



**SÁLIM ALI CENTRE FOR ORNITHOLOGY
AND
NATURAL HISTORY**

**Annual Report
2011 - 2012**



Published by

The Director

Salim Ali Centre for Ornithology and Natural History

Anakkatty, Coimbatore - 641 106

Phone : 91-422-2203100, 109

Fax : 91-422-2657088

E-mail : salimali@sacon.in

URL : www.sacon.in

Editorial Board

Dr Mathew K Sebsatian

Dr S Bhupathy

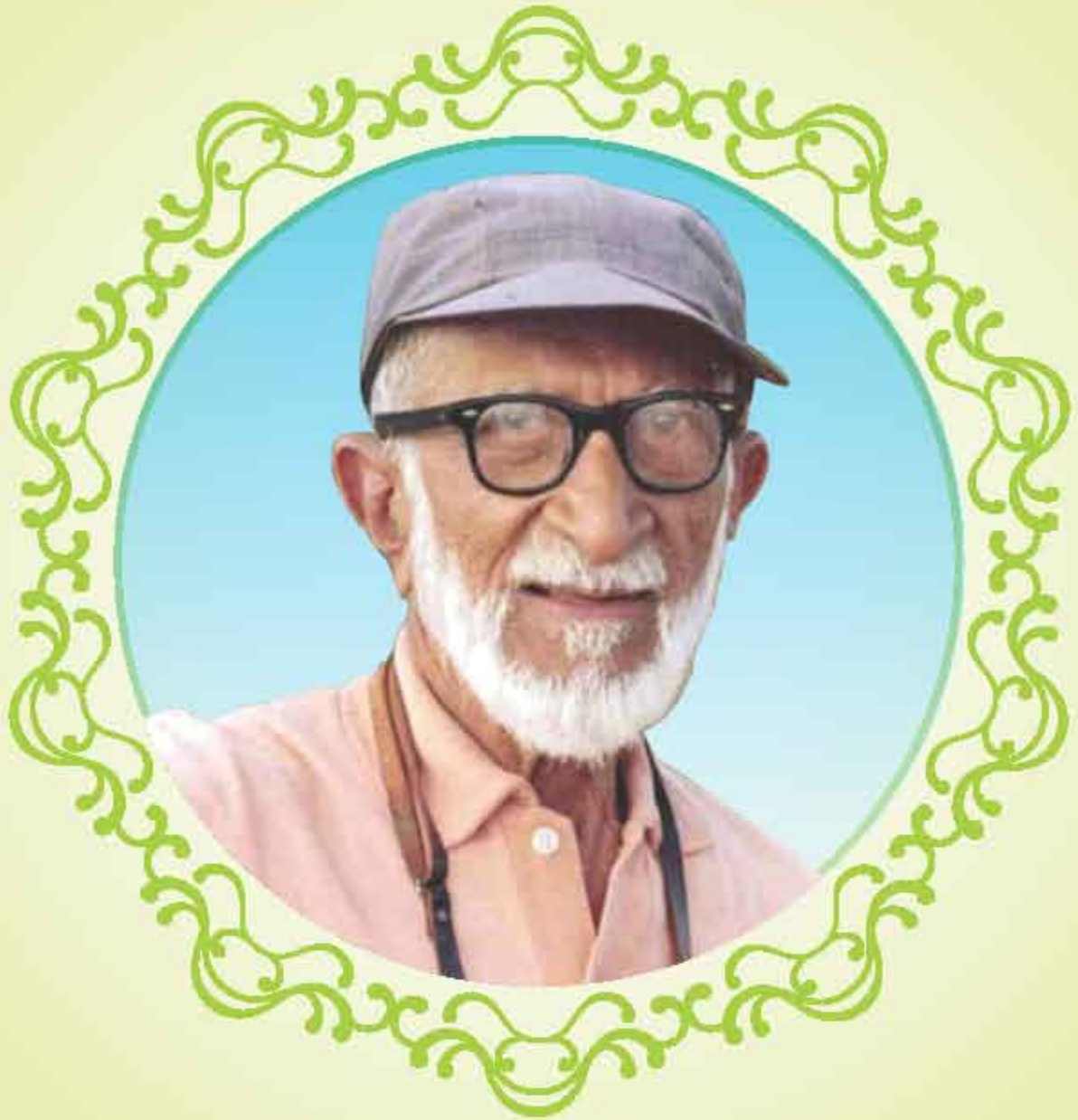
Dr B A K Prusty

Dr Goldin Quadros

Cover Photo

Dr M Murugasan

Dr. Sálim Ali



(1896-1987)

S. No.	CONTENTS	Page No.
1.	BACKGROUND	1
2.	EXECUTIVE SUMMARY	2
3.	ORGANIZATION	4
4.	RESEARCH HIGHLIGHTS	12
	Conservation Ecology	12
	Conservation of the Endangered Species and Habitats - The Edible-nest Swiftlet in the Andaman and Nicobar Islands	12
	Status, Ecology and Conservation of Narcondam Hornbill <i>Aeceros narcondami</i> on Narcondam Island, India	14
	Reassessment of the Impact of Nest Collection on the Edible-nest Swiftlet in the Andaman Islands	15
	Patterns of Distribution of Selected Faunal Groups in the Agasthiyamalai Hills, Western Ghats, Kerala, India	16
	Conservation Biology	18
	Phylogeography of the Fishing Cat (<i>Prionailurus viverrinus</i>) in India: Identifying Populations for Conservation.	18
	Development of Conservation Strategy for a Newly Discovered Lion-Tailed Macaque <i>Macaca silenus</i> Population in Sirsi-Honnava, Western Ghats: II. Understanding of the Impact of NTFP Collection on the Lion-Tailed Macaques	21
	Assessment of Occurrence and Abundance of Large Mammals, Birds and Woody Plants in Bannerghatta National Park, Karnataka	22
	Landscape Ecology	25
	Study on Avian Frugivory and Seed Dispersal of Endemic Tree Species in Select Shola Forests of Nilgiri Hills, Western Ghats	25
	Monitoring Post-Tsunami Coastal Ecosystem Recovery in the Nicobar Islands and Developing Site Specific Restoration Measures	26
	Biodiversity Assessment for Environmental Monitoring of Medium/Minor Irrigation Schemes in Andhra Pradesh	29
	Ecotoxicology	31
	Monitoring of Pesticide Residues in Select Components of an Agro-ecosystem Adopting Organic and Chemical Farming in Padayetti Village, Palakkad District, Kerala.	31
	Monitoring and Surveillance of Environmental Contaminants in Birds in India	33
	Environmental Impact Assessment	35
	Monitoring the Impacts of Jangi Wind Power Farm (91.8 MW) with Special Reference to Birds and Bats	35
	Baseline Environmental Data (BED) Collection for Flora and Fauna for Mithiviridi Nuclear Power Project at Bhavnagar, Gujarat	35
	Impacts of Proposed Seismic Survey Operations on the Avifauna and Wildlife of Reserve Forest Areas of KG Basin Project of Oil India Ltd	37

S. No.	CONTENTS	Page No.
	Impact Assessment of LNG terminal Augmentation Project by M/s PLL on the Terrestrial Flora and Fauna at Puthuvypeen, Kerala.	39
	Comprehensive Management Action Plan for Oussudu Sanctuary, Puducherry	40
	Review of State of Environment in Keoladeo National Park, Bharatpur, Rajasthan and Its Catchment Area: A Historical Analysis	42
	Extension	43
	Ecological status survey of the wetlands of Srikakulam district of Andhra Pradesh	43
5.	OTHER ACTIVITIES	45
	Wetland Ecology	45
	Wetlands of India ENVIS Centre	45
	Nature Education	46
	Nature Education Activities for Coimbatore	46
	DNA Clubs for Andaman Islands.	48
	Eco-development Plan for Mahatma Gandhi Marine National Park, Andaman Islands	49
6.	ACADEMIC ACTIVITIES	50
7.	WORKSHOPS, CONFERENCES & TRAINING PROGRAMS	52
8.	PUBLICATIONS	56
9.	INFRASTRUCTURE FACILITIES	62

BACKGROUND

Salim Ali Centre for Ornithology and Natural History (SACON) funded by the Ministry of Environment and Forests (MoEF), Government of India, was established in 1990. The management of SACON is vested with the Governing Council. The President of the SACON society is the Honourable Minister for Environment and Forests, Government of India and Chairman of the Governing Council is the Secretary to the Government of India, Ministry of Environment and Forests. Realising the significance of a holistic approach in avian studies and conservation, the major objectives of SACON have been designed to cover the entire field of natural history with ornithology at the centre.

MISSION

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

OBJECTIVES

The objectives of SACON are to

- Design and conduct research in ornithology, covering all aspects of biodiversity and natural history
- Develop and conduct regular courses in ornithology and natural history at the level of M.Sc., M.Phil., and Ph.D. and also short-term orientation courses in related subjects
- Create a data bank on Indian ornithology and natural history, and disseminate knowledge relating to ornithology and natural history for the benefit of the community.





EXECUTIVE SUMMARY



The year 2011-12 was very productive for SACON. We have continued our research and conservation activities along with regular nature education / conservation education zealously with added vigour. SACON, during the earlier years, was severely constrained by the low number of core scientists. Towards the end of the year, more core scientific staff were inducted, making SACON's current strength to 17 bringing in lot of state of art expertise to the institution, and we hope in the coming years our productivity in terms of scientific contributions and conservation activities will be much more noteworthy.

The SACON Society held its 21st Annual General Meeting (AGM) on 23 February / 2012 at Coimbatore presided over by Mrs Jayanthi Natarajan, Honourable Minister of State for Environment and Forests (IC), Government of India & President, SACON Society. While welcoming the members of the Society the President appreciated SACON for its work and advised SACON to initiate research programmes, which sensitize the public, particularly the youth. Commending SACON for conducting the 1st International Conference on Indian Ornithology during November 2011 the President also advised SACON to conduct next conference in 2013 at Coimbatore.

The Governing Council (GC) of SACON was reconstituted during the year and its 62nd meeting was held on 21st October 2011 at MoEF, New Delhi. The Research, Monitoring and Advisory Committee (RMAC) of SACON met twice during the year on 28th June 2011 (23rd Meeting) and on 17th February 2012 (24th meeting) at Coimbatore.

The programs undertaken by SACON during the year covers thematic stresses on species, their ecological requirements and distribution, habitats and ecosystems, environmental contaminations and assessments. The species, habitats and ecosystems we have identified for our works are based on threat perceptions and national and international priorities. We have continued with our more than a decade endeavour for conservation of edible nest Swiftlet, the island subspecies, at Andamans, inducing them to settle and breed in customised structures, which we are

steadily winning. This is especially important in view of our re-assessment of the species covering the whole archipelago showing loss of several wild colonies of the species mainly because of poaching and other pressures. A study was also initiated, on the Narcondam Hornbill, the most endangered hornbill in the world and a species restricted to the small Narcondam Island.

In Agasthyamal hills, SACON has initiated a study of the factors shaping the distribution pattern of faunal groups. It aims to document species richness and turnover patterns of reptiles and birds in view of the altitude and other factors here, and to apply distribution (ecological niche) models on selected endemic species found in the area.

Ecosystem services by birds in various ecosystems, especially forests, have been our long-term interest. Our research on avian frugivory and seed dispersal in the shola forests documents the role of endemic birds such as the Nilgiri Laughing thrush and Nilgiri Wood Pigeon in dispersing endemic tree species, aiding in forest regeneration. In the Nicobar Islands, the program on post-tsunami coastal ecosystem recovery generated valuable ecological information and could identify sites and species for restoration and site-specific measures to improve the recovery of the invaluable ecosystem in the islands.

We have been looking at small cats and Lion Tailed macaques. In spite of India having 15 species of cats, the highest number any country has, the smaller ones among them do not feature in any major research or conservation planning in the country. Realising how grave (meagre) our understanding on these small carnivores is, we have taken up an investigation on the Fishing cat to identify its populations for conservation. In the recent years, we had discovered a new population of Lion Tailed Macaques and documented the competition it faces from NTFP collectors at Sirsi-Honnava, Southern Karnataka. To reduce the resource conflicts we are working on a model. Our study on large mammals and birds of Bannerghatta National Park highlights the threats from mining activities around the periphery of the forest and other

illegal activities, and spread of Lantana on the animal species there.

Several are the infrastructure development projects in the country that had wide impact on the biodiversity. In this regard, in Andhra Pradesh SACON made an assessment of around 100 irrigation projects spread over 23 districts. While documenting the biodiversity in these areas, we identified threats and offered site specific (catchment and command areas) management measures, only if the authorities implement them. Wind farms have been considered as eco-friendly (although not always, and collateral damages are many; of course location specific) means of generating electricity and high in demand in the country. Our study, first of its kind, on the impacts of Jangi wind power farm focussing on birds and bats has been progressing well for the last one year. While this project apparently appears ecologically benign, conclusive observation and recommendation would be possible only after completion of the study, after two years. As part of our EIA projects, we have also worked on the LNG terminal augmentation project at Puthuvypeen (Kerala) and documented collateral damages of such projects, which could be very well avoided if timely attention is given.

Under our ecotoxicology works, we have been assessing environmental contamination from various chemicals. The on going residue analysis in the birds all around the country has been undertaken, aiming chiefly to address unusual mortalities of birds and to identify the factors responsible. In view of the increasing threats from agrichemicals, we compared pesticide residues in an agro-ecosystem adopting organic and chemical farming in Kerala along with changes in the local biodiversity. As expected, differences could be found between the two systems in pesticide residues and species presence. However, further investigations are to be conducted to corroborate the findings.

Wetlands have remained a priority for SACON. During the year, we made an ecological documentation of the wetlands of Srikakulam in Andhra Pradesh. The study brings out the conservation values of the wetlands in the district and highlights the potential threats. SACON is also operating the MoEF ENVIS node on wetlands of India, which collates and disseminates available information on the wetlands of

the country. SACON has been assisting various agencies for developing ecological management plans for various types of ecosystems or protected areas. We have helped in preparing the Ecological Management plan for the Oussudu Lake Sanctuary (Puducherry), the only bird sanctuary in that Union territory and Eco Development Plan for Mahatma Gandhi Marine National Park, Andaman Islands.

SACON has been very active in spreading the message of conservation and nature education. In addition to organising various activities related to the DNA clubs (Department of Biotechnology, GoI) in Andaman Islands, we have been conducting regular nature education activities in the campus and outside, reaching out to thousands of students and others.

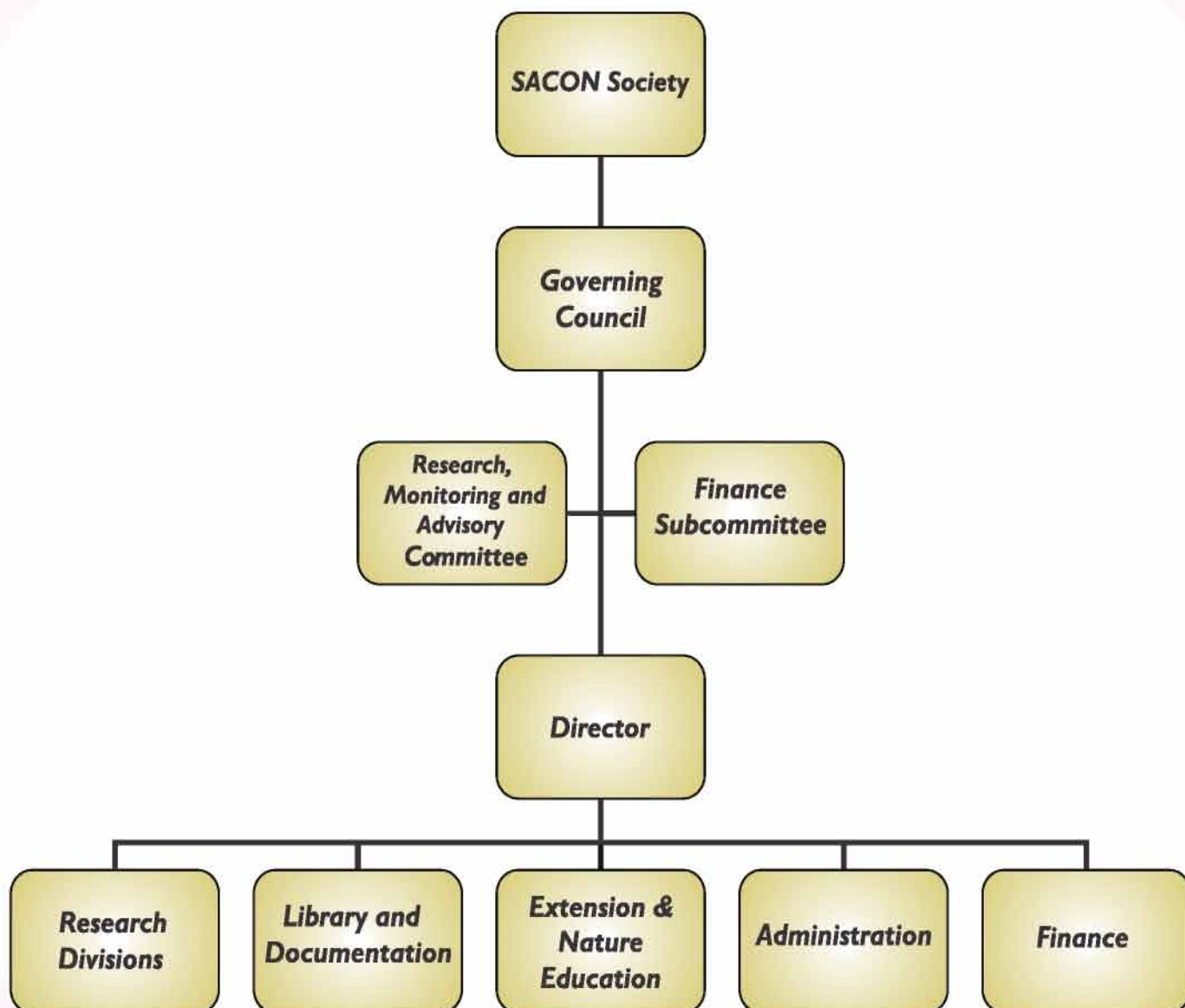
As part of our endeavour to develop human resources in the field, SACON has been persistent in encouraging youngsters to undertake higher studies in the field. In the current year, 19 students have registered for PhD and seven students either are awarded degree or have submitted theses. Several youngsters are also supported by SACON in their Masters' programs and in capacity building by offering internships to work with our scientists. SACON has done relatively satisfactory in terms of scientific publications.

The first International Conference on Indian Ornithology (ICIO - 2011) conducted by SACON in 2011, collaborating with various other organisations was well received. The theme of the conference was "Status of Indian Birds and their conservation". The next one of this biennial conference would be held in 2013. Another important academic event held at SACON was DST-SERC Interaction Meeting on Bird Biology, in which more than 35 research proposals were discussed threadbare and necessary steps to improve them were suggested.

While acknowledging that SACON needs to do more SACON team is confident to accomplish the vision of the founders, the MoEF and several others, reaching further heights in conservation research and actions.

P A Azeez
Director

ORGANIZATION STRUCTURE OF SACON



ORGANIZATION



SACON Society

The SACON Society comprises the President, the members of the Governing Council and experts in the field of ornithology, wildlife sciences and management. The Honourable Minister of Environment and Forests or Minister of State of Environment and Forests is the President of the SACON Society and the Director, SACON is the Member Secretary. The total members in the SACON Society are 29.

The 21st Annual General Meeting (AGM) of the SACON Society was held on 23rd February 2012 at Coimbatore under the Presidentship of Mrs Jayanthi Natarajan, Honourable Minister of State for Environment and Forests (IC), Government of India & President, SACON Society.

Welcoming the members of the SACON Society to the 21st AGM of the SACON Society, the President appreciated SACON for its work in ornithology and biodiversity conservation. The President advised SACON to initiate research programmes, which sensitise the public, particularly the youth. The President commended SACON for conducting the 1st International Conference on Indian Ornithology at SACON, Coimbatore during November 2011 and advised to conduct next conference in 2013 at Coimbatore.

Members of the SACON Society

- | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1. Smt Jayanthi Natarajan
Hon'ble Minister of State for Environment and Forests & President – SACON Society
Government of India
Paryavaran Bhawan, CGO Complex,
Lodhi Road, New Delhi – 110 003</p> | <p>2. Dr T Chatterjee, IAS
Chairman – SACON (GC) & Secretary to the Government of India
Ministry of Environment and Forests
Paryavaran Bhawan, CGO Complex
Lodhi Road, New Delhi – 110 003</p> |
| <p>3. Ms Geeta Kumar, IAS
Addl. Secretary and Financial Advisor
Ministry of Environment and Forests
Paryavaran Bhawan
CGO Complex, Lodhi Road
New Delhi – 110 003</p> | <p>4. Dr S Kaul
Advisor, Govt. of India
Ministry of Environment and Forests,
Paryavaran Bhawan
CGO Complex, Lodhi Road
New Delhi – 110 003</p> |

<p>5. Mr C V Sankar, IAS Principal Secretary to the Govt. of Tamil Nadu Dept. of Environment and Forests Govt. of Tamil Nadu Fort St. George, Chennai – 9</p>	<p>6. Mr P R Sinha, IFS Director Wildlife Institute of India P B No. 18, Chandrabani Dehra Dun – 248 001 (UP)</p>
<p>7. Dr C Swaminathan Vice Chancellor Bharathiar University Maruthamalai Road Coimbatore – 46</p>	<p>8. Dr A R Rahmani Director Bombay Natural History Society Hornbill House, Salim Ali Chowk Shaheed Bhagat Singh Road Mumbai - 400 02</p>
<p>9. Dr R Sukumar Chairman Centre for Ecological Sciences Indian Institute of Science Bangalore – 12</p>	<p>10. Dr. Erach Bharucha Director Bharati Vidyapeeth Deemed University Institute of Environment Education and Research Katraj-Dhanakawadi Pune- 411 043 (Maharashtra)</p>
<p>11. Prof Bonny Pilo 204 Janardhan Apartments 14 Pratap Gunj Vadodara- 390 002</p>	<p>12. Dr J S Samant Professor (Retd) Development Research, Awareness and Action Institute (DEVRAAI) 'RAAI' - 379, R K Nagar Kolhapur – 416 013</p>
<p>13. Prof. C K Varshney 88, Vaishali Pitampura Delhi – 110 034</p>	<p>14. Dr K N Ganesiah University of Agricultural Sciences Department of Genetics and Plant Breeding G K V K Bangalore - 560 065</p>
<p>15. Prof Anil K Gupta Professor Indian Institute of Management Vastrapur, Ahmedabad Gujarat – 380 015</p>	<p>16. Vacant</p>
<p>17. Dr Sukhdev Thakkur, IFS (Retd.) 9, Baskaran Street VOC Nagar Pammal, Chennai – 600 075</p>	<p>18. Vacant</p>

<p>19. Dr P Balasubramanian Principal Scientist Division of Landscape Ecology SACON</p>	<p>20. The Principal Secretary to the Government Department of Environment and Forests Office of the Principal Chief Conservator of Forests Van Sadan, Port Blair Andamans – 744 102</p>
<p>21. The Principal Chief Conservator of Forests & Chief Wildlife Warden (WL) Government of Nagaland Dimapur – 797 112. Nagaland</p>	<p>22. The Director Zoological Survey of India M Block, New Alipore Kolkatta – 700 053</p>
<p>23. The Director Bannerghatta Biological Park Bannerghatta Bengaluru</p>	<p>24. The Director Keoladeo National Park Bharatpur – 321 001 Rajasthan</p>
<p>25. Mrs Tara Gandhi AI Uttaravedi No 7, 2nd Seaward Road Valmiki Nagar Chennai - 600 041</p>	<p>26. Dr L M S Palni GB Pant Institute of Himalayan Environment and Development Kosi-Katarmal, Almora – 263 643 (Uttarakhand)</p>
<p>27. Dr B M Parasharya AINP on Agricultural Ornithology Biological Control Research Laboratory Anand Agricultural University Anand – 388 110 Gujarat</p>	<p>28. Dr P S Easa Wildlife Biologist Anugraham, Apsara Gardens Nellikunnu, East Fort P.O. Thrissur - 680 005, Kerala</p>
<p>29. Dr P A Azeez Director / Member Secretary SACON Coimbatore</p>	

GOVERNING COUNCIL

The Chairperson of the Governing Council (GC) of SACON is the Secretary to the Government of India, Ministry of Environment and Forests (MoEF). The GC has 16 members; Financial Advisor to the MoEF, Advisor to the MoEF or nominee, four ex-officio members, eight nominees of the Governing Council and the Director, SACON (Member Secretary). The tenure of the Governing Council is three years. The members of the GC reconstituted in July 2011 are listed below:

Members of the Governing Council		
1	Secretary to the Government of India, or his nominee not below the rank of Additional Secretary, Ministry of Environment and Forests – Chairperson	Dr T Chatterjee, IAS, Secretary
2	Financial Advisor, MoEF, or his / her nominee from the IFD of the MoEF (Ex-officio)	Ms Gauri Kumar, IAS, Financial Advisor
3	Advisor, MoEF, dealing with the matters of SACON, or his / her nominee (Ex-officio)	Dr S Kaul
4	Secretary, Department of Environment and Forests, Tamil Nadu (Ex-officio)	Mr C V Sankar, IAS
5	Director, Wildlife Institute of India, Dehra Dun (Ex-officio)	Mr P R Sinha, IFS
6	Vice Chancellor, Bharathiar University, Coimbatore (Ex-officio)	Dr C Swaminathan
7	Director, Bombay Natural History Society (Ex-officio)	Dr A R Rahmani
8	The Chairperson, Centre for Ecological Sciences, IISc, Bangalore (Ex-officio)	Dr R Sukumar
9-11	Three experts in the field of ornithology	<ol style="list-style-type: none"> 1. Dr Erach Bharucha, Director, Bharati idyapeeth Deemed University, Pune 2. Prof Bonny Pilo, Professor of Zoology (Retd), M S University of Baroda 3. Dr J S Samant, Advisor and Trustee, Development Research Awareness and Action Institute, Kolhapur
12-13	Two experts in the field of ecology or in disciplines of natural history	<ol style="list-style-type: none"> 1. Prof C K Varshney, Professor (Retd), School of Environmental Sciences, Jawaharlal Nehru University, Delhi 2. Dr K N Ganeshiah, University of Agricultural Sciences, Bangalore
14	One faculty from management institutes	Dr Anil Gupta, Professor, Indian Institute of Management, Ahmadabad
15	One representative from public sector enterprises / banks	Vacant
16	Director, SACON (Member Secretary)	Dr P A Azeez

The reconstituted Governing Council held its 62nd meeting on 21st October 2011 at MoEF, New Delhi. The GC is advised by Finance Sub-Committee (FSC), and Research, Monitoring and Advisory Committee (RMAC). The GC has also constituted a Building Sub-Committee (BSC) to oversee and advise on the construction activities at SACON.

Research, Monitoring and Advisory Committee (RMAC)

The mandate of the RMAC is to i) act as an advisory body to the scientific and educational faculty of the SACON, ii) review scientific research proposals developed by the Centre, iii) review and assess scientific research projects being implemented by the Centre, and monitor the output; dissertations, reports, papers in scientific journals and other publications, and iv) conduct a review annually of all research and extension activities of the Centre and advise changes, if any. The members of the Committee during the reporting period is given below.

1. Dr Sukhdev Thakur, IFS (Retd), Principal Chief Conservator of Forests, Tamil Nadu (Chairman)
2. Dr A R Rahmani, Director, Bombay Natural History Society, Mumbai
3. Dr V C Soni, Professor, Dept. of Biosciences, Saurashtra University, Rajkot
4. Dr B M Parasharya, AINP on Agricultural Ornithology Biological Control Research Lab, Anand Agricultural University, Anand
5. Prof. B C Choudhary, Wildlife Institute of India, Dehra dun
6. Dr Mewa Singh, Professor, Dept. of Psychology, Mysore University
7. Senior most Scientist of SACON
8. Director, SACON (Member Secretary)

The Research, Monitoring and Advisory Committee met twice during 2011-12 on 28th June 2011 (23rd Meeting) and 17th February 2012 (24th meeting) at Coimbatore.

Staff of SACON

The core scientific staff strength of the year (till March 2011) was eleven; Director (1), Principal Scientists (5), Extension Officer (1), Senior Scientist (1) and Scientists (3). During the period reported, SACON recruited five more scientists; Principal Scientists (2), Senior Scientist (1) and Scientists (2).

SCIENTIFIC

Director	:	Dr P A Azeez
Ornithology	:	Dr Rajah Jayapal, Principal Scientist (joined on 21st March 2012)
Avian Physiology and Genetics	:	Dr R P Singh, Scientist (joined on 19th March 2012)
Conservation Ecology	:	Dr S Bhupathy, Principal Scientist Dr S Manchi Shirish, Scientist
Conservation Biology	:	Dr S Mukherjee, Principal Scientist Dr H N Kumara, Scientist
Landscape Ecology	:	Dr S N Prasad, Principal Scientist (retired on 31 st August 2011) Dr P Balasubramanian, Principal Scientist Dr P V Karunakaran, Principal Scientist (joined on 19 th March 2012)
Ecotoxicology	:	Dr S Muralidharan, Principal Scientist
Environmental Impact Assessment	:	Dr P R Arun, Principal Scientist Dr B Anjan Kumar Prusty, Scientist
Wetland Ecology	:	Dr Goldin Quadros, Senior Scientist (joined on 1st August 2011) Dr Mahendiran M, Scientist (joined on 30th May 2011)
Extension	:	Dr Mathew K Sebastian
Nature Education	:	Dr P Pramod, Senior Scientist

TECHNICAL

Library and Documentation	:	Mr M Manoharan, Library Assistant
---------------------------	---	-----------------------------------

ADMINISTRATION

Finance Officer	:	Mr P Karupplah (on contract till April 2012) Mr Aneesh K Abraham (Since 20 th February 2012)
Junior. Administrative Manager	:	Mr R. Jayakumar
PA to Director	:	Mr V Vaidyanathan
Accountant	:	Mr M Muthupandi
Administrative Assistant	:	Mr S Patturajan
Office Assistant	:	Mrs R Rajalakshmi
Stenographer	:	Mr M Eanamuthu
Receptionist / LDC	:	Mrs M Jayageetha
Site Engineer	:	Lt Col. (Rstd) N Sundararaj (on contract)
Computer Assistant	:	Mr A Srinivasan (on contract)
Drivers	:	Mr R Ravi and Mr P Subramanian
Office Attendants	:	Mr A Devaraj and Mrs V Santhalakshmi

NEW APPOINTMENTS

Dr Goldin Quadros obtained PhD for his study on 'Intertidal Fauna of Thane Creek from the Bombay University'. He worked with WWF-India, Maharashtra State Office as Senior Education Officer and Interim State Director prior to joining SACON. His broad field of study is wetland ecology.



Dr Mahendran Myswamy, PhD from Delhi University, subsequently he worked as scientist at the Centre for Environmental Management and Degraded Ecosystem, Delhi University. His broad areas of interest are behavior, morphology, biogeography and phylogenetics using birds as model organism.



Dr Rajah Jayopal has extensive research and teaching experience in the field of ornithology and ecology. He studied macro-ecology of forest birds of Central Indian Highlands (M.P.) for his Ph D from the Forest Research Institute, Dehradun. His research interests include taxonomy and biogeography of birds, ecology of bird communities, evolutionary ecology, conservation biology, ecosystem responses to human enterprises and development, and biostatistics & quantitative methods.



Dr R.P. Singh's research is focused on the reproductive physiology, molecular biology and assisted reproductive technologies in birds. He has developed the semen preservation method and artificial insemination technologies for chicken, guinea fowl and Japanese quail. Currently he is conducting research on sperm RNA and protein to develop fertility bio-markers for avian species



Dr Karunakaran completed his PhD work in Biological Sciences (Wildlife Science) from the Wildlife Institute of India on "Ecological studies on the Montane grasslands of Eravikulam National Park, Western Ghats" in 1998. After his Ph D, he worked with French Institute, Pondicherry in the Department of Ecology. Before joining SACON, Dr Karunakaran worked with Centre for Environment and Development, Thiruvananthapuram as Programme Director. Dr Karunakaran's research interests include landscape level management of natural resources, angiosperm taxonomy, biodiversity conservation, GIS and remote sensing, contemporary issues in ecology, and conservation and protected area management.

RESEARCH HIGHLIGHTS

Conservation of the Edible-nest Swiftlet in the Andaman and Nicobar Islands

Background

After the successful Phase-I (1999-2002) and Phase-II (2002-2008) of the programme to conserve the Edible-nest Swiftlet in the Andaman & Nicobar Islands, Phase-III was initiated in 2009. The program has made significant progress resulting up to a 75% increase in population found at focal sites. We are in the process of establishing a population of Edible-nest Swiftlet in a customized house; nest building and egg laying have taken place, demonstrating that this approach will lead to far wider recoveries in population of the birds.

Objectives

In the current Phase (2009-2014), it is intended that the programme is continued, expanded and brought to fruition. The three major components being pursued in this phase are :

I R e s e a r c h a n d d e v e l o p m e n t

- To develop the technology and the methodology to attract and induce Edible-nest Swiftlets to breed in human habitations
- To continue ongoing studies on the breeding and foraging ecology of the species
- To study longevity and dispersal patterns of the Edible-nest Swiftlet

ii) In-situ conservation

- The consolidation and expansion of cave sites where conservation action is being implemented from the existing two to eight (5 in the Andaman and 3 in the Nicobar), where nest-collectors will be organized and supervised in scientifically managing Swiftlet colonies
- To establish scientific harvesting systems

iii) Ex-situ conservation

- To develop and expand the number of houses in which the Edible-nest Swiftlet breeds, thus establishing alternate populations and enabling widespread ranching of swiftlets from houses
- To establish scientific harvesting systems in Edible-nest Swiftlet colonies in houses

iv) Swiftlet Conservation Co-operative

- To facilitate establishing a co-operative that will develop market linkages for nests harvested under supervised and scientifically managed systems, which is fundamental to the conservation of the Edible-nest Swiftlet.

<i>Principal Investigator</i>	: Manchi Shirish S.
<i>Co-Investigators</i>	: Nil
<i>Collaborative agencies</i>	: Department of Environment and Forests, Andaman & Nicobar Islands
	<i>Research Personnel: Ngulkhohal Kongsai (till November 2011)</i>
	<i>Akshaya Mane (since December 2011)</i>
<i>Duration</i>	: 5 years
<i>Date of commencement</i>	: 1st April 2009
<i>Date of completion</i>	: March 2014
<i>Budget</i>	: Rs. 5,77,000/- (for year 2011-12)
<i>Funding Source</i>	: Ministry of Environment and Forests (through DoEF, A&N Islands)
<i>Status</i>	: On-going

Results

At all the three focal sites in North and Middle Andaman Islands, 28 motivated nest collectors were engaged on daily wage basis for protecting caves with nests of the Edible-nest Swiftlet during their breeding season.

At Chalis-ek the population in 28 caves, with about 17% annual growth rate in 2011, the population reached 1102 nests (breeding pairs). Approximately 732 chicks fledged from 558 nests at Chalis-ek. Breeding in more than 40% of the total nests was unsuccessful because of the unexpected event of nests missing from the caves during May 2011. At Interview Island population of the Edible-nest Swiftlet showed no further growth in the 163 nests/breeding pairs in a protected cave. Approximately 266 chicks fledged from those nests. With an addition of 91 nests (breeding pairs) in the last year's breeding population the total nest count at Baratang reached 553 (approximate) nests. Approximately 664 Chicks fledged from these nests by the end of the season.

In 2011, in total 1662 chicks fledged from 1818 protected nests. With involvement of the nest protectors scientifically managed harvesting of the nests is going on. After the breeding season in 2011, 1152 nests were collected from Chalis-ek (558), Interview (136) and Baratang Island (458). All the harvested nests were numbered, registered, air dried and packed in air tight containers and deposited with Andaman and Nicobar Forest Department.

Discussion/ recommendations

Overall population of the Edible-nest Swiftlet in the protected sites is showing noticeable increase. However, at the cave at Interview Island decrease in the population was seen and the reason for the same is unknown. Survey of the remaining caves on the Interview Island may give us an idea about population shifts or dispersals. This gives us an opportunity to plan some detailed studies regarding dispersal patterns in the species. Simultaneously, the well established breeding colony of the Glossy Swiftlet in the same cave at Interview Island is seen either poached heavily or shifted completely.





Based on the present study, the following actions are suggested.

1. Identified potential sites should be monitored to document the present population in the unprotected caves.
2. Incentives should be made available to the nest protectors till a proper nest marketing system is set up.
3. A steering Committee should be formed to review the project and to set up nest marketing system.
4. With continuous efforts to attract the non commercial swiftlets and colonization of the species in the ex-situ sites should be studied in detail at every step.

Status, ecology and conservation of Narcondam Hornbill *Aceros narcondami* on Narcondam Island, India

Background

Of nine species of hornbills found in India, three are endemic; Malabar Grey Hornbill *Ocyrocus griseus*, endemic to the Western Ghats, Indian Grey Hornbill *Ocyrocus birostris* widely distributed over peninsular India and the Narcondam Hornbill restricted to 6.82 sq km island in the Andaman Sea. Narcondam Hornbill is considered as the most endangered hornbill species in the world. The species is one of the globally threatened birds listed as Vulnerable by BirdLife International and IUCN; it is included in Schedule I of the Indian Wildlife Protection Act, 1972 as well. It is a high priority species for avian conservation.

Principal Investigator	: Manchi Shivish S.
Co-Investigators:	None
Collaborative agencies	: None
Research Personnel	: None
Duration	: 18 Months
Commencement :	May 2011
Date of completion	: October 2012
Budget	: Rs. 6,07,200/-
Funding Source	: MoEF, Govt. of India
Status	: On-Going

Objectives

- Investigate population status of the Narcondam Hornbill
- Study nesting and foraging habitat requirements of the species
- Study breeding and non-breeding biology of the species
- Identify threats, formulate and advocate conservation measures

Results

Permissions from the Andaman Forest Departments are received to carry out the required research work. Communication from the Indian Coast Guard (Delhi) was received only during December 2011. The field work will be initiated by April 2012.

Discussion/ recommendations

As the field work is to be initiated by April 2012, a communication was sent to the funding agency for no-cost extension of the project.



Reassessment of the Impact of nest collection on the Edible-nest Swiftlet in the Andaman Islands

Background

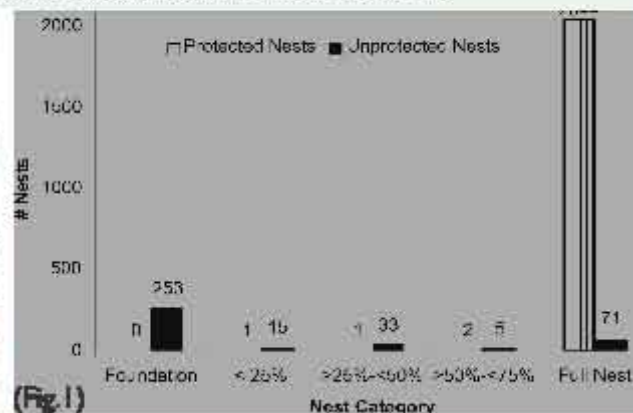
The Edible-nest Swiftlet *Aerodramus fuciphagus* builds nests exclusively of saliva, which is highly prized in Chinese cuisine and pharmacy. Ranked amongst the world's most expensive animal products, excessive and uncontrolled nest collection has led to serious declines in population. However, when properly managed by following scientifically prescribed harvesting regimes, populations of the Edible-nest Swiftlet have shown remarkable recoveries elsewhere. Swiftlets' nest harvesting is ethically acceptable as it does not involve killing or constraining the birds in any way.

A study conducted by SACON during 1998 explored 384 caves (260 inland and 124 coastal) across the Andaman and Nicobar Islands of which 291 were found occupied by the Edible-nest Swiftlet. Total 4620 pairs were estimated to be breeding in 249 caves (203 inland caves and 46 coastal caves) in Andaman Islands. After estimating more than 80% decline within a decade in the population of the Edible-nest Swiftlets in the caves of the Andaman and Nicobar Islands, a programme to conserve the Edible-nest Swiftlet has been underway since 1999. The proposed study was initiated to identify the potential areas for expansion of the on-going conservation program. The study can also help us in understanding the rate of population loss across the Andaman Islands.

<i>Principal Investigator</i>	: <i>Manchi Shrish S.</i>
<i>Co-Investigators</i>	: <i>None</i>
<i>Collaborative agencies</i>	: <i>None</i>
<i>Research Personnel</i>	: <i>None</i>
<i>Duration</i>	: <i>One Year (12 Months)</i>
<i>Date of commencement</i>	: <i>September 2011</i>
<i>Date of completion</i>	: <i>September 2012</i>
<i>Budget</i>	: <i>Rs. 1,95,000/-</i>
<i>Funding Source</i>	: <i>Small Grant Program, WWF-India</i>
<i>Status</i>	: <i>On-going</i>

Objectives

- Estimate the breeding population of the Edible-nest Swiftlet throughout the Andaman Islands
- Assess the extent of the nest collection in Andaman Islands
- Identify the potential populations towards expansion of the on-going conservation program



(Figure 1 The number of nests observed in different size categories during the survey which depicts the results of an extent of the illegal nest collection in the unprotected caves and legal nest harvesting in the protected caves. (Foundation = Saliva laid attached to rock; <25% = >Foundation < 25%; >25%<50% = nest built was > 25% but < 50%; >50%<75% = Nest built was > 50% but < 75%; Full Nest = nest built was > 75%-100%)



Results

Of the seven surveyed islands with known breeding sites of the Edible-nest Swiftlet, three islands have no signs of their presence during the present study. Of the total 384 caves surveyed in 1998, 256 in North and Middle Andaman region were revisited and 2378 nests were seen. Over 84% of these nests were seen in the 203 protected caves at Interview Island, Challs-ek and Wrafter's Creek. Only 377 nests were observed in 53 undefended caves revisited. More than 99.8% of the 2044 protected nests were built completely whereas, of the 377 unprotected nests only close to 19% of nests were found built completely and more than 67% nests were in the foundation building stage (Fig. 1).

Discussion/ recommendations

Absence of populations or any signs of the species on the islands clearly shows disappearance of some colonies. Of the all observed undefended nests, presence of only 19% of completely built nests shows the high intensity of nest collection. As it is known that the fully built edible nests fetch high price compared to the partially built nests, these fully built nests must be kept for harvest. Thus, the collector can get the high price. Though the Edible-nest Swiftlet breeding colony on the extreme northern island (Landfall Island) is new and large, protecting this population will be a challenge as there is no freshwater source on the island and commuting to the nearby islands is very difficult because of turbulent sea. The requirement of the resources and the expenses to protect the colony will be high. It is apparent that there is no potential site for expansion of the ongoing in-situ conservation program. However, it is very important to cover the remaining caves also to achieve last objective of the project.



Patterns of distribution of selected faunal groups in the Agasthiyamalai Hills, Western Ghats, Kerala, India

Background

Understanding the distribution patterns of biotic communities is important for planning conservation of biological diversity at local and regional levels, as global decline is being reported for several taxa. Apart from understating fundamentals of species distribution in large landscapes, this study would provide some guideline for prioritization of Protected Area delineation in the Western Ghats, one of the Global Biodiversity Hotspots.

<i>Principal Investigator</i>	: S Bhupathy
<i>Co-Investigator</i>	: Lalitha Vijayan
<i>Research Fellows:</i>	Jins, J V and Madhumita Panigrahi
<i>Duration</i>	: Three years
<i>Date of Commencement</i>	: August 2011
<i>Date of Completion:</i>	August 2014
<i>Budget</i>	: Rs. 24,90,400/-
<i>Funding Source</i>	: Dept of Biotechnology, Govt. of India
<i>Status</i>	: In Progress

Objectives

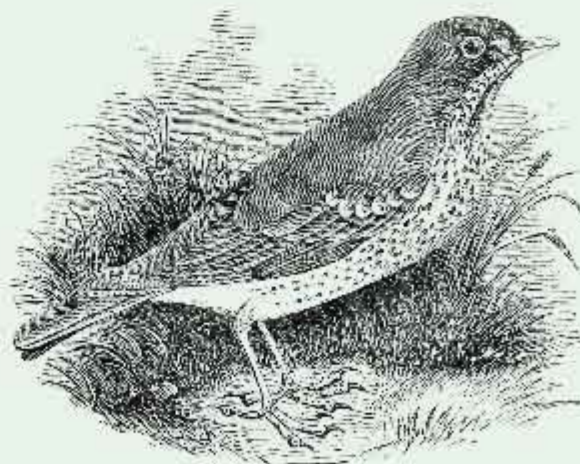
- Determine species richness and turnover patterns of reptiles and birds with altitude in Agasthiyamalai Range, Western Ghats, Kerala,
- Understand abiotic and biotic factors influencing such patterns,
- Know the status of reptile and bird species found in the Agasthiyamalai Range, Kerala, and
- Apply distribution (Ecological Niche) models to find out the probable distribution limits of selected endemic species found in Agasthiyamalai Hills.

Results

Maps of the study area (Agasthiyamalai Hills) with respect to elevation and vegetation types have been prepared and grids of 1x1 km have been overlaid. Rapid surveys have been undertaken and sampling methods tested. A total of 150 species of birds and 30 species of reptiles have been observed, which included several endemic species of reptiles and birds. Range restricted species such as Kangaroo Lizard *Otocryptis beddomii* has been observed at various parts of Agasthiyamalai Hills and efforts are being made to find out the probable distribution limits of this species in the Western Ghats south of Palghat Gap using Ecological Niche Modelling protocols.

Recommendations

Fieldwork is in progress, and recommendations would be submitted once the fieldwork and substantial data analyses are completed.





Phylogeography of the fishing cat (*Prionailurus viverrinus*) in India: identifying populations for conservation

Background

India is home to 15 species of cats, the highest number any country has. Yet, apart from the four big cats the small ones do not feature in any major research or conservation planning. For the most part information on small cats in India, including the fishing cat, is in the form of natural history notes on distribution and habits, ad-hoc records on sightings and behavior or short studies on diet and habitat use. The distribution of the fishing cat in India is yet unclear and recent surveys for mammals in some potential fishing cat habitats have not yielded any positive result. With no specific focus on the species, the distribution currently projected within India is largely an expected/predicted presence of the cat in its potential habitats, from records in the past. In fact, most reported fishing cat records are from protected areas. The species perhaps also exists outside the protected area network in the country and these populations could be crucial to maintain genetic connectivity between populations. However, no information is available on such populations.

<i>Investigator:</i>	: Shomita Mukherjee
<i>Co-Investigator:</i>	: Uma Ramakrishnan
<i>Collaborating Agency:</i>	: National Centre for Biological Sciences, Bangalore
<i>Research Personnel:</i>	: none
<i>Duration:</i>	: 1 year
<i>Date of commencement:</i>	: 1st April 2010
<i>Date of completion:</i>	: 31st May 2011 (after a no-cost extension for two months)
<i>Budget:</i>	: \$8350/- (Rs. 3,86,306/-)
<i>Funding Source:</i>	: Panthera Foundation, New York
<i>Status:</i>	: Completed

Objectives

- Study genetic variation of the fishing cat in India and identify populations that need urgent conservation attention.
- Using results from the above objective, we aim to identify large connected habitats suitable for the fishing cat in India, using imageries and Geographical Information System and conduct surveys in these for presence.
- Compare fishing cat distribution and genetic variation to already existing data on jungle cat and leopard cat from India: Can abundance and distribution of a species be used to predict its genetic variation and genetic structure?
- Relate genetic and spatial data to environmental/landscape variables for the fishing cat, leopard cat and jungle cat. What limits cat distributions?
- Identify populations of fishing cats, across its global range that need urgent conservation attention, using non-invasive molecular techniques. This will be done at the global scale with samples from museum specimens and captive individuals in zoos across the world as well as from natural habitats in India and other countries where collaborators will be willing to share samples.

Results

A total of 155 scats were collected from various regions including Andhra Pradesh (Coringa Wildlife Sanctuary), Orissa (Monglajori), West Bengal (Howrah, Hooghly, Sundarbans, Jhargram), Uttar Pradesh (Dudhwa National Park, Katarniaghat Wildlife Sanctuary), Uttarakhand (Corbett Tiger Reserve), Rajasthan (Keoladeo Ghana National Park). One skin of unknown location was obtained from Assam. One tissue sample of a dead fishing cat was obtained from Aima village, Howrah district, West Bengal.

Of the 155 scats, 4 were of known identity since they were collected from captive fishing cats, all from West Bengal (3 from the Kolkata zoological gardens and 1 from a captive facility in Jhargram, West Medinipur District. Of the 151 scats we extracted DNA from 114. The remaining 37 scats were not included in the extractions because they were in close physical proximity to already identified scats. Thirty two percent (37 scats) of the 114 scats showed positive results for felids with the felid specific 16s rRNA primers.

Four scats failed to give satisfactory sequences and they were not classified under any felid and left out of further analysis. The failure could be due to contamination from other sources. Another scat (from Bharatpur) gave positive results for fishing cat after sequencing with the 16s marker but with all the other markers of the cytochrome b gene, it showed heavy contamination with jungle cat DNA and hence could not be used for analysis.

A comparison of three species of small cats in India shows that the fishing cat is intermediate in the degree of genetic variation, having lower variation than the jungle cat but higher than leopard cat. The small sample size in the case of the fishing cat did not permit analysis on genetic structure.

The network shows a loop which indicates unresolved linkages and could be an effect of insufficient sampling. The network does not indicate any structure since haplotypes from various regions are mixed with one or two mutations between them, and not segregated.

Discussion

Though the final sample size (n=19) obtained for fishing cats seems low, this indicates the rarity of the cat since the effort put into scat collection was high and a large geographical area including 6 states (Andhra Pradesh, Orissa, West Bengal, Uttar Pradesh, Uttarakhand and Rajasthan) was covered within 7 months (October 2010 to April 2011).

The small sample size did not permit us to obtain substantial information for the objective 1 which was to determine unique populations within India (if any). However, even with a small sample size it is clear that the fishing cat has considerable genetic variation within the country. From this we can infer connectivity in habitat from the Terai region of Uttarakhand and Uttar Pradesh through Nepal, Assam, Bengal and Orissa. The haplotypic network does not suggest any structure with the haplotypes from various regions being separated by a single or couple of mutations. In fact samples from West Bengal seem to be maximally separated with a maximum of 6 mutations between two haplotypes (WB17 from the Sundarbans and WB3A a captive individual caught around the Kolkata airport).

Additional information and samples are required from areas between Bharatpur and the Terai and between Orissa and Andhra Pradesh. Furthermore, from current records, the Western Ghats do not seem to be within the range of the fishing cat, though they are found in Sri-Lanka. However, this needs to be verified but was not possible within the limited span of this project though it was to be addressed through Objective 2.



The sample from Bharatpur was very important since fishing cats have not been reported from here since a year (Forest Department pers. comm.). Nevertheless, the presence of the fishing cat was confirmed through a sighting around the same location where the scat was found by Mr Bholu Khan (Keoladeo National Park) after we informed him of the result through genetic analysis. This result highlights the importance of genetic tools in surveying rare species.

One of the most important outcomes of the project was in joining the global network of fishing cat researchers and a global fishing cat working group has been formed addressing conservation issues across the fishing cat distribution range.



Regarding threats and conservation issues, the fishing cat seems to be safe in the Terai belt where it occurs within several Protected Areas as well as in agricultural fields outside these, such as Dudhwa National Park, Katarniaghat Wildlife Sanctuary and Corbett National Park. Discussions with locals around these areas did not reveal any form of conflict. In contrast the Eastern part of India (mainly West Bengal) conflict with fishing cats seems to be severe and villagers often kill the cat after snaring or trapping it. Reports of fishing cat meat being sold in the market were obtained by Tiasa Adhya (pers. comm.). While this can be addressed through awareness programs which Tiasa is currently doing, the other threat of habitat destruction due to brick mining and urbanization seems to be a hopeless and lost case. All of South Kolkata was once connected to the Sundarbans and was potential fishing cat habitat. This is borne out by the fact that a couple of years ago two fishing cats were captured from the Kolkata airport area and are now in captivity in the zoological gardens there. Unless there is a political effort made to use land judiciously from an ecological perspective, these small pockets of populations will be soon lost.

The population in Coringa is very small but safe and a survey specifically through the Andhra wetlands is required to assess their status there. Similarly surveys are required in and around Keoladeo Ghana in the several satellite wetlands.



Development of conservation strategy for a newly discovered Lion-Tailed Macaque *Macaca silenus* population in Sirsi-Honnava, Western Ghats: II. Understanding the impact of NTFP collection on the Lion-Tailed Macaques

Background

Recently identified lion-tailed macaque population in the forests of Sirsi-Honnava in southern Karnataka possibly represents the largest, contiguous population of the macaque in its natural habitat. Conservation requires baseline information on various aspects more than the just identification of the population. The forests also harbor high density of people and large extent of agricultural land, it is necessary to understand the interaction of people and the forest to properly manage the region. NTFP collection has been an integral part of the local people. To understand the impact of NTFP collection on the ecology of the lion-tailed macaques, studies on availability of forest produce and its use by monkeys and people has to be studied together. In the present study along with study of lion-tailed macaques for their ecology, 73 households in the home range of the study group have been monitored for the NTFP extraction.

<i>Principal Investigator</i>	: Hannavalli N. Kumara
<i>Co-Investigator</i>	: -
<i>Collaborative agencies</i>	: -
<i>Research Personnel</i>	: K. Santhosh
<i>Duration</i>	: 18 months
<i>Date of Commencement</i>	: August 2009
<i>Date of Completion</i>	: July 2011
<i>Budget</i>	: Rs. 6,06,300/-
<i>Funding source</i>	: Critical Ecosystem Partnership Fund (CEPF) Small Grants
<i>Status</i>	: Completed

Objectives

- Study the impact of NTFP collection on feeding ecology of lion-tailed macaques
- Assess the status of such food plant species
- Develop a strategy for sustainable harvesting of NTFPs to the local forest managers

Results

Of the 268 species of plants present in the study area, lion-tailed macaques feed on 67 species. Interview with people reveals that they are known to collect at least 14 species of NTFPs annually for both commercial and domestic purposes. It is observed that more than 70 percent of the NTFP species are also food species of LTM and phenophases of plant species utilization by both humans and monkeys either overlap completely or utilization by one, makes it unavailable for the other especially to the lion-tailed macaque. In the cases of overlap in utilization, plant parts used by both might vary or remain same which





may lead to conflict in the process of gaining upper hand over the resource. During the study period, we have found that major competition exists between lion-tailed macaques and local people for *Garcenia gummi-gutta*, *Myristica malabarica* and *M. dactyloides*.

Fruits of Uppage (*Garcenia gummi-gutta*), an understory tree has assumed a major role in the economy of people in the district. Uppage is one of the most preferred fruits of LTM in the wet season constituting a major proportion in its diet seasonally (16.4%) and annually (7.1%). It is the most widely extracted NTFP by all sections of society in the region. Although the phenophases preferred by both monkey and man is ripe fruits, increase in demand and unstable markets have resulted in early harvest, and destructive harvesting practices. The plant part preferred by LTM is the mesocarp, whereas seeds and rind are discarded by them which are collected by man. The fruit is collected by direct harvest or picked up, seeds separated and rind dried in fire wood ovens for 24 hours. They are collected in a very short span of a month and large quantities of fire wood are used to dry them. There is intense competition although the resource is available in plenty; but the competition is only for a very short time leading to early harvest by man.

In case of *Myristica malabarica* and *Myristica dactyloides*, increase in harvest between households was directly proportional to increase in the number of people involved in each household. Although people prefer ripe fruits, they are forced to collect aril of unripe fruits due to the intense competition among them. *Myristica spp.* is one of the major food species and most preferred by monkeys in other areas of Western Ghats, but in this area it is very rare for the animals to find them ripe. The upper hand humans have over this resource made it unavailable for monkeys.

Discussion / Recommendations

In the region, the NTFP collection is legal and the collection of the same is auctioned by the Forest Department. Hence, we recommended developing a strategy / harvesting mechanism and also imposing a ban on collection of certain NTFPs. Department has already considered this recommendation and incorporated the same in the current management plan.

Assessment of occurrence and abundance of large mammals, birds and woody plants in Bannerghatta National Park, Karnataka

Background

Preparation of conservation action plan for any forest patches or protected areas require basic information such as bio-diversity, ecological and conservation status of the species, distribution pattern and identification of critical area for each important species, evaluation of existing threats and solution for resolving or reducing them. Though there is an extensive Protected Area network in the country, such baseline information is not available for many of the Protected Areas. Bannerghatta National Park (BNP) is one such Protected Area which requires detailed documentation of the basic ecological information. The park has mostly dry deciduous and thorny scrub forests, with patches of moist deciduous forests along the streams.

Principal Investigator	: Honnavalli N. Kumara
Co-Investigator:	: -
Collaborative agencies	: -
Research Personnel	: -
Project Period	: 5 months
Date of Commencement	: November 2010
Date of Completion	: July 2011 (Extended)
Budget	: Rs. 1,50,000/-
Funding source	: Karnataka Forest Department
Status:	: Completed

Objectives

- Occurrence and abundance of mammals, birds and woody plants in Bannerghatta National Park
- Distribution of mammals, birds and woody plants in the Park
- Habitat correlates of mammal and bird distribution in the Park

Results

Woody Plants

In the 164 quadrats (25 x 25 m), in total 5766 woody plants were recorded belonging to 153 species (\geq 15 cm GBH), 109 genera and 49 families. Among these *Anogeissus latifolia* was seen in highest number (n = 441) followed by *Acacia chundra* (n = 343) and *Shorea roxburghii* (n = 281). The highest Important Value Index (IVI) was recorded for *Shorea roxburghii* (16.89) followed by *Anogeissus latifolia* (12.73) and *Acacia chundra* (10.47). The Shannon-Weiner index of diversity for woody plants in the study area was 4.23. The Simpson index of diversity was 0.977. The mean stand density in the study area was 570.7 (stems ha⁻²) and basal area was 44.8 (m² ha⁻²).

Birds

In total 176 species belonging to 53 families were recorded during the survey. Of these 145 species were recorded during the transect walks; 134 species residents and the rest 42 visitors. The density estimated for 145 species varied between 0.05 to 23.15 birds/ha for different bird species. The density of Red-vented Bulbul was the highest (23.15 birds/ha), followed by Yellow-Billed Babbler (13.92 birds/ha) and Red-whiskered Bulbul (12.97 birds/ha). Red Spurfowl, White-eyed Buzzard, Eurasian Eagle Owl recorded the lowest densities among resident birds (0.05 birds/ha). Among the visitors, Green Bee-eater had highest density (10.51 birds/ha), and among the low density species are Spangled Drongo, Sirkeer Malkoha and Verditer Flycatcher (0.05 birds/ha), Blyth's Reed-Warbler (0.11 birds/ha), Indian Scimitar Babbler (0.45 birds/ha) and Blue-bearded Bee-eater (0.73 birds/ha).

Mammals

Considering the nominal distribution, we expected 33 species of mammals from the park; however we were able to get evidence of only 20 species. Among diurnal primates Hanuman langur is absent and only bonnet macaque was found in Bannerghatta range. The nocturnal primate slender loris was also recorded from the Bannerghatta range. Other two arboreal mammal's i.e. Malabar giant squirrel and large brown flying squirrels were also absent in the park. Though we did not sight a single large carnivore species, evidences show presence of leopard, sloth bear and jackal, and occasional visit of dholes. We were unable to get proper evidence for occurrence of tiger and wolf in the park. Among small carnivores, common mongoose, small Indian civet and Asian palm civet were sighted and recorded from many parts of the park. The fox was reported to occur only at marginal areas of the park. Chital, sambar and elephants were recorded from all the forest ranges, where the gaur and four horned antelope were also reported to occur in all the forest ranges. A total of 213 km of night survey was carried out in the park. During this we sighted only slender loris, Asian palm civet and small Indian civet, apart from chital, sambar, gaur, and elephant. Surprisingly we had very poor encounters of all the species. We had sightings of five slender loris, six Asian palm civets and two small Indian civets, and most of the sightings were from Bannerghatta forest range. The overall encounter rate was 0.02, 0.028 and 0.009 for slender loris, Asian palm civet and small Indian civet respectively. Since the animals live in low abundance in the park, we considered droppings of all the possible species which we were able to identify and count. Mean density of droppings for elephant (69.96) and chital (45.65) was higher than the other animals. Further, non parametric chi-square test shows that density of droppings of all the species varied significantly between the grids except in the case of muntjac.



Discussion / Recommendations

Mining around the periphery of the forest and other illegal activities hamper animal movements and reduces the roosting site for many raptors which prefer rocky outcrops for the same. Irrespective of the forest type, the increase in *Lantana* density is correlated with the decline in canopy birds and insectivores. Further, *Lantana* forms dense thickets in the understory which alters the structure of the forest and birds are one of the taxa which are affected the most. Apart from the firewood collection and domestic hunting by local people, there are sand mining and land conversion for developmental activities very prominently around the park. If such activities persist in the future, the options for reestablishment for many species will be difficult and they may continue to decline in number.



Study on Avian Frugivory and Seed Dispersal of Endemic Tree Species in Select Shola Forests of Nilgiri Hills, Western Ghats

Background

Fruit-frugivore interactions play a pivotal role in maintaining the structural and functional integrity of ecosystems. Basic knowledge about fruit-frugivore interactions and seed dispersal in forest ecosystems is essential for conservation of threatened birds and the forest itself. Avian seed dispersal mutualism was once thought to be characterized by stable ecological relationships between birds and plants. It was argued that consistent bird-fruit interactions favored the evolution of fruit characteristics to correspond with the foraging behavior of fruit-eating birds. Seed dispersal has a major influence on plant fitness because it determines the locations in which seeds, and subsequently seedlings, can live or die. Thus, a study on bird-fruit interactions with reference to avian frugivory and seed dispersal of endemic tree species becomes very important for the conservation and management of biodiversity.

Objective

- Assess the role of avian frugivores in seed dispersal of endemic tree species of the shola forests in Nilgiris

Results

Fruiting phenology: Pronounced seasonality was noticed. Fruiting peak was observed in June-August while a dip in fruiting was recorded in October.

Avian frugivore attracting plant families in the shola forests: In total, 11 plant families were found to be visited by avian frugivores in the shola forests. Maximum number of avian frugivore visits was noticed on Lauraceae (n=546), then Sapotaceae (n=522) and Myrtaceae (n=264). Four species of Lauraceae was found attracting frugivores. Among the eleven plant families, seventeen species of avian frugivores were attracted by members from Sapotaceae and 9 species by members from Myrtaceae. Lauraceae, Myrtaceae and Sapotaceae are major food plants for the avian frugivores in shola forests of Nilgiris.

<i>Principal Investigator</i>	: P. Balasubramanian
<i>Co-Investigators</i>	: -
<i>Collaboration</i>	: Tamil Nadu Forest Department, Chennai
<i>Research Personnel</i>	: C. Anbarasu
<i>Duration</i>	: 6 months
<i>Commencement</i>	: March 2011
<i>Date of Completion</i>	: August 2011
<i>Budget</i>	: Rs. 1,00,000/-
<i>Funding Source</i>	: Tamil Nadu Forest Department
<i>Status</i>	: Completed



Avian frugivore families in the shola forest of Nilgiris: In total, 28 species of avian frugivores belonging to 11 families were recorded in the shola forests. Major frugivorous bird families include Muscicapidae (8) and Pycnonotidae (5) which appear to be the principal avian frugivores in the shola forests.

Avian frugivore composition in the shola forests: 15 plant species were examined for avian frugivory. In total of 2663 individuals belonging to 11 species of frugivores were recorded. Nilgiri Laughing thrush (n=711) followed by Red-whiskered Bulbul (n=506) and Jungle Myna (n=192) were the predominant visitors. These three species appear to be the principal seed dispersers in the shola forest. Red-whiskered Bulbul visited 15 plant species followed by Nilgiri Laughing thrush (13 species).

Discussion/Recommendations

Endemic birds such as the Nilgiri Laughing thrush and Nilgiri Wood Pigeon consume fruits of endemic tree species and disperse the seeds away from the parent plant, thus aiding in forest regeneration. Endemic tree species belonging to family Lauraceae, Myrtaceae and Sapotaceae support several frugivorous birds including the endemics by providing them edible fruits. The fruiting period of the endemic plant species is staggered. Hence, in order to sustain the needs of frugivorous birds throughout the year, it is suggested to include all the 15 endemic tree species reported here in the reforestation programs.

Monitoring post-Tsunami coastal ecosystem recovery in the Nicobar Islands and developing site specific restoration measures

Background

Island ecosystem is rich in biodiversity and prone to natural and anthropogenic disturbances. The mega earthquake of 9.3 magnitude and subsequent tsunami on December 26, 2004 made disastrous impacts on people and biodiversity of south-east Asia. The close vicinity to the epicenter of the earth quake attributed to the maximum damage levels in Nicobar Islands in terms of human lives and coastal biodiversity. The tsunami had completely destroyed or significantly damaged all vegetation that existed in the coastal area between the beach and the hill. The earth quake had resulted in a tilt in the land with southernmost Nicobar Islands having sunk by about 1.6 m while the Northern most Andaman Islands have been elevated by about 1.2 m. Coastlines have receded towards the hills, at places by several hundred meters, often resulting in very little or no land between the hills or high ground and the sea.

The impacts to coastal ecosystems have been: (1) physical uprooting of coastal forests and mangroves by the tsunami, (2) scorching of littoral vegetation due to salt stress from sea water inundation, (3) dying out of mangroves due to perennial submergence of the pneumatophores, (4) sea water inundation of inland freshwater bodies, destruction of marshes and creeks, and (5) physical destruction of coral reefs by the tsunami waters. The tsunami impact has affected both the floral and faunal diversity along the coastal belt. The species of faunal groups that were affected the worst include the Nicobar Megapode, a mound building megapode endemic to the Nicobar Islands whose greatest concentrations were in the littoral forests due to the propensity of megapodes to build incubation mounds close to the beach. Hence, there was a need to assess the damage to understand the changes and address issues on restoration. SACON and Andaman Forest department initiated this project to assess the post tsunami status of flora and fauna in the tsunami affected areas of Nicobar Islands.

Objectives

- Assess and monitor vegetation regeneration in tsunami affected littoral forests.
- Assess impacts of tsunami on mangrove forests and monitor the natural re-colonization of mangrove species.
- Monitor species of fauna that inhabit coastal ecosystems, focusing on the Nicobar Megapode along with other endemic bird species and Robber Crab.
- Develop and implement appropriate site specific strategies to restore damaged habitats.

Results

Vegetation: In general, the species richness was highest in UF with 133 plant species followed by SLRV (123 species) and SRV (45 species). Similar pattern was observed in the species richness / plot, where UF has showed maximum richness 18.04 (SD±8.17) followed by SLRV 16.39 (SD±7.09) and SRV 5.58 (SD±3.95). Basal area ha⁻¹ m² is again highest for UF 73.88 (SD±29.08) followed by SLRV 28.23 (SD±20.95) and SRV 2.41 (SD±3.76). Stem density/plot was highest in SLRV 164.12 (SD±74.40) followed by UF 87.47 (SD±52.22) and SRV 18.72 (SD±18.28). One-way ANOVA showed that the mean species richness, stem density and basal area/plot varied significantly between UF, SLRV and SRV ($F_{2,86} = 29.844$, $p < 0.01$; $F_{2,86} = 48.956$, $p < 0.01$; $F_{2,86} = 85.751$, $p < 0.01$). Natural regeneration is poor in SRV due to the disturbance caused at the substrate level. High variation in vegetation composition observed in SRV during the study period suggests that the natural regeneration is slowly getting accelerated, perhaps due to improvement in soil condition. Only 13 species could be identified from snag enumeration and the total basal area was calculated as 38.6 m²/ha.

Mangrove re-colonization was studied from 25 locations distributed over eight islands. A total of 17 species of mangroves were enumerated of which five species were recorded for the first time from the Nicobar Islands. The overall stem density of mangrove saplings in the re-colonizing sites is 146 individuals ha⁻¹. *Rhizophora mucronata*, *Rhizophora stylosa* and *Bruguiera gymnorrhiza* are the dominant true mangroves. *Lumnitzera racemosa*, *Sonneratia alba*, *Lumnitzera littorea* and *Sonneratia ovata* are the dominant back mangroves. The basal area of pre-tsunami mangrove forest was estimated as 24.55 m² (10.8±SD) ha⁻¹. The stem density estimated for the pre-tsunami mangrove forest is 325 (121.4±SD) individuals ha⁻¹.



Fauna: A total of 10216 individuals from 85 species of birds were recorded during 1188 point counts (490 counts in tsunami-affected & 698 in unaffected habitats). In all, 77 species of birds were recorded in the tsunami-affected littoral areas, while 57 were recorded from the unaffected habitats. Island-wise occurrence of threatened and endemic bird species showed that it appears that the loss of coastal habitats due to tsunami has not significantly influenced the population of endemic birds except Nicobar Megapode. Four new bird species hitherto unrecorded from the Nicobar Islands were sighted during this study.

Megapodes were sighted from 13 of the 17 islands surveyed. During the present study, first sight record of Nicobar Megapode from Pilo Milo and Cubra was made. Of the total 73 mounds recorded, Type C mounds were common (46.6%), followed by Type A (27.45%). Low representation of Type B mounds



could be due to scarcity of large live trees in the coastal areas after the tsunami. Status of mounds located included, active (40, 54.8%), inactive (17 mounds, 23.3%) and abandoned (15 mounds, 20.5%) and the status of one case was uncertain. Mean distance of the mounds from the beach was 85.5m (SD \pm 146.3). Mean size (volume) of active and inactive mounds was $3.98 \pm 4.18 \text{m}^3$ (range 0.2m^3 to 26.8m^3). The smaller size of the mounds indicated that active and inactive mounds were constructed after tsunami. Sand-loamy or sandy substrates were largely preferred to loamy or gravel mound substrates. Average canopy cover and height over the mounds were $47.5 \pm 22.8\%$ and $19.5 \pm 12.6 \text{m}$ respectively. The moderate amount of canopy cover over the mounds found during the present study was due to the regeneration of habitat that is happening for the last 6 years. Based on the 40 active mounds located along 73 km long coastal habitats surveyed, it is estimated that 376 mounds to occur along 687 km long coastline of Nicobar Islands within the known distribution range of megapode. Approximately, 376-752 breeding pairs of Nicobar Megapode were estimated to occur in Nicobar Islands when one pair per mound is set as the lower limit and two pairs per mound was set as the upper limit. The present study indicates that the population of Nicobar Megapode remains stable after its 70% decline due to habitat loss reported in the earlier post-tsunami surveys.

Out of the 64 locations surveyed during October 2009-August 2011, Robber Crab could be sighted from two locations only (a pair at Bompoka and one individual at Chawra). Sightings of just three individuals and few indirect evidences during the entire study period show the very rare occurrence of this species in Nicobar Islands, which was reportedly common prior to tsunami.

Recommendations

The high species diversity in tropical forests makes it more resilient to any disturbance event. Very often studies have established the fact that when a forest ecosystem is disturbed, it reconciles by itself. However, disturbances that affect the soil quality of the habitat will result in long-lasting effects on species composition. Human intervention is needed in such cases for the speedy recovery of species composition and ecosystem functions. Based on the present study, restoration measures were suggested for both mangrove and littoral habitats of the Nicobar Islands.

In littoral forest, restoration activities can be possible only at few sites where SRV prevails. Based on the adaptation tendency of plant species to the conditions in SRV, 17 species are suggested for habitat restoration. In the case of mangroves, species that show better colonization tendency are suggested for habitat restoration. Seed collection sites are also given for the effective implementation of restoration programs.

Biodiversity Assessment for environmental monitoring of medium/minor irrigation schemes in Andhra Pradesh

Background

The Government of Andhra Pradesh negotiated with the AP Irrigation and Livelihood Improvement Project (APILIP) to construct new minor irrigation tanks in water surplus basins and rehabilitate medium irrigation projects, improving water management and agriculture practices and thereby increasing agricultural income, to be implemented in three batches over a period of six years during 2007-2013. Many of the irrigation scheme areas in the state which are also wetlands are inhabited by variety of flora and fauna. Realizing the need for biodiversity assessment of these tanks/wetlands, the Irrigation and CAD Department entrusted the study to SACON. The study was restricted to 100 selected irrigation schemes in 23 districts of Andhra Pradesh.

Objectives

- Make biodiversity inventories for the selected wetlands
- Identify biodiversity rich wetlands, threats and suggest measures for conservation and management

Results

In total, 116 bird species belonging to 45 families were recorded. Of these predominant avian families include Ardeids, Anatids and Charadriids. Highest number of bird species was recorded at Kottipallivagu (26 species) followed by Chennuru (24 species) and Dindi (23 species). Threatened species such as Spot-billed Pelican, Oriental Darter and Oriental White Ibis were recorded in a few wetlands.

A total of 284 plant species belonging to 74 families were recorded during the study. Highest number of species belonged to Asteraceae (23 species) followed by Papilionaceae (22) and Malvaceae (19). Common weed species in the wetlands included *Eichhornia crassipes*, *Ipomoea* spp, *Prosopeis juliflora* and *Parthenium* sp.

In the wetlands adjoining forested areas, wild animals such as Wild Boar, Bonnet Macaque and Fox were recorded. List of fishes and butterflies seen in these wetlands were also prepared.

Various types of threats mainly due to human activities were observed in the wetlands. Major threats

Principal Investigators	: S N Prasad (Till August 2011), P Balasubramanian (Since Sept 2011)
Co-investigators	: -
Collaboration	: AP Irrigation & CAD Department
Research Personnel	: Chiranjibi Pattanaiik, YVB Charan, G Yadagiri, B Narendar, C Anbarasu
Duration	: One year
Date of Commencement	: January 2011
Date of Completion	: December 2011
Budget	: Rs. 14,66,000/-
Funding Source	: Irrigation & CAD Dept Govt of AP
Status	: Ongoing (up to April 2012)



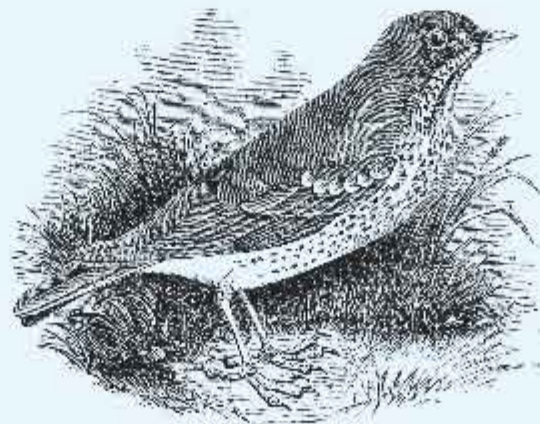


include cattle grazing in 83% of wetlands followed by tree cutting (53%) and various types of pollution (35%).

Recommendations

The following steps are suggested.

- I) Tree cutting must be stopped in minor irrigation schemes located in and around forest habitats.
- II) Encroachment in the catchment area and around the tank needs to be controlled
- III) Farmers in the ayacut area need to be educated to reduce the use of pesticides and fertilizers and encouraged to practice organic farming
- IV) Once in a year weeds (*Eichhornia*, *Ipomoea*) must be removed manually or mechanically
- V) Excessive fishing by local people needs to be controlled as fish forms major source of food for several wetland birds
- VI) Afforestation work needs to be carried out in and around the wetland and in the catchment area to prevent soil erosion and to provide nesting sites for birds and other fauna



Monitoring pesticide residues in select components of an agro-ecosystem adopting organic and chemical farming in Padayetti village, Palakkad District, Kerala

Background

Kerala State Biodiversity Board through the Directorate of Environment and Climate Change has taken up a project to conserve biodiversity associated with agro-ecosystems by totally avoiding chemical inputs in agriculture. In this regard, SACON was entrusted with the work to document the residue levels of persistent chemical contaminants in sediment, crab, mollusk, fish, frog, agricultural produces (rice and fodder), cow-milk and select species of resident birds (on opportunistic basis) in organic and chemical farming areas in Padayetti village, Palakkad district Kerala. Apart from this, Arthropod communities (insects and spiders) abundance and their changing pattern in paddy habitat are being studied.

Objective

- Monitoring pesticide residues in select components of agro-ecosystems adopting organic and chemical farming.

Principal Investigator	: S Muralidharan
Research Fellows	: K Ganesan
Project Period	: 3 Years
Date of Commencement	: March 2009
Expected date of completion	: April, 2012
Budget	: Rs. 15,45,000/-
Funding Source	: Directorate of Environment & Climate Change, Govt. of Kerala
Status	: Ongoing

Results

Bird abundance : During the period (April 2011 to March 2012), 60 species of birds belonging to 36 families were sighted in Padayetti paddy fields. In organic farming, the highest number was 507 individuals from 60 species during December 2011 and the lowest was 384 birds from 55 species during October 2011. In conventional farms, 321 individuals (54 species) were sighted during November 2011. Minimum was 221 individuals (49 species) during October 2011. Cattle Egret *Bubucus ibis*, Indian Pond Heron *Ardeola grayii*, Common Myna *Acridotheres tristis*, Black Drongo *Dicrurus macrocercus* were common in





both the farms (>50 % of the total species composition). However, higher number of individuals was recorded in organic farms. Passeriformes was the most dominant order represented by 16 families and 28 species of birds. Of the 60 species of birds recorded, 31 were breeding in around Padayetti village. Irrespective of farming type, the major feeding guild in the study area was insectivores (54 %), followed by omnivores (23 %) and granivores (8 %).

Higher number of birds was recorded during Rabi than Kharif crop. Based on the field conditions, the growth stages of paddy were divided into ploughing and transplantation (P&T), tillering (T), booting (B) and harvesting (H). Egrets and Pond Herons were seen as the most dominant group during P&T. General increase in total bird population was noted in organic farms than chemical farms during T and B stages. Decline in population of Herons and Egrets were noted during maturing and after harvesting period. Among the granivores, Bayweaver, Munia and Doves were comparatively higher in number during maturation and harvesting period. In organic, 68% of birds were ground foragers, 28% aerial sweepers and 4% water birds whereas in chemical farms the ground foragers, aerial sweepers and water birds were 59, 34 and 7% respectively.

Organochlorine pesticide residues :

Residues of S-HCH were below detection limit (BDL) in sediments of organic farms where as in conventional farm it ranged between BDL and 30.90 $\mu\text{g}/\text{kg}$. In the chemical farm, in frogs, concentrations of S-HCH, S-DDT, S-Endosulfan, HE and Dieldrin, were in the range of BDL- 3.86, BDL- 2.11, BDL- 3.42, BDL- 2.24 and BDL- 3.11 $\mu\text{g}/\text{kg}$, respectively. Whereas in frogs from organic farming, the concentrations of S-HCH and HE were in the range of BDL- 3.32 and BDL- 2.22 $\mu\text{g}/\text{kg}$ respectively and S-DDT and S-Endosulfan levels were below detection level. Among the organochlorine residues detected, S-HCH was higher in the crabs collected from chemical farms (32.30 $\mu\text{g}/\text{kg}$).



Comparatively the residues levels of S-DDT and endosulfan were lower in mollusk of organic than chemical farms. Among the isomers of HCH, γ -HCH was found to be the maximum in the frogs from the chemical farms (18.01 $\mu\text{g}/\text{kg}$), whereas levels of α , β , δ isomers were less. In fishes, total DDT ranged from 3.6 to 14.2 $\mu\text{g}/\text{kg}$ and BDL to 2.2 $\mu\text{g}/\text{kg}$ in chemical and organic farms respectively. In paddy the level of S-HCH ranged between BDL and 30.90 $\mu\text{g}/\text{kg}$ and BDL and 5.58 $\mu\text{g}/\text{kg}$ in chemical and organic farms respectively. S-DDT levels were below detection limit in paddy straw in both the farms and S-Endosulfan levels were higher (5.27 $\mu\text{g}/\text{kg}$) in chemical farm produce than organic (1.02 $\mu\text{g}/\text{kg}$). India banned DDT for agricultural purposes in 1989, but it continues to be used for malaria control. The Kerala government banned endosulfan five years before and very recently the Supreme Court vide its order dated May 13, 2011 has banned its manufacture, sale and use, and permitted only its export to countries where the policies permit.

Organophosphorous pesticide residues : Among the Organophosphorous residues analyzed, residues of Σ -Permethrin (155.50 $\mu\text{g}/\text{kg}$) and Chlorpyrifos (47.1 $\mu\text{g}/\text{kg}$) were higher in tissues of frogs collected from chemical farms than those from organic farms (BDL and 2.62 $\mu\text{g}/\text{kg}$). Similarly, average Σ -

Permethrin and Phenthoate levels were 149.82 and 22.76 µg/kg respectively in a snail collected from chemical farms while the levels were 2.66 and 3.21 µg/kg respectively in organic farms. The levels of Primifos ethyl and Ethion were below detection limit in all the components and Mirex (5.2 µg/kg) and Malathion (2.2 µg/kg) were detected only in frog and crab samples from chemical farms. Methyl parathion (30.09 µg/kg) and Phenthoate (1.86 µg/kg) were detected the highest in milk samples from cows which were feed with feeds available in the market and fodder grown in chemical farms than in milk from cows feeding only feeds grown in organic (22.64 and 1.62 µg/kg) farms.

Monitoring and Surveillance of Environmental Contaminants in birds in India

Background

To address the concerns about the presence of environmental contaminants in Indian Avifauna, a national level study was initiated. The main aim of this study is to document unusual mortalities of birds and identify the factors responsible.

Objectives

- Monitor residue levels of persistent chemicals in birds and generate a database
- Identify chemicals responsible for mass mortality of birds across the country
- Assess the effectiveness of guidelines on usage of major chemical pesticides in the country

Results

Between April 2011 and March 2012, 224 individuals comprising 38 species of birds have been collected dead from 6 states of India (Tamil Nadu, Kerala, Gujarat, Uttar Pradesh, Jharkhand and Uttarakhand). Notable species are White-rumped Vulture, Crow, Painted Stork, White Ibis, Sand Piper, Eurasian Golden Oriole, Red Crested Pochard, Black Winged Stilt and Common Moorhen. On priority basis data on select species of birds, namely Crow have been compiled. It is to be noted that over the last three to four months, several crows have died in and around Jamshedpur. Information received from different quarters, such as researchers, forest officials and media the number of death is estimated at 2000. There are also reports on the death of crows in other parts of Jharkhand, parts of Bihar, West Bengal, and Orissa. Recently, Coimbatore also witnessed mass mortality of crows (approximately 150), but it was only restricted to one locality and not wide spread in terms of area and time unlike in other states referred above. Preliminary analysis did not confirm any chemical contaminants responsible for the death; however, further analyses are on. There are also unconfirmed reports on the role of H5N1 virus in the death of crows in Jamshedpur and Kurdha district in Orissa. Another instance of mass mortality was in Pea Fowl in Southern Tamil Nadu. While circumstantial evidences were pointing towards pesticides poisoning, samples of tissues could not be obtained for confirmation.

<i>Principal Investigator</i>	: S Muralidharan
<i>Research Fellows</i>	: K Nambirajan K.Ganeshan and V Kirubhanandhini
<i>Project Period</i>	: 3 Years
<i>Date of Commencement</i>	: March 2010
<i>Expected date of completion</i>	: March 2013
<i>Budget</i>	: Rs. 48,36,000/-
<i>Funding Source</i>	: MoEF, Govt. of India
<i>Status</i>	: Ongoing

Pesticide residues: Among various organochlorine pesticides analyzed in species, namely Crow, levels of



Isomers of HCH (α , β , δ and lindane or γ -HCH) were detected in all the tissues tested. The level of γ -HCH detected ranged between BDL and 3.7 $\mu\text{g/kg}$ in brain, followed by BDL and 2.4 $\mu\text{g/kg}$ in liver. The metabolites of DDT (p - p' -DDT, p - p' -DDE, p - p' -DDD) and cyclodiene insecticides such as Endosulfan, Heptachlor and Dieldrin levels were below detection level. Among the organophosphorus pesticide residues analyzed, Methyl parathion was the maximum (8.23 $\mu\text{g/kg}$) in kidney tissues. Other OP pesticides such as Phorate, Prifos ethyl, Malathion, Chlorpyrifos, Chlordane, Ethion, Mirex, Permethrin and Phenthoate were below detection levels.

Plasma cholinesterase (AChE and BChE) activity: One hundred forty four brain samples (23 species of birds) and forty five blood samples (16 species) collected from Ahmadabad during January 2012 and nine blood samples (4 species) collected from Palakkad district of Kerala between November 2011 and February 2012, were considered for the study. Among the species collected from Ahmadabad the highest levels of mean brain AChE activity was in White-rumped Vulture (5.62 $\mu\text{moles/min/g}$) followed by House Crow (4.82 $\mu\text{moles/min/g}$) and Common Myna (4.76 $\mu\text{moles/min/g}$). Of all the species studied, low levels of AChE activity was measured in Comb Duck, Marsh Sandpiper, Indian Peafowl and Little Cormorant (1.76, 1.82, 2.24 and 2.31 $\mu\text{moles/min/g}$ respectively). Between two species of ibises, White Ibis recorded higher AChE activity (3.96 $\mu\text{moles/min/g}$) than Black Ibis (3.22 $\mu\text{moles/min/g}$). The brain AChE cholinesterase activity measured in these species are two to three fold lower than the levels measured in small size birds; Marsh Sandpiper (1.82 $\mu\text{moles/min/g}$) and Little Cormorant (2.31 $\mu\text{moles/min/g}$). In plasma mean AChE activity was the highest in Black Ibis (32.09 $\mu\text{moles/min/ml}$) followed by Black Kite (13.87 $\mu\text{moles/min/ml}$) and White-rumped Vulture (10.34 $\mu\text{moles/min/ml}$), while the lower levels of AChE activity was seen in Jungle Crow followed by Pond Heron and House Crow (1.95, 2.41 and 2.44 $\mu\text{moles/min/g}$ respectively). AChE and BChE activity recorded in the present study are higher than the levels reported by Dhananjayan (2007) from Gujarat and Tamil Nadu in brain and plasma in 149 individuals (16 species) and 114 individuals (13 species). Present study results are comparable with AChE and BChE activity levels in 34 individuals (11 species) reported by Sasikumar (2010). Considering the fact that all the birds included in the study were victims of kite flying, the recorded levels could to some extent be called as normal till such time disproving data sets are available..

Recommendations

Data is being compiled and comprehensive recommendations are being formulated.



Monitoring the impacts of Jangi wind power farm (91.8 MW) with special reference to birds and bats

Background

The present study, initiated in August 2011, monitors the impact of wind power turbines focusing on avifauna and bats in Kachch district of Gujarat.

Objectives

- Study various habitat parameters in the area.
- Determine bird and bat species composition, relative abundance and habitat use
- Determine bird and bat mortality due to wind turbines.

<i>Principal Investigator</i>	: P R Arun
<i>Co-Investigators</i>	: Nil
<i>Collaborative agencies</i>	: Nil
<i>Research Personnel</i>	: Mohamed Samsoor AR, A., Ramesh Kumar, S
<i>Duration</i>	: 3 years
<i>Date of commencement</i>	: 31 August 2011
<i>Date of completion</i>	: 31 August 2014
<i>Budget</i>	: Rs. 19,62,600/- year
<i>Funding Source</i>	: G.P Wind (Jangi) Pvt. Ltd
<i>Status</i>	: On going

Results

273 species of plants, belonging to 190 genera and 69 families, were recorded. The habitat availability study revealed predominance of bare land devoid of vegetation in the area (42.7%) in the study site followed by cultivations, grasslands and wooded habitats. During the reporting period, 134 bird species from 43 different families and 15 orders were observed. Out of these, Darter, Lesser Flamingo, Oriental White Ibis, Black-bellied Tern, European Roller, Eurasian Curlew and Painted Stork are 'Near Threatened' (IUCN 2008) and the Indian Peafowl is included in Schedule I of the Wildlife Protection Act, 1972. A roost of Indian Flying Fox *Pteropus giganteus* was observed on a *Ficus benghalensis* tree at Lallana village near Jangi.

Nocturnal acoustic survey revealed bat activities in the area with wind turbines. During the study period we found carcasses of Blue Rock Pigeon, *Coturnix* sp., Spotted Dove, Cattle Egret, Eurasian Collared Dove and Egret Sp. All appeared to have died as a result of collisions with the wind turbine. An injured Eurasian Spoonbill was found in a Pond surrounded by Wind turbines.



Baseline Environmental Data (BED) collection for flora and fauna for Mithivirdi Nuclear power project at Bhavnagar, Gujarat

Background

Currently nuclear power is referred as one of the efficient solutions to meet the energy needs of a highly developing economy like India. As of now India has an installed capacity of nuclear power projects for 4,780 MW of energy. Adding to this the Nuclear Power Corporation India Limited (NPCIL), the sole



agency operating Nuclear Power Projects In the country, has recently proposed several projects all over the country. The Mithivirdi project of 6000MW is one, proposed at Mithivirdi, Bhavnagar District, Gujarat. SACON was entrusted with the documentation of the flora and fauna of the proposed project site.

Objectives

- Document the basic ecological data of the study area

Results

136 species of birds were observed during the present survey in the study area. Birds such as Ashy-crowned Sparrow Lark (*Eremopterx griseus*), Rosy starling (*Sturnus roseus*), Painted Stork (*Mycteria leucocephala*), Little Cormorant (*Phalacrocorax niger*), Black Ibis (*Pseudibis papillosa*) and Black-headed Ibis (*Threskiornis melanoleucus*) were fairly common in most of the study area. Of the 136 species of birds, Black-headed Ibis, Lesser Flamingo, European Roller, Eurasian Curlew, Painted Stork come under threatened category as per IUCN. Apart from these, according to Indian Wildlife Protection Act, *Pavo cristatus* (Indian Peafowl) and *Platatea leucorodia* (Eurasian Spoonbill) fall under Schedule-I.

Principal Investigator	: P R Arun
Co-Investigators	: Nil
Collaborative agencies	: Nil
Research Personnel	: M Murugesan PP Nikhil Raj
Duration	: Six months
Date of commencement	: 6th September 2011
Date of completion	: July 2012
Budget	: Rs. 20,55,000/-
Funding Source	: Engineers India Limited, New Delhi
Status	: On going



Forty five butterfly species belonging to 5 families were recorded during the present study period. At family level, Nymphalidae is the dominant one with 18 species followed by Pieridae with 13 species. Species such as Chocolate pansy, Common Castor, Common Jezebel, Plain Tiger, Common Crow, Lime Butterfly and Small Orange Tip were commonly seen in study area. Of the 45 species, butterflies such as Crimson Rose, Danaid Eggfly and Common Pierrot are protected under Schedule - I of Indian Wildlife Protection Act. Common Gull is included under Scheduled - II and Common Crow under Schedule - IV of the Act. Blue Mormon and Crimson Rose are endemic species found occurring in the present study area, the distributions of which are restricted to the Peninsular India and Sri Lanka.

Six species of mammals were recorded. The present study area is a suitable habitat for Nilgai (*Capreolus pygmaeus*) and several Nilgai sightings were recorded.

Four hundred and twenty two plant species (wild, ornamental and cultivated plants) belonging to 279 genera and 79 families were documented and identified. Among them, 327 species are dicotyledons and 95 monocots. Of the 279 genera recorded, the genus *Fimbristylis* is the dominant one represented by 11 species. Among the 79 families, Poaceae, represented with 60 species, is the dominant one. Based on habit type herbaceous plants are dominant represented by 168 species, followed by 103 species of trees, 51 of shrubs, 60 of grasses and 40 species of climbers/stragglers.

Discussion/ recommendations

The present study documents the baseline environmental data of the proposed Nuclear Power project area at Mithivirdi. The study area supports rich biodiversity especially being a major feeding and breeding ground for various migratory and resident birds. Hence, suitable conservation measures need to be adopted during the construction and operation phase of the proposed project.

Impacts of proposed seismic survey operations on avifauna and wildlife of Reserve Forest areas of KG Basin Project of Oil India Ltd

Background

M/s Oil India Ltd proposes to conduct seismic survey in connection with their ongoing oil exploration program in the KG basin. In this connection SACON was requested to conduct a study to assess the impact of such operation on wildlife.

Objectives

- Assess the impact of the proposed Seismic survey activities on the wildlife and avifauna in the Reserve Forest areas
- Explore options to minimize and mitigate the impacts, if any, on wildlife and avifauna in the areas areas.

Principal Investigator	: P R Arun
Co-Investigators	: Nil
Collaborative agencies	: Nil
Research Personnel	: M Murugesan and PP Nikhil Raj
Duration	: 3 months
Date of commencement	: 6th June 2011
Date of completion	: September 2011
Budget	: Rs. 10,63,893/-
Funding Source	: Oil India Limited, Kakinada
Status	: Completed

Results

The study resulted in the documentation of 101 plant species belonging to 74 genera under 34 families in and around the study area. Among these, 28 species are mangrove species and the rest mangrove-associates, seashore and inland species. Of the 34 plant families, Poaceae is the dominant one represented by 16 species. Herbaceous plants were dominant with 32 species (31%) followed by shrubs with 21 species (21%), trees 20 species (20%), climbers and stragglers were 12 species (12%) and grasses 16 species (16%).

Among the 79 bird species observed 23 species are migratory. Of these migratory species Tufted Duck, Eurasian Curlew, and Black Bittern are known to be international migrants. Little Egret (*Egretta garzetta*), House Crow (*Corvus splendens*), Large-billed Crow (*Corvus macrorhynchos*), Little Cormorant (*Phalacrocorax niger*), Common Myna (*Acridotheres tristis*), Indian Pond-heron (*Ardeola grayii*) and Western Reef-egret (*Egretta gularis*) are the most sighted species during our field visit. Little Egret, Little Cormorant, Indian pond-Heron and House Crow were seen in almost all type of transects including settlements along the river banks, beaches, fishing area, and destructed mangrove forest area. River Terns on the other hand are seen aplenty in locations near to Nilarava estuary. Western Reef-egret was more in areas where fishing using traditional fish nets were active. Inland water logged areas near the Sacramento beach supports species such as Black-winged Stilt (*Himantopus himantopus*) and Red-wattled Lapwing (*Vanellus indicus*) in large numbers. The mudflats in the river course between Gautami Godavari and Nilarava river, and the sandy beaches and the creek bordered by the verdant mangrove vegetation near Kottapalem provides habitat for waders, and other wetland birds.



During the study period we have observed 35 butterfly species falling under 22 genera spreading over 4 families. Butterflies such as Chocolate pansy, Plain Tiger, Danaid Eggy, Common Crow, Lime Butterfly and Common Grass Yellow were commonly seen during the present study period. At family level, the family Nymphalidae is the dominant one with 16 species. Some butterflies seen here, Crimson Rose, Danaid Eggy and Common Pierrot, are protected under schedule - I of Indian Wildlife Protection Act 1972. Common Gull is included under schedule - II and Common Crow under schedule - IV of the Act.

The unique morphology of the river Godavari, with dynamic beaches reportedly harbors the vulnerable species Olive Ridley Sea Turtle (*Lepidochelys olivacea*) during breeding season. Especially the Sacramento beach is one of the reported nesting sites for the species in the eastern coast. Moreover the offshore beaches in the Kaknada is a route for mass migration of the sea turtle to Orissa coast. Tripathy et al (2003) had observed 608 Olive Ridley nests near the Sacramento beach area of the proposed site during February-March. Besides Olive ridley sea turtle, the critically endangered Leatherback Turtle (*Dermochelys coriacea*) and Green turtle (*Chelonia mydas*) are also reported from the area.



The area supports wide range of mammal species including otters, fishing cats and jackals. We have also observed common mongoose, wild boars and squirrels during our rapid field surveys in the area. Indirectly as scats and from the local people we could confirm the presence of fishing cats in and around the study area.

Since the area is located very close to Coringa Wildlife Sanctuary there is a very high probability of finding more mammal species from the area.

Discussion/ Recommendations

The Seismic surveys can cause disturbance to the system mainly through the movement of people and materials during the laying of Geophones/ hydrophones, Shoot-hole drilling and during the shooting process. The reserve forest area is dominated by mangroves and has potential bird habitats such as mudflats and turtle nesting beaches along the seaward side. To minimize the impact on these sensitive areas the Seismic surveys should not be carried out along the beaches during the turtle breeding season (Feb-April). Last remnants of healthy and luxuriant mangrove stands exist mainly in the northern parts of the present study area along the Rathikaluva falling within the Rathikaluva Reserve forest. This patch is relatively free from human disturbances and harbor good biodiversity of mangrove fauna and flora. Shooting within this mangrove patch may be avoided. However Geophone lines may be used in the area if necessary with adequate precautions and completed in minimal time required.

The Indicated bird areas and turtle nesting sites may either be excluded from the proposed survey activities or the survey could be appropriately timed and managed avoiding migratory and breeding seasons of birds and turtles. The following specific safeguards should be followed for minimizing the impact of Seismic surveys on Avifauna and wildlife of the area.

- No cutting or destruction of natural mangroves may be done during the seismic survey operations. Appropriate adjustments may be made in the locations of shoot holes and geophones in order to avoid damage to mangroves.
- The seismic survey activity may preferably be restricted to the period between May and November. More specifically, no activity should be undertaken during December to February in the mangrove areas.
- The survey may be avoided in the 1 km wide stretch along the beaches during February to April, the reported breeding season of Olive Ridley Turtles (*Lepidochelys olivacea*) in this area.

Impact Assessment of LNG terminal augmentation project by M/s PLL on the terrestrial flora and fauna at Puthuvypeen, Kerala

Background

M/s PLL proposes to augment their LNG terminal and SACON was entrusted to conduct a study on the area in that context.

Objective

- Collect and update the baseline environmental data on the terrestrial flora and fauna.

Results

The study area is rich in diversity. It is surrounded by dense human settlements of Kochi metropolitan City, mangrove forest patches, agricultural lands and various water bodies including rivers, lakes and coastal wetlands. In total 422 species falling under 290 genera belonging to 94 families were recorded during the present study period within the 10 km radius area from LNG site. Of these, trees are represented by maximum number of species (191 species; 40%) followed by herbs (115 species; 27%), shrubs (48 species; 12%), stragglers/climbers (38 Species; 9%) and grasses (30 species (7%). Among the 94 families of plants documented Poaceae is represented by maximum number of species (n=30).

Principal Investigator	: P R Arun
Co-Investigator	: P A Azeez
Collaborative agencies	: Nil
Research Personnel	: M Murugesan and PP Nikhil Raj
Duration	: 3 months
Date of commencement	: July 2011
Date of completion	: October 2011
Budget	: Rs. 8.98,000/-
Funding Source	: Petronet LNG Ltd, New Delhi
Status	: Completed



57 species of birds were observed during the present study. Species such as House Crow (*Corvus splendens*), Little Cormorant (*Phalacrocorax niger*), Darter (*Anhinga melanogaster*), Black Kite (*Milvus migrans*), Brahminy Kite (*Haliastur indus*), Common Myna (*Acridotheres tristis*), Indian pond-Heron (*Ardeola grayii*), Indian Cormorant (*Phalacrocorax fuscicollis*), Little Egret (*Egretta garzetta*), and Intermediate Egret (*Mesophoyx intermedia*) were common in almost all the sampling points. Among the birds, Ashy Drongo (*Dicrurus leucophaeus*), Chestnut-tailed Starling (*Sturnus malabaricus*), Common Sandpiper (*Actitis*

hypoleucos), Common Redshank (*Tringa totanus*), Grey Heron (*Ardea cinerea*), Marsh Sandpiper (*Tringa stagnatilis*) are seasonal visitors to the area.

Forty nine butterfly species (33 genera, 5 families) were recorded. At family level, the Nymphalidae is dominant with 21 species (43%). The least number of species were recorded in the family Lycaenidae with 3 species (6%). Butterflies such as Common Castor, Common Emigrant, Common Mormon, Grey Pansy, Southern Birdwing, Chocolate Pansy, Plain Tiger, Danaid Eggfly, Common Crow, Lime Butterfly and Common Grass Yellow were commonly seen in and around the study. The following butterflies viz., Clipper, Malabar Banded Peacock, Red Helen, Peacock Pansy and Rustic were rarely seen in the study area. Two species namely, Crimson Rose and Danaid Eggfly are protected under schedule - I of Indian Wildlife Protection Act 1972. The Common Pierrot, Southern Birdwing and Common Gull are butterflies included in schedule- II. Species such as Malabar Banded Peacock, Blue Mormon, Crimson Rose and Southern Birdwing present in the area are endemic to Southern India.

The present study recorded 5 species of Reptiles and 5 species of mammals. Since the study was of short term, referring to various secondary sources we have furnished check lists of animals that are reported from the area.

Discussion/ recommendations

The study area is predominantly covered by urban areas, sea and backwaters. The study was focussed on the terrestrial biodiversity aspects. Despite the restricted habitat availability and urbanization pressure, the study area showed reasonably good diversity and abundance of flora and fauna. A major cause of concern in the area is the degradation of the Mangrove patch adjacent to the PLL's LNG facility for various reasons. The M/s PLL may take active steps to manage this issue. Considering the urbanised environment of the study area, the diversity of faunal and floral elements recorded during the present study was relatively good. However being a predominantly urban area the species recorded were mostly common ones and none was restricted to this area or its immediate environs. As discussed elsewhere in this report, specific impact from the proposed Augmentation project activities would be minimal on the flora and fauna provided the authorities follow the environment management plans meticulously.

Comprehensive Management Action Plan for Oussudu Sanctuary, Puducherry

Background

Ousteri Lake, the largest fresh-water lake of Puducherry region, is one of the most important wetlands in Asia. The lake is situated near Oussudu village and is part of both Tamil Nadu and Puducherry. As per the Government of Puducherry records, the total water spread of the lake, when full after the monsoons, are about is 390 ha. The lake is a major wintering spot for a large number of migratory birds and is a rich source of fish. At present there is no habitat protection in the lake. The lake has been declared as a bird sanctuary and developed for bird watching and it is the first wildlife sanctuary of Puducherry. In view of this, the Department of Forest and Wildlife, Puducherry has requested Sálím Ali Center for Ornithology and Natural History, for preparing of a Comprehensive Management Action Plan for Conservation of the lake. The project started during November 2010 and the draft management plan was submitted during April 2011. Upon receiving comments, from the Department of Forest and Wildlife, Govt. of Puducherry, on the draft report the findings of the study were presented before the State Wetland Steering Committee and subsequently the revised and final report was submitted during.

Objectives

The major objectives of this project include the following.

- Assessment of the state of environment in and around the lake
- Examination of the probable threats to the lake and its ecological environs
- Develop a Comprehensive Management Action Plan (EMP) for conservation of the lake and its surroundings

<i>Principal Investigator</i>	: B A K Prusty
<i>Co Investigator</i>	: PR Arun and S Bhupathy
<i>Collaborative Agency</i>	: -
<i>Research Personnel</i>	: M Murugesan, Rachna Chadra
<i>Duration</i>	: Six months
<i>Commencement</i>	: 01 November 2010
<i>Date of completion</i>	: 30 April 2011
<i>Budget</i>	: Rs. 5,81,000/-
<i>Funding source</i>	: Dept of Forest and Wildlife, Govt of Puducherry
<i>Status</i>	: Completed (Final report submitted)

Results

Secondary data on different ecological variables were collected from several sources including various line departments of Govt. of Puducherry. The results of the primary field survey are presented in the following table.

For examining the depth profile (using a bamboo stick) of the lake, 03 transects were laid crisscrossing the lake. Two transects were of 2.5 km long and the 3rd one was of 2.0 km long. The overall depth of the lake was 3 meters. Further an analysis of the water level in the lake in the month of January, considering January as peak migratory season, reveals that the annual average water availability in the lake has been gradually increasing consistently since the year 2003 with a fall in 2007.

During our survey of the lake and its surrounding areas, socio-economic survey of households in several villages, interaction with officials of government and non-government organizations, and referring to other published reports on Ousteri, it is found that people recognize several of the ecosystem services: 1) Provisioning services (Food, fresh water, fiber, fuel and genetic materials), 2) Regulating services [climate regulation, water regulation (hydrological flows including ground water recharge), water purification and waste treatment, erosion regulation, natural hazard regulation, pollination (habitat for pollinators)], 3) Cultural services (Recreational, aesthetic and educational), and 4) Supporting services (Soil formation and nutrient cycling).

Discussion and Recommendations

As part of the Environmental Management Plan several issues were identified for management intervention in order to maintain the ecological integrity of the Ousteri wetland: 1) Regulation of water level and fishing, 2) Vehicular movement and boating & automobile exhaust and pollution, 3) Boundary demarcation and prevention of encroachment, 4) Mounds within the lake, 5) Bridge and watch tower, 6) Walk-way improvement, 7) Dumping of solid wastes on the lake embankments, 8) Disposal of sewage, 9) Weed infestation, 10) Dumping of construction debris, 11) Soil erosion and siltation, 12) Water and land use planning, 13) Nature education and interpretation centre, 14) Training and awareness programmes, 15) Information Management System, 16) Plantation for habitat improvement, 17) Butterfly park, 18) Sustainable lake management through community participation, 19) Formation of anti-poaching camps, 20) Database on biodiversity, 21) Eco-friendly approach, 22) Environmental monitoring and management cell and 23) constitution of a joint inter-state environmental panel to look after the environmental issues of the lake on both Puducherry and Tamil Nadu side.



Review of state of environment in Keoladeo National Park, Bharatpur, Rajasthan and its catchment area: A Historical analysis

Background

Keoladeo National Park (KNP) at Bharatpur, Rajasthan is one of the early Ramsar sites of India. There have been several attempts to understand its ecological functioning and the threats which would help the authorities to prioritize their management intervention. However, in the recent past there have been periodic drought which drive the winter avian visitors off the park and they are bound to find abode in the several smaller wetlands in the catchment of the Park. Any effort to identify the threats and prioritize research matrix and management intervention in the Park would necessitate having a relook at the past scientific investigations in the Park and its catchment, including the wetlands in the area. It requires revisiting all the completed scientific investigations and compiling the existing information on ecology of KNP and its catchment. It would facilitate the forest department in general and Park management in particular to expedite conservation efforts for maintaining this unique ecosystem. Owing to the above specifics, it is intended to review the present scenario revisiting all the completed investigations to ecological variables of KNP, which would facilitate preparing a regional scale comprehensive management action plan and strategy for environmental management.

<i>Principal Investigator</i>	: B A K Prusty
<i>Research Personnel</i>	: Mahd. Zeeshan, Natasha Srivastava
<i>Duration</i>	: Six months
<i>Commencement</i>	: 27 December 2011
<i>Date of completion</i>	: 26 June 2012
<i>Budget</i>	: Rs. 4,94,000/-
<i>Funding source</i>	: SER Division, Planning Commission, Govt. of India, New Delhi
<i>Status</i>	: On going

Objectives

- Review of state of environment in KNP and its catchment area and,
- Historical analysis of the information in view of the changing climate over time and anthropogenic pressures

Results

We visited various line departments of Government of Rajasthan and Government of India, and several organizations and universities to collect available information about the Park, and its catchment. Akin to these, several colleges were visited in each of the district head quarter: Alwar, Karauli, Bharatpur, Dholpur, Agra and Dausa to collect the information (publications and reports) on different ecological variables. The collected data are in various stages of compilation and processing, and synthesis.



Ecological status survey of the wetlands of Srikakulam district of Andhra Pradesh

Background

Srikakulam district, the extreme north eastern district of Andhra Pradesh with an area of 5837 sq. kilometers, is rich in water resources. Apart from the major rivers viz. Nagavalli, Vamsadhara, Mahendratanaya, Champavathi, Bahuda and Kumbikotagedda, originating from Eastern Ghats flowing through the district, Irrigation department has listed 6936 wetlands with 100-500 acres ayacut area and 905 wetlands with more than 500 acres ayacut area.

<i>Principal Investigator</i>	: Mathew K Sebastian
<i>Co-Investigators</i>	: P R Arun & P A Azeez
<i>Collaborative Agencies</i>	: Nil
<i>Research Personnel</i>	: Arthi T
<i>Duration</i>	: Seven months
<i>Date of Commencement</i>	: 1 st September 2011
<i>Date of completion</i>	: 31 st March 2012
<i>Budget</i>	: Rs.3, 34,950/-
<i>Funding Source</i>	: MoEF, Govt. of India
<i>Status</i>	: Report under preparation

The coastal plains of the district rich in various types of wetlands play a major role in maintaining the ecological security of the entire district. Majority of the population depends upon agriculture and allied activities for their living. The various ecosystem services provided by the wetlands play a major role in sustaining their livelihoods directly. These wetlands harbor a rich biodiversity as well.

Unfortunately most of the wetlands, especially the coastal ones in the district, are facing threats of varied kinds. Some are facing existential problems due to the proposal for establishing Super Thermal Power Plants which are under various stages of progress. Therefore the present study assumes significance.

Objectives

- Assess the ecological status and conservation importance of the selected wetlands of Srikakulam district.

Results

Extensive field surveys were conducted in October 2011, February and March 2012. Major wetlands covered were Naupada swamps, Sompeta, Poondi, Donkuru, Ichapuram, Chintada





Cheruvu, Pappa Cheruvu, Madduvallasa reservoir, Pechcheruvu, Tampara, Sagram, Narayanapuram, Narayanavalasa, Arisadu Cheruvu, Cheri Cheruvu, Kupplattu Cheruvu, Koneru Cheruvu, Kattabommal Pedda Cheruvu, Sriram Ooru Cheruvu, Telineelapuram wetlands, Tellkunchi, Narsipuram Pedda Cheruvu, Nalla Cheruvu, Kuddiram Cheruvu, Lanka Cheruvu etc. The river mouths of Nagavalli, Vamsadhara and Mahendratanya were also surveyed.

The data collected on flora and fauna, mainly birds and plants were compiled and are being analyzed. A total of 662 plant species belonging to 406 genera and 111 families, and 236 bird species falling under 147 genera, 56 families and 17 orders were recorded.

The Sompeta wetland with an area of 3000+ acres, Naupada Swamps about 4000+ acres, Poondi Backwaters and adjoining wetlands about 800+ acres and Ichapuram wetland in the extreme north of the district are the major coastal wetlands. There are hundreds of other wetlands in the coastal plains of the district which are major foraging grounds for both migrant and resident birds.

The proposed Super Thermal Power Plants in Sompeta and in Bhavanapadu wetlands which is a part of Naupada swamps are a major threat to the very existence of these ecologically sensitive wetlands on which hundreds of species of flora and fauna and thousands of humans depend.

Recommendations

The proposal for setting up Super Thermal Power Plants at Sompeta and Bhavanapadu should be shelved. A comprehensive survey of the wetlands of Srikalukam district should be conducted and delineate all the wetlands which fall under the provisions of National Wetland (Conservation & Management) Rules-2010. Adequate steps should be initiated to protect all the wetlands in the coastal plains since lakhs of people depend on the ecosystems services provided by them for the same.



WETLAND ECOLOGY

Envis Centre on Wetlands of India

Background

The centre was functioning from the Hyderabad office till 31st August 2011. It was permanently shifted to SACON and will perform the functions as per the aims and objectives laid down by the ENVIS head office in MoEF, New Delhi. Staffs were appointed from the month of February 2012 and have started with the process of data collection as per the need of the centre.

Objectives

- Database Wetland Ecosystems to be added on website with regional language interface.
- Establish and operate a distributed clearing house to answer and channel queries related to the allocated subject.
- Establish linkages with information users, carriers and providers from government, academic, business and Non-Governmental Organizations including that with ENVIS.
- Identification of information/ data gaps in the specified subject areas and action taken to fill these gaps.
- Publication of ENVIS newsletters to disseminate wetland information.

<i>Principal Investigator</i>	: Goldin Quadros
<i>Research Fellows</i>	: Sheeba Nanjan, K A Nishadh
<i>Duration</i>	: Long-term
<i>Budget</i>	: Rs. 3,84,000/-
<i>Funding Source</i>	: MoEF, Govt. of India
<i>Status</i>	: On going

Results

The website is attracting good number of visitors from 58 countries. We have requested ENVIS secretariat to upload the website on the NIC platform. The Newsletter, Sarovar Saurabh is published on a regular basis and uploaded on the website. Reports / workshops / conferences and seminars related to wetlands are also uploaded.



NATURE EDUCATION

Nature Education Activities for Coimbatore

SACON has been pursuing its nature education programs to disseminate the message of conservation and the value of ecosystems, species and habitats intensively and extensively among people from all walks of life.

Objective

- Conduct programmes for creating environmental awareness among public with special emphasis on students and nature lovers.

<i>Coordinator</i>	: P Pramod
<i>Project period</i>	: Long term
<i>Funding source</i>	: SACON & local sponsors

Activities in SACON campus

SACON has been using its natural serene campus as the location for the various nature education programmes. Forty seven one-day programmes were conducted in the campus for various target groups for the purpose of creating nature awareness. The programmes included nature walks, bird-watching, butterfly watching, small observation based activities, slideshows, audiovisual shows and interactive sessions with scientists.

Programmes for the school children

1100 students from 16 schools of Salim Ali Nature Club Network visited SACON for one-day nature camps at SACON campus this year. One-day nature camps are the nature awareness initiation programme of SACON in which the children will be taken to forests and trained to see the wonders of nature directly followed by slideshow and discussions on various topics such as birds, butterflies or nature conservation. SACON, in collaboration with local NGOs, has also conducted three children's nature awareness programmes. On 23rd April 2011, 'Siruthuli' – an NGO from Coimbatore brought 100 school children from 20 schools for one day nature awareness programme. Similarly Outreach Foundation – India, Coimbatore collaborated with SACON in conducting two similar programmes in this year.



Programme for College students

Six hundred and forty six college students from 13 colleges attended 14 nature camps conducted in SACON campus. Seven of these programmes were conducted in collaboration with Outreach Foundation - India. The K G College of Nursing, Coimbatore requested SACON to organize a nature awareness programme on 12th December 2012 in which 100 nursing students with 4 teachers participated.

Programme for Corporates

Three nature awareness programmes were conducted in the campus out of which two were conducted for employees of M/s Robert Bosch Ltd, Coimbatore. The other programme was conducted in collaboration with M/s Outreach Foundation - India for employees of HSBC bank.

Programme for forest officials

Three programmes for forest officials were conducted in campus in collaboration with Central Academy for State Forest Service, Coimbatore.

Programme for the teachers

Six programmes were conducted for school and college teachers, of these four were for college teachers in collaboration with Avinashilingam University Coimbatore. Among the other programmes, one was for geography teachers and the other one for teachers with the department of education, Government of Tamilnadu.

Nature Walk and Bird watching during Coimbatore Vizha

Coimbatore Vizha is the festival of Coimbatore celebrated jointly by governmental, nongovernmental, cultural and civil society organizations during the first week of January every year since 2007. SACON is a regular partner in the programme conducting various nature awareness programmes. This year SACON conducted a one-day nature walk and bird watching for nature lovers of Coimbatore on the 6th of January in the Anaikatty Hills in collaboration with Yi of CII.

Salim All Trophy Nature Competitions

The annual interschool competitions for the Salim All Trophy Nature Awareness for this year conducted on 12th February 2012. Two thousand one hundred students from 58 schools participated in the competitions and 134 students from 21 schools won the prizes. Konguvellalar Mat Hr Sec School, Karumathampatti for the first time won the coveted Rolling Trophy for the best school. The previous year Champions G D Mat Hr Sec School, Coimbatore and Kadri Mills Hr Sec School occupied the next two positions respectively.

Salim Ali Naturalist Forum

Salim All Naturalist Forum (SANF), a platform of nature education, initiated, promoted and technically supported by SACON, regularly conducts bird watching and trekking programmes in forests, wetlands and other natural ecosystems in and around Coimbatore. This year SANF conducted 30 bird watching programmes (four of these in SACON campus) participated by 120 experienced and emerging bird watchers from the city. During the programmes they sighted 130 species of birds. All these programmes were conducted on Sundays. The results and experiences of bird watching is immediately communicated, discussed and photos shared in the forum network groups.



This program aims to promote awareness among school children about the importance of our environment, biodiversity, biotechnology and the relation of all these with everyday life. SACON has selected 10 schools across the Andaman and Nicobar Islands for the programme and the programme is going on successfully in all these schools for the last 5 years.

The programmes included invited lectures (36 lectures), field visits (35 field visits); laboratory experiment demonstrations (55 hands on activities and experiments), audiovisual programmes (40 programmes) during 2011-12. These activities benefited 600

students from the 10 participating schools in Andamans directly and hundreds of students of the same schools indirectly. The participating students have taken up more than 50 study projects as part of this programme. Regular monthly meetings are also being conducted to review the progress of the project and to clear doubts among children.

Vacation Training Programme-2011, Andaman Islands

Vacation Training Programme -2011 on Bioresources for school children in Andaman and Nicobar Islands was conducted from 4th to 21st June 2011. This vacation training programme has been planned as a fully residential camp for school children who have appeared for their 10th class examination. The 18 days long camp was conducted in Krishi Vigyan Kendra (KVK) Sippighat, and the activities included lectures, hands-on activities, project works and field trips. Twenty two students selected from 10 DNA Club member schools across different Andaman Islands participated in the programme.

The programme was inaugurated by Mr D V Negi, IFS, Principal Chief Conservator of Forests, and Secretary, Science and Technology Department, A&N Islands and was presided over by Dr R C Srivastava, Director of CARI. Dr P Pramod, Course Director of the programme welcomed the gathering and gave a brief introduction of the programme. Dr Senthil Kumar, IFS, Director, Department of Science and Technology delivered key note address and Mr Suresh Elamon, renowned naturalist and film maker, felicitated the programme.

The programme was concluded on the 20th of June 2011, with the Valedictory session. Chief Guest of the Valedictory session was Dr Alok Saxena, IFS, Additional PCCF, Andaman & Nicobar Administration and he gave the valedictory address. Dr S Senthilkumar, Director, DST, A & N Islands delivered the Key note address on the occasion. Dr. P. Pramod welcomed the gathering and gave a brief report of the programme. Dr Nagesh Ram, Programme coordinator of KVK, Sippighat and Dr P R Arun, Principal Scientist, SACON felicitated the programme and the participants. The four representatives of student participants shared their experience and their views about the training programme. The valedictory session was concluded with vote of thanks by Mr Rishikesh Sinha, Sr. Scientific Officer, DST, A & N Islands.

<i>Principal Investigator</i>	: P Pramod
<i>Assistants</i>	: Rajan P and Suhirtha Muthi (From 19.8. 2011)
<i>Project period</i>	: 2007-2012
<i>Budget</i>	: Rs. 52,00,000/-
<i>Funding Source</i>	: Dept of Biotechnology, Govt. of India
<i>Status</i>	: On going



Eco Development Plan for Mahatma Gandhi Marine National Park, Andaman Islands

The Mahatma Gandhi Marine National Park (MGMNP) was established in the year 1983 in the Andaman Islands. Situated about 29 km from Port Blair, it covers an area of 281.5 km² consisting of 15 uninhabited islands and the sea around these islands. Since its inception the tangible economic benefits from the Park has been largely enjoyed by the outsiders, leaving out the local people living around the park in the fringe villages. Recognizing the importance of inclusive management of MGMNP, the Department of Environment and Forests (DoEF) of A&N Administration initiated discussions on the development of an Ecodevelopment Plan for MGMNP.

DoEF entrusted SACON to facilitate the development of this eco-development programme. SACON visualized the EDP as a joint document of the people of the surrounding area and the DoEF, charting out the policy, approach, guiding principles, micro-plans, benchmarks, success indicators and a timeframe for the sustainable development of the area. To develop this plan, SACON conducted stakeholder consultations, synthesis of the available data and explored the eco-developmental options possible for the given area. As there is an approved Management plan enforced for the National Park, the scope of the proposed plan was restricted within the broad framework of the management prescriptions given in it. Methods adopted by SACON is an attempt to integrate the local people's aspirations, plans and ideas for the area into the practical operational context of the MGMNP by forest department with minimal conflict of interests.

Depending on the geographical and practical consideration the dependent village areas were considered as two clusters and started activities. After a series of stakeholders' consultations and analysis of the secondary and primary information, SACON conducted a dependency analysis, discussed it in the collective meeting of the stakeholders and was agreed upon. A series of potential livelihood options were brought into discussions of the public with a view to reduce their dependency on the National Park areas. All the practical and agreeable suggestions for the micro-planning of activities were consolidated into a brief report and submitted to the department for consideration and further action.



ACADEMIC PROGRAMMES

ZOOLOGY

Lalitha Vijayan	N. Sheeba	Ph D	Ecology and conservation of spot-billed pelican	Submitted
S. Bhupathy	J. Gokulakrishnan	Ph D	Ecology of sea turtles along the Nagapattinam coast, Bay of Bengal	Submitted
	G. Srinivas	Ph D	Ecology of amphibians in high wavy mountains, Western Ghats	Submitted
	N. Sathish Kumar	Ph D	Ecology of reptiles in high wavy mountains, Western Ghats	On going
	C. Ramesh	Ph D	Ecology of the Indian python in Keoladeo National Park, Bharatpur	On going
	M. Kamalakannan	M Phil	Diurnal activity of the Indian python in Keoladeo National Park, Bharatpur	Awarded
	P Pramod	Chetan Nag	Ph D	Addressing the issue of taxonomic position of peninsular Indian Hanuman langurs (<i>Semnopithecus entellus</i>) through a multidisciplinary approach
L. Joseph Reginald		Ph D	Diversity and habitat preference of bats (Order Chiroptera) of Coimbatore	On going
A.P.Zaibin		Ph D	Insular biogeography of Nicobar Islands from a bird community perspective	On going
P. Rajan		Ph D	Ecology and distribution of two introduced bird species (<i>Acredothres tristis</i> and <i>Passer domesticus</i>) in Andaman Islands	On going
H N Kumara	K. Priya	M Phil	Genetic diversity analysis of Andaman day gecko <i>Phelsuma andamanense</i> by DNA fingerprinting	On going
	K. Santhosh	Ph D	Status, ecology and conservation of Lion Tailed Macaque in Sirsi-Honnava forests of Western Ghats, Karnataka	On going

BOTANY

P. Balasubramanian	C. Anbarasu	Ph D	Avian frugivory and seed dispersal in the shola forests of Nilgiris, Western Ghats, India.	On going
	R. Aruna	Ph D	Frugivory and seed dispersal by birds in mixed dry deciduous and scrub forests	On going
	P. Nehru	Ph D	Floristic diversity, dynamics and recovery of littoral forests of Nicobar Islands, India- a post Tsunami scenario	On going

ENVIRONMENTAL SCIENCES

P. A. Azeez	P. P. Nikhil Raj	Ph D	An analysis of environmental changes in the Bharathapuzha River basin, Southern India.	Awarded
	R Dhanya	Ph D	Urbanization and environmental transition: A study on the impact of developmental activities with special reference to EMR on the House Sparrows.	Submitted
	J. Ranjini	Ph D	Adaptation and tolerance of birds to urbanization – a critical evaluation with emphasis on life strategy	On going
	K Nishad	PhD	Usage and application of real time and continuous environmental data for climate change adaptation	On going
	R Chandran	Ph D	Environmental Education: Impact on Higher Education	On going
S. Muralidharan	A. Alaguraj	Ph D	Organic contaminants in the marine fishes available in Coimbatore and their suitability for human consumption	Submitted
	P. Jayanthi	Ph D	Organochlorine pesticides residues in the commercial marine fishes of Coimbatore and their suitability for human consumption	Submitted
	S. Jayakumar	Ph D	Impact of agricultural pesticides on the population status and breeding success of select species of fish-eating birds in Tamil Nadu	On going
	K. Ganesan	Ph D	Comparative study on pesticide residues in select components of an agro ecosystem adopting organic and chemical farming in Padayetti village, Palakkad District, Kerala-	On going
B A K Prusty	P. Navamani	M Phil	Poly Cyclic Aromatic Hydrocarbon (PAHs) in marine fishes collected from Cochin and Rameshwaram coasts and their suitability for human consumption	Submitted
	Mohd. Zeeshan Malik	Ph D	Assessment of environmental changes in three districts (Jammu, Rajouri & Ramban) representing altitudinal gradients in Jammu region.	On going

First International Conference on Indian Ornithology (ICIO - 2011)



SACON organized the first International Conference on Indian Ornithology (ICIO 2011) at Coimbatore. The ICIO-2011 was organized in association with the Bombay Natural History Society and more than 150 research and conservation organizations and individuals in India and abroad participated. The theme of the ICIO 2011 was "Status of Indian Birds and their conservation". The state of knowledge on biological, ecological and conservational aspects of Indian birds was discussed in the conference. A compilation of 153 research works from 25 states in India was made for the conference. 284 scientists contributed papers. The conference was conducted in eleven symposia as three parallel sessions in three days. While the four pre-conference workshops exposed the young researchers to modern tools for ornithological research and communication, the post conference field work exposed the participants to on ground conservation scenario in one of the well known national parks in south India, the Silent Valley National Park.

Conference was conducted in the serene atmosphere of SACON campus surrounded by deciduous forests with chirping of birds. Dr P J Dillip Kumar, Director General of Forests and Special Secretary to the Government of India, MoEF inaugurated the conference at 10.00 am on 20th November 2011 in a special session presided by Mr Luvkumar Kachhar, the veteran Ornithologist. There were three plenary lectures and one special lecture, 65 oral presentations distributed across 11 symposia and also several



speed talks and posters in the conference.

Experts from abroad included Drs Pamela C. Rasmussen (Michigan State University, USA), Rhys Green (Royal Society for the Protection of Birds and Department of Zoology, University of Cambridge, UK), Mohammad Ali Reza Khan (Dubai Zoo, UAE), Christopher Bowden (RSPB, UK), Trevor Price



(University of Chicago), and Ian Barber (RSPB, UK), while delegates from India included almost all senior ornithologists as well as younger generation of researchers in the field, across the country.

Pre conference Workshops

There were four capacity building pre conference workshops conducted to motivate young researchers in the new lines of ornithology research. Conducted on 19th November 2011 on the themes, conservation genetics, sampling and study design, basic statistics using the R platform and scientific communication.

Post conference Field Trip

A post conference field trip was organized on 23rd November 2011 for the outstation delegates to the Silent Valley National Park (SVNP), the floor of first successful environmental conservation campaign in India. Fifty five registered delegates participated in the field trip. The day was sunny and pleasant, the team could witness, Lion tailed macaques (the icon in the conservation movement on the SVNP), Nilgiri Langurs, Malabar Giant squirrels and very many bird species.

Association of Bird Biologists in India (ABBI)

Prior to ICIO-2011, SACON hosted an interaction meeting in bird biology on the behest of Department of Science and Technology, New Delhi to refine the research proposals submitted by various researchers from different university departments and academic institutions. The interaction meeting duly conducted by a panel of experts in the field expressed the necessity for better networking among the researchers in avian studies. During subsequent discussions, it was decided that the forthcoming International Conference on Indian Ornithology could be used as a platform to deliberate upon forming a researcher group in the presence of hundreds of researchers from across the country. Thus a panel discussion was organized during the International Conference on Indian Ornithology held at SACON on 21 November 2011. The Panellists and the floor were unanimous in forming a group that may be named as "Association of Bird Biologists in India (ABBI)" and urged Director, SACON to be the Convener of this proposed research group to initiate the formalities of registering it as a formal association/society.





Session on COP-11 of CBD

A special session for sensitizing bird and wildlife researchers about the forthcoming CBD-COP-11 and to deliberate upon the strategy for bird studies and conservation at the national level was a part of the ICIO-2011. In this session and later on delegates discussed on showcasing ornithological works and conservations actions undertaken in India during COP-11 deliberations.

The event (ICIO – 2011) was primarily supported by Ministry of Environment and Forests, Govt. of India. Other agencies which extended support was Department of Science and Technology, Council of Scientific and Industrial Research, Indian Council of Agricultural Research, M/s Power Grid Corporation of India Ltd, M/s Pirojsha Godrej Foundation, Mumbai, M/s ELGI Rubber Company, M/s Park Group of Institutions, and Central Bank of India, (Nanjundapuram Branch), Coimbatore.

DST-SERC Interaction Meeting on Bird Biology

With an objective to improve research in Bird Biology in India, the Department of Science and Technology, Government of India, initiated and sponsored this interaction meeting. The meeting was conducted at SACON during 5-8 August 2011, co-ordinated by Dr S Bhupathy, Principal Scientist, SACON. Thirty five Principal Investigators (PIs) from all over the country participated in the brainstorming session.

World Wetland Day Celebrations-2012



On 2nd February 2012, World Wetlands Day, a field evaluation visit around the Ukkadam wetland was conducted. The field visit exposed the participants to the wetlands and the threats while interacting among different stakeholders around the lake.

The highlight of the programme was the visit of the Worshipful Mayor of the Coimbatore Corporation, and Mr T K Ponnusamy, IAS, Commissioner, Coimbatore Corporation to the location while the exercise was in progress. The Mayor promptly took action against some of the environmentally undesirable activities being undertaken along the banks of the wetland.



Chemical Analytical Service

We continued to extend analytical services to academic and industrial institutions. During the period under report we provided analytical service to KG Hospital, Coimbatore, Kerala State Biodiversity Board and Kerala Forest Research Institute, Kerala.

Kerala State Biodiversity Board (KSBB) has launched a major program to monitor the fishes of all the 44 rivers in Kerala involving resource persons from colleges, institutions and fishermen community. This particular module is on the contamination status of the rivers using fish as an indicator. SACON was entrusted with the job by the board. Eight hundred and ninety individuals belonging to 21 species of fishes have been received from 43 rivers of Kerala. Morphometric measurements of each individual fishes were documented and $10 \pm 0.5\text{g}$ and $1-1.5\text{g}$ of homogenate muscle tissue taken for analysis of pesticide and metal residues respectively. QuEChERS multiresidue extraction method was followed with suitable solvents and reagents for extracting pesticide residues. Acid digestion method was followed for metal residue extraction. Qualitative and quantitative analyses of pesticides were carried out with Gas Chromatograph equipped with suitable detectors (ECD/NPD/MS). Heavy metal analyses were carried out with Perkin Elmer Model 800, double beam Atomic Absorption Spectrometer. Final report of the project on "Contamination status of Rivers in Kerala: Fish-An Indicator" was sent to KSBB during March 2012.



Masters dissertation and summer training

SACON has been providing facilities to master's students from different disciplines (Animal Science, Biotechnology and Animal Biotechnology) from various institutions such as Bharathiar University, Indraprastha University, Nehru Arts and Science College, Coimbatore and AVS College of Arts and Science.



Journals - National

- Aruna R and Balasubramanian P (2011). Flowering and fruiting phenology of a tropical mixed dry deciduous forest in Anaikatty hills, Western Ghats. *Indian Journal of Forestry*. 34 (2): 165-168.
- Balasubramanian P, Aruna R, Anbarasu C and Santhoshkumar E (2011). Avian frugivory and seed dispersal of Indian Sandal wood, *Santalum album* in Tamil Nadu. *Journal of Threatened taxa*. 3(5): 1775-1777.
- Bhupathy S and Nixon A M A (2011). Status of reptiles in Upper Nilgiris, Nilgiri Biosphere Reserve, Western Ghats, India. *Journal of Bombay Natural History Society*. 108(2): 103-108.
- Kumara H N, Pritham N S, Santhosh K, Raj V M and Sinha A (2011). Decline of suitable habitats and conservation of the endangered lion-tailed macaque: Land cover change at a proposed protected area in Sirsi-Honnava, Western Ghats, India. *Current Science*. 101: 434-439.
- Kumara H N, Sasi R, Suganthasakthivel R and Srinivas G (2011). Distribution, abundance and conservation of primates in Highway Mountains of Western Ghats, Tamil Nadu, India. *Current Science*. 100: 1063-1067.
- Murugesan M, Arun P R and Prusty B A K (*in press*). The Butterfly community of an urban wetland system-a case study Oussudu bird Sanctuary, Puducherry, India. *Journal of Threatened Taxa*.
- Rajeshkumar N and Balasubramanian P (2012). Habitat use and food habits in Indian Peafowl *Pavo cristatus* in Anaikatty hills, Western Ghats. *Indian Birds*. 7(5): 125-127.
- Ramesh Kumar, Mohammad Samsoor Ali S, Arun P R and Murugesan M (*in press*). Preliminary observations on avifaunal composition and possible impacts of wind turbines on birds in Jangi region of Kutch District, Gujarat, India. *Zoos print journal*.

Journals – International

- Bhupathy S, Srinivas G, Sathish Kumar N, Murugesan M, Babu S, Suganthasakthivel R and Sivakumar P (2012). Diversity and conservation of selected biota of the Megamalai landscape, Western Ghats, India. *Current Science*. 102(4): 590-595.
- Borkar M U, Athalye R P and Quadros Goldin (2011). Salinity induced changes in the leaf anatomy of the mangrove *Avicennia marina* along the anthropogenically stressed tropical creek. *Journal of Coastal Development*. 14 (3): 191-201.
- Chandra R, Prusty B A K and Azeez P A (2011). Pre-mining baseline characterization of soils: Alkali and alkaline earth metals. *Acta Ecologica Sinica*. 31: 283-290.
- Chandra R, Prusty B A K, and Azeez P A (2011). A revised checklist of the flora of Keoladeo National Park, a world heritage site in India. *Environmental Research Journal*. 5 (2-3): 331-348.
- Chethan Nag K S, Pramod P and Karanth K P (2011). Range extension or sampling artifact? Range limits of Northern type *Seminopithecus entellus* in Peninsular India. *Journal of Threatened Taxa*.
- Das S, Dutta S, Mangalam M, Varma R K, Rath S, Kumara H N and Singh M (2011). Prioritizing remnant forests for the conservation of Mysore slender lorises (*Loris lydekkerianus*) in Karnataka, India through estimation of population density. *International Journal of Primatology*. 32: 1153-1160
- Dhananjayan V, Jayakumar R and Muralidharan S (2011). Assessment of exposure to and effect of organochlorine pesticides on birds in India. *Research & Reviews: A Journal of Toxicology*. 1(3): 17-23.
- Dhananjayan V, Muralidharan S and Ranapratap S (2011). Organochlorine pesticide residues in eggs and tissues of House Sparrow, *Passer domesticus*, from Tamil Nadu, India. *Bulletin of Environmental Contamination and Toxicology*. 87: 684-688. DOI 10.1007/s00128-011-0414-9.
- Jayakumar R and Muralidharan S (2011). Metal contamination in select species of birds in Nilgiri District, Tamil Nadu, India. *Bulletin of Environmental Contamination and Toxicology*. DOI 10.1007/s00128-011-0323-y.
- Jayakumar R and Muralidharan S (*in press*). Evaluation of Metal pollution in Wetlands using fish as an Indicator. *Research & Reviews: A Journal of Toxicology*.
- Kumara HN and Suganthasakthivel R (2011). Predicting the potential distribution and conservation needs of Travancore flying squirrel *Petinomys fuscicapillus* in Peninsular India and Sri Lanka, using GARP. *Tropical Conservation Science*. 4(2): 172-186.
- Manchi S and Sankaran R (*in press*). Effect of Protection on White-nest Swiftlet *Aerodramus fuciphagus* population in Andaman Islands, India – an assessment. *Oryx*.

- Prusty B A K (2011). A Book review on "Climate Change and Chemicals: Environmental and Biological Aspects. Authored by Golam Kibria, A. K. Yousuf Haroon, Dayanthi Nugegoda and Gavin Rose. Current Science. 100 (1): 121-122.
- Radhakrishna S, Kumara H N and Sasi R (2011). Distribution patterns of slender loris *Loris lydekkerianus* subspecies in Kerala, southern India. International Journal of Primatology. 32:1007-1019.
- Santhoshkumar E and Balasubramanian P (2012). Seed dispersal by Indian Grey Hornbill *Ocyrceros griseus* in Eastern Ghats, India. Ecotropica. 17:71-77.

Papers in conferences / seminar / proceedings / edited volumesNational

- Anbarasu C and Balasubramanian P (2011). The pivotal role of Nilgiri Laughingthrush *Garrulax cachinnans* in the regeneration of shola forests, Western Ghats. in Status of Indian birds and their conservation, Proceedings of the first International Conference on Indian Ornithology (2011), SACON, Coimbatore. p 155-157.
- Arun P R (2011). Importance of biodiversity and the lessons that we haven't learned. in National Seminar on Biodiversity: Present Status and Future Concerns, Pala, Kottayam
- Aruna R and Balasubramanian P (2011). A study on the avifauna of Attappady and Anaikatty, Western Ghats, In Status of Indian birds and their conservation, Proceedings of the first International Conference on Indian Ornithology (2011), SACON, Coimbatore. p 281-282.
- Bhupathy S, Ramesh Kumar S, Thirumalainathan P, Paramanandam J and Arthi T (2011). Exploitation of Birds by the Tribes of Eastern Nagaland: A Case Study. in Status of Indian Birds and their Conservation, Proceedings of the First International Conference on Indian Ornithology(2011), SACON, Coimbatore.
- Ganesan K and S Muralidharan (2011). Comparative study on species composition of birds in an agricultural habitat in Kerala. in Status of Indian birds and their conservation, Proceedings of the first International Conference on Indian Ornithology (2011), SACON, Coimbatore.
- Goldin Quadros, Gauri Gurav, Kaustubh Bhagat, Aniruddha Dhamorikar, Kashmira Khot and Alok Chorgha (2011). Avian fauna of Indian Institute of Technology campus-Bombay, Powai. in Status of Indian Birds and their Conservation, Proceedings of the first international conference on Indian ornithology(2011), SACON, Coimbatore. p. 173-175.
- Goldin Quadros, R P Athalye, Vaishali U Somani, N N Patil and M U Borkar (2011), Distribution of water birds from the intertidal mudflats of Thane creek, the central west-coast of India. in Status of Indian Birds and their Conservation, Proceedings of the first international conference on Indian ornithology(2011), SACON, Coimbatore. p. 292-293.
- Jayakumar S, Muralidharan S and Dhananjayan V (2011). Impact of pesticides on fish-eating birds in Tamil Nadu. In Status of Indian birds and their conservation, Proceedings of the first International Conference on Indian Ornithology (2011), SACON, Coimbatore. P 45-46.
- Kavitha S, L Joseph Reginald and Pramod P (2011). Distribution of Spot billed pelican *Pelecanus Philippensis* from urban wetlands of Coimbatore, Tamilnadu, India. in Status of Indian birds and their conservation, Proceedings of the first International Conference on Indian Ornithology (2011), SACON, Coimbatore.
- Manchi Shirish S (2011). Review of an on-going Conservation Program of the Edible-nest Swiftlet in the Andaman and Nicobar Islands. in Status of Indian birds and their conservation, Proceedings of the first International Conference on Indian Ornithology (2011), SACON, Coimbatore. p 62-64
- Mane Akshaya and Manchi Shirish(2011). Narcondam Hornbill and Its Conservation: A Review. Young Ecologists Talk and Interaction (YETI), Guwahati.
- Murugesan M, Rachna Chandra, B Anjan Kumar Prusty, P R Arun and S Bhupathy (2011). Bird diversity of Oussudu Lake, Pondicherry: An update. in Status of Indian birds and their conservation, Proceedings of the first International Conference on Indian Ornithology (2011), SACON, Coimbatore. p. 179-181
- Rajan P and Pramod P (2011). Common birds of Andaman Islands with special emphasis on introduced birds. In Status of Indian birds and their conservation, Proceedings of the first International Conference on Indian Ornithology (2011), SACON, Coimbatore.
- Ramesh Kumar S, Bhupathy S, Vengota Nakro, Thirumalainathan P, Paramanandam J and Pranjit Sarma (2011). Blyth's Tragopans of the Eastern Nagaland: People's Perception. in Status of Indian birds and their conservation, Proceedings of the first International Conference on Indian Ornithology (2011), SACON, Coimbatore, India.

- Uthaman K V, M J Palot, Sashikumar C and Pramod P (2011). Birds of Aralam Wildlife Sanctuary Kerala: a long term participatory study with an ecological approach. in Status of Indian birds and their conservation, Proceedings of the first International Conference on Indian Ornithology (2011), SACON, Coimbatore.
- Zaibin A P and Pramod P (2011). Post-tsunami status of Nicobar Megapode *Megapodius nicobariensis* in Nicobar Islands. in Status of Indian birds and their conservation, Proceedings of the first International Conference on Indian Ornithology (2011), SACON, Coimbatore.

International

- Chandra R, Prusty B A K and Azeez PA (2011). Ecological, social and climate change dimensions of Keoladeo National Park wetland ecosystem, Bharatpur, India: challenges and options for its revival. Abstract accepted for oral presentation at 4th World Conference on Ecological Restoration (SER-2011), Mérida, Mexico. August 21-25, 2011.
- Manchi S and R Sankaran (2011). Breeding Habitat requirements of the Edible-nest Swiftlet in North and Middle Andaman Islands. in International Conference and Training on Swiftlet Ranching, Universiti Sultan Zainal Abidin, Kuala Terrenganu, Terrenganu, Malaysia. 17th -19th July 2011.
- Manchi S and R Sankaran (2011). Conservation of the Edible-nest Swiftlet *Aerodramus fuciphagus* in the Andaman & Nicobar Islands: A critical analysis. in International Conference and Training on Swiftlet Ranching, University Sultan Zainal Abidin, Kuala Terrenganu, Terrenganu, Malaysia. 17th -19th July 2011.
- Prusty B A K (2011). *Prosopis juliflora* invasion in drylands of western India: Ecological and Social dimensions and management challenges for sustenance and restoration of fragile dryland ecosystem. Abstract for oral presentation at 4th World Conference on Ecological Restoration (SER-2011), Mérida, Mexico. August 21-25, 2011.
- Prusty B A K and Chandra R (2011). Is the changing Human-Environment Interactions in and around Keoladeo National Park, India, a Climate induced phenomenon?. In International Humboldt Kolleg regional and expert international conference on adaptive management of ecosystems: the knowledge systems of societies for adaptation and mitigation of impacts of climate change. Institute for Social and Economic Change, Bangalore, India. 19-21 October, 2011.

Books/ Chapters in books

- Bhupathy S, Prusty B A K, Kumara H N and Quadros G (2011). Status of Indian Birds and their Conservation. Proceedings of the International Conference on Indian Ornithology (ICIO) – 2011 (Eds.). Sálim Ali Centre for Ornithology and Natural History, Coimbatore, India. 301 pp.
- Pramod P, Shashikular C, Palot M J and Uthman K V (2011). Bird of Aralam Wildlife Sanctuary, Kerala – A long study with Ecological approach. Department of Forests and Wildlife, Kerala.
- Chettri Basundhara, Bhoj Kumar Acharya and S Bhupathy (2011). An Overview of the Herpetofauna of Sikkim with Emphasis on Elevational Distribution Pattern and Threats and Conservation Issues. Pp: 233-254. In Biodiversity of Sikkim - Exploring and Conserving a Global Hotspot (Eds. M. L. Arrawatia and Sandeep Tambe). Information and Public Relations Department, Government of Sikkim.
- Deepak V, M Ramesh, S Bhupathy and Vasudevan K (2011). *Indotestudo travancorica* (Boulenger 1907) - Travancore tortoise. In Rhodin A G J, Pritchard P CH, van Dijk P P, Saumure R A, Buhlmann K A, Iverson J B, and Mittermeier R A (Eds.). Conservation Biology of Freshwater Turtles and Tortoises: A Compilation Project of the IUCN/SSC Tortoise and Freshwater Turtle Specialist Group. Chelonian Research Monographs No. 5, p. 054.1–054.6, doi:10.3854/crm.5.043. travancorica.v1. 2011, <http://www.iucn-tftsg.org/cbftt/>.
- Muralidharan S, Jayakumar S and Dhananjayan V (2011). Status of pesticide contamination in birds in India with special reference to Threatened species. Threatened Birds in India: their conservation requirements. Ed. Dr Asad Rahmani. p73-91.
- Prusty B A K, Chandra R and Azeez P A (In Press). Cu, Pb and Zn fractionation in a savannah type grassland soil. In: Geochemistry. Intech Open Science/Open Mind Publishers.
- Sahoo NK and Prusty B A K (2011). Mineral resources: Depletion, exploitation and issues related to sustainability. Chapter in books/ PG Diploma in Sustainability Science.
- Saini R, Prusty B A K and Singh R (2011). Pollution and Waste Generation: A Global Environmental Challenges for sustainable Development. Chapter in books/ PG Diploma in Sustainability Science.

Reports

- Balasubramanian P and Anbarasu C (2011). Study on Avian frugivory and seed dispersal of endemic tree species in

- select shola forests of Nilgiri hills, Western Ghats. Report submitted to the Tamil Nadu Forest Department.
- Bhupathy S, Vengota Nakro and Azeez P A (2012). Strengthening Community Conservation Efforts in Nagaland: A Programme to Impart Technical Support on Biodiversity Conservation and Livelihood Options. Final Report Submitted to Sir Dorabji Tata Trust, Mumbai. pp 184.
- Kumara H N (2012). Development of conservation strategy for a newly discovered lion-tailed macaque *Macaca silenus* population in Sirsi-Honnava, Western Ghats. Project Completion Report submitted to CEPF-ATREE.
- Kumara H N (2012). Understanding of the impact of NTFP collection on the lion-tailed macaques. Project Completion Report submitted to CEPF-ATREE.
- Kumara H N, Sathagirish M K and Murugesan M (2011). Assessment of occurrence and abundance of large mammals, birds and woody plants in Bannerghatta National Park, Karnataka. Technical Report submitted to Karnataka Forest Department, Bannerghatta National Park, Bengaluru, Karnataka, India.
- Muralidharan S and Ganesan K (2011). Monitoring of pesticide residues in select components of an agro-ecosystem adopting organic and chemical farming in Padayetti village, Palakkad district, Kerala. SACON, Progress Report. pp 59.
- Muralidharan S and Navamani P (2012). Contamination status of rivers in Kerala: Fish as an indicator. SACON, Report. pp 1-44.
- Muralidharan S, Murali Manohar B, Kar CS, Saravana Perumal N, Ramakrishnan C and Vijayabharathi V (2012). Surveillance of Waterfowl at Nalabana Bird Sanctuary, Chilika Lake, Odisha. SACON, Executive Summary. pp 1-10.
- Prusty B A K, Arun PR, Bhupathy S, Murugesan M and Chandra R (2011). Comprehensive Management Action Plan for Conservation of Ossudu Sanctuary, Puducherry. Report submitted to The Department of Forest and Wildlife, Puducherry. pp 118.

Talks delivered

- Balasubramanian P (2011). Talk given on "Role of birds in Ecosystem Maintenance" at a function organized by "Living with Nature" in Erode. July 2011.
- Balasubramanian P (2011). Lecture delivered on "Integration of bioscience sub-disciplines for Environmental Conservation" at Krishna Arts & Science College, Coimbatore. July 2011.
- Balasubramanian P (2011). Talk given on "Role of Big "Bs" in Ecosystem Maintenance" at a function organized by Indian Chamber of Commerce and Industry and The Hindu in Coimbatore. August 2011.
- Balasubramanian P (2011). Inaugurated the Science Exhibition and delivered a Lecture on "Birds-our friends" at the GKD Matric Higher Secondary School, Coimbatore. August 2011.
- Balasubramanian P (2011). Delivered a lecture on "Ornithology" at Sri Ramakrishna Engineering College, Coimbatore. September 2011.
- Balasubramanian P (2011). Lecture delivered on "Avifaunal diversity of Tamil Nadu" for the Forest Range Officers at the Tamil Nadu Forest Academy, Coimbatore. September 2011.
- Balasubramanian P (2011). Delivered a lecture on "Ornithology" as Resource person of the DST sponsored Science Camp-INSPIRE Program for High school students held at the Agricultural Research Institute and College, Madurai. December 2011.
- Balasubramanian P (2012). Lecture delivered for the forest officers on "Bird identification Techniques" at CASFOS, Coimbatore. January 2012.
- Balasubramanian P (2012). Lecture delivered on "Habitat restoration bird sanctuaries of Tamil Nadu" at the Project Orientation Training Programme (Tamil Nadu Bio-diversity Conservation and Greening Project) at Tamil Nadu Forest Academy, Coimbatore. January 2012.
- Balasubramanian P (2012). Lecture delivered on "Bird-plant interactions" at the Botany Association Meeting in the Vellalar College for Women at Erode. February 2012.
- Bhupathy S (2012). Lecture delivered on "Reptiles: Super Specialised Vertebrates" at Sarah Tucker College, Tirunelveli. 9 January 2012.
- Bhupathy S (2012). Lecture delivered on "Reptiles and Research Status in India" at Academic Staff College, Bharathiar University, Coimbatore. 31 January 2012.
- Bhupathy S (2012). Lecture delivered on "Introduction to Snake Behaviour" at Tamil Nadu Agricultural University, Coimbatore. 24 February 2012.

- Bhupathy S (2012). Lecture delivered on “Primer in field sampling techniques (inventory and monitoring)” at DST-SERB School in Herpetology, North Orissa University, Baripada. 28 February 2012.
- Bhupathy S (2012). Lecture delivered on “Herpetofaunal Communities” at DST-SERB School in Herpetology, North Orissa University, Baripada. 29 February 2012.
- Bhupathy S (2012). Lecture delivered on “Adaptations in Herpetofauna” at DST-SERB School in Herpetology, North Orissa University, Baripada. 1 March 2012.
- Bhupathy S (2012). Lecture delivered on “Distribution of Herpetofauna along the Altitudinal Gradient” at DST-SERB School in Herpetology, North Orissa University, Baripada. 2 March 2012.
- Bhupathy S (2012). Lecture delivered on “Long-term Study on the Ecology of Indian Pythons” at DST-SERB School in Herpetology, North Orissa University, Baripada. 2 March 2012.
- Mahendiran M (2011). Lecture delivered on “Importance of Wetlands” at Anand Niketan College, Varora, Maharashtra. 2 February 2011.
- Mahendiran M (2011). Lecture delivered on “Importance of Wetlands and Openbill stork”. at Danapur Cantonment, Bihar. 22 October 2011.
- Mukherjee Shomita (2012). Invited lecture on “Phylogeography of jungle and leopard cat populations in India” at the Wildlife Institute of India. January 2012.
- Mukherjee Shomita (2012). Invited lecture on “application of endocrine methods in studying small carnivores” at National Workshop on Applications of Non-invasive Hormone Monitoring to Wildlife Endocrine Assessment, Laboratory for the Conservation of Endangered Species (LaCONES, CCMB), Hyderabad. February 2012.
- Pramod P (2012). The key note address for the inaugural of Biosciences Association at Dr G R Damodaran college of Science, Coimbatore. 26 July 2011.
- Pramod P (2011). Special lecture on “Biodiversity conservation” at ‘OSAI Enviromeet – July 11’. 29 July 2011.
- Pramod P (2012). Plenary lecture in National Seminar “Biodiversity conservation” Farook College, Calicut. 1 November 2011.
- Pramod P (2012). Invited lecture on “Patterns and changes in Biodiversity” at Government College Chittur. 19 January 2012.
- Pramod P (2012). Key note address in the national seminar on “Changing pattern of Western Ghats Biodiversity” in St. Mary’s College Manarcaud, Kottayam. 20 January 2012.
- Pramod P (2012). Lead lecture in “Assessing and addressing the animal problems of Coimbatore” at Second symposium on Animal Welfare and conservation. Nirmala College for Women, Coimbatore. 24 – 25 January 2012.
- Pramod P (2012). Special lecture on “Environmental Awareness” Sri Sakthi Engineering college Karamadai. 25 February 2012.
- Pramod P (2012). Invited lecture in Seminar on Animal biodiversity Bishop Heber College, Tiruchirappaly. 8 March 2012.
- Pramod P (2012). Invited lecture on “Nature conservation” at Lisieux College of Education. 23 March 2012
- Pramod P (2012). Invited lecture in “Environmental education for biodiversity conservation” at National seminar on Pazhassiraja College Mattannur. 24 March 2012.
- Pramod P (2012). Valedictory address on a week long programme on birds and conservation at GKD Mat. Hr.Sec.School, Coimbatore. 15 August 2012.
- Prusty BAK (2012). Talk on “Tools and Techniques in EIA” at UGC Academic Staff College, Avinashilingam University, Coimbatore. 14 December 2011.
- Prusty BAK (2012). Talk on “Basics on EIA: Procedures and provisions” at Biotechnology department, Konganadu Arts and Science College, Coimbatore on 05 January 2012.
- Prusty B A K (2012). Talk on “Urban Wetlands in Coimbatore – How healthy are they?” at 2nd Symposium on Animal Welfare & Conservation (SAWC 2012), Nirmala College for Women, Coimbatore. 24 – 25 January 2012.
- Prusty BAK (2012). Talk on “On environmental impact assessment as a tool for sustainable development” at PSGR Krishnammal College for Women, Coimbatore. 20th February 2012.
- Prusty B A K (2012). Invited Talk on “Environmental Impact Assessment A Potential Tool for Sustainable Development, and Management of Natural Resources” at National Conference on Biodiversity and

Biotechnology: Biological Resources Conservation, Management and Sustainable Uses, APS University, Rewa, Madhya Pradesh. 13-14 March 2012.

Popular articles

- Kumara H N (2011). Declaration of "Aghanashini Lion-tailed Macaque Conservation Reserve". Zoo's Print, 26 (7): 5.
- Manchi Shirish S (2011). Conservation of the Edible-nest Swiftlet in the Andaman and Nicobar Islands. In Souvenir of the International Conference on Indian Ornithology, SACON, p. 62-64.
- Prusty B A K (2011). Electromagnetic Radiation from Cell phone Towers: A new age threat to birds. In: Souvenir of the International Conference on Indian Ornithology (ICIO) – 2011, SACON, Coimbatore, India. p. 10-12.

Participation in seminar/ conference/ meetings

- Balasubramanian P (2011). Attended the First International Conference on Indian Ornithology at Coimbatore. November 2011.
- Balasubramanian P (2011). Attended the ISRO-GBP project workshop on "LULC dynamics and impact of human dimensions in Indian River Basins" held at Dehra Dun.
- Balasubramanian P (2011). Participated in the 12th Five-year plan Working Group meeting on "Forest and Wildlife" organized by the State Planning Commission at Chennai. November 2011.
- Balasubramanian P (2012). Participated in the one day seminar on "Cell tower radiation on living beings" at Avinashilingam Institute for Home Science & Higher Education, Coimbatore. March 2012.
- Ganesan K and K Nambirajan (2012). National workshop on "Sustainability through Green Chemistry and Catalysis" sponsored by Royal Society of Chemistry, South India on 2nd March 2012 held at PSGR Krishnammal College for Women, Coimbatore.
- Goldin Q (2011). Planning Commission 2nd meeting on 'Ecosystems resilience' at ATREE in Bangalore on 19th August, 2011.
- Goldin Q (2011). Planning Commission 3rd meeting on 'Ecosystems resilience' at Yojana Bhavan, New Delhi on 25th August, 2011.
- Goldin Q (2011). SCCS conference from 14th to 16th September, 2011 in the 'Who's Who?' category displaying the banner on activities and opportunities at SACON and promoting the ICIO-2011 conference.
- Goldin Q (2011). INC-IUCN meeting at CEE, Ahmadabad during 29th to 30th November, 2011 called by the IUCN Asia chapter, to discuss the representation and events for COP-11.
- Goldin Q (2011). Science Express Biodiversity Special (SEBS) meeting on 1st December, 2011 called by MoEF at Gandhinagar, Gujarat on the Themes to be displayed in the SEBS train for COP-11.
- Goldin Q (2011). Consultative meet on Ecological Security on 13th December, 2011 at Guwahati called by the SDTT to evaluate the Nagaland project.
- Goldin Q (2011). Planning Commission on Environment performance index at Yojana Bhavan, New Delhi on 9th January, 2012.
- Goldin Q (2011). National Biodiversity Authority meeting on 6th February, 2012 to discuss the role of agencies in the side events during the COP-11.
- Goldin Q (2011). Two day evaluation workshop at IIRS Dehradun during March 15 to 16, 2012.
- Mahendiran M (2011). Technical and Advisory committee of Kerala Forest department held on 8th November 2011 at Thiruvananthapuram.
- Manchi Shirish, S (2011). Invited Speaker and presented two papers in the International Conference and Training on Swiftlet Ratching, Universiti Sultan Zainal Abidin, Kuala Terrenganu, Terrenganu, Malaysia, 17th - 19th July 2011.
- Mukherjee Shomita (2011). National Workshop on "Applications of Non-invasive Hormone Monitoring to Wildlife Endocrine Assessment", Laboratory for the Conservation of Endangered Species (LaCONES, CCMB), Hyderabad.
- Mukherjee Shomita (2011). Students Conference on Conservation Science held in Bangalore between the 14th and 16th of September 2011. Attended as well as conducted a workshop on conservation genetics.
- Mukherjee Shomita (2011). YETI (Young Ecologists Talk and Interact) meeting held in Guwahati, between the 13th and 15th of December 2011, attended and conducted a workshop on conservation genetics.
- Prusty BAK (2011). Training Workshop on "Understanding and Resolving Water Conflicts in India", Forum for Policy Dialogue on Water Conflicts in India, Shristi & Odisha Water Forum, Satapada, Chilika Lake, Odisha 18 – 22 July 2011.

INFRASTRUCTURE

SACON's location at Anaikatty with the backdrop of the Western Ghats, one of the 'hot spots' of biodiversity in the world, offers great opportunities for long term studies on various aspects of its varied avifauna, other wildlife and on biological principles involved in the functioning of ecosystems. The tri-junction of Kerala, Tamil Nadu and Karnataka in the Western Ghats, one of the best wildlife areas in the country, 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.

As advised by the Governing Council, we have created two shallow depth static water tanks each 4500 liters capacity in the SACON campus to cater to the needs of birds and wild animals. These strategically located water bodies are being utilized by elephants, spotted deer, wild boar, wild gaur, various birds etc. The tanks are connected with fresh water supply for everyday replenishment.

Laboratory : Currently, our laboratory is equipped with UV-Vis Spectrophotometer, Perkin Elmer Model Lambda 35, HPLC Agilent Technology Model 1100 series with DAD and Fluorescence detector, Ultra Deep Freezer (-80°C), New Brunswick, Model U 410 Premium, Deep freezers (-20°C), Carrier, Model CHP-30 and fridges, Model LG and Samsung, Flame Atomic Absorption Spectrophotometer (AAS) Perkin Elmer, Model 3300 with 13 lamps, Mercury Hydride Generator, Perkin Elmer, Gas Chromatograph, Hewlett Packard Model 5890 Series II with three detectors, (Electron Capture Detector - ECD, Nitrogen Phosphorous Detector - NPD and Flame Photometric Detector - FPD), Microwave Digestion System, Milestone Model 1200, Flame Photometer, Systronics 128, Vertical Laminar Flow Chambers, Respirable Dust Samplers, Ultra Centrifuge, Microprocessor research centrifuge Walk-in cold room, Rotary Flask Evaporator, Millipore water purification system, and Water Quality analyzer - Multi Parameter TROLL - 9500.

Library and documentation : SACON library has 3263 books, 2508 Back Volumes, 2706 maps, 91 CD/DVDs, 101 project technical reports, 34 PhD Theses, 62 Current Periodicals (National - 40; International - 22), Online Subscription of JSTOR Archive: Biological Science. Facility for literature searches has been provided to all the staff and students. As in the previous years, the library facilities were used also by students, scholars and scientists from other institutions in and around the Coimbatore.



Homage



Shri J C Daniel
(July 9, 1927 – August 23, 2011)

We at SACON are extremely sad on the demise of Shri J C Daniel, former Honorary Secretary, Bombay Natural History Society, Mumbai. The demise of one of the pioneering natural historian, who made invaluable contribution to the country's wildlife science and natural history, is a great loss to the scientific community of India and SACON in particular. He authored several acclaimed books on birds, mammals and reptiles. He served as member of the SACON Society, Governing Council and various committees of SACON since its inception.

