsible for the death of Indian Bustard received from Pune.

Between the two species of birds tested for PAHs, the total PAHs concentration in tissues of Blue Rock Pigeon was found to be higher than Pariah Kite with significant variations between sex and years. Presence of PAH residues in birds of Ahmedabad city shows the continuous input from industrial operations mainly petrochemical to the environment.

Summary

Between April 2006 and March 2007, we received 275 birds comprising 28 species. Postmortem examinations were conducted in all the birds and tissues have been stored for all possible analysis in the future. Some samples were processed and analyzed for residues of chemicals, namely organochlorine pesticides, PCBs and PAHs.

18. Use of biomarkers in evaluation of heavy metal contaminants in marine fishes

Project Supervisor : S. Muralidharan
Research Fellow : R. Jayakumar
Duration : Two years
Budget : Rs. 2,73,696/-
Funding Agency : CSIR – as senior fellowship to Mr. Jayakumar

Methods

Standard operating protocols were followed in quantifying the contaminants and biomarkers. Heavy metals were determined using Atomic Absorption Spectrophotometer. Samples were digested with microwave digestion system. Biomarkers were quantified using spectrophotometric techniques.

Results and Discussion

A total of 136 fishes comprising five species were examined for metal contamination in tissues, namely gill, liver, kidney and muscle while biomarkers were estimated only in liver and kidney. Attempts have been made to understand the relation between the levels of metals and biomarkers

Among the fishes collected from Cochin, *R.kanagurta* recorded the maximum concentrations of Cu (1.90 ± 0.16 ppm) and Cr (0.35 ± 0.14 ppm). *S. longiceps* had the highest mean levels of Cd (0.12 ± 0.02 ppm) and Zn (30.19 ± 2.97 ppm) while the same species recorded the least level of Cr (0.03 ± 0.02 ppm). *S.longiceps* collected from Rameshwaram recorded the highest levels of Cu (2.56 ± 0.20 ppm), Cd (0.17 ± 0.02 ppm) and Zn (27.72 ± 2.43 ppm) similar to the fishes from Cochin while *R.kanagurta* had the maximum

concentrations of Cr (0.97 ± 0.29 ppm). Irrespective of seasons and species, zinc and copper levels were high. Significant variation in metal contamination ($P < 0.05$) among species may be related to feeding habits and habitats.



R Jayakumar

Fishes – Indicators of metal contamination

Regarding biomarkers (MT and MT-like proteins) *R.kanagurta* and *C.agassizi* had the maximum hepatic ($15.91 \pm 4.86 \mu\text{g/g}$) and renal levels ($24.69 \pm 3.89 \mu\text{g/g}$) respectively. Variations observed could be related to age, diet and reproductive phase of the fishes. A significant strong positive correlation existed between MT and Cd levels. This makes us to infer that increase in metal ions increases MT synthesis as commonly reported in many other studies. Highest GST activity was observed in *N.japonicus* (2187.38 ± 947.0 n moles/ min/ mg protein) while *S. longiceps* exhibited the lowest (84.78 ± 39.23 n moles/ min/ mg protein). The correlation between levels of GST and metals was not significant. This may be because GST is not influenced only by metals.

Summary

A study on the use of biomarkers in evaluation of heavy metal contaminants in select marine fishes supplied from Cochin and Rameshwaram coastal zones was conducted. Five commercially important species, namely *Sardinella longiceps*, *Rastrelliger kanagurta*, *Nemipterus japonicus*, *Cynoglossus macrolepidotus* and *Chlorophthalmus agassizi* were analysed for heavy metals (copper, zinc, cadmium and chromium) and biomarkers (Metallothionein and Mt-like proteins and Glutathione S-transferase enzyme).

relation between primary habitat of species and tolerance to urbanization.

IV. DIVISION OF ENVIRONMENTAL IMPACT ASSESSMENT

19. Adaptation and tolerance of birds to urbanization – a critical evaluation with emphasis on life strategy

Investigator : Ranjini J.
Supervisor : P. A. Azeez
Duration : 3 years
Date of Commencement : February 2007
Expected date of Completion : February 2010
Budget : Rs. 4,00,000/-
Funding agency : International Foundation for Science (IFS), Sweden

Objectives

To study

- Species abundance and trends, nest success and abundance along an urban gradient
- Tolerance levels of each selected life strategy (or species) to urbanization, in terms of their habitat utilization, feeding, breeding and roosting adaptations.
- Suggest suitable urban management plan

Hypothesis

Assumption 1 : Life-strategy of species has direct influence on tolerance to urbanization: Life-strategy can be taken as an indication of tolerance to a particular habitat. Here we propose that there is

i) Flocking species (atleast certain times of the day), with better flight capacities and larger home ranges, are more successful in higher gradients of urbanization. Exception to this may be raptors and brood parasites.

ii) Breeding strategy is a crucial factor in tolerance to urbanization: Cooperative breeders are less likely with higher gradients of urbanization.

Assumption 2.: Resource availability for breeding, roosting and foraging is a major constraint in urban areas. Nesting height, type and choice of material has an important role in tolerance to urbanization. Ground nesting species, may not survive in higher gradients of urbanization.

Results and Discussions

Works progress: i) Literature surveys: Subject matter relevant to the study were researched in national and international journals and books. In addition few relevant contacts were made with experts in the field. Scientific papers in the fields of bird community studies in forest and urban areas, urbanization and impacts, evolution were collected. Review papers on “Binocular vision favour social living?”, and “Does urban areas holds analogues of forests: an evaluation based on bird habitats?” are in progress. Google Earth images were downloaded, which used along with certain urbanisation parameters such as density of built up area, population, road intensity and traffic intensity can help in identifying the intensive study areas.

Initial surveys were carried out in several parts of Coimbatore city, nearby suburbs and villages. Birds and respective nests were counted along the transects. Physical parameters such as buildings were quantified in terms of grades. As disturbances increased in the form of urbanization the population count and nest count density decreased. In the urban areas the number of species was restricted to 7 (excluding water birds) and had higher individual species density.

The life-strategy distribution in urban areas tends to be of more partially flocking nature. The successful birds to urbanization were mostly, crows, mynas, sparrows, Blue Rock Pigeon and Cuckoo. Their flight capabilities and partially flocking nature seem to have helped in adapting to urban environments. Another interesting factor to note is the nesting habits of these species – The Myna is a cavity nesting species, whereas the Blue-rock Pigeon is a platform nester. They were occupying the platforms of ventilations and air-condition exhausts. Pigeons also occupied roofs of brick kilns / chulas, having small pigeonholes. Crows are tree nesters and build nests in the trees such as *Cocos nucifera*, *Azadirachta indica*, *Phycus religiosa* and *Tamarindus incus* in urban areas. They are also seen attempting to nest in brick kiln chimneys. It was found that crows were not nesting on exotic species of plants. Cuckoo, being a brood parasite, resources needed to build nests appear not to constraint for them. They are canopy dwellers with good flight capacity and were seen in the urban vegetated areas. These observations support the hypothesis, that the ground nesting birds disappear as urbanization progresses. Although birds frequent the urban areas, our quantification and grading of the urban areas shows that

they are disappearing from the areas where the building density is higher with less vegetative cover.

20. Study of habitat and development of EMP for Blewitt's owl in Araku Valley

Project Investigators	: P.A.Azeez, S. Bhupathy
Research Fellows	: Rachna Chandra & T. Selva Kumar
Duration	: One year
Date of	
Commencement	: November 2006
Expected date of	
Completion	: November 2007
Budget	: Rs. 11 lakhs
Funding agency	: Andhra Pradesh Mineral Development Corporation
Status	: Ongoing

Presently the Govt. of Andhra Pradesh has leased out three locations, i.e. Raktakonda, Galikonda and Chittamgondi in the Araku Valley, Visakhapatnam district through the Andhra Pradesh Mineral Development Corporation (APMDC) for bauxite exploitation. There has been a report of a carcass of the Forest owl (Blewitt's owl) in the valley and hence the APMDC through M/s JSW Limited, Mumbai commissioned a study to propose management of the area with reference to the owl habitats.

Objectives

The major objective of the present study is to examine the status of Blewitt's owl in the study area and development of an Environmental Management Plan for conserving the species.

Since, development of an EMP is a major objective of the study ecological data were

collected in an area falling within approximately 10 km radial distance from the mine sites.



Araku Valley – one of the study sites

T Selva Kumar

For the floral survey quadrats and transects were laid. One transect each of one kilometer and one transect each of half a kilometer in each site was laid. In total 15 quadrats (20 x 20 m) in each season in each site were selected for recording tree species. 60 quadrats each for shrubs (1 x 1 m) and herbs (50 x 50 cm) were put in each site. Altogether 142 plant species were recorded from the study sites. Poaceae comprised the largest family with 29 species. *Phoenix loureirii* was the dominant species on hilltops. Notable differences were found in the vegetation probably due to local soil characteristics, micro-climatic variations and human disturbances. The lush green vegetation is almost burnt for slash and burn cultivation by locals and left to dry during February. *Phoenix* sp. was used by locals for various purposes and its pith is consumed.

The forest type in the area is mainly two, Moist Mixed Deciduous Forest and Dry Savannah Forest. The forests to a great extent seem to be of secondary in nature, probably due to the extensive shifting or slash and burn cultivation. Moist Mixed

Deciduous Forest was found on the slopes, whereas Dry Savannah Forest type was found on the hilltop. Few plant species common to the area were *Ageratum conyzoides*, *Anacardium occidentale*, *Andropogon* sp., *Arundinella* sp., *Bothriochloa pertusa*, *Casurina equisetifolia*, *Crotalaria* sp., *Desmodium triflorum*, *Emblia officinalis*, *Eucalyptus* sp., *Eupatorium* sp., *Grevillea robusta*, *Heteropogon contortus*, *Lantana camara*, *Leucas hirta*, *Mallotus philippensis*, *Mangifera indica*, *Mitrocarpus villosus*, *Murraya* sp., *Paspalum scrobiculatum*, *Setaria pumila*, *Stachytarpheta indica*, *Syzygium cumini*, *Tamarindus indica*, *Tectona grandis*, *Tridax procumbens*. In addition, on the slopes in certain areas coffee (*Coffea* sp.) and black pepper plantations run by the Government of Andhra Pradesh were present.

The variable width line-transect method (Bibby et al., 1992) was mostly followed for counting the birds. A total of 24 transect each of 1 kilometer length was laid for the purpose. Of these, eight transects in each of the study sites covered most land area and habitats. Altogether 142 species of birds were recorded including three vulnerable and globally threatened species and two near threatened species. The species belonging to the families Pycnonotidae, Sylviinae, Muscicapidae and Turdinae were sighted frequently. Several nests were also located in the scrub jungle and wooded forests (e.g. Speckled Piculet, Rufous Woodpecker, Brown Headed Barbet, Common Hoppoe, Plain Prinia, Lesser Whitethroat, Spotted Owlet, Collard Scops Owl, and White-Rumped Shama). Eleven species of owls and owlets could be encountered, mainly from the slopes of the hillocks and valleys.

The largest number of species of birds was recorded in the wooded forest followed by scrub jungle. Many owl species sighted, nest in the open scrub jungle. Brown Wood Owl *Strix leptogrammica*, Mottled Wood Owl *Strix ocellata* (nest), Eurasian Eagle Owl *Bubo bubo* (nest) and Jungle Owlet *Glaucidium radiatum* were reported at higher altitudes along the slopes of the hills. Brown Hawk Owl *Ninox scutulata* (nest), Spotted Owlet *Athene brama* (nest), Collard Scops Owl *Otus bakkamoena* (nest), Oriental Scops Owl *Otus sunia* (nest) were reported at lower altitudes. The



Owl nest in Araku Valley

Brown Fish Owl *Ketupa zeylonensis* and Short Eared Owl *Asia flammeus* were reported in the mid altitude of the hill. The large sized owls, though seen in few numbers, preferred higher altitude despite these heights having fewer numbers of large trees. Other owls and owlets (Spotted Owlet, Collared Scops Owl, Brown Hawk Owl and Oriental Scops Owl) preferred lower altitude with large economically important trees such as mango, tamarind and jack fruit.

A total of 10 species of reptiles were found in the area during the survey. Two species of Agamids – *Calotes versicolor* and *Psammophilus* sp., two species of Scincidae (*Mabuya* sp. and *Lygosoma* sp.) and Gekkonidae (*Geckoella* sp. and

Hemiphyllodactylus sp.) were observed in the valley. Three species of snakes representing two families were observed. Family Colubridae was represented by two species- *Lycodon* sp. and *Liopeltis calamaria*. Family Typhlopidae was represented by single species *Typhlops* sp. Of the recorded species, the most frequently observed was *Psammophilus* sp. followed by *Lygosoma* sp. and *Mabuya* sp. Survey during other seasons may result in more number of species. A total of 5 taxa of amphibians, *Bufo melanostictus*, *Rana limnocharis*, *Tomopterana* sp and two species of *Pholautus* were observed during the study.

Altogether 56 species of butterflies were recorded during the field surveys, Nymphalids were commonest followed by Lycaenids. The highest number of butterflies was recorded from the ecotone area of grassland and wooded forest. The EMP will be developed after collecting of data for complete one year on ecological and species specific aspects.

Summary

The study area is rich in animal and plant biodiversity. 11 species of owls are encountered in the study area, the Araku valley

21. Role of soil organic matter in trace metal dynamics in a wetland-terrestrial ecosystem complex, Keoladeo National Park, Bharatpur, India

Project Investigator : B.Anjan Kumar Prusty
Supervisor : P.A.Azeez
Duration : Two Years
Date of Commencement : 1st April 2006
Expected date of Completion : 31st March 2008
Budget : Rs. 3,00,400/-
Funding Agency : CSIR, as Senior Research Fellowship to Mr. Prusty
Status : On going

This study, a continuation of the Detrital Dynamics component of KNP Project, is aimed at chemical characterization of soil and sediment samples collected from Bharatpur, subsequent analysis of the analytical data and communication of the research findings to the International Scientific community.

Objective

The major objective is to assess the influence of detritus decomposition in the nutrient cycling in soil on a spatio-temporal scale in Keoladeo National Park.

Results

Major aspects of the chemical characterization of collected soil samples are completed. In total, 2496 soil and sediment samples were collected from KNP and processed in SACON laboratory for chemical analysis. Most of the chemical analysis is completed except transitional elements such as Fe, Mn, Zn, Cu, Pb, Cd and Ni. However, some of the samples were analyzed for Cu, Pb and Zn

and the rest of the metals are yet to be analyzed.

The collected samples were analyzed for some basic parameters such as pH, electrical conductivity (EC) and total dissolved solids (TDS, ppm). The major nutrients that were estimated were Total Organic Carbon (TOC), Total Available Nitrogen (TN), Total Available Phosphorus (TAP) and Total Available Sulphur (TAS), alkali (Na and K) and alkaline earth (Ca, Li and Mg) metals. pH, EC and TDS were measured by respective digital electrodes, where as TOC was estimated by the chromic acid digestion method, TN by Persulphate Oxidation method, TAP spectrophotometrically and TAS by turbidimetric method. Ammonium acetate extractable forms of Na, K, Ca and Li were measured flame photometrically and Mg was determined by EDTA titration and expressed as mg/kg soil. CEC, SAR, pNa and rCa were empirically estimated after converting the values of alkali and alkaline earth metals in to meq/Kg. The overall ranges of values for the analyzed parameters are given in the Table 1. The values for the seasonal samples were presented in Table 2.

Table 1. Details of the parameters analyzed

Parameter	Range
pH	5.1 – 10.21
Electrical Conductivity ($\mu\text{S}/\text{cm}$)	1.0 – 1778.0
Total Dissolved Solids (H_2O ext, ppm)	8.0 – 974.0
Total Organic Carbon (%)	0.28-27.78
Total Nitrogen (%)	0.44-1.17
Total Available Phosphorus (%)	0.0004-0.0243
Total Available Sulphur (%)	0.0007-0.0488
Sodium (mg/Kg)	41.0-690.0
Potassium (mg/Kg)	180.0-775.0
Calcium (mg/Kg)	1247.0-3957.0
Lithium (mg/Kg)	5.8-29.5
Magnesium (mg/Kg)	185.2-5147.7
Cation Exchange Capacity (meq/Kg)	76.9 – 1222.3
Sodium Absorption Ratio	0.009 – 32.66
pNa	0.418 – 93.04
rCa	0.013 – 12.666

Table 2. Range of the elements in the wetland sediment (Seasonal variation)

Parameter	Range	Month-Year	Sediment layer (cm)
pH	L = 6.5	Sep-03	0-5
	H = 8.6	Jan-05	15-20
EC ($\mu\text{S}/\text{cm}$)	L = 48.0	Sep-04	5-10
	H = 473.7	May-05	0-5
TDS H_2O ext (mg/Kg)	L = 243.3	Sep-03	10-15, 15-20
	H = 2890	May-05	0-5
Total Organic Carbon (%)	L = 0.61	Jul-05	15-20
	H = 14.01	Nov-03	0-5
Total Nitrogen (%)	L = 0.26	Jul-05	5-10
	H = 0.68	May-04	0-5
Total Available Phosphorus (%)	L = 0.001	Nov-03	10-15, 15-20
	H = 0.034	Jul-05	10-15
Total Available Sulphur (%)	L = 0.0008	Sep-03	15-20
	H = 0.012	Jul-04	5-10
C: N ratio	L = 1.38	Sep-03	15-20
	H = 13.56	Mar-05	0-5
C: P ratio	L = 18.81	Jul-05	15-20
	H = 5995.83	Nov-03	0-5

C: S ratio	L = 352.19	Jul-04	15-20
	H = 3929.49	Nov-03	0-5
N: P ratio	L = 9.34	Jul-05	5-10
	H = 561.61	Nov-03	15-20
L: Low, H: High			

The values fall within the normal ranges expected from similar habitats. Since the metal analysis is yet to be completed, no interpretation of the results with respect to the major objective of the study is made.

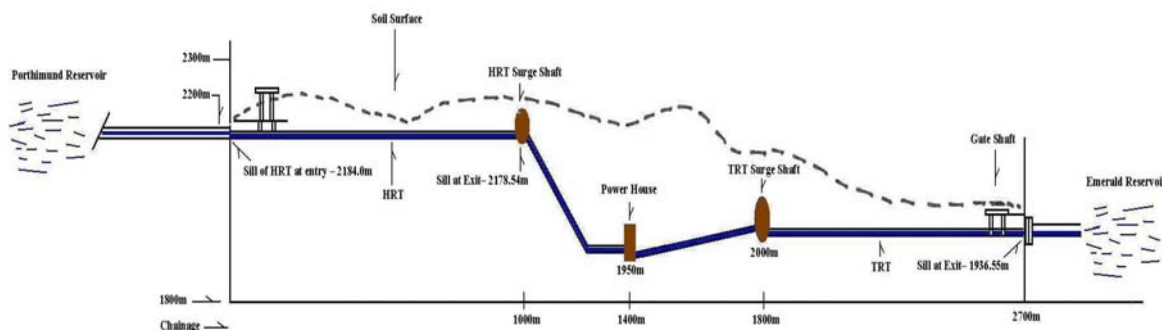
22. Rapid Environmental assessment of the Kundah pumped storage hydro electric project, the Nilgiris, Tamil Nadu

Project Investigators : P.A.Azeez,
S. Bhupathy &
P. Balasubramanian
Duration : Three months
Sponsor : Tamil Nadu
Electricity board

Objectives

The study examined the project sites and its environs focusing on the impact of the project on biological components and ecological environment.

The project does not propose development of any storage structures and intends to pump water from the lower Avalanche-Emerald reservoir to Porthimund reservoir situated at an upper level. For this, the cheaply available surplus power available during the off-peak demand hours will be used. During the peak hours the generator of KPSHEP will be operated to produce power that will be evacuated to the grid. Major components of the project such as Head Race Tunnel, Power House and Tail Race Tunnel will be located underground, while surges and switchyard are the major components located over ground. The project requires about 13 ha of reserve forest land, mostly of exotic wattle plantations, to be diverted for its use.



General subsurface vertical profile of KPSHEP

Field survey of the project sites and its environs were undertaken from November 2005 to March 2005. Standard methods were adopted for collection of the primary data on flora and fauna. In total 64 species of plants, 64 birds, 10 reptiles and 6 amphibians were recorded in the study site during November 2005 to April 2006. Of these 15 species are enlisted in schedule I & II of Wild life Protection Act. Six animal species is red listed while 10 plant species are endemic that needs attention from the standpoint of conservation. The Shola forests are of high conservation importance. Hence activities that will put stress on Sholas may be avoided. Since the project area and its environs fall within the forestry (manipulation) zone of the Nilgiri Biosphere Reserve the TNEB should take utmost care in minimizing disturbances during the construction phase of the project.

A shift in alignment of the Adit I exit, which currently opens to a species rich shola is suggested so that its opening is in non-forested area close to the nearby road and the shola patch into which it currently opens could be protected. A shift in the alignment of road to Switch-yard is also suggested to save another shola patch. During alignment and laying the roads TNEB has to take utmost care to avoid any Sholas.

Most of the installations of KPSHEP are to be placed underground and no new water storage (submergence) is expected. All major over-ground components of the project are located in wattle plantations and hence, the project is expected to cause minimum damage to the local environment. Proper scheduling of the project execution, some realignment of the project structures away from ecologically

important vegetation, stringent control on traffic and access to roads, proper management of debris and wastes, reduction in blasting to the bare minimum, and control of workers can help considerably in reducing the impacts.

23. Mumbai Trans Harbour Sea Link project: Study of Flamingos and migratory birds

Project Investigators : Lalitha Vijayan,
S.N. Prasad,
S. Muralidharan, &
S. Bhupathy
Research Fellows : A. P. Zaibin,
V. Dhananjayan &
P. Jayanthi
Duration : August 2006 –
August 2007
Budget : Rs.15.00 lakhs
Funding Agency : Maharashtra State
Road Development
Corporation, Mumbai

Objectives

The Mumbai Trans Harbour Sea Link (MTHL) alignment of 21 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 of major concern for the environment 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 2-15% of the entire south Asian population of the Lesser Flamingo (*Pheonicopterus minor*), a near threatened species. Hence, a study has been commissioned by MSRDC to look at

the population of birds with emphasis on the Flamingos, their behaviour and the quality of the habitat, which will help in taking necessary steps for the protection of the birds and the area.



Lalitha Vijayan

Flock of the Lesser Flamingo at Sewri-Mahul Region in Mumbai

The present study is for a period of one year ie. from August 2006 to August 2007 and encompasses three major subcomponents, 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.

Methods

Class	Area in sq.km	% of total area
Dense Mangrove	21.5	7.2
Open Mangrove	28.0	9.3
Tree Cover vegetation	10.5	3.5
Mudflat	37.9	12.6
Openland	20.7	54.2
Sand	11.0	6.9
Waterbody	162.8	3.7
Built-up Area	8.2	2.7
TOTAL	300.7	100.0

The pH, temperature and dissolved oxygen of the water samples were within the limits prescribed by EPA (1986). The nutrients namely phosphate and nitrate in water and

The habitats of the study area were mapped using satellite data (IRS P6 LISS IV) procured from NRSA Data Centre (NDC) and LANDSAT ETM⁺ datasets downloaded from GLCF site.

At least two counts of flamingos and other birds were done in each month. The abundance estimates were arrived at by direct and photographic counting 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 & Discussion

The total study area covered 300.7 km². After digital classification of satellite image, we have identified eight land cover types as shown in the table below.

total organic carbon were higher in Mahul probably because of the discharge of domestic and industrial effluents. The levels of heavy metals, cadmium and

chromium were much lower than the prescribed limits. Detailed investigation of other toxic metals such as mercury, lead, nickel, copper and zinc are yet to be done. The residues of organochlorine pesticides (OCP) and PCBs were in lower quantities, whereas PAHs were in very high concentrations probably because of several oil companies, shipping and ship repair activities in this region. These compounds are carcinogenic and hence of concern.

A total of 65 species of birds have been recorded at the study sites, 56 at Sewri and 34 at Nhava with the maximum population of 29,666 birds of 35 species at Sewri-Mahul Creek in January, while it was 2121 of 16 species at Nhava in March. The maximum number of birds was of Little Stint, Lesser Sand Plover, Lesser Flamingo, Curlew Sandpiper and Brown-headed Gull.

The flamingos arrived at Sewri-Mahul region in the last week of November 2006; their number increased slowly till February 2007 and reached above 10,500 during March 2007 with a lower proportion of immature birds (16%) than in the beginning (40%). Flamingos spent

70.4 - 78.1 % of their time in feeding in all the months, preferring mostly mudflats and shallow water areas of lower turbidity and higher oxygen levels at the Sewri-Mahul region.

Interim recommendations given were mainly for getting information from the state Pollution Control Board and taking necessary action for reducing the levels of PAHs in the area; shifting the ship repair activities from Sewri; construction of the bridge to be done in this area when the birds are absent; and the need for extension of this study and a detailed long-term monitoring programme for this area.

24. Andhra Pradesh Community Based Tank Project Environmental and Social Assessment Study

Principal Investigator : S. N Prasad

Project staff : Rajamamanan M.A., N. Sridharan

Duration : July to December 2006

Budget : Rs. 2.9 lakhs

Funding Agency : Centre for Ecological Economics and Natural Resources, Institute for Social and Economic Change, Bangalore.

Summary

The study of flamingos and other birds and the habitats was conducted during September 2006 to March 2007 at Sewri-Mahul and Nhava regions which will be impacted by the construction of the MTHL Bridge. The Lesser Flamingo arrived late in November and their population increased in March to >10,500. Large extent of mudflats (13%) in the study area was inhabited by numerous waders and Flamingos during this season. The Flamingos spent most of the time feeding in the mudflats and shallow water areas, moving according to the tide. Quality of habitat showed slightly higher levels of turbidity, nutrients at Mahul area while concentrations of heavy metals, pesticides, and PCBs were low.

Objectives

- To develop a framework to assess the social and environmental impacts of the proposed project interventions,
- Develop measures to mitigate negative impacts and enhance positive impacts and
- Examine the legal, policy and institutional aspects to ensure adequate and effective stakeholder group formation, management and functioning of tanks that is central to the community based approach of the project.

Methods

This assessment used a combination of Participatory Transect Walks, PRAs and Focus Group Discussions, Questionnaire Canvassing, Consultations with SC and ST members of the community and with the officials of various line-departments, and PRAs with the community. To validate the findings, a series of internal and external consultative reviews and public consultations were held at four places. Across the State, 50 tanks have been identified for the social and environmental assessment and to compile the tank profiles. A list of 50 tanks was provided by the Irrigation and Command Area Development Department. The tanks were distributed over three regions and spread over 17 districts of the state

Results and Discussion

Social Concerns

- Encroachment (based on census survey of 5 tanks): a) Area/tank range from 7 to 57 acres and Number of PAPs 5 to 30 per tank, b) Two-third families are nuclear, c) 83% PAFs are illiterates, d) 3% PAFs are women, and e) All PAFs are below poverty line
- Inadequate and poor participation of WUA members in: a) Tank Management covering regular O&M, b) Payment of Water charges, c) Collective action as WUA, d) Water distribution, and e) Maintenance of distribution network and sluices Conflicts on water use: a) Head and tail enders,

b) Fisherman and tank bed cultivators, c) Tankbed and command area cultivators, d) Upstream and down stream users in cascade system of tanks

- Tail end issues: a) Less number of irrigations compare to head enders, b) Poor distribution system, c) Poor maintenance, d) Head and middle reach farmers store up during scarcities
- Status and returns from tank based livelihoods: a) Reduced over time, b) High levels of siltation has reduced storage levels, c) Less number of irrigations, d) Less groundwater recharge
- Poor participation in WUA: a) Lack of consultation process, b) Low participation of women in tank management, c) Poor representation in WUA

Environmental Concerns

- Quality (based on water quality tests in 10 tanks): a) Coliform range 50-1600 (std <50), b) TDS range 134-589 (Std 500), c) Non-potable water in many peri-urban tanks owing to chemicals
- Base flows to be maintained
- Likely Use of higher quantities of agro-chemicals due to change in cropping pattern
- Lack of environmental awareness among farmers, community members, extension workers

Summary

The Government of Andhra Pradesh has initiated a community based action plan to rehabilitate about 4 lakh ha of command area under minor irrigation tank systems in a project mode to improve tank-based livelihoods on technical, socio-economic and environmentally sound principles. The State government has proposed to set up a Project Monitoring Unit that would house the multi-disciplinary skills necessary to implement the plan.

V. NATURE EDUCATION DIVISION

25. Vacation Training programme on Bioresources for School children

Course Director	: P. Pramod
Staff	: R. Eswaran
Duration	: One month
Budget	: Rs. 5,10,000/-
Source	: NBDB, DBT
Status	: Completed

This was a basic course designed to train and develop awareness in school children about the relevance of bioresources, and the relationship between bioresources and biotechnology. It focused on sustainable utilization, conservation of bioresources and its relevance to everyday life. The course targeted students who have appeared class X examination and are awaiting results. The number of participants was restricted to 25 and duration of the residential course was 25 days (16th May and 9th June). The course comprised of (a) laboratory work, (b) invited lectures, (c) interactive sessions and (d) individual projects. All the participants stayed in the SACON campus

and worked together with the course director, scientists and research scholars of SACON during the whole camp. They attended 55 hours of lecture in 32 classes. They also visited the field, accompanied by professionals in field taxonomy and ecology, for about 128 hours to learn and experience the diversity of bioresources. Late in the evenings, the participants were shown movies on bioresources and ecology and had discussions with experts.

The diversity of the participants in this programme makes it special. While the ratio between boys and girls was 3:2, the rural-urban and Tamil/English composition was 1:1. Similarly 50% of the participants were from Aided/ Government schools. This combination allowed us to involve students of different capabilities in this programme.

Keeping the classroom lectures only to 20 % of the total time schedule, the first priority was given to experiences that would give not only knowledge, but also the required skills in identifying natural elements (such as the species of birds, fishes, butterflies, frogs, snakes, insects, spiders, trees, medicinal plants, garden plants and wild relatives of cultivated plants) and inculcate the right attitude towards conserving our depleting bioresources and nature. Each participant selected one topic to conduct individual projects on and submitted the report to SACON. Each went back with an idea for starting at least one more long duration project near their school/ home. The reports of those projects were submitted to the 3rd Children's Ecology Congress held on 23rd February 2007. The participants visited SACON again on 31st December for a get-together and discuss their projects.

26. People's Biodiversity Register through School Children

Course Director	: P. Pramod
Staff	: S. Balaji
Duration	: 2006-2007
Budget	: Rs. 50,000/-
Source	: DBT through
Centre for Ecological Sciences	
Status	: Completed

This was a collaborative project with Centre for Ecological Sciences, Indian Institute of Science, Bangalore. The programme was initiated in five schools, selected, based on their performance in the last two years of nature education activities. Two government schools, two aided schools and one matriculation school were selected to ensure representation of all categories of institutions. The schools selected and the Panchayats they studied were the following:

1. Govt. High School, Devarayapuram (Narasi puram Panchayat)
2. Govt. High school, Idigarai (Thengumaratta Panchayat)
3. Kadri Mills. Hr. Sec. School, Ondiputhur (Kallapalayam Panchayat)
4. PSGG Kanagurukulam Hr. Sec.School for girls, Peelamedu (Kalapatty)
5. G.D. Naidu Mat. Hr.Sec. School, Coimbatore (Chettipalayam Panchayat)

The school study team included one/two teachers and 5-10 students. The team visited their study areas many times, collected data on local biodiversity, people's knowledge on biodiversity, and associated information about the village and people. The data of part I of the

schedule has been compiled and submitted to SACON. The data is being computerized. The second part of the data collection is in progress. Results of two of the five projects were presented in the National Children's Science Congress, 2006 and the Thengumaratta project done by Government High School Idigarai, was selected as the best Biodiversity project of Tamil Nadu, and classified as one of the excellent student projects in the National Children's Science Congress conducted in Sikkim. The consolidated report has been submitted to CES, which they submitted (consolidating reports from all the four states) to DBT.

Other nature education programmes

Coordinator	: Dr. P. Pramod
Assistance	: Volunteers
Duration	: April 2006 – March 2007
Funding	: Local sponsors

The following programmes were conducted under the head of nature education for the period April 2006 – March 2007

Programme 1. Nature Camps for students of Coimbatore

Thirty three nature camps were conducted for 1500 students from varied socio-economic backgrounds, rescued street children, school and college regular students, NSS volunteers, MSc (wildlife, zoology and environmental science) students, Engineering and Law college students, Students of catering technology, business management and so on. The content of the camps was customized keeping with the profile of the participants. Nature walks, short treks, field lectures, audio visual shows, film

shows, debates and discussions were the major events in the camps.

Programme 2. Wildlife Week Celebrations

A week long programme on nature awareness was conducted on the occasion of World Wildlife Week in the first week October. The programmes were conducted in three venues; State Forest Service College, Kadri Mills Hr. Sec. School, PSGG Kanya Gurukulam and SACON. About 3000 students from five schools participated in the programme. Screening of wildlife films, lectures, cultural programmes and tree planting were organized for students and a seminar on wildlife was conducted in SACON for research scholars.

Programme 3. Salim Ali Trophy Nature Awareness Competitions and awards

This is a regular annual event. This year 2000 students from 40 schools attended the Salim Ali Trophy Nature Competitions conducted on 29th October 2006. The competitions were conducted under 16 different categories and 132 students bagged the prizes. The Salim Ali Trophy for the best school was won by G. D. Matriculation Hr. Sec. School. Coimbatore.

Young Bird Watcher of the Year contest

Vignesh S of Kadri Mills Hr. Sec. School (Junior) and Poornima M, and Santhia P of PSGG Kanya Gurukulam Hr. Sec. School for girls (Senior and Super seniors) were selected as the Young bird Watcher of the year 2006.

Programme 4. Salim Ali Birth Anniversary Celebrations

The 110th Birth Anniversary of Late Dr. Salim Ali was celebrated on 12th November, participated by hundreds of school children. The worshipful Mayor of Coimbatore City Corporation was the chief guest. Winners of the Salim Ali Trophy Nature Competitions were given awards on the occasion presided over by Mr. Rathinam, a veteran bird watcher and author of many books on birds.

Programme 5. Student research programmes

Twenty five research projects on biodiversity and other environment related topics were conducted by the student members of Salim Ali Nature clubs. The reports were submitted to SACON and the results presented in the 3rd Children's Ecology Congress conducted on 23rd February 2007.

Programme 6. Salim Ali Naturalist Forum

Fifteen meetings and two field trips were conducted for Salim Ali Naturalist Forum (SANF) members during this period. Thematic discussions and screening for wildlife movies were conducted in the meetings. A new-year get together of nature education partners of SACON, which include nature lovers of Coimbatore, school and college students, and teachers, was conducted on behalf of the forum. A two-day residential camp which exposed the members to the world of birds, butterflies, plants along with stars and planets in the night was organized. One education field trip to Silent valley National Park was also conducted.

Programme 7. Other Nature awareness activities

Three teams of trainees and course participants from State Forest Service College (SFSC) visited and lectures were

arranged at SACON for their benefit. The Nature Education officer and other scientists delivered lectures in the Jungle Training Programme for Sub Inspectors of Police from Tamil Nadu conducted by the Special Task Force of Tamil Nadu Police at Sathyamangalam.

Programme 8. World Wetlands day Programme

SACON observed World Wetlands Day on 2nd February with a three-day programme. On 31st January, SACON scientists and Salim Ali Naturalist forum (SANF) members conducted a bird watching session and public awareness programmes was conducted at Kuruchi Lake. Students from various schools, SANF members and public attended the function. On 1st February selected members of SANF, Salim Ali Nature clubs, SACON students and faculty visited 14 wetlands of Coimbatore and conducted a wetland bird survey. Around 12,000 birds belonging to 54 species were recorded during the survey.

Programme 9

About a hundred students attended the 3rd Children's Ecology Congress (CEC) this year held on 23rd February. Twenty six papers were presented in the event. Extended abstracts of the papers were brought out in the proceedings. All meritorious students were given

certificates and prizes. One specialty of this year's CEC was a symposium on People's Biodiversity Registers by the school children. Students, who were involved in the documentation of people's knowledge on biodiversity in the last two years, presented their finding.

Programme 10. Naming of common butterflies in Tamil

The absence of Tamil names for some butterfly species were troubling the students of rural schools who take butterfly watching seriously. This year, children of two schools, Kadri Mills Hr. Sec.School and Govt. High school, Devarayapuram took efforts to develop their own names for about 80 species of butterflies. They have suggested more than one name for most of the common selected butterflies. These names were deliberated upon on the day of the Children's Ecology Congress. Merits and demerits of each name were debated and Tamil names for 50 butterflies were finalized. SACON is planning to develop a Tamil book on butterflies using these names.

Programme 11. "Song of Sparrow" Nature Education e-Newsletter.

Three issues of the bimonthly e-newsletter were published and sent to all the nature education partners and members of Salim Ali Naturalist Forum.

UNIVERSITY DEPARTMENTS

The SACON continued to have the affiliation with the Bharathiar University. The University programme of SACON has enrolled 26 students for Ph.D., and 2 for M.Phil. Three PhD theses were submitted and one PhD was awarded. Eight M.Sc students did their dissertation work at SACON for the partial fulfillment of their degree from different colleges and universities.

Name of the Guide	Name of the Student	Course	Topic of Research	Status
Zoology				
Dr. V. S. Vijayan Director (Retd)	P. Balakrishnan	Ph. D.	Status, Distribution and Ecology of the Grey-headed Bulbul <i>Pycnonotus priocephalus</i>	Ongoing
Dr. Lalitha Vijayan	S. Somasundaram	Ph. D.	Ecology of the Nilgiri Wood Pigeon	Thesis submitted
	Uma J. Vinod	Ph. D.	Ecology of the Nilgiri Pipit	Thesis submitted
	K. S. Anoop Das	Ph. D.	Monitoring the Bird Community in the Silent Valley National Park	Ongoing
	Bhoj Kumar Acharya	Ph. D.	Bird communities along the Elevation Gradient of Teesta Valley, Sikkim	Ongoing
	Raja Mamanan M. A.	Ph. D.	Avifaunal Diversity of the Andaman Islands	Ongoing
	Ezhilarasi N.	Ph. D.	Status and Ecology of the Andaman Craze	Ongoing
	Sheeba N.	Ph. D.	Ecology and Conservation of Spot-billed Pelican <i>Pelecanus philippensis</i>	Ongoing
	N sridharan, AVC College, Bharathidasan University	M.Sc. (Project report)	Studies on Wetland and Wetland birds of Kadalur, Thanjavur and Nagapattinam	Submitted (April 2006)
	Bupesh Gupta, AVC College, Bharathidasan University	M.Sc. (Project report)	Studies on Wetland and Wetland Birds of Trichy, Perambalur, Coimbatore and Thiruvavur	Submitted (April 2006)
	Deivanayaki M., Govt. Arts and Science College	M. Sc. (Project report)	Status of Wetland Birds in Coimbatore District, Tamil Nadu	Ongoing
	Anitha D., Govt. Arts and Science College	M. Sc. (Project report)	An Assessment of the status of the Black-and-orange Flycatcher in the Upper Nilgiris, Western Ghats	Ongoing
Dr. 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
Dr. S. Bhupathy	Debanik	Ph.D.	Resource utilization patterns of	Thesis

Name of the Guide	Name of the Student	Course	Topic of Research	Status
	Mukherjee		reptiles in Anaikatti Hills, Western Ghats	submitted
	Basundhara Chettri	Ph.D.	Altitudinal distribution of Herpetofauna along the Teesta River Valley, Sikkim	Ongoing
	G. Srinivas	Ph.D.	Amphibian Communities of the High Wavy Mountains, Western Ghats, India	Ongoing
	J. Gokula-krishnan	Ph.D.	Ecology of sea turtles along the Poompuhar coast, Nagapattinam, Tamil Nadu	Ongoing
	Joya Thapa	Ph. D.	Ecology of mammals along the Teesta River Valley, Sikkim	Ongoing
Dr. P. Pramod	R. Eswaran	Ph. D.	Ecological studies on insect communities of Anaikatty hills	Awarded
Botany				
Dr. S. N Prasad	-	-	-	-
Dr. P. Bala-subramanian	M. Gunasekaran	Ph.D.	Sthalavriksha practice in conservation of plant biodiversity in Tamil Nadu	Ongoing
	E. Santhoshkumar	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 Sciences				
Dr. S. Murali-dharan	R. Jayakumar	Ph.D.	Heavy metal contamination in freshwater fishes of Inland wetlands of India	Ongoing
	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 Pesticide residues In the commercial marine fishes of Coimbatore and their suitability for human consumption	Ongoing
	Sindhu S.	M.Phil.	Accumulation of inorganic contaminants in water, sediment	On going

Name of the Guide	Name of the Student	Course	Topic of Research	Status
			and fish samples collected along the harbour line, Mumbai (ongoing).	
	Vinny R. Peter.	M.Phil.	Persistent organic contaminants in water, sediment and fishes collected along the harbour line, Mumbai (ongoing).	On going
	Rajarajeshwari C., Bharathiar University	M.Sc. (Project report)	Residues of DDT and its Metabolites in Selected Species of Commercial Marine Fishes available in Coimbatore market.	Completed
	Praveen M. P, PSG College of Arts and Science, Bharathiar University	M.Sc. (Project report)	Physicochemical characters of water and sediment collected from select locations along Harbour line, Mumbai.	Completed
	Mahendran C., PSG College of Arts and Science, Bharathiar University	M.Sc. (Project report)	Residues of Polycyclic Aromatic Hydrocarbons (PAHs) in fish and sediment collected along Harbour line, Mumbai.	Completed
	Umamaheshwaran P. V, PSG College of Arts and Science, Bharathiar University	M.Sc. (Project report)	Polycyclic Aromatic Hydrocarbons (PAHs) in the tissues of Pariah Kite and Blue Rock Pigeon collected from Ahmedabad (2006-2007).	Completed
Dr. P. A Azeez	Baladhandapani	Ph.D.	A Techno-economic evaluation of common effluent treatment plants (CETP) in Tiruppur	Ongoing
	B. Anjan Kumar Prusty	Ph.D.	Humification and trace metal dynamics in a wetland sediment: The case of KNP, Bharatpur, India	Ongoing
	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

WORKSHOPS, CONFERENCES AND TRAINING PROGRAMMES

1) Conservation and Management of Biodiversity in Teesta Valley, Sikkim, 16 - 17 October 2006 (*Organizing secretaries: Lalitha Vijayan & S. Bhupathy*)

The workshop was organized as a part of the research project, “An ecological study on mammals, birds, herpetofauna and butterflies in Sikkim” undertaken as a component of the multi-institutional project “Carrying capacity studies on the Teesta basin, Sikkim” coordinated by the Centre for Interdisciplinary Studies on Mountain and Hill Environment (CISMHE), University of Delhi and funded by NHPC and MoEF. The objective of the workshop was to disseminate information gathered during the study from 2002-2006 to a wider audience and stakeholders such as forest managers, local communities, researchers and policy makers and, discuss the conservation and management issues.

The workshop was conducted at the Forest Conference Hall, Forest Secretariat, Gangtok, Sikkim. Dr. S.K. Pradhan, Principal, Sikkim Government College, Gangtok inaugurated the workshop, after welcome and a brief introduction by Dr. Lalitha Vijayan, Senior principal Scientist, SACON. In his inaugural address, Dr. Pradhan pointed out the importance of Sikkim in terms of biodiversity and emphasized need for further research. Shri H.P. Pradhan, Conservator of Forests (Wildlife), Government of Sikkim, in his special address emphasized the importance of research in conservation of biodiversity and provided historical aspects of wildlife conservation in the state.

The programme had three technical sessions. The first Session had four presentations based on research undertaken by SACON; one each on butterflies, herpetofauna, birds and

mammals. Ms. Usha Lachungpa, Senior Research Officer, Department of Forest, Environment and Wildlife Management, Government of Sikkim, chaired the session. The Session II chaired Dr. M.P. Thapa, Head, Department of Zoology, Sikkim Government College, had five invited presentations on general biodiversity of Sikkim and its conservation. The abstracts of all the presentations were compiled and circulated during the workshop.



On the dais (from left) Lalitha Vijayan, S Lama, T R Poudiyal and T P Tamang

Workshop at Gangtok: The Hon'ble Forest Minister of Sikkim, Sh. Sher Bahadur Subash – delivers presidential address

The second day of the workshop had interactive panel discussion (Technical Session III) in the forenoon and valedictory function in the afternoon. Shri Sandeep Tambe, Project Manager, The Mountain Institute

(TMI), Gangtok, chaired this session. The theme of the discussion was “Conservation and Management Strategies in Sikkim”. About 60 representatives from various Institutions, Government Departments, Non-Government Organizations (NGOs) and Community Based Organizations (CBOs) took part in the discussions. Scientists and managers answered the queries related to floral and faunal conservation. Director, Tourism Development Corporation cleared doubts raised by participants related to tourism and wildlife. Conservation problems pertaining to butterflies, birds, alpine zone and wetlands were highlighted.

Sikkim harbors 690 species of butterflies that makes up around 50% species that occur in Indian subcontinent. Need for their conservation was emphasized by researchers and foresters. Researchers of SACON mentioned that low altitude areas in Sikkim are hotspots for butterflies and hence, emphasized the need to promote these areas as eco-tourism destinations. Since these areas are very rich in butterflies and peak butterfly season coincides with the tourist influx in Sikkim, the Forest and Tourism Department and the Government of Sikkim, agreed to collaborate in identification and designation of these sites as tourism destination points. Department of Tourism requested researchers for information such as photographs and notes on butterfly species and specific hotspots to prepare brochures, which will be useful for tourists as well as local people. The department also felt the shortage of trained tourist guides in the state. SACON expressed its keen interest and willingness to collaborate with the concerned departments for preparing brochures and training members of the local community.

NGO sector expressed their views that existing tourist guides can be roped in for training on butterflies. In response to the queries raised by NGOs, foresters and researchers regarding the probable hazards to the hotspots for butterflies by the proposed dam, National Hydroelectric Power Corporation (NHPC) representative, Dr. A.K. Tripathi opined that these issues could be examined and mitigation measures adopted.

Sikkim is very rich in avifaunal diversity. Based on the research findings of SACON the following points were highlighted:

- Temperate broadleaved forests in and above 2000m elevation are hot spots for birds.
- Chungthang (its surrounding forests) and above is very rich in plants, both diversity and also endemism. Same holds true for birds and mammals as well. Hence, these areas need to be conserved.
- Both NHPC and private parties are on the anvil and identified 4-5 projects in this region for implementation of power projects. Such action should be stopped looking at fragility of the landscapes as well as unique biodiversity of the region.
- Some river basins in the state should be kept inviolate for the times to come.

Sikkim is abode of a large number of montane lakes and streams, and these water bodies are considered sacred by all ethnic groups of the state. The importance of these landscapes and conservation issues were discussed with active participation of NGOs (The Mountain Institute, WWF, KCC, YEC) and others. All appreciated the new initiatives taken by the Forest Department and the Government to protect high altitude landscapes including wetlands with the participation of the local communities.

The following conservation issues were highlighted and discussed:

- Firewood collection, livelihood and conservation of Rhododendron in Shingba and Thangu areas in North Sikkim.
- Involvement of security agencies in nature conservation in east and north Sikkim.
- Carrying capacity related issues
- Awareness campaign and integrated plan for ecotourism

The local NGOs requested SACON to prepare documents such as field guides, checklists and major findings in local language. It is learnt that this work is already in progress, and products would be available from 2007. The need of a workshop with the policy makers of the state was also felt.

The Valedictory function of the workshop held at 15:00 on 17th October 2006 was presided over by Shri Sher Bahadur Subedi, Hon. Forest Minister, Government of Sikkim. Dr. Lalitha Vijayan, Senior Principal Scientist, SACON, bid welcome and presented the summary of the proceedings of the deliberations in the workshop. Dr. J.P. Tamang, Regional Coordinator, Carrying Capacity Project and Shri. S. Lama, Member State Planning Commission gave felicitations. Shri T.R. Poudyal, Principal Chief Conservator of Forests cum Secretary, Department of Forest, Environment and Wildlife Management, Government of Sikkim, delivered special address. Honourable Forest Minister Shri Sher Bahadur Subedi delivered Presidential address extending support to research in future. Dr. S. Bhupathy, Senior Scientist, SACON proposed vote of thanks.

A total of 87 delegates including forest managers, officials from tourism and forest department, Government of Sikkim; scientists, academicians, NHPC official, research scholars, representatives of various local NGOs and university students attended the workshop.

2) National Conference on Biodiversity Conservation and Human Well-being.

This conference was conducted jointly by Department of Zoology, Osmania University and Deccan Regional Station, Salim Ali Centre for Ornithology and Natural History from 8th to 10th February 2007.

This Conference addressed following aspects of biodiversity namely: Faunal Biodiversity Status; Endangered Biodiversity; Major ecosystems; Bio-prospecting; Seri-biodiversity; Agri-biodiversity; Advanced Geospatial tools in conservation; *Ex situ* Conservation; Basic molecular approaches and biotechnology tools in taxonomy and conservation; Biodiversity and rural livelihoods. A total of 92 participants attended the conference. Many distinguished scholars, Sri K. S. Rao, Principal Chief Conservator of Forests (Wildlife) and Chief Wildlife Warden, Government of Andhra Pradesh and Dr. R. Hampaiah, Chairman, Andhra Pradesh State Biodiversity Board, Government of Andhra Pradesh participated in the inaugural function.



Dr S N Prasad, Sr. Principal Scientist addressing the participants of the workshop

From the dais (from left) (1)Prof. P. Judson, Dept. of Zoology, Osmania University (2) Prof. K. Veera Reddy, Principal, UCS, Osmania University (3) Mr. K. S. Rao, PCCF (Wildlife), AP Forest Department, Govt. of Andhra Pradesh, (4) Dr. R. Hampaiah, Chairman, AP Biodiversity Board, (5) Prof. K. Janardhan Reddy, Member, Executive Committee, Osmania University

Prof. B. Raghavendra Rao, Head, Department of Zoology, Osmania University and Organizing Secretary of the National Conference presented the theme of the National Conference and briefed about the research and teaching initiatives taken up by the Department.

In his presidential address Sri. K. S. Rao voiced his concerns of the role of policy makers in the Governmental setup in protecting and conserving the rich biodiversity of the country. He also emphasized the need for species specific conservation strategies for the conservation measures to be successful. Prof. K. Janardhan Reddy, Member, Executive Council, Osmania University, briefed about the achievements of University in teaching and research fields and efforts made to strengthen the biodiversity studies. Dr. S.N. Prasad, Senior Principal Scientist, SACON, explained theme of the National Conference. Dr. R. Hampaiah, Chairman, Andhra Pradesh State Biodiversity Board, Government of Andhra Pradesh, Chief Guest of the

function, in his keynote address elaborated about the current status of biodiversity conservation, protection of endangered species and the disturbing trends of human progress thereby affecting the varied and rich biodiversity. Dr. P. Judson, Co-organizing Secretary, presented vote of thanks to the august gathering.

The following subject experts were invited to share their views with the participants of the National Conference.

- Dr. K. S. Rajan, Reader, International Institute of Information Technology (Invited Speaker); Achieving Biodiversity Conservation Through Economic Well-being – Role of Information Technology
- Prof. S. Krupanidhi of Department of Biosciences, Sri Sathya Sai Institute of Higher Learning, Prasanthi Nilayam, Andhra Pradesh (Plenary Lecture); In Silico tools in evaluating the conservation homology among interleukins
- Prof. M. C. Sathyanarayana of Department of Zoology and Wildlife Biology, A.V.C. College (Autonomous), Mayiladuthurai, Tamil Nadu (Plenary Lecture); Animal

Alternatives (Digital CD ROM) and Their Significant Role in the Conservation of Wild Animals used in Zoology / Life Sciences / Animal Sciences Practicals in Laboratories

- Dr. S. S. Hundal, Punjab Agriculture University, Ludhiana, Punjab (Plenary Lecture); Status of Agro-biodiversity scenario and conservation in Punjab
- Ms. Anuradha Vinodh of Environment Education Cell of Andhra Pradesh State Forest Department, Hyderabad (Invited Speaker); Status of Conservation Education in Andhra Pradesh

Recommendations

The major recommendations of the National Conference on Biodiversity Conservation and Human Well-Being includes,

1. Increase in collaborations between academicians, scientists, policy makers and bureaucrats for effective conservation of biodiversity.
2. Biodiversity conservation projects are given priority in terms of financial assistance by the Governmental funding agencies.
3. The Department of Zoology, Osmania University to act as centre for biodiversity research and function as liaising agency to increase collaboration among NGO's and Governmental Departments.
4. Collaboration with the Andhra Pradesh State Biodiversity Board to prepare Regional State Biodiversity Register for Telengana and Conservation Action Plans for Endangered Animals in Andhra Pradesh.
5. Compilation of traditional knowledge and approach on biodiversity conservation by indigenous tribals in forested tracts of Eastern Ghats.
6. Documentation of faunal resources of Andhra Pradesh with special emphasis on Eastern Ghats and Godavari River Basin using advanced Information Technology.
7. Micro-level resource mapping.
8. Identification of Key Biodiversity Areas both within and outside Protected Area Network.
9. Sensitize students and common public on the values of nature and imperatives to conserve them through Conservation Education Programmes in collaborations with Andhra Pradesh Forest Department, World Wide Fund and Centre for Environment Education.

10. Follow up the recommendations of this Conference and organize hands-on-training workshop on techniques of implementing IT advances in scientific projects, taxonomy, conservation education and informatics on an annual basis.



R Jayakumar

Prof Shyamala congratulates Ms Hema, prize winner – Training Programme on Analytical Techniques

men, Coimbatore. In all 106 students (M.Sc, MPhil and Ph.D) from academic institutions, namely PSGR Krishnammal College for Women, PSG College of Arts and Science, Bharathiyar University, SACON and Wildlife Institute of India participated in the exercise. The course was designed to give the students theoretical and practical exposure to various analytical tools towards qualifying and quantifying inorganic and organic constituents in a variety of biological and non-biological matrixes.

3) Training Programme

Four training courses on Instrumentation and Analytical Techniques were organized by the Division of Ecotoxicology during the year. The courses were inaugurated by Dr. A. Reghupathy, Retd. Dean Tamil Nadu Agricultural University, Prof. S. Chandrasekaran, Department of Agricultural Entomology TNAU, Prof Rammohan, Department of Biotechnology, Bannari Amman Institute of Technology and Dr. Shyamala, Professor and Head, Department of Chemistry, Avinashilingam University for

Wo



S Muralidharan

Students at the Training course on Analytical Techniques at

OTHER ACTIVITIES

Analytical Service to Industries and Academic Institutions

Samples of water, soil, plant and textile materials were analyzed for different parameters such as pesticide residues, alkaloids, NPK, textile dyes, amines and organometallic tin.

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C. Chapters in books

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D. Seminar/ Conference/ Workshop

Acharya, B.K. and Vijayan, L. (2006). Bird Diversity along the Teesta Valley, Sikkim. In: Proc. Workshop on conservation and management of biodiversity in Teesta Valley, Sikkim, 16-17 October 2006. (Abstract). Eds. Vijayan, L *et al*. P10. SACON and CISMHE Delhi Univ.

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- Gaikwad, S. and Prasad S.N. (2007) Application of Open Source Geospatial Softwares, Geohorizon 2007 symposium, 16-17 March, Anna University, Chennai.
- Gaikwad, S., Pattanaik, C. and Prasad, S. N. (2007) Geo server – an open source server for Web-GIS. Map World Forum 2007, 21-25 January, Hitex City, Hyderabad.
- Gaikwad, S., Prasad S.N. (2007) Workshop on Open Source Softwares, Jawaharlal Nehru Technology University, Hyderabad.
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- Pattanaik, C. and C. S. Reddy (2007). Vegetation and phytodiversity characterization of Similipal Biosphere Reserve, Orissa, India, Abstract in National Seminar on Recent Trends in Plant Sciences, 15th February, Kakatiya University, Warangal, p-8.
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- Pramod, P. (2006) National workshop on Teachers Science Congress at NCERT Delhi, conducted by NCSTC, New Delhi, on 26-27 August 2006
- Pramod, P. (2007). Taxonomist’s Workshop on People’s Biodiversity Registers, conducted by Kerala state Biodiversity Board, in Thiruvananthapuram on 23-24th March 2007
- Prasad, S. N. (2006) Workshop on ENVIS, Shimla, 10-12 October 2006.
- Prasad, S. N. (2006) Workshop on Hill wetlands, 12-14 September, Ooty.
- Prasad, S. N. (2006) Workshop on Management effectiveness evaluation of the protected areas of India, 6-7 April, Paryavaran Bhawan, New Delhi.
- Prasad, S. N. (2007) Review meeting of OSGEO-India Hyderabad chapter at SACON, Regional Station, Hyderabad, 11 January 2007.
- Prasad, S. N. (2007). Design Database and Information System, National Conference on Biodiversity Conservation and Human Well-being, 8-10 February, Osmania University, Hyderabad.

- Prasad, S. N. and Gaikwad, S. (2007) Inland wetland conservation: role of free and open source ICT tools in CEPA, Paper presented at First Wetland Link International Asia Symposium, 24-26 January, Honk Kong.
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- Prusty, B A K., V. Jayalakshmi and P.A. Azeez (2006). Distribution of select transition metals in monsoon fed urban wetland sediments. SETAC Asia/Pacific 2006 – Growth with a limit: the integration of ecosystem protection for human health benefits, Peking University, Beijing, China, 18th -20th September.
- Prusty, B. A .K., and P. A. Azeez. (2007) Trace metal speciation in the soil profile of a semi arid dry woodland. International Conference on Opportunities and Challenges in Biotechnology and Environmental Sciences. Vellalar College for Women, Erode, India, 22nd – 23rd February.
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- Somasundaram, S. and Vijayan L. (2007). Population and habitat use of Globally Near threatened Grey-breasted Laughing Thrush in the Palni Hills. National conference on Biodiversity conservation and Human Wellbeing, 8-10 February 2007. Dept. Zoology , Osmania University, Hyderabad. Pp. 25.
- Sr. Nirmala, T. and Vijayan L. (2007). Breeding birds of Anaikatty Hills. National Conference on Biotechnology and Biodiversity. 23-25 February 2007. Vellalar College for Women, Erode. (Abstract).
- Sridharan, N., Thiyagesan K. and Vijayan L. (2007) Status of Wetlands and Wetland Birds in Kanyakumari, Thanjavur, Cuddalore and Nagaipattinam districts in Tamil Nadu.

- National conference on Biodiversity conservation and Human Wellbeing, 8-10 February 2007. Dept. Zoology, Osmania University, Hyderabad. Pp. 24
- Vijayan, L. (2007). Behavioral Studies on Birds and Conservation. Plenary lecture at the XXXI Annual Conference of the Ethological Society of India, April 10-12, 2007, University of Agricultural Sciences, Bangalore. Abstract. Pp.138-139
- Vijayan, L. and Balasubramanian, P. (2007). Conservation of Endemic and Threatened Birds of Tamil Nadu. Seminar on Wild Biodiversity Conservation in Tamil Nadu: 7 - 8 March 2007. Eds. Sreedharan, CK and Annamalai, R. Tamil Nadu Forest Department. P.21.
- Vijayan, L. and Bhupathy, S..(2006). Overview of Research Undertaken by SACON along the Teesta Valley, Sikkim. Workshop on conservation and management of biodiversity in Teesta Valley, Sikkim, 16-17 October 2006. Abstracts Eds. Vijayan,L and Bhupathy, S. p8. SACON.
- Vijayan, L. and Somasundaram S. (2007). Endemic birds of the Western Ghats and their conservation. In: "Averting biodiversity meltdown in the Asian tropics" Inaugural conference of the Asian Chapter of the Association for Tropical Biology and Conservation. 6-8 March 2007. Mahabalipuram. Abstracts. Ed. P. Davidar. Pp. 70-71. Pondicherry Univ. and French Institute of Pondicherry.
- Vijayan, L., Vijayan VS, Prasad S.N, Muralidharan S. (2006). Conservation of wetland birds in India. J. Ornithol. 147 (Suppl.) 24th International Ornithological Congress- Abstracts. P 80.
- Vijayan, L., Vijayan, V S., Prasad, S. N. and Muralidharan, S. (2007). Threatened wetland birds of India and their conservation. Symposium on Emerging Conservation Strategies for Endangered Species. 27-28 February 2007. Ahmedabad, Vanishing Herds Foundation and Gujarat Forest Dept. (Abstract).
- Vijayan, L., Vijayan, V S., Prasad, S. N. and Muralidharan, S. (2007). Conservation of Wetlands in Tamil Nadu. Seminar on Wild Biodiversity Conservation in Tamil Nadu: 7-8th March 2007. Chennai. Abstracts. Eds. Sreedharan, CK and Annamalai, R. Tamil Nadu Forest Department. P. 25

E. Newsletters

- Bhupathy, S. (2007). Monitoring of marine turtles along the Kerala and Tamil Nadu coasts. *Indian Ocean Turtle Newsletter* 5: 1-9.
- Gaikwad, S., Pattanaik, C. and Prasad, S. N. (2006) Wetland Informatics, *SAROVAR SAURABH Newsletter*, Vol-2, No-3, pp 1-10.
- Gaikwad, S., Pattanaik, C. and Prasad, S. N. (2006) Wetland inventory and remote sensing, *SAROVAR SAURABH Newsletter*, Vol-2, No-2, pp 1-10.
- Prasad, R. C., Gaikwad, S. and Prasad, S. N. (2006) Biodiversity and Conservation of Riverine Ecosystems of India. *SAROVAR SAURABH Newsletter*, Vol-2, No-1, pp 1-6.

Vijayan, L., Murugan, V. and Rajamamnnan, M. A. (2006). Conservation of the Andaman Teal. *Threatened Waterfowl Specialist Group Newsletter*. 15: 55 -59

F. Talks/lectures given by the Faculty Members

Balasubramanian, P. “Forests, People and Conservation issues” delivered in the PG Department of Botany, Vellalar College, Erode, Tamil Nadu. 24 August 2006.

Balasubramanian, P. “Plant-animal interactions” at the PSGR Krishnammal College, Coimbatore. 13 February 2007.

Balasubramanian, P. “Plant-animal interactions” delivered in the PG dept. of Botany, Madras Christian College, Chennai. 24 November 2006.

Balasubramanian, P. “Vegetation and Avifauna of the Nilgiri Biosphere Reserve”. Coimbatore Zoological Park and Society, Coimbatore. 23 January 2007.

Basundhara, Chettri and S. Bhupathy (2006). “Herpetofaunal Diversity along the Teesta Valley, Sikkim”. 16-17 October 2006, Gangtok, Sikkim. Salim Ali Centre for Ornithology and Natural History and CISMHE, University of Delhi.

Bhupathy, S., Bhoj Kumar Acharya, Basundhara Chettri and Joya Thapa (2006). “Human Resource Development in Environment Sector: Nature Awareness Workshop for Sikkim Students- A Report”. 16-17 October 2006, Gangtok, Sikkim. Salim Ali Centre for Ornithology and Natural History and CISMHE, University of Delhi.

Bhupathy, S. (2006). “Introduction to Snakes. Jungle training programme to the Tamil Nadu Police”, June 2006. Special Task Force, Sathyamangalam.

Lalitha Vijayan and S. Bhupathy (2006). “Overview of Research Undertaken by SACON along the Teesta Valley, Sikkim”. 16-17 October 2006, Gangtok, Sikkim. Salim Ali Centre for Ornithology and Natural History and CISMHE, University of Delhi.

Pramod, P. Invited lecture in the Department of Zoology Bharathiar University, on the topic “Survival and the ultimate games” 8th February 2007.

Pramod, P. National conference on People’s Biodiversity Registers conducted by National Biodiversity Authority, Chennai, gave a lecture on student’s role in documenting people’s knowledge. 21-23 June 2006

Pramod, P. National workshop on Organic Farming in Bannariamman Institute of Technology, Sathiamangalam, gave lecture on biodiversity and organic farming. 27th November 2006.

Pramod, P. National conference of sustainability of Natural resources, conducted by Bishop Heber College, Trichy, gave a plenary lecture on “Communicating sustainability”. On 7th March 2007

Pramod, P. National conference on environmental ethics. Conducted by Malabar Christian College, Calicut. Plenary lecture on “Environmental ethics and education” on 15th March 2007.

G. Theses

- Mukherjee, Debanik (2007). Resource Utilization patterns of reptiles in the tropical dry mixed deciduous forest of Anaikatty Hills, Western Ghats. Ph. D. Thesis submitted to the Bharathiar University, Coimbatore.
- Somasundaram, S. (2006). Status and ecology of the Nilgiri Wood Pigeon in the Western Ghats. Ph. D. thesis. Bharathiar University (submitted in October 2006)
- Uma, J. Vinod . (2006). Status and ecology of the Nilgiri Pipit in the Western Ghats. Ph. D thesis. Bharathiar University.

H. MSc Project reports / dissertations

- Anitha D. (2007) An assessment of the status of the Black-and-orange Flycatcher in the upper Nilgiris, Western Ghats. M.Sc. (project) dissertation. Bharathiar University
- Deivanayaki, M. (2007) Status of wetland birds in Coimbatore district. M.Sc. (project) dissertation. Bharathiar University.
- Guptha, B. M. (2006). Status of the wetlands and wetland birds in Coimbatore, Trichy, Perambalur and Thiruvavur districts of Tamil Nadu. M.Sc. (project) dissertation. Bharathidasan University.
- Karthik, T. (2007). Herpetofaunal mortality on the Cumbum- Kumaly interstate Highway, Theni Forest Division, Western Ghats, India. M.Sc. (project) Dissertation. A.V.C. College. Mayiladuthurai
- Sridharan N. (2006). Status of the wetlands and wetland birds in Kanyakumari, Thanjavur, Cuddalore and Nagaipattinam districts of Tamil Nadu. M.Sc. (project) dissertation. Bharathidasan University

STAFF OF SACON

Scientific

Director Incharge : Dr. Lalitha Vijayan (up to 7th August 2006)
Dr. P. A Azeez (since 8th August 2006)

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

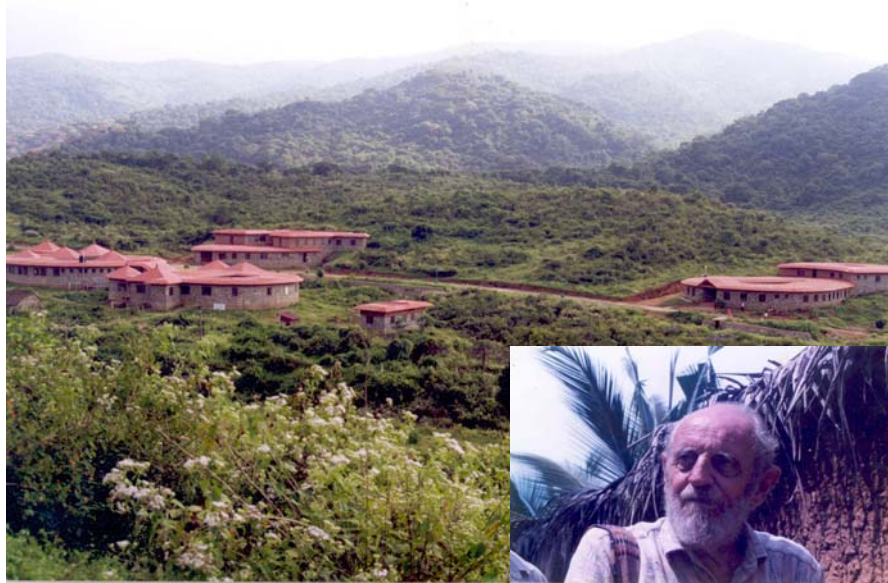
Library & Documentation : Mr. M. Manoharan, Library Assistant

Administration & Finance

Senior Finance Officer : Mrs. Jayashree Muralidharan (on EOL since 1.1.2007)
Finance Officer : Mr. P. Karuppiah (Since 1.1.2007 on contract)
Junior Admn. Manager : Mr. R. Jayakumar
Personal Assistant to Director : Mr. V. Vaidyanathan
Administrative Assistant : Ms. T. Rajapraha
Accounts Assistant : Vacant
Office Assistant : Mrs. R. Rajalakshmi
Stenographer : Mr. M. Eanamuthu
Receptionist : Mrs. M. Jayageetha
Site Engineer : Mr. Ibrahim Kutty (up to May 2006)
Computer Assistant : Mr. M. Prabhakaran (on contract)
Office Attendant : Mr. A. Devaraj
Drivers : Mr. R. Ravi and P. Subramanian

TRIBUTE

SACON pays respectful homage to Mr Laurie Baker (1917-2007), world renowned eco-friendly architect who designed the buildings of SACON at Anaikatty.



“I never build for classes of people, HIG, MIG, LIG, Tribals, but I will build only for a Matthew, a Bhaskaran, a Muneer, or a Sankaran”..... Laurie Baker

INFRASTRUCTURE

Permanent 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 maintenance of the fragile systems. The trijunction of Kerala, Tamil Nadu and Karnataka in the Western Ghats, considered to be 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.

Laboratory facilities

The SACON laboratory is equipped with the following:

- UV Spectrophotometer, Perkin Elmer Model Lambda 35
- HPLC Agilent Technology Model 1100 series with DAD and Florescence detector
- Ultra Deep Freezer (-80⁰ C), New Brunkswick
- Flame Atomic Absorption Spectrophotometer (AAS) Perkin Elmer, Model 3300 with 13 lamps for analyzing metal residues
- Graphite Furnace Atomic Absorption Spectrophotometer for analyzing metal residues
- Mercury Hydride Generator for AAS, Perkin Elmer for analyzing mercury and other hydride forming elements
- 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.
- Microwave Digestion System, Milestone Model 1200 for digesting samples for analysis in the AAS
- Dissolved Oxygen (DO) Analyzer, Biochemical Oxygen Demand (BOD) Incubator
- Flame Photometer
- Vertical Laminar Flow Chamber
- High volume air sampler for sampling suspended particulate matters (SPM), Oxides of Nitrogen (NO_x) and Sulphur (SO_x)
- Ultra Centrifuge
- Walk-in cold room

Computer facilities

Each Scientist has been provided with a laptop computer and Pentium PC in addition to the general facility for students and visiting scientists. All are connected with a Local Area Network.

Library

Addition of 11 books, 23 back volumes and electronic versions of high impact journals such as Auk (1884-1960), Condor (1889-1961), Forktail (1998-2004) and Current Science (2000-2006) have been made to the Library.

Total holding of the library is 2813 Books, 2381 back volumes of periodicals, 75 Current periodicals (Indian 44; International 31), 2706 maps and 51 CD-ROM's of reference materials including Nature (2001-2006), Point Calimere: Little Kingdom, FAO Regional Office for Asia & The Pacific Publications (1999-2004), etc.

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

APPENDIX – I. MEMBERS OF THE SACON SOCIETY

Mr. A. Raja
President, SACON Society &
Hon'ble Minister for Environment & Forests, Govt. of India
Ministry of Environment and Forests, Paryavaran Bhawan
CGO Complex, Lodhi Road
New Delhi-110 003

01	Dr. Prodipto Ghosh, IAS (from Dec 2005 to May 2007) Secretary to the Govt. of India & Chairman – SACON (GC) Ministry of Environment and Forests, Parayvaran Bhawan CGO Complex, Lodhi Road New Delhi – 110 003	02	Dr. R. Uma Shannker University of Agricultural Sciences Department of Crop Physiology GKVK Bangalore - 560 065
03	Mr. Vishwanath Shegaonkar, IAS (from May 2006 to 3 Jan 2007) Mr R Rajagopal, IAS since 4 Jan 2007) Secretary to the Govt. of Tamil Nadu Dept. of Environment and Forests Govt. of Tamil Nadu Fort St. George , Chennai – 9	04	Dr. Pratap Saraiya 12-B Suneeta B G Kher Marg Mumbai – 400 006
05	Mr. P. K. Mishra, IAS (from March 2005 to October 2006) Mr Raghu Menon, IAS (since November 2006) Addl. Secretary and Financial Advisor Ministry of Environment and Forests, Govt. of India, Paryavaran Bhawan CGO Complex, Lodi Road New Delhi - 110 003	06	Mr. Cyrus Guzder Airfreight Pvt. Ltd Neville House, Ground Floor Currimbhoy Road, Bellard Estate Mumbai – 400 036
07	Dr. Erach Bharucha Director Bharati Vidyapeeth Deemed University Institute of Environment Education and Research Katraj-Dhanakawadi	08	Vacant (Mr. Karamchandani, expired)
09	Dr. A. R. Rahmani Director Bombay Natural History Society Hornbill House, Shaheed Bhagat Singh Road Bombay – 400 023	10	Dr. K. K. Tiwari, Ex-Director Zoological Survey of India B – 278 Shahapura Bhopal - 462 016 Madhya Pradesh
11	Dr. G. Thiruvagasam Vice Chancellor Bharathiar University	12	Mr. Samar Singh, IAS P-1, Hauz Khaz New Delhi - 16

	Maruthamalai Road Coimbatore - 641 046		
13	Dr. R. Sukumar Chairman Centre for Ecological Sciences Indian Institute of Sciences Bangalore - 560 012	14	Prof. Shekhar Singh C-17A, Munirka New Delhi – 110 067
15	Dr. Sukhadeo Thorat Chairman University Grants Commission Bahadurshah Zafar Marg New Delhi – 110 002	16	Mr. J. C. Kala, IFS (up to Oct 2006) Mr G K Prasad, IFS (since Nov 2006) Director General of Forests Ministry of Environment and Forests, Paryavaran Bhawan, CGO Complex New Delhi – 110 003
17	Dr. S. Z Qasim A - 15, Defence Colony New Delhi - 110 024	18	Dr. Robert B Grubh COSMOS, II Main Street Christopher Nagar (Extension) Nagercoil – 629 003
19	Dr. Sukumar Devotta Director National Environmental Engineering Research Institute (NEERI) Nehru Marg Nagpur – 440 020	20	Mrs. Tara Gandhi C/o Mr Gopalkrishna Gandhi Raj Bhawan Kolkata
21	Mr. B. Vijayaraghavan IAS (Retd.) Chairman Chennai Snake Park Raj Bhavan Post CHENNAI - 600 022	22	Dr. Ashish Kothari Kalpavriksh, Apartment-5 Shri Dutta Krupa 908 Deccan Gymkhana Pune - 411 004
23	Mr. N. R. Krishnan IAS (Retd) 2 nd Floor 18 Balaji Nagar, 2 nd street Royapetta Chennai- 600 014	24	Mr. S. A. Hussain A - 104 "Casa Grande" Attavar, Mangalore. 575 001. D.K. Karnataka. India
25	Dr. C. Ramasamy Vice Chancellor Tamil Nadu Agricultural University Coimbatore – 641 003	26	Mr. Zafer Futehally No.2205 Oakwood Apartments Jakkasandra Layout Koramangla, 3 rd Block, 8 th Main Road BANGALORE – 560 034
27	The President Bird Watchers' Society of Andhra Pradesh 8-2-545 "Prem Parvat" Road No 7, Banjara Hills Hyderabad – 500 034	28	Mr. J. C. Daniel 16/186 Chander Niwas Sion (East) Mumbai – 400 022
29	Mr. S. S. Ramachandra Raja Wildlife Association of Ramnad District 58 PSK Nagar Rajapalayam – 626 108 Tamil Nadu	30	Mrs. D. S. Variava Director, Bharat Tiles 32-B Samachar Marg Mumbai - 400 023

31	Dr. B. F. Chhapgar E/31 Cusrow Baug Colaba Causeway Mumbai – 400 005	32	Mr. R. Rajamani IAS (Retd) 8-2-585/A/1 Road No.9 Banjara Hills Hyderabad - 500 034
33	Mr. K. P. Geethakrishnan, IAS (Retd) K-15 Anna Nagar (East) Chennai – 600 102	34	Mr. T. K. A. Nair IAS (Retd) Principal Secretary to the Prime Minister Office of the Prime Minister South Block New Delhi
35	Mr. N. D Jayal IAS (Retd) Co-ordinator The Himalaya Trust 274/II, Vasant Vihar Dehra Dun - 248 006	36	Mr. Prakash Gole Ecological Society I/B Abhimanshree Housing Society off; Pashan Road Pune - 411 008
37	Mr. Lavkumar Kacher 14 Jayant Society Rajkot - 360 002 Gujrat	38	Dr. (Mrs.) Priya Davidar Salim Ali School of Ecology Pondicherry University R V Nagar, Kalapet, PONDICHERRY - 605 014
39	Dr. M. S. Swaminathan M S Swaminathan Research Foundation 3 rd Cross Street Taramani Institutional Area CHENNAI - 600 113	40	Mr. P. Kannan Plot No. 126, 14 th Street Choudhary Nagar Valasaravakkam Chennai - 85
41	Dr. M. K Ranjitsinh IAS (Retd) Indian National Trust for Art and Cultural Heritage (INTACH) 71, Lodi Estate New Delhi – 110 003	42	Dr. Digvijay Sinh ‘The Palace’ WANKANER – 363 621 GUJARAT
43	Dr. H .Y Mohan Ram 194, SFS DDA FLATS Mukherji Nagar Delhi – 110 009	44	Mr. Bittu Sahgal Sanctuary Asia 602, Maker Chambers V Nariman Point Bombay- 400 021
45	Dr. Madhav Gadgil Agarkar Research Institute Agarkar Road Pune – 411 004	46	Dr. A. N. D Nanavati C/o. S Nanavati Sundervan Flat Rasala Marg AHMEDABAD – 380 006
47	Mr. R .M Mehrotra, IFS (since June 2005) Principal Chief Conservator of Forests, Govt. of Rajasthan Van Bhawan Jaipur – 302 005	48	Mr. Darshan Shankar Director Revitalization of Local Health Traditions (FRLHT) No. 74/2 Jarakbande Kavel Via- Atturpo Post Yalahanka Bangalore – 560 064
49	Mr. Pradeep Khanna, IFS	50	Prof. Maroli K. Chandrashekar

	Principal Chief Conservator of Forests Block No. 14 Dr Jivraj Mehta Bhavan Govt. of Gujarat Gandhi Nagar – 382 010		Chairman, Evolutionary and Organismal Biology Unit Jawaharlal Nehru Centre for Advanced Scientific Research Jakkur, PO Box No. 6436 Bangalore- 560 064
51	Mr. M. B Lal, IFS Principal Chief Conservator of Forests Govt. of Arunachal Pradesh Itanagar – 791 111	52	Dr. Bonny Pilo 204- Janrdhan Apartment 14- Pratap Gunj Baroda - 390002
53	Mr. S. S Choudary, IFS Principal Chief Conservator of Forests Andaman and Nicobar Islands Complex, Van Sadan Port Blair – 744 102	54	Mr. Thomas Mathew Wildlife Trust of India A-220, New Friends Colony New Delhi - 110 065
55	Dr. J.R.B. Alfred 522 C Lake Gardens 'Kundahar' Kolkata-700 045 West Bengal	56	Mrs. Nanditha Krishna Honorary Director CPR Environmental Education Centre, 1, Eldams Road Chennai – 600 018
57	Dr P Balasubramanian Senior Scientist Division of Terrestrial Ecology SACON Coimbatore	58	Dr. R. K. Pachauri Director General Tata Energy Research Institute (TERI) Darbari Seth Block Habitat Place, Lodi Road, New Delhi – 110003
59	Dr. S. Muralidharan Senior Scientist Division of Ecotoxicology SACON, Coimbatore	60	Prof. J. S Singh Department of Botany Banaras Hindu University Varanasi – 221 005
61	Dr. S. Kaul Director Ministry of Environment and Forests, Paryavaran Bhawan CGO Complex, Lodhi Road New Delhi –110 003	62	Prof. C. Kameshwara Rao No. 1, Gupta's Layout Southend Road Bangalore –560 004
63	Dr. K. Radhakrishnan Director National Remote Sensing Agency Balanagar Hyderabad 500034	64	Dr. G. Bhakthavatsalam Chairman K G Hospital Coimbatore – 18
65	Dr. G. Marimuthu School of Biological Sciences Madurai Kamaraj University Madurai – 625 021	66	Dr. S. V Balasubramaniam Chairman Bannari Amman Sugars Limited 252, Mettupalayam Road Coimbatore – 641 043
67	Dr. V. Vijay Kumar Director	68	Mr. G. K Sundaram Chairman

	Gujarat Institute of Desert Ecology Patwadi Naka Bhuj (Kachchh) Gujarat – 370 001		Lakshmi Mills company Limited 1100, Avanashi Road P N Palayam Coimbatore – 37
69	Prof. V. C Soni Department of Biosciences Saurashtra University Rajkot – 360 005 Gujarat	70	Mr. Kartikeya V. Sarabhai Director Centre for Environment Education Nehru Foundation for Development Thaltej Tekra Ahmedabad – 380 054
71	Prof. K. C Saxena Professor School of Environmental Sciences Jawaharlal Nehru University New Delhi – 110 067	72	Dr. P. R Sinha, IFS Director Wildlife Institute of India P B No. 18, Chandrabani Dehra Dun – 248 001 Uttar Pradesh
73	Dr. P. S Roy Dy. Director National Remote Sensing Agency Balanagar Hyderabad 500034	74	Dr. G. K Prasad, IFS (up to Aug 2006) Dr Jagdish Kishwan (since July 2006) Director General Indian Council of Forestry Research & Education P.O. New Forests Dehra Dun - 248 006
75	Dr. N. Mahalingam Chairman Sakthi Group of Companies 180, Race Course Road Coimbatore – 641 019	76	Dr. Uppeendra Dhar Director G.B.Pant Institute of Himalayan Environment & Development Kosi - Katarmal - 263643 Uttar Pradesh
77	Dr. D. Jayavarthanavelu Chairman and Managing Director Lakshmi Machine Works Perianaickenpalayam Coimbatore – 20	78	Prof. Gurdeep Singh Head Centre of Mining Environment Indian Schools of Mines, Dhanbad – 826004
79	Dr. M. Sanjappa Director Botanical Survey of India CGO Complex – III MSO Building, DF Block, Sector – 1 Salt Lake City Kolkata – 700 064	80	Mr. K. S. Rao, IFS Chief Wildlife Warden Government of Andhra Pradesh Office of the Principal Chief Conservator of Forests Tuljaguda Complex M J Market, Hyderabad
81	Mr. B. S Parsheera, IAS, Additional Secretary (Conservation) MoEF Ministry of Environment and Forests Paryavaran Bhawan CGO Complex, Lodhi Road New Delhi – 110 003	82	Mr. A. K. Verma, IFS (since May 2005) Chief Wildlife Warden (WL) Government of Karnataka Aranya Bhavan, 18 th Cross Malleshwaram Bangalore – 560 003

83	Ms. Veena Upadhyaya, IAS (up to Feb 2007) Mr G. Balachandran, IAS (since March 2007) Joint Secretary to the Govt. of India Ministry of Environment and Forests Paryavaran Bhawan CGO Complex, Lodhi Road New Delhi – 110 003	84	V. Gopinathan, IFS (up to Dec 2006) Mr V. S. Varughese, IFS (since Jan 2007) Chief Wildlife Warden (WL) Government of Kerala Forest Headquarters Vazhuthacaud Trivandrum – 695 014
85	Mr. B. Majumdar, IFS Principal Chief Conservator of Forests (WL) Chief Wildlife Warden Room No. V Floor, MECL Building Seminary Hills Nagpur – 440 006 2549563	86	Mr. S. B. Mandal, IFS (up to 31 Jan 2007) Mr S S Bist, IFS (since Feb 2007) Chief Wildlife Warden Govt. of West Bengal, Bikash Bhawan 3rd Floor, North Block Salt Lake Kolkata – 700 091
87	Mr. C. M. Seth, IFS (up to April 2006) Mr A K Srivastava, IFS (since May 2006) Chief Wildlife Warden Government of Jammu and Kashmir TRC, Srinagar – 180 001 Jammu	88	Mr. M. C. Malakar, IFS Chief Wildlife Warden R G Baruah Road Rehbari Guwahati – 710 008 Assam
89	Dr. Lalitha Vijayan (up to 7 August 2006) Dr. P. A Azeez (since 8 th August 2006) Director Incharge, SACON Member Secretary	90	