Annual Report 2013 - 2014

SACON

SÁLIM ALI CENTRE FOR ORNITHOLOGY AND NATURAL HISTORY

Published by
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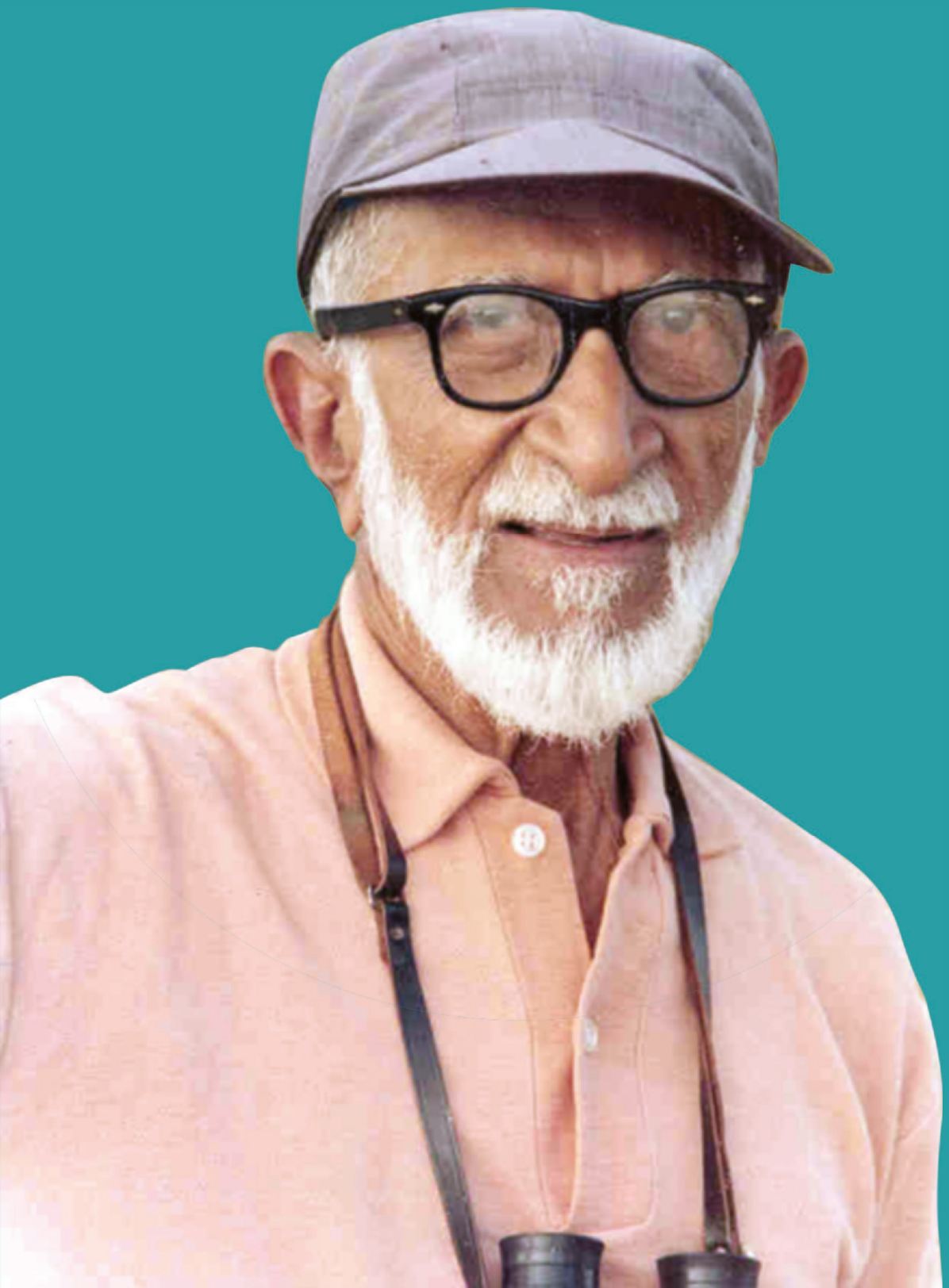


(1896-1987)

BACKGROUND

Sálim Ali Centre for Ornithology and Natural History (SACON) established in 1990, as a Centre of Excellence,under the Ministry of Environment and Forests and Climate Change (MoEF&CC), Government of India. The SACON Society, presided by the Hon'ble Minister for Environment and Forests and Climate Change (Government of India), is the apex body of SACON and the management of SACON is vested in a Governing Council, chaired by the Secretary to the Government of India, MoEF & CC. Realizing the significance of holistic approach in avian studies and conservation, the major objectives of SACON have been designed to cover the entire field of natural history focusing on ornithology.

MISSION

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

OBJECTIVES

- Design and conduct research in ornithology, covering all aspects of biodiversity and natural history
- Develop and conduct regular courses in ornithology and natural history 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 reporting year, 2013-14 was another productive year for SACON. During the year, SACON continued its research and outreach activities, through funding support from prestigious organizations, successfully conducted 2nd International Conference on Indian Ornithology, and organized specific training Programmes such as SERC School in Avian Biology for early career ornithologists and training programme on marine birds for Fisheries Survey of India. Our Nature Education Programmes by its various activities reached thousands of people from different walks of life; school and college students, teachers, amateur and professional ornithologists, NGO's and others.

While continuing its research that covers thematic focus on species, their distribution and ecological requirements, habitats and ecosystems, plant bird interactions, documentation of traditional cultivars, their ecological services and accompanied traditional knowledge systems. SACON has taken up new works to find out the RNA transcripts present in avian sperm and their relation to fertility which will have ramifications in finding out the genetic factors influencing the fertility of wild birds and in captive breeding as well. Our initiative to find out the taxonomic and conservation status of the forest owlet through genetic tools will go a long way in deciphering certain important biological/taxonomical questions, including the phylogeography of the species, the genetic connectivity between populations, and resolve the issue of possible hybridizations.

More than a decade old research, which later evolved into participatory action research resulting in invaluable outcomes in terms of enhancing the population of the Edible-nest Swiftlet in Andaman and Nicobar Islands, has been continuing with active collaboration of the Andaman Forest Department. Our researchers are in the process of establishing a population of Edible-nest Swiftlet in a house; demonstrating that this approach will lead to far faster recoveries in population of the species and positively benefit these ecologically important islands and its human inhabitants. As an adjunct to the ongoing study, another programme was taken up to reassess the overall breeding populations of the Edible-nest Swiftlet in the Andaman Islands (subspecies endemic to the islands) and to understand the extent of nest collection pressure on the undefended populations in the Islands. The studies on the Narcondam Hornbill, one of the most endangered Hornbills in the world, indicates that the bird population is on the way to recovery, yet adequate steps have to be ensured to protect the population.

The study initiated at Agasthiamalai hills to understand the factors shaping the distribution pattern of the faunal groups revealed that the species richness of reptiles and birds when plotted against the altitudinal categories and contrasted with the simulated response both the taxa did not show uni-modal pattern predicted by the mid-domain theory. Typically, the species richness of both the taxa showed a steadily declining trend with increasing altitude, though the rate of decline varied among altitudes.

The research project initiated during the reporting year 'spatio-temporal burrow use patterns by vertebrates in Keoladeo National Park, Bharatpur, Rajasthan, India' is one of the few studies in this kind initiated anywhere in the country. The interesting observation made during the study, the co-occurrence of several species (both predators and preys) in the burrows, has thrown up new challenges to elucidate the factors determining faunal assemblage and activity of those species.

SACON has maintained its presence in the extreme north east of the country by taking up research programme on ecological species sorting in relation to habitat structure in the small cat guild of Eaglenest Wildlife Sanctuary, Arunachal Pradesh. The project aims to use non-invasive techniques such as scats, molecular tools, camera trapping and spatial analysis to test the hypothesis.

Study on the social organization, behaviour and phylogeography of *Macaca fascicularis umbrosa* endemic to three islands (Great Nicobar, Little Nicobar, and Katchal), tries to understand the

ecology, and evolutionary history of this species. As part of our research on conservation biology, a survey of slender loris in parts of Kerala and Tamil Nadu was also taken up. Both the studies are pioneering efforts. Evaluating the status of NTFP trees and development of a model for sustainable harvest of *Garcinia gummi-gutta* in Aghanashini-Lion-tailed Macaque Conservation Reserve is a participatory action research programme with a view to minimize the conflict between the local communities and the Lion-Tailed Macaques in sharing the common resource viz. *Garcinia gummi-gutta* (Uppage) fruits. The work has yielded positive results.

SACON's study on plant-bird interactions has demonstrated its significance in forestry management. The ecological investigation of woody vegetation and nest tree use by birds in the riverine forests of Athikkadavu Valley has identified important tree species to be conserved to facilitate the nesting of various birds which include important endemic ones. The study on the status and distribution surveys of selected CR/EN/VU plant taxa in the wild, a major component of a state-wide research program of the Tamil Nadu Forest Department is producing valuable outputs handy for the conservation of the species.

Since inception it has been SACON's endeavour to cover all the facets of ornithology. In order to address the threats faced by birds and other taxa, from environmental contamination, we have been taking ecotoxicology works. The findings from the ongoing project 'Monitoring and surveillance of environmental contaminants in birds in India', has been highly useful to the administrators for formulating effecting control measures. Our studies revealed that the high incidence of the death of the water fowls in the Nalabana Bird Sanctuary, Chilika Lake was not due to the toxicity of the heavy metals as suspected.

We have been involved in Environmental Impact Assessment taking up several studies on behalf of various organisations. Impact assessment of 'prospecting exploration activitive through 3D seismic data acquisition by Oil India Ltd. on mangrove fauna at Kakinada', 'cEIA of Hydro-Electric Projects of Sutlej river basin in Himachal Pradesh (HP) focusing on Faunal Aspects', 'Monitoring the impacts of Jangi Wind power farm with special reference to birds and bats', 'cEIA of Hydro Power Projects on river Yamuna, Tons and tributaries (UK)- Faunal aspects', 'Impact of Wind power project on wildlife including migratory birds and roosting of Raptors, Davangere, Karnataka', and 'Assessment of the impact of agrochemicals on avifauna in the catchment of Keoladeo National Park, Rajasthan' are the projects which were taken up during the reporting period.

'Owl Assemblage and occupancy in Andaman archipelago, India' was the new initiative of SACON in the Andaman and Nicobar Islands as part of our continuing ornithological research in this part of the country for the past more than two decades. 'Assessment of the morphological diversity and the ecological patterns in the near threatened colonial water birds across Indian sub-continent using novel approach' is a research project which employs a novel approach to study the morphological features of a bird by using video images.

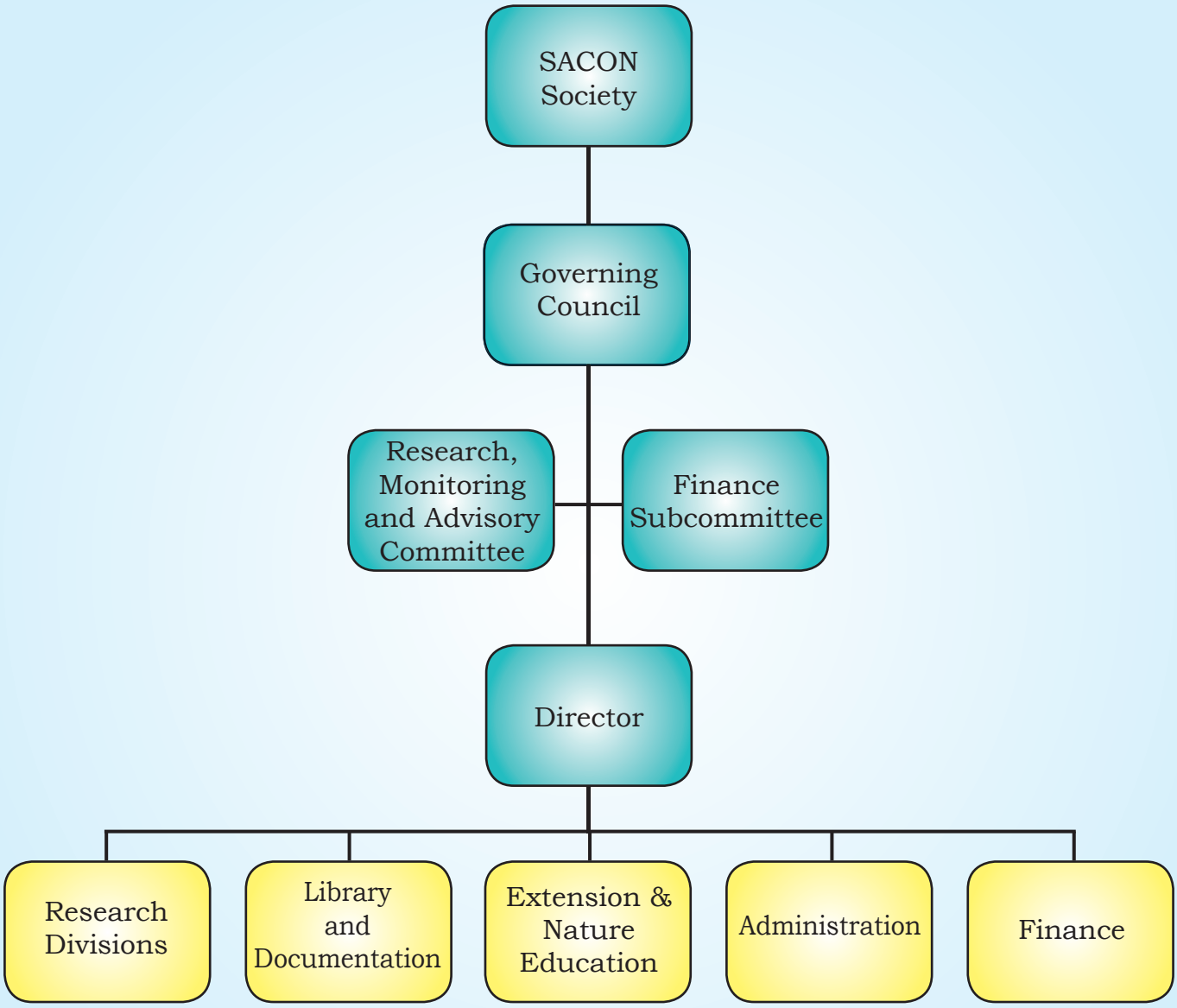
Research on the 'ecological and ethno-cultural examination of the rise and fall in rice diversity in southern India with special reference to the Western Ghats' tried to document the Traditional Ecological Knowledge (TEK) associated with various traditional rice varieties along with ethno-cultural information associated with these varieties.

SACON's ENVIS centre on wetlands expanded its activities by creating an active website, which has attracted huge hits, and also by the publication of ENVIS Newsletter on a regular basis.

SACON has continued with its nature education and extension activities reaching out to thousands of students and public. Publishing peer reviewed articles, popular articles, technical reports, and education materials also have continued. Towards human resource development in ornithology and conservation we have more than 20 scholars working for their doctoral degrees, several PG students working for their MSc dissertation, and several interns.

P A Azeez
Director

Organization structure of SACON



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 and Climate Change or Minister of State for Environment and Forests and Climate Change 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 22nd Annual General Meeting (AGM) of the SACON Society was held on 28th March 2013 at Chennai presided by Smt. Jayanthi Natarajan, Honourable Minister of State for Environment and Forests (Independent Charge), Government of India & President, SACON Society.

Welcoming the members of the SACON Society to the 22nd 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 sensitize the public, particularly the youth. The President commended SACON for conducting the first International Conference on Indian Ornithology at SACON, Coimbatore during 19-23 November 2011 and advised to conduct the next conference during 2013 at Coimbatore.

Members of the SACON Society			
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		
2	**Dr. V Rajagopalan,** 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	3	**Shri. S S Mohanty,** IAS, Financial Advisor Ministry of Environment and Forests Paryavaran Bhawan CGO Complex, Lodhi Road New Delhi – 110 003
4	**Dr. J R Bhatt** Advisor, Govt. of India Ministry of Environment and Forests, Paryavaran Bhawan CGO Complex, Lodhi Road New Delhi – 110 003	5	**Shri. C V Shankar,** IAS Principal Secretary to the Govt. of Tamil Nadu Dept. of Environment and Forests Govt. of Tamil Nadu Fort St. George, Chennai – 9

6	**Shri. P R Sinha,** IFS Director Wildlife Institute of India P B No. 18, Chandrabani Dehra Dun – 248 001 (UP)	7	**Dr. G James Pitchai** Vice Chancellor BharathiarUniversity Maruthamalai Road Coimbatore – 46
8	**Dr. A R Rahmani** Director Bombay Natural History Society Hornbill House, Sálim Ali Chowk Shaheed Bhagat Singh Road Mumbai - 400 02	9	**Dr. Renee Borges** Chairperson Centre for Ecological Sciences Indian Institute of Science Bangalore – 12
10	**Dr. Erach Bharucha** Director Bharati Vidyapeeth Deemed University Institute of Environment Education and Research Katraj-Dhanakawadi Pune- 411 043 (Mahrashtra)	11	**Prof Bonny Pilo** 204 Janardhan Apartments 14 Pratap Gunj Vadodara- 390 002
12	**Dr. J S Samant** Professor (Retd) Development Research, Awareness and Action Institute (DEVRAAI) 'RAAI' - 379, R K Nagar Kolhapur – 416 013	13	**Prof. C K Varshney** Emeritus Professor School of Environmental Sciences Jawaharlal Nehru University New Delhi
14	**Dr. K N Ganeshaiah** University of Agricultural Sciences Department of Genetics and Plant Breeding, G K V K Bangalore - 560 065	15	**Prof Anil K Gupta** Professor Indian Institute of Management Vastrapur, Ahmedabad Gujarat – 380 015
16	**Dr. Sukhdev Thakkur,** IFS (Retd.) 9, Baskaran Street VOC Nagar Pammal, Chennai – 600 075	17	**Dr. P Balasubramanian** Principal Scientist Division of Landscape Ecology SACON, Coimbatore – 641108

18	**Dr. S Muralidharan,** Principal Scientist, Division of Ecotoxicology, SACON, Coimbatore - 641108	19	**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
20	**The Principal Chief Conservator of Forests & Chief Wildlife Warden (WL)** Government of Nagaland Dimapur – 797 112 Nagaland	21	**The Director** Zoological Survey of India M Block, New Alipore Kolkata – 700 053
22	**The Director** Bannerghatta Biological Park Bannerghatta Bengaluru	23	**The Director** Keoladeo National Park Bharatpur – 321 001 Rajasthan
24	**Smt. Tara Gandhi** A1 Uttaravedi No 7, 2nd Seaward Road Valmiki Nagar Chennai - 600 041	25	**Dr. L M S Palni** GB Pant Institute of Himalayan Environment and Development Kosi-Katarmal, Almora – 263 643 (Uttarakhand)
26	**Dr. B M Parasharya** AINP on Agricultural Ornithology Biological Control Research Laboratory Anand Agricultural University Anand – 388 110, Gujarat	27	**Dr. P S Easa** Director Kerala Forest Research Institute Peechi P.O. Thrissur - 680 005, Kerala

Governing Council

The Chairperson of the Governing Council (GC) of SACON is the Secretary to the Government of India, Ministry of Environment and Forests & Climate Change (MoEF&CC). The GC has 16 members; Financial Advisor to the MoEF&CC, Advisor to the MoEF&CC 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 :

S No	Constitution	Name
1	*Secretary to the Government of India, or his nominee not below the rank of Additional Secretary, Ministry of Environment and Forests – Chairperson*	*Dr V Rajagopalan, IAS, Chairman*
2	*Financial Advisor, MoEF, or his / her nominee from the IFD of the MoEF (Ex-officio)*	*Shri. S S Mohanty, IAS, Financial Advisor*
3	*Advisor, MoEF, dealing with the matters of SACON, or his / her nominee (Ex-officio)*	*Dr J R Bhatt*
4	*Principal Secretary, Department of Environment and Forests, Tamil Nadu (Ex-officio)*	*Shri. Mohan Varghese Chunkath, IAS*
5	*Director, Wildlife Institute of India, Dehra Dun(Ex-officio)*	*Shri. P R Sinha, IFS*
6	*Vice Chancellor, BharathiarUniversity, Coimbatore(Ex-officio)*	*Dr G James Pitchai*
7	*Director, Bombay Natural History Society (Ex-officio)*	*Dr A R Rahmani*
8	*The Chairperson, Centre for Ecological Sciences, IISc, Bangalore(Ex-officio)*	*Dr Renee Borges*
9-11	*Three experts in the field of ornithology*	*Dr Erach Bharucha, Director, Bharati Vidyapeeth Deemed University, Pune* *Prof Bonny Pilo, Professor of Zoology (Retd), M S University of Baroda* *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*	*Prof C K Varshney, Professor (Retd), School of Environmental Sciences, JawaharlalNehruUniversity, Delhi* *Dr K N Ganeshaiah, 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 63rd meeting on 17 August 2012 and the 64th meeting on 15 March 2013 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) advise the faculty of the SACON, ii) review research proposals developed by the Centre, iii) review and assess projects being implemented, and monitor the output; dissertations, reports, papers in scientific journals and other publications, and iv) conduct annual review of all research and extension activities of the Centre and advise changes, if any. The panel of the Committee is given below.

1. Dr. A R Rahmani, Director, Bombay Natural History Society, Mumbai (Chairman)
2. Chief Wildlife Warden, Tamil Nadu or nominee (Ex-Officio member)
3. Chief Wildlife Warden, A & N Islands or nominee (Ex-Officio member)
4. Chief Wildlife Warden, Kerala or nominee (Ex-Officio member)
5. Deputy Inspector General, MoEF&CC, New Delhi (Ex-Officio member)
6. Prof. Mewa Singh, Department of Psychology, Mysore University (Member)
7. Dr. P S Easa, Director, Kerala Forest Research Institute, Peechi (Member)
8. Prof. B C Choudhary (Retd), Wildlife Institute of India, Dehra dun (Member)
9. Dr. E J James, Director, Water Institute, Karunya University, Coimbatore (Member)
10. Mr. RSC Jayaraj IFS, Director, State Forest Research Institute, Itanagar (Member)
11. Dr. K Thiyagesan, Principal, AVC college, Mayiladuthurai (Member)
12. Dr. P Balasubramanian, Principal Scientist, SACON (Member)
13. Dr. S Bhupathy, Principal Scientist, SACON (Member)
14. Dr. P A Azeez, Director, SACON (Member Secretary)

The Research, Monitoring and Advisory Committee met on 11 January 2013 (25th meeting) at SACON, Coimbatore.

Staff of SACON

The core scientific staff strength of the year (until March 2013) was Seventeen; Director (1), Principal Scientist (9), Senior Scientist (2) and Scientist (6) during the period reported.

Scientific

Director	:	Dr P A Azeez
Ornithology	:	Dr Rajah Jayapal, Principal Scientist Dr S Babu, Scientist
Avian Physiology and Genetics	:	Dr R P Singh, Scientist
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 P Balasubramanian, Principal Scientist Dr P V Karunakaran, Principal Scientist
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, Sr. Scientist Dr Mahendiran M, Scientist
Extension	:	Dr Mathew K Sebastian, Principal Scientist
Nature Education	:	Dr P Pramod, Senior Scientist

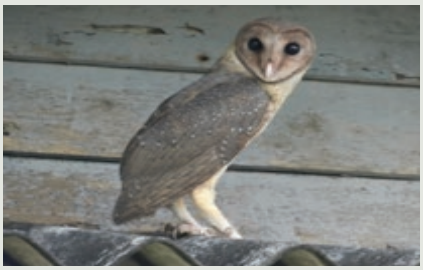
Technical

Library and Documentation	:	Mr M Manoharan, Library Assistant

Administration & Finance

Finance Officer	:	Mr Aneesh K Abraham
Jr. Administrative Manager	:	Mr R Jayakumar
PA to Director	:	Mr V Vaidiyanathan
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. (Retd) 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

Owl assemblage and occupancy in Andaman archipelago, India



Andaman archipelago consists of three main islands surrounded by around 325 offshore islands. The offshore islands are of varied sizes (0.36 to 690 km2), habitats (littoral, evergreen and mangrove forests) and distances from the main island. The Andaman Islands support ~214 species of birds with five species of owls, among them four are endemics and two 'near-threatened'. This emphasizes the significance of the archipelago in terms of conservation. It also highlights the importance of the island group for testing the hypothesis related to owl assemblages. Out of five assembly rules applied to birds, diamond's rule and nestedness reported widely in offshore islands but the pattern was not evaluated for top predators like owls. We, therefore, are evaluating the various assembly rules in relation to owl in the offshore islands of Andaman. The specific objectives of the study are (i) how do offshore islands' size, degree of isolation and habitat diversity (alone or combination of all) determine the assemblage of owls in the Andaman archipelago, and (ii) what are the habitat covariates that influence the distribution and occupancy of owls in the North Andaman.

Of the five species of owls reported from the islands, Oriental scops owl (*Otus sunia*) and Hume's hawk owl (*Ninox obscura*) was recorded in all surveyed habitats. However, Andaman hawk owl (*Ninox affinis*) was recorded only in forest mixed agriculture habitats. Number of owl species per point was higher in forest-agriculture mixed habitats and forested habitat. During the preliminary survey, habitat characteristics around the owl census point were also assessed at two levels viz., tree and understory. The presence of Hume's hawk owl was significantly influenced by higher the tree height. Higher understory height and understory cover was important for the occurrence of Andaman hawk owl. Occurrence of Andaman scops owl was influenced by higher understory height and cover but lesser grass height. Oriental scops owl was influenced by the higher tree GBH and tree canopy cover.Altogether, 50 spatial grids were covered. Fifteen islands of varied sizes and isolation were assessed for the occurrence of owl species. Among the surveyed islands, four species of owls were recorded from the Interview Island, whereas in other islands maximum of two species of owls were recorded.

Oriental Scops-owl, Andaman Scops-owl, Andaman Hawk-owl and Hume's Hawk-owl were recorded to be common to uncommon; however, Andaman barn owl (*Tyto deroepstorffi*) was rare in North Andaman. Higher species richness in forest-agriculture mixed habitats and forested habitat can be attributed to availability of diverse niches.

Dr.Babu, sanbabs@gmail.com

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

A program to conserve the edible-nest Swiftlet (*Aerodramus fuciphagus inexpectatus*),a subspecies endemic to the Andaman & Nicobar Islands has been underway since 1999, implemented by the Department of Environment and Forests, Andaman & Nicobar Islands and Sálim Ali Centre for Ornithology and Natural History (SACON). Since then the program has made significant progress; considerable increase in population has already occurred at the focal sites under protection. We are in the process of establishing a population of Edible-Nest swiftlet in a house; demonstrating that this approach will lead to far wider recoveries in population of the swiftlets and positively benefit these ecologically important islands.

During 2013, the population of the edible-nest swiftlet showed 3% and 14% growth at Chalis-ek and Baratang islands respectively, whereas in a cave on Interview island 3% decline was observed. In 2013, the total estimated population at all the three protected sites was 5855 birds. Almost 2127 chicks fledged from 2241 pairs (number of nests) breeding in 204 caves at the three sites with average breeding success of 78%. Scientifically managed harvesting of the nests is going on by the forest department and the nest protectors. Total 2053 nests were harvested during the year 2013.

Roosting pattern studies show that, there is no significant difference in arrival time of birds for roosting with respect to different lunar phases. However, breeding stage is proven to be affecting the roosting pattern of the species. During May and June 2013, 101 edible-nest swiftlet eggs were cross fostered in the nests of the glossy swiftlets in a customized ex-situ swiftlet house at Tugapur from Chalis-ek caves. More than 71% of chicks of the Edible-nest Swiftlet fledged successfully from the swiftlet house. However, no breeding attempt was recorded during the season, which we expect to happen in the coming years.

While the overall increase in the population of the Edible-Nest swiftlet is noticeable, in a protected cave in the Interview Island the population is in decline even after continuous successful breeding; to find the reasons the population is under continuous monitoring.

The urban populations should be observed and multiplied for the benefit of the species and the people. It is important to de-list the species from the schedules of Indian Wildlife Protection Act (1972) to allow protectors to get their well-deserved incentive, with scientific guidance and local administration, from this high priced, local natural resource. Discovery of the urban populations is one of the most important outcomes of the present survey.

Breeding population of the edible-nest swiftlet in an abandoned house near Port Blair Bazaar, South Andaman Island

Dr. Manchi Shirish S, ediblenest@gmail.com

Reassessment of the impact of nest collection on the edible-nest swiftlet in the Andaman Islands

One of the major objectives of the Edible-nest Swiftlet conservation programme during Phase –III was to identify the existing potential populations in Andaman and Nicobar islands to be included in the in-situ conservation program along with the existing colonies. On the basis of earlier studies it was suggested several additional Edible-nest Swiftlet breeding sites for protection in Andaman and Nicobar islands. But no further visit was made to these colonies by anybody. From the scale of decline recorded earlier we presume that situation at the suggested potential sites and also the other sites must have changed drastically. Further to this presumption,a survey was proposed to reassess the breeding populations of the Edible-nest Swiftlet in the Andaman Islands and also to understand the nest collection pressure on the undefended populations in the Andaman Islands.

Among 314 caves surveyed in the Andaman Islands, more than 64% were occupied by swiftlets. Edible-nest and glossy swiftlets were occupying around 57% and 15% caves respectively. Since 1998, more than 37 % caves were found deserted by the Edible-nest Swiftlet (Figure 1).

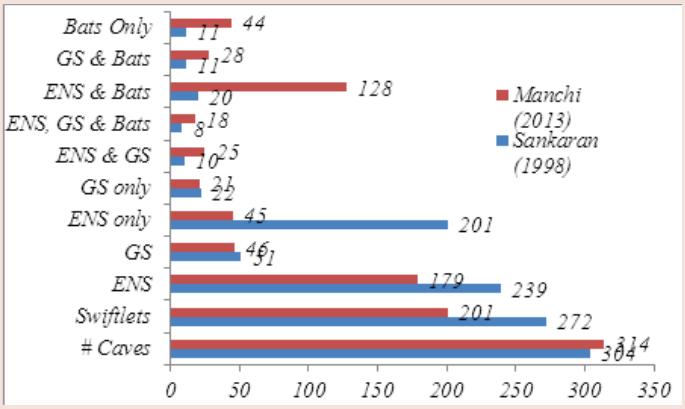


Figure 1. Number of caves occupied by the Edible-nest and Glossy Swiftlet in the Andaman Islands in 1998 and in 2013 (ENS = Edible-nest Swiftlet & GS = Glossy Swiftlet).

The results of the latest survey clearly show that the undefended population on the islands is under tremendous nest collection pressure. Among all the surveyed sites, at present only South Button and part of the Landfall islands have potential populations and these can be incorporated in the ongoing in-situ conservation of the Edible-nest Swiftlet. Both these islands are like big rocks in the middle of the open sea, no fresh water sources are available and inaccessible in harsh climatic conditions, it seem to be practically difficult to setup the protection camps. From the discussion with local nest collectors (those who used to collect nests in the past) it is understood that the undefended populations in Andaman Islands is also under tremendous pressure and the population is already lost on some islands. This information is depicted by our observations from the population trend and the current nest harvesting pressure (Figure 2). These outcomes made us believe that there may be no other potential areas remaining for suitable

Figure 2. First time located Northern most breeding colony of the Edible-nest Swiftlet on Landfall Island of North Andaman islands.

in-situ conservation of the species in the Andaman Islands. That means the present populations under protection are the key populations for survival of the species in these islands.

As the protected populations are the only viable populations in the Andaman Islands, continuous protection should be ensured. It is also imperative to survey the caves in Nicobar Islands to understand the population trend and to identify the potential sites for in-situ conservation of the edible-nest swiftlet.

Dr. Manchi Shirish S, ediblenest@gmail.com

Status, ecology and conservation of Narcondam Hornbill (*Aeceros narcondami)* on Narcondam Island, India

Narcondam hornbill *Aeceros narcondami* is the most endangered hornbill species in the world. This endemic bird is restricted to 6.82 km^2 Narcondam Island on the eastern side of the North Andaman Islands in Bay of Bengal. As the known population of the species on the island is not more than 400 individuals, the population has high conservation priority globally. During last studies, the species was observed to be facing several threats by habitat destruction and poaching. The present study is designed primarily to estimate the population of this endangered Hornbill and to understand the current threats, the species and its habitat facing on the island.

The estimated density of Narcondam hornbill was 129±63 birds/km^2 i.e. total 883 birds (estimated). On comparison with previous studies, the population shows considerable increase within a decade. The nests of the Narcondam hornbill were

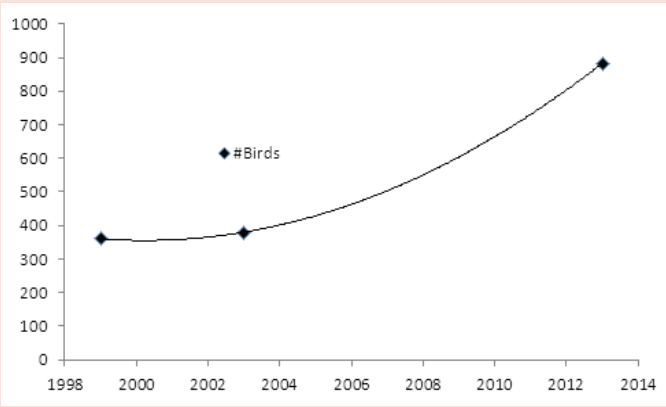


Figure 1. Population trend of the Narcondam Hornbill in last 15 years

Figure 2. A pair of Narcondam Hornbill on Narcondam Island (Male on the left and female on the right)

found on nine different tree species at different heights between 4m and 11m. Male was observed feeding female and chicks in the nest. Narcondam hornbills were found quite opportunistic in their diet. Males at the nests were seen bringing food, majority of the items being fruits of different types, mantids, spiders and grasshoppers. Total 21 types of seeds were collected from the middens. The population structure of the tree community shows normal reverse 'J' shaped curve. The recruitment rate of young individuals were observed.

The high encounter rate of the Narcondam hornbill shows that there is a noticeable increase in the hornbill population. High rate of successful fledglings shows that the species is breeding very successfully in the island. Further, survival of the fledglings have to be studied to understand the population recruitment of the species. One of the major outcomes of this study is confirmation of no goats on the island. Also, we could get indirect evidences of no poaching by the policemen on the islands or others. It is strongly recommended that there should be no more interference of any sort on the island as the Narcondam hornbill and its habitat seem to be recovering gradually, and to ensure that the species flourishes on the island.

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

Understanding the distribution patterns of biotic communities is important for planning conservation measures at local and regional levels, as global population decline is being reported for several taxa particularly from the tropics. This project aims to study the spatial patterns of distribution of selected fauna (birds and reptiles) and factors governing the same along the altitudinal gradient (about 50 to 1868 m above sea level) in the Agasthiamalai Hills, Western Ghats. Within this analytical framework, it is also planned to map the distribution range of select species of rare and endemic taxa using predictive tools like Ecological Niche Modeling (ENM).During the reporting period, we modeled the distribution probability of two such taxa: Kangaroo Lizard *Otocryptis beddomii* and Captain's Wood Snake *Xylophis captaini*. The study intends to explore the spatial patterns of species diversity to develop a protocol to identify, prioritize, and delineate biodiversity-rich sites for further protection in the newly declared Agasthiamalai Biosphere Reserve.

When the species richness of reptiles and birds was plotted against the altitudinal categories and contrasted with the simulated response, it was found that both taxa did not show uni-modal pattern as predicted by the mid-domain theory. Typically, the species richness of both the taxa showed a steadily declining trend with increasing altitude, though the rate of decline varied between altitudes. For example, the decline was slow and gradual till 800 m elevation, but took a steep fall between 800-1200 m. The highest reptile species turnover among consecutive elevational zones was noted between 1100-1200m and 1200-1300m zones (SI=0.75). In addition, the species turnover of reptiles was observed to be nearly complete between 600-700m and 800-900m zones. Expectedly, most of the higher altitudinal zones (>1200m) had higher turnover (SI> 0.8) with lower altitudes. Unlike the reptiles, the species turnover in birds was rather gradual and contiguous barring the composition of communities between 300m and 1500m, which were almost non-identical.

The Ecological Niche Modeling (MAXENT) predicted that potential sites (p>0.7) for *Otocryptis beddomii* were found south of Periyar Tiger Reserve and highly suitable sites (p>0.8) were predicted only further south of the Shenkottah Gap. About 730 sq km of Western Ghats,including 620 sq km in Agasthiamalai Biosphere Reserve, was found to be moderately suitable (p >0.6) for this species Similarly, *Xylophis captaini* was found in 33 locations.The model showed that the predicted distribution of *X. captaini* as south of Thodupuzha (09.58'N, 76.38') of the Kerala State.

Otocryptis beddomii

The differences between reptiles and birds in terms of species turnover along altitudinal gradient were quite marked unlike their near-convergence in species richness-elevation pattern. We suspect this to be largely a function of relatively higher degree of endemism and niche-conservatism shown by reptilian taxa compared to birds.

Regarding the species-distribution models, it was evident that the precipitation seasonality has highest predictive gain when used in isolation and it appeared to be the most important variable for the predicted model.The findings show that MAXENT model is suitable for predicting distribution range of species, which will be useful for further targeted surveys. Other models using presence and absence data and habitat variables will be developed for predicting distribution range of little known species particularly rare and endemic taxa of high conservation significance.

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Spatio-temporal burrow use patterns by vertebrates in Keoladeo National Park, Bharatpur, Rajasthan, India

In arid and semi-arid conditions, due to scanty rainfall and high fluctuations in temperature, it appears that earthen burrows act as important refugia for many species. A study conducted in Keoladeo National Park (KNP), Bharatpur reported the occurrence of several species of vertebrates (both predators and prey) together in underground burrows. However, factors determining faunal assemblage and activity of these species are unknown. Hence a study has been designed with the objectives : (i) determine burrow dwelling animal assemblage in KNP, Bharatpur, and (ii) understand (spatio-temporal) factors influencing the assemblage and activity of animals, especially their emergence from and retreat into burrow. Direct observations, camera traps, burrow video camera and indirect evidences have been used for assessing burrow occupancy and activities of various species; data loggers for assessing burrow and ambient temperatures and humidity, and burrow structure will be determined using Ground Penetrating Radars.

The study is being undertaken at Keoladeo National Park (KNP), Bharatpur (27°7.6´ - 27°12.2´N, 77°29.5´ - 77°33.9´ E), Rajasthan. Animals inhabiting Indian crested porcupine (ICP) *Hystrix indica* burrows are being studied, as this is the most conspicuous burrow system available at KNP. Surveys were carried out on foot traversing the land area to locate porcupine burrows, and the burrow locations were marked using a Global Positioning System.

Forty one porcupine burrow systems were recorded in Keoladeo National Park, Bharatpur during the present study i.e. November 2013 - March 2014. This works out to be about 2 burrows/ sq km. Porcupine burrows were found largely in clusters and most of them were located on the periphery of the wetland. Twenty burrows were randomly selected to study number of animals dwelling there. 170 trap days covering the burrow openings (34 openings X 5 days) showed 13 species of vertebrates; 17 burrows had porcupines, and pythons and bats were found in seven and nine burrows respectively (Table 1). 46 Porcupines were observed in 17 burrow systems i.e. 1.96±1.07 (range = 0-8)/ burrow system. This works out to be 3.92 animals km-2 in the terrestrial area of KNP. ICP occupied 17 burrow systems with burrow openings ranging in number from 1-4 per burrow system. Hyenas and jackals were also found to be using the burrows for giving birth and an interaction between jackal and Indian pythons was observed.

The preliminary data on the burrow dwelling animal communities is being collected and it shows the importance of the terrestrial burrows in the semi-arid region of KNP. The camera trap data so far revealed 13 vertebrate species using these burrows either regularly (e.g. porcupines, Indian pythons, Bats) or at some stage in their life cycle (e.g. littering by golden jackals and striped hyenas).

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Table 1: Burrow use by vertebrates in 20 burrows systems studied in KNP. Each burrow opening was monitored for five consecutive days using IR cameras.

Species	Taxa	(Species)												
		1	2	3	4	5	6	7	8	9	10	11	12	13
Indian Porcupine (1)	Mammals	17	3	3	4	8	1	1	1	1	2	4	1	2
Field Rat (2)			3	2	1	1	-	-	-	-	1	-	-	1
Grey Mongoose (3)				3	1	1	1	-	-	-	1	-	-	-
Golden Jackal (4)					4	1	-	-	-	-	1	5	-	1
Bat (5)						9	1	-	-	-	-	2	-	-
Jungle Cat (6)							1	-	-	-	-	-	-	-
Five Striped Squirrel (7)								1	-	-	-	-	-	1
Black-naped Hare (8)									1	-	-	-	-	-
Striped Hyena (9)										1	-	-	-	-
Hemidactylus Gecko (10)	Reptiles										2	-	-	-
Indian Python (11)												7	-	1
Bengal Monitor (12)													1	-
Indian Robin (13)	Bird													3

Determining the taxonomic and conservation status of the Forest Owlet (*Heteroglaux blewitti*)

The forest owlet (*Heteroglaux blewitti*) is a Critically Endangered, endemic species distributed in less than ten locations in central India. While the species was believed to be extinct, after a gap of 113 years it was rediscovered in 1997. Its distribution is extremely patchy with no information on connection among the various populations. Its primary habitat is under severe threat from anthropogenic pressure, which has probably led to the extinction of some earlier pockets of populations. The current project aims to study the phylogeography of the forest owlet to examine genetic connectivity between various populations, examine its molecular taxonomy and phylogeny with other owls and resolve the issues of possible hybridization with spotted owlet. The study is based on molecular analysis of feather samples collected non-invasively.

To date 20 individual forest owlets from the Khandwa (Madhya Pradesh) population have been sequenced for a total of 1500 bp of the COX1 and Cyt b genes of the mitochondrial DNA. Four spotted owlets have also been sequenced for the same regions. Currently, phylogenies are being built with this dataset.

130 samples of various owl species including those from the genera *Athene, Nynox, Glaucidium* and *Tyto* were obtained from the BNHS museum and are now being analyzed in the laboratory.

Primers for nuclear genes have been ordered for purchase and in the future populations from around Melghat Tiger Reserve and Toranmal in Maharashtra will be sampled, once permits from the forest department are obtained.

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Ecological species sorting in relation to habitat structure in the small cat guild of Eaglenest Wildlife Sanctuary, Arunachal Pradesh.

Nine of the 15 species of felids found in India occur in the north-east, perhaps the richest anywhere in the world. Cat morphology frequently indicates evolutionary origins with long tails suggesting arboreality and short tails, adaptation to open habitats. Yet, literature suggests considerable flexibility in the choice of habitats by most felids. We propose to explore if felid morphology is strictly related to habitat structure, facilitating co-existence particularly in a high diversity region. This project aims to study this in Eaglenest Sanctuary in the West Kameng district of Arunachal Pradesh,

through non-invasive sampling using scats, molecular tools, camera trapping and spatial analysis on the GIS platform.

Permits from the forest department of Arunachal Pradesh for beginning the work are awaited. Weather stations have been procured and transferred to Eaglenest Wildlife Sanctuary where they will be deployed in the winter months. LISS IV imageries for the sanctuary and 30 heat sensor camera traps have been ordered and their delivery is awaited.

Preliminary surveys were initiated in January. Chemicals and kits for molecular analysis of scats have been procured.

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Social organization, behaviour and phylogeography of *Macaca fascicularis umbrosa* on the Nicobar Islands, India

In India, data on the unique endemic subspecies, *Macaca fascicularis umbrosa*, is limited only to a status report from a short survey. This subspecies is endemic to three islands namely Great Nicobar, Little Nicobar, and Katchal. Nicobar Islands were one of the worst hit areas during the December 2004 Tsunami. Large parts of the habitat of the macaque were affected. Further, the inhabited islands have been isolated since long and this could potentially result in inbreeding within, and genetic isolation among populations. The consequence of this would be high genetic distance among populations resulting in strong genetic structure and variations. Phylogeography utilizes standing patterns of genetic variation to explain historical events such as migrations and demography over space and time. The project aims to document and study the phylogeography, social organisation and behaviour of *Macaca fascicularis umbrosa* in the Nicobar Islands, which would help in understanding the ecology and evolutionary history of this species.

A total of 224.63 km (N=36 trails) was walked in three islands, and 72 groups of monkeys were sighted, which means an encounter rate of 0.32 groups/km. The number of detection of long tailed macaque group was 29, 5 and 38 in Great Nicobar, Little Nicobar and Katchal respectively, which otherwise means a relative abundance of 0.26, 0.28 and 0.41 groups/km respectively.

For genetic analysis seven samples of the monkey's feces were sequenced. We downloaded sequences of all sub species from NCBI (National Centre for Biotechnology Information) database to compare genetic relationship between the species. In terms of systematics, the fascicularis group is structured and has several sister groups. The

Indonesian group is paraphyletic individuals from this group occurring in more than one clade. Our present results shows that two haplotypes with just a single mutation was seen in 550bp. Very low variation could be attributed to either sampling the same individual or closely related individuals, since the sampling was from one location or the region of marker chosen (D-loop) is conserved.

The relative abundance of monkeys in Great Nicobar and Little Nicobar did not show any significant difference between post and pre Tsunami. However, the relative abundance of monkeys in Katchal shows significant increase after Tsunami. Pre Tsunami encounter rate in Katchal was 0.19 groups/ km, which has significantly increased to 0.41 groups/ km. This increase in encounter rate can be attributed to coconut plantations, which were abandoned after Tsunami. The Nicobar macaques seem to be falling in a separate group (unique), closest to the Javan group forming a sister clade. However, since the samples are from a single location this cannot be conclusive.

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A survey of Slender Loris in parts of Kerala and Tamil Nadu, India

The Slender Loris *Loris lydekkerianus* is one of the two nocturnal primates found in India. Two subspecies are recognized so far; the Mysore Slender Loris, *Loris lydekkerianus lydekkerianus* and the Malabar Slender Loris, *Loris lydekkerianus malabaricus* inhabiting the dry and wet forest types of the Eastern and Western Ghats respectively. Although the distribution and abundance of the species is known for the state of Karnataka and some parts of Tamil Nadu, Kerala and Andhra Pradesh, the full distributional extent of the species in southern India remain largely unknown. So, understanding the distribution pattern of the lorises and the quality of the remaining forests will help in conservation prioritization and planning for conservation in the crucial areas.

23 forest ranges in 11 forest divisions in southern Kerala was surveyed. 47 lorises were sighted during the 641 km of walk or vehicular transects. Slender loris was sighted in all the forest divisions except Ranni division. 12 forest divisions were surveyed in the Tamil Nadu, among them one is Biological Park, which is a protected area, where as all other surveyed areas were outside the protected area. A total of 782 km of walk or vehicular sampling was made and sighted 60 lorises. All the lorises sighted in the present survey in Tamil Nadu were identified as *L. l. lydekkerianus*.

The distributional range of *L. l. malabaricus* is confined to the western slopes of the Western Ghats. Ariankavu pass and Palghat gap has created a major barrier over a period for the movement of animals across these gaps, which has resulted in separate populations for *L. l. malabaricus*. Thus, the population of *L. l. malabaricus* in Kerala can be considered as three populations i.e. Neyyar WLS in the southern tip to the south of Ariankavu pass, population in the north of Ariankavu pass up to the south of Palghat Gap and north of Palghat gap up to Aralam WLS.

In Tamil Nadu, lorises are confined to the forests of Western Ghats, Eastern Ghats and its adjoining forests. The populations of lorises are contiguous with the population in Karnataka and Andhra Pradesh in north. Apart from the population found along the Western Ghats, other major populations include -1) Karur- Dindigul- Madurai-Tiruchirapalli- Pudukottai, 2) Shevroy hills of Salem, 3) Krishnagiri, 4)Vellore-Thiruvannamalai, and 5) Chennai-Thiruvallur.The habitat loss may be the important threat for the conservation of lorises in Tamil Nadu. Habitat loss has already driven the population into isolation; thus conserving the scrub forests of Eastern Ghats can only help the long-term conservation of lorises and the existing remnant forest patches should be protected and upgraded for their conservation.

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Evaluating the status of NTFP trees and development of a model for sustainable harvest of Garcinia gummi-gutta in Aghanashini Lion-tailed Macaque Conservation Reserve, Western Ghats, India

Forests of Sirsi-Honnavara over the last decade has seen a rapid decline in the vegetation cover of estimated yearly loss of 1.9%, in which largest population of LTM was first identified in 2002 and reconfirmed and marked the boundaries to develop as protected area in 2008, which has resulted in "Aghanashini Lion-tailed macaque Conservation Reserve". The work suggests an overlap in utilization of resource by both monkeys and people. Out of 13 NTFP collected by people, nine of them are food for LTM. Of these *Garcinia gummi-gutta* (Uppage) is the most widely extracted NTFP by all sections of the society. Uppage is the most important food item during the wet season for the LTM constituting 16.4% of its food, while for the whole year it constituted 7.1%. These findings were of interests to the forest managers and they were keen on banning extractions of the NTFP. In this context, a study was conducted to develop a model for sustainable harvest of Uppage and its impact on stand structure, regeneration, and for its sustainable management by the forest managers.

The status of NTFP tress was assessed in five selected sites in the habitat of lion-tailed macaque. A series of interactions and public meetings with local people was held to influence them for proper and sustainable harvesting system at right phenophases of Uppage and also seeking inputs from them in minimizing their dependence on the forest. Meetings with the processing firms and factories were also held to exclude

middle men from the trade, thus ensuring supply of quality raw materials directly from harvester to the factory.

Among the NTFP tree species, the IVI of *Garcinia gummi-gutta* varied from 5.1 to 10 in the study sites and in the southern part of the same landscape the IVI was 7.9. The IVI value of *Caryota urens* in southern ACR was 5.5, where as in the northern ACR it was 2 or less. *Myristica malabarica* and *Myristica dactyloides*, which are known to be highly exploited by people for NTFP, showed variation from 1.2-2.9 and 2.4-9.7 respectively indicating high degree of variation across the area.

The income from *Garcinia gummi-gutta* forms a major share of the annual income of the local people. The high requirement for firewood to process the rind of *Garcinia gummi-gutta* has lead to severe fragmentation of the habitat. To mitigate this it is imperative to decrease the firewood usage by people, we recommended distribution of ASTRA ovens, which would require lesser firewood, to the people. Restoration of the degraded areas was also an important consideration for the study. The species important for both LTM and people needs to be raised in nurseries of the forest department for the purpose. Streamlining the process of harvesting and marketing will also have a positive impact in decreasing pressure on the forest.

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Ecological investigation of woody vegetation and nest tree use by birds in the riverine forests of Athikkadavu Valley, Western Ghats

Two important tree strata namely bole and canopy are heavily used by birds for nesting. While the cavity nesters such as parakeets, owls, barbets, hornbills, woodpeckers, and mynas use the cavities of live and dead trees, stick-nesting raptors such as kites, eagles, vultures and owls use the tree canopy. Cavity nesting birds prefer diseased, dying or dead trees because it is easier to find or excavate cavities in such trees. In India, more than 100 species of tree-cavity nesting birds have been identified, but very little information is available about their breeding habits.

Riparian forests are exceptionally rich in woodpeckers, parakeets, tits and owls, and protecting the trees favored by birds attracts a variety of birds. Anthropogenic interventions such as tree felling, non-timber forest produces collection, agricultural activities alongside the forests threaten birds that nest in cavities of tree trunks and canopies. Hence, it is felt that a study on tree diversity and its use by birds in the riverine forests of an important river system-the Bhavani, a tributary of Cauvery, would be useful for protecting the biodiversity.

During the study, seventy woody plant species belonging to 38 families were recorded in the riverine forests. Thirty six woody species were utilized by the local people, for fruits, dyeing, food, livestock feed, wood for house construction, fencing purpose and fuel wood.

In the riparian and its fringe forests 145 bird species belonging to 46 families were recorded. Of these 32 were cavity nesters. Cavity bearing trees were searched along the river banks for finding out the nest trees. Thirty five cavity bearing tree species belonging to 21 families were recorded and all these species were used by birds for nesting.

Encroachment of riparian fringe forests by the local residents for cultivation purpose leads to fragmentation of the forest strips along riverbanks. Lopping is also common scenario in the area. Efforts need to be initiated by the forest department to control these activities. In order to make the connectivity of the riparian strip, degraded sites needs to be restored by planting appropriate native tree species.

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Status and distribution surveys of selected CR/EN/VU plant taxa in the wild

Cycas circinalis

Tamil Nadu Forest Department has formulated Tamil Nadu Biodiversity Conservation and Greening Project (TBGP) primarily aimed at assessing the wild plant taxa for conservation of vital biodiversity of the state both inside the Protected Areas and Reserve Forests. The project is being implemented at several stages with financial assistance from Japan International Cooperation Agency (JICA). The steps for assessment of wild threatened taxa in the forest areas were framed based on the IUCN criteria. A state wide assessment plan was made and it was decided to carry out the surveys in 17 Divisional Management Units (DMU) across the state. Of the 17 DMUs, four [Sathyamangalam Wildlife Sanctuary (SWS), Point Calimere Wildlife Sanctuary (PCW), Mukurthi National Park (MNP) and Gudalur Forest Division (GFD)] were allotted to SACON.The specific objectives of the project are to prepare the master check list of plant species in the above four DMUs, list out the endemic and threatened taxa in the DMUs, and assess the status of the threatened plant taxa (IUCN) in the DMU.

Sathyamangalam Wildlife Sanctuary: Fifty seven quadrats were laid in 14 forest types. In all, 925 species were recorded. Ten threatened species comprising five vulnerable and five endangered species were found which include nine trees and an orchid, *Vanda scandens*.

Gudalur Forest Division: Eleven quadrats were laid in five different forest types. Two hundred and eighty species were recorded. Five threatened species including four trees and one herb were found. Majority of the threatened species were reported from the southern montane wet temperate forest.

Pterocarpus marsupium

Mukurthi National Park: Eight quadrats were laid in two different forest types namely (shola) southern montane wet temperate forest and grassland. In all, 195 species was recorded. Six threatened species including five trees and one herb were found. Majority of the threatened species were located in the southern montane wet temperate forest.

Point Calimere Wildlife Sanctuary: List of plants of Point Calimere has been prepared from published literature. Vegetation sampling in the field is scheduled during 2014-15.

The surveys indicated the presence of exotic weeds across habitats in all the DMUs. *Lantana camara, Eupatorium glandulosum, Parthenium hysterophorus, Prosopis juliflora* are commonly occurring in Sathyamangalam Wildlife Sanctuary. *Acacia spp* are abundantly found in MukurthiNational Park.

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Monitoring and Surveillance of Environmental Contaminants in Birds in India

Birds are one of the major victims of environmental contaminants as they occupy a wide range of trophic levels in different food chains. One of the reasons is suspected to be pesticides and heavy metals residues in vital organs. In India, the actual situation, among birds, is not known since there are not many studies. Hence, a study has been initiated for monitoring the levels of contaminants in birds that will give an indication on their distribution in the environment, which would help administrators informulating effective control measures. The specific objectives of the present study were (i) monitor residue levels of persistent chemicals in birds and generate a database, (ii) identify chemicals responsible for mass mortality of birds across the country, and (iii) assess the effectiveness of guidelines on usage of major chemical pesticides in the country.

The study is in progress and several samples from various locations in the country are being collected for residue analysis.

Waterfowls poisoned to death near Sivakasi,Viruthunagar Dt of Tamil Nadu:

Post-mortem examination of Rose-ringed Parakeet Psittacula krameriat Ahmedabad, Gujarat

Between April 2013 and March 2014, 148 individuals comprising 39 species of birds were received dead from states, namely Assam, Gujarat and Tamil Nadu. Notable species are bar-headed goose, sarus crane, demoiselle crane, Himalayan griffon vulture, white-rumped vulture, painted stork and great white pelican.

On priority basis, 189 tissue samples belonging to three and 19 species of birds received from Assam and Gujarat, respectively were analyzed for 19 banned or restricted persistent organochlorine (OC) pesticides. Levels of ∑-OC were found to be high (2600.22 ± 564.46 ng/g) in liver tissues of Himalayan griffon *Gyps himalayensis* from Assam and low (12.99 ± 4.32 ng/g) in rose-ringed parakeet *Psittacula krameri* from Gujarat. Among the various OCs tested, isomersof HCH (41%) and metabolites of DDT (29%) contributed more tothe ∑-OCPs than ∑-endosulfan (12%), dieldrin (8%), ∑-heptachlor (6%), dicofol (3%) and alachlor (1%). Among the isomers of HCH, β-HCH accounted for 47% of total HCH, while γ-, α- and λ-HCH accounted for 27%, 22%and 4% respectively. Of all the metabolites of DDT,p,p'-DDE contributed the maximum (63%) to the total DDT residue, indicating its higher persistence in bird tissue. The maximum accumulation of OC residues was in liver of birds and the minimum in gut. Although, the differences were not significant among tissues (ANOVA, P>0.05),

significant differences were observed in OC levels among the various species of birds studied. When all the birds were grouped based on their food habits significantly higher load of pesticide residues were recorded in carnivorous birds (ANOVA, $P<0.05$). Total OC pesticide load was in the following order: carnivores> insectivores> piscivores> frugivores> omnivores> granivores. When individual pesticides were considered, significant variation was observed in HCH residues among the species of birds studied ($P<0.05$). Comparatively higher load of ∑-HCH (>2000 ng/g) was recorded in red-wattled lapwing and barn owl from Gujarat. Among all the OCPs detected, α-endosulfan and p,p'-DDE were the highest in concentrations i.e. 9653.97 (intestine) and 7,431.01 ng/g (liver) respectively in lesser adjutant *Leptoptilos javanicus* from Assam. Total DDT and HCH levels were high in many individuals and warrant attention. The results clearly indicate that OCPs, namely DDT andHCH, remain widely persistent in birds all over India.

In addition to OC, residues of chlorpyrifos, the most common organophosphate, have also been detected in liver (94.43 ng/g) and kidney (83.73 ng/g) of white-rumped vulture *Gyps bengalensis* collected from agriculture field near Ahmadabad, confirming the cause of its death. Other species detected noticeable amounts of chlorpyrifos include both intermediate egret *Mesophoyx intermedia* (Intestine: 35.65 ng/g) and oriental white ibis *Threskiornis melanocephalus* (liver: 25.80 ng/g) from Gujarat and, Himalayan griffon *Gyps himalayensis* (liver: 11.92 ng/g) and lesser adjutant *Leptoptilos javanicus* (intestine: 11.63 ng/g) from Assam. Levels of chlorpyrifos were BDL in other samples. Hence, it is clear that even chemicals with a very short half-life, such as chlorpyrifos, could pose threat to birds if the exposure levels are high.

Forty liver and 78 brain samples from 11 and 23 species of dead birds, respectively collected from Ahmadabad were analyzed for cholinesterase (ChE) activity.The highest level of mean liver ChE activity was observed in oriental black ibis *Pseudolus papillosa* 0.93±0.03 µmol/min/g and lowest was in black kite *Milvus migrans* 0.24±0.2 µmol/min/g. Brain activity ranged between 2.02 µmoles/min/g in bar-tailed godwit *Limosa lapponica* and 8.39 µmoles/min/g in rosy starling *Sturnus roseus*. The variation in brain and liver ChE activity among the species was significant ($p < 0.05$).

Mean liver ChE activity was found to be the highest in oriental white ibis *Threskiornis melanocephalus* (2.18 µmol/min/g) and lowest in black kite *Milvus migrans* (0.68 µmol/min/g). The brain activity among the species was significant ($p < 0.05$) and varied between 0.37µmoles/min/g in blue rock pigeon *Columba livia* and 1.63µmoles/min/g in bar-tailed godwit *Limosa lapponica*.

Maximum levels of both liver (3.75 µmol/min/g) and brain (2.4 µmoles/min/g) ChE activities were recorded in common myna *Acridotheres tristis*. Likewise, lowest levels of liver (1.23 µmol/min/g) and brain (0.08µmoles/min/g) activities were recorded in black ibis *Pseudibis papillosa*.

The whole brain and liver ChE activities recorded in the present study could be used as reference values for understanding the impacts of anti-cholinesterase inhibiting pesticides. Nevertheless, ChE can give an early qualitative and semi-quantitative warning of the toxic effects of OP and Cb pesticides in birds.

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Surveillance of Waterfowl at Nalabana Bird Sanctuary, Chilika Lake, Odisha

Many species of waterfowl died in Nalabana Bird Sanctuary every year during the winter since 2006; northern pintail, northern shoveler, brown-headed gull and garganey teal were notable among them. During 2009-10, a detailed investigation was carried out to understand the reason for the mortality especially with respect to pesticides. None of the pesticides tested was found to be responsible for the mortality. Hence, SACON carried out a study to check if there were any other causes responsible for the huge mortality. Although we had generated information on many pesticide residues in the dead birds, the levels of some toxic metals were not estimated. Hence, it was proposed to use the preserved tissues from muscle, liver and kidney of seven species of birds (20 individuals) to estimate the levels of heavy metals such as Cu, Cr, Pb and Cd.

View of Large congregation of Birds at Nalabana Bird Sanctuary:

Northern Pintail Duck (Anas acuta) showing flaccid paralysis of head and neck

Of all the four metals analyzed in the three body tissues, liver had significantly higher concentration of Cu (1026 ng/g) than kidney (773 ng/g) and muscle (335 ng/g) tissues. Mean Cu concentration was the highest in Eurasian wigeon *Anas penelope* (1057 ± 1024 ng/g) and minimum in Common Pochard *Aythya ferina* (290.75 ± 165.27 ng/g). Cu concentration varied significantly among Eurasian wigeon, northern pintail and garganey teal ($p<0.05$). Highest mean Cr concentration was seen in northern pintail *Anas acuta* (1049 ± 78 ng/g) and lowest in Common Pochard *Aythya ferina* (2667 ± 1147 ng/g). Levels of Cr in livers of all the 7 species of waterfowl ranged between 38.75 ng/g and 1030 ng/g. Mean Pb concentration was the highest in Eurasian wigeon *Anas penelope* (195 ± 0.00 ng/g), while the lowestwas in Northern Pintail *Anas acuta* (19.20 ± 10.80 ng/g). Variation in lead concentration was not significant among the species ($p>0.05$) studied.

According to the available information, present levels of Pb and Cd fall well below the subclinical exposure and are not indicative of mortality due to these heavy metal toxicity.

Contamination of Cu, Cr, Pb and Cd in seven species of birds recorded in the present study are lower than the levels documented elsewhere. Although the present levels of contamination is not alarming, it is of concern as even low level of exposure if continuous, can pose serious problem in long run.

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Impact assessment of prospecting exploration activities through 3D seismic data acquisition by Oil India Ltd on mangrove fauna at Kakinada, Andhra Pradesh

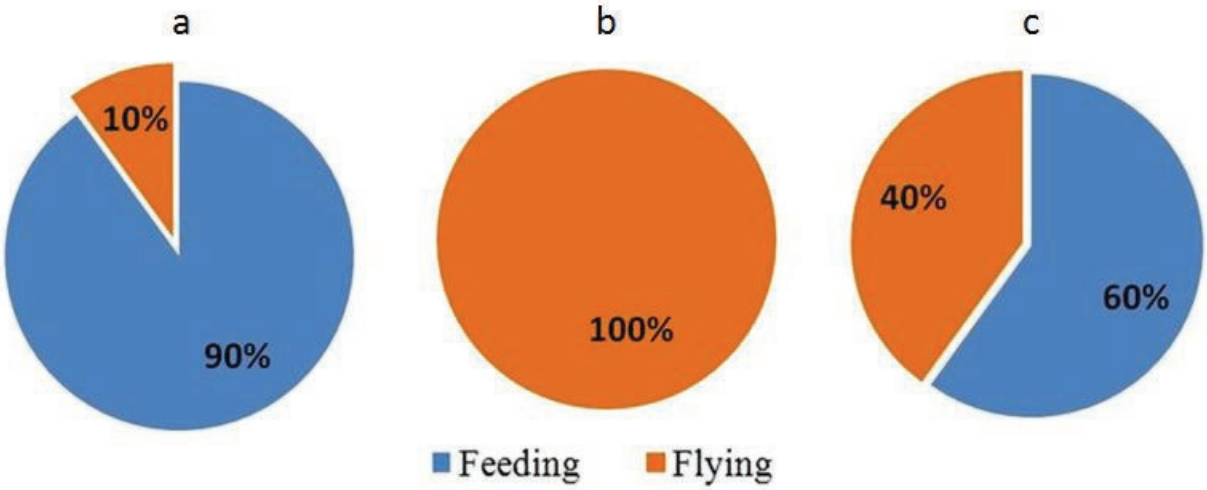
Scientific studies on seismic exploration showed that, it has the potential to affect wildlife by increasing noise and human activity during the seismic shooting process. The present monitoring study had originated from one of the recommendations of an earlier study by SACON titled "Impacts of Proposed Seismic Survey Operations on the Avifauna and Wildlife of Reserve Forest Areas of KG Basin Project of OIL India Ltd". The study had recommended specific management and mitigatory measures for the then proposed 3D seismic surveys in East Godavari mangrove areas targeting at minimization of the disturbances due to the activity to the fauna and flora. As a continuation of the previous study, the present study was aimed at monitoring the impact of prospecting exploration activities by OIL through 3D seismic data acquisition on the fauna of mangrove forests at Kakinada, East Godavari district of Andhra Pradesh and to generate information on response of select faunal species during the seismic surveys.

Damaged mangrove plants

Dead fish - Acanthopagrus latus

Our studies indicated that, activities related to seismic survey did disturb both migratory and resident birds' normal activities. Most of the birds flew off from their perches during the shooting time due to sound. People moving in and around the mangrove for drilling shot-holes and transporting materials also disturbed birds and other fauna. It was also observed that beyond 100m there was no perceivable change in the behaviour or activity pattern of birds in response to the seismic shoots. During seismic shooting, insects especially bees suspended their activities and were airborne. However, after a few minutes they resumed their activities. Butterflies also were found to be disturbed and flying off during shooting time possibly due to the vibrations. Direct impacts on habitat is caused by clearing of mangrove vegetation during the laying of geophones and cable lines as well as shot hole drilling for the 3D seismic explorations. During the study, two dead fishes were found in the shooting activity zone. It is inferred that, the sudden seismic shock can affect fishes and crabs which are very close to the shot hole area. No major direct impacts were observed on other faunal species such as birds, reptiles, insects, and crustaceans during the survey. There were no impacts found on fauna beyond 100 meters from the shooting sites. Based on the study, it was suggested that (i) the seismic survey activity may preferably be restricted to the period between May to November; (ii) more specifically, no activity should be undertaken during December to February in the

View of Large congregation of Birds at Nalabana Bird Sanctuary:



Insects' feeding and flight activities during seismic shots (a - before shooting, b- during shooting and c – after shooting)

mangrove areas (iii)) the survey may be avoided along the 1km wide stretch along the beaches during February to April, (breeding season of olive ridley (*Lepidochelys olivacea*) and (iv) avoid natural habitat destruction during selection of locations for shot-holes and for laying geophones.

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Cumulative environmental impact assessment (CEIA) of hydro-electric projects of Sutlej river basin in Himachal Pradesh (HP) - faunal aspects

The state of Himachal Pradesh is the catchment of several major west flowing north Indian rivers and is rich in biodiversity. Although several hydro electric projects are proposed on many of these rivers, the intrinsically complex issues associated with steep and unstable terrain of Himalayan region wherein these projects are planned and the impact from alteration of existing hydrological regimes remain serious concern. Hence, a study was assigned to evaluate the cumulative environmental impact of hydropower projects in the Sutlej river basin of the state and to prepare suitable Environmental Management Plan (EMP) to reduce these impacts on fauna and rivers. The scope of the assignment include i) inventory of avifauna and other terrestrial fauna,ii) evaluation of conservation importance of species (rare, endangered, threatened, endemics etc.), iii) documentation of existing Protected Areas in the study area, iv) explore existence of barriers and corridors for wild animals, threats to wildlife and identification of ecologically sensitive areas and v) examine faunal impacts of Baspa and Nathpa Jakhri projects as case studies.

Six hundred and ten faunal species were recorded; 118 species of butterflies, 13 species of amphibians, 37 species of reptiles, 368 species of birds, and 74 species of mammals. Of the birds, 44 species were migratory (31 winter visitors and 12 summer visitors), 111 (30.16%) species were local migrants, and 168 (45.65%) species residents. Twenty-four threatened species as per the IUCN status were present in the

basin. Seven bird species endemic to Western Himalayas are also present.

The cumulative analysis showed that the proposed HEP sites in the middle elevation area had maximum faunal wealth. Water dependent bird species such as forktails, dippers and redstarts were found exclusively associated with the tributaries of the Sutlej with clear waters in the rhiparian zones. Changes in the flow pattern and water quality caused by hydroelectric project in the higher elevation zones of the tributaries especially in the zone I and II will affect avifauna the most. Among the three zones, the middle zone, especially between 2000 and 3000 m elevation, is most important habitat for the wild fauna followed by the lower zone.

Hydropower development activities will lead to changes in the faunal communities due to the creation of more lentic (stagnant) habitats and decline in lotic (running water) habitats. The Basin under investigation is crucial for the endangered snow leopard *Pantherea uncia*, and vulnerable Cheer Pheasant *Catreus wallichii*. Initiatives towards strengthening the long-term conservation of these species are recommended for sustainable development of this region.Good population of cheer pheasant is present in and around the Majdhal WLS near the Koldam project. Since some of the potential habitat patches of this species are present outside the protected areas, community conservation reserves may be developed in these regions with appropriate incentive schemes for public participation.

The Nako Lake of Kinnaur district; A high altitude lake at 3662 m above MSL

View of Spiti River and the Cold desert landscape near Kaza

The proposed/under investigation projects in the zone I (Chango-Yangthang, Khab, Lara Sumta, Sumte Kothang and Young Thang Khab) are located close to Kibber WLS and are possible snow leopard habitat and hence any further disturbance to this system should be avoided. Apart from the above two species, there are other sensitive and threatened faunal elements as well as several river/ stream associated species that prefer the pristine conditions along the river courses. Strict maintenance of environmental flow and monitoring the compliance of the same is recommended. It was also recommended that with flushing of silt from desiltation chambers, coordinated between multiple projects, and extended release with a higher dilution factor, a well designed futuristic power generation network could be designed.

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

The study was taken up further to the request from Genting Energy Ltd. to understand the potential environmental impacts of their Jangi wind power farm. The specific objectives of the project are i) documentation of prevailing environmental / climatic conditions of the area, ii) documentation of bird and bat populations in and around the project sites and identification of roosting sites, iii) developing an effective monitoring protocol for bats and birds, iv) recording the seasonal patterns in the migratory bird population and assess the importance of the area in terms of migratory route for birds and v) evaluate the impact of the project on Raptor roosting sites. .

So far, 172 species of birds belonging to 45 families and 16 orders have been reported. Of these 69 species were wetland species (38 residents and 31 winter migrants) belonging to 10 orders and 19 families. Among these, 3 species (dalmatian pelican, greater spotted eagle and sarus crane) fell under the category 'vulnerable' and 9 species (darter, painted stork, black-necked stork, Oriental white ibis, pallid harrier, European roller, black-tailed godwit, Eurasian curlew and river tern) fell under 'near threatened' species. Of the total 20 species of raptors recorded, only five species were resident to the area. Except a single nest of shikra, no nests of other raptors were recorded.However, other birds like egrets, herons, starlings, bee-eaters, peafowl, mynas, etc. were regularly roosting in the study area. During winter, the wetlands support thousands of migratory birds, dominantly pelicans and cranes. Of the 172 species recorded, 63 species of terrestrial birds were found wintering in the project site in large numbers.

View of Jangi Wind farm area

Blue rock Pigeon mortalitya

Thirty eight bird fatalities of different species (blue rock pigeon, house crow, indian peafowl, Eurasian-collared Dove, common Kestrel, cattle egret, pallid scops Owl, steppe eagle, long-legged buzzard, black drongo, and black-crowned night heron) were recorded. The annual mortality rate of birds during past two years from collision with turbine blades ranged between 0.1 to 0.2 birds/turbine, comparatively low than most reports from other parts of the world. Only a single colony of bats (Indian flying fox) is present in the study area and seasonal changes of the population have been regularly monitored. Since 2011, only four instances of bat fatalities were recorded in the farm included 3 greater mouse-tailed bats.

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Cumulative Impact Assessment study of Hydro Power Projects on river Yamuna, Tons and tributaries (Uttarakhand) - Faunal aspects

The river Yamuna together with its tributary Tons is identified as a major source for hydro electric power in the state of Uttarakhand. Currently, five run of the river schemes generate 550 MW of hydropower utilizing a gross available head of 240 m. In view of the several hydroelectric projects, operational and proposed, along the river basin, the High Court of Uttarakhand asked Government of Uttarakhand to conduct a cumulative environmental impact assessment (cEIA) of hydropower projects on River Yamuna and Tons and its Tributaries in Uttarakhand. Accordingly, a study was assigned to Indian Council of Forestry Research and Education (ICFRE) for conducting a cEIA in collaboration with relevant expert organizations. Sálim Ali Centre for Ornithology and Natural History (SACON), Coimbatore was awarded with the faunal component of the study.

The specific tasks of the study include inventory of birds and other terrestrial fauna and evaluate their conservation status and threat perceptions from the hydro electric projects.

During the study, from the area so far156 species of birds (49 families and 100 genera) were recorded. This included one endangered species (Egyptian vulture *Neophron percnopterus*), one vulnerable species (pallas's fish eagle *Haliaetus leucoryphus*) and two near threatened species (cinereous vulture *Aegypius monachus* and river lapwing *Vanellus duvaucelii*). Remaining species were mostly of 'least concerned 'as per IUCN.

At Janakichatti area during Winter sampling

Great Barbet.(Megalaima virens magnifica)

Black Bulbul (Hypsipetes leucocephalus psaroides)

View of Tons River

View of siltation in Ichadi Dam reservoir

View of Dakpathar Barrage at confluence of Yamuna & Tons

Twelve species of mammals including central Himalayan langur, yellow-throated marten, common mongoose, large Indian civet, red fox, golden jackal Asiatic Black

Bear and the Leopard were recorded. Two of the species recorded (Leopard and Large Indian Civet) comes under 'near-threatened' category and one (Asiatic Black Bear) under 'vulnerable' category of IUCN.

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Study of impact of wind power project on wildlife including migratory birds and roosting of Raptors, Davangere, Karnataka

Wind energy is a promising energy source and it is believed to be relatively free from environmental degradation associated with the conventional energy resources. However, the unprecedented rate of wind farm installation by countries raises the question of possible impacts on the ecosystem. The primary issue of concern is the direct mortality risk from the possible collision of flying birds with rotating turbine blades. The changes in local avifauna and habitat loss are also of ecological concern. The present study was taken up to assess the impact of CLP wind farm project in general, including impact on migratory birds and roosting of raptors in particular in forest land of 56.5 hectare in Hyarada Reserve Forest. The study in the area located near to Harpanahalli of Davangere district (Karnataka).

View of Hara Wind farm

Turbine pose collition risk for birds

Two of the Bat mortalities recorded

Total one hundred and fifteen species of birds belonging to eighteen orders were recorded from the project area and its surroundings. It comprised of 41.59% Passeriformes, 10.62 % Charadriiformes, 7.96% Accipitriformes, 7.08 % Anseriformes & Pelecaniformes, 4.43 % Columbiformes, 3.54% Cuculiformes, 2.66% Ciconiformes, Gruiformes & Coraciiformes, 1.77% of Galliformes, Piciformes & Falconiformes, and 0.89 % Podicipediformes, Sulliformes, Apodiformes, Bucerotiformes and Psittaciformes. Fifteen fatalities involving five species of birds (unidentified raptor, *Halcyon smyrnensis, Apus affinis*, and *Pitta brachyura*) and one bat species (*Taphozous melanopogon*) were found during the study. Among the three zones monitored, we observed maximum number of birds in zone 'A' followed by 'B' and then 'C' . Observations indicated that most of the birds kept safe distance from turbine blades. However, the initial data set collected indicated that wind turbines do cause some bird and bat mortalities in the CLP wind farm area; however, a quantitative estimation would only be possible after collecting one full year of data covering all seasons.

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Assessment of the impact of agrochemicals on avifauna in the catchment of Keoladeo National Park, Rajasthan

Keoladeo National Park (KNP) at Bharatpur is unique having multiple habitats with congregation of thousands of birds on the onset of monsoon. Upstream water diversion, and possibly local weather change in recent years have greatly reduced the water available to the Park, leading to relatively drought conditions during the last 15-20 years. Due to the reduced water availability, several more birds have started depending on wetlands (satellite) in neighbouring districts. As these satellite wetlands receive agro-run off from the neighbouring farmlands, there is likelihood of accumulation of agrochemicals in different trophic levels including birds. Therefore, this study is aimed at assessing the level of residues of different groups of agro-chemicals in various trophic levels and look at the impact on breeding success in piscivorous and granivorous birds with respect to cropping pattern and agro-inputs.

In total, 39 wetlands were surveyed, in which nearly 27% have water retention period of only 4 months, and are used for agriculture once the water dries up. A total 122 bird species were recorded, with an addition of 82 species from satellite wetlands and its surrounding areas to the existing list of birds.

Black-winged Stilt in a satellite wetland of KNP

White Ibis feeding in a wetland near KNP

Twenty-six villages were surveyed for understanding the use of agrochemicals and agriculture practices, and this included 46 locations to which visits were made to see the ongoing cropping practices etc. Most of the area in Bharatpur has double cropping system, i.e. Kharif and Rabi. The analysis shows that the fertilizer use is negatively correlated with Kharif crop production ($r = 0.878$, $p < 0.05$), and positively correlated with Rabi crop production ($r = 0.844$, $p < 0.05$).

Sarus Crane at Bhandor (one of the satellite wetlands of KNP)

Soil and water samples collected from the satellite wetlands and their neighbouring agriculture fields contain heavy metals such as Cu, Zn and Cr. Cu level in soil varied from 7.6 mg/kg (Panchna Dam) to 73.8 mg/kg (Mansarovar), Zn level from 5.4 mg/kg (Kanota dam) to 90.2 mg/kg (Bhandore), and Cr level from 15.3 mg/kg (Kanota dam) to 51.96 mg/kg (Bhandore). Cu concentration in water ranged between 0.275 mg/lit (Ramsagar) to 1.42 mg/lit (Chambal river – piped water),Cr levels ranged between 0.013 mg/lit (Jagartal) to 0.123 mg/lit (Yamuna barrage).

Six breeding colonies of water birds were indentified around selected satellite wetlands of KNP. Data on nesting population and clutch size of various species of birds in the identified breeding colonies are collected through regular surveys in the area following standard field survey methods.

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Real time air pollution modelling and dissemination of location based information using mobile devices

Urban air pollution control measures require spatio-temporally relevant pollution information and facility for the public to make informed choices towards control measures. This study addresses those requirements through various optimal routines in a case study mode of suspended particulate matter pollution in urban Coimbatore. The optimal routines explored were low cost real time particulate monitors, sensor observation service for established monitor resources and other related data sources, real time simulation routines for computationally intensive air quality models and open standard based dissemination routines for monitored and modelling particulate pollution information.

The major objectives are i) develop Sensor Observation Service (SOS) for spatially distributed air quality sensors and real time meteorological data website, ii) develop real time air quality modelling web processing service using the SOS, validate and compare it with similar other models, iii) develop a Geo-SMS based android application to disseminate the modelling result.

By combining a shelf particulate profiler and real time data communication system, real time particulate monitors were developed and installed in four different parts of Coimbatore for continuous monitoring. Particulate profiler used was Dylos air quality monitor, a low cost laser based indoor dust profiler, and the data communication system developed was a single board computer enabled with GSM internet or SMS communication. The monitor system can transmit particulates count in the size ranges <0.5 and <2.5 micrometer at every 2 minutes interval in the internet mode and every 15 minutes in the SMS mode. SOS for the real time particulate monitor was carried out using PYTHON program sensor web enablement implementation, istSOS. The monitor data was standardized for web service to query the real time and time series data. The open data formats generated by SOS on monitored data were used for developing web application that would picture data in map interface and line charts. It has interface to download the monitored data in various formats directly open to statistical analysis. This web-application was hosted in free GITHUB page (http://saconswl.github.io/cbeair/).

Widely used numerical weather prediction model, Weather Research Forecast Model with Chemistry (WRF-CHEM), was used for the real time air quality modelling. Script based model execution routines such as PERL language based WRF-Environmental Modelling System (WRF-EMS) was used to simulate weather above Coimbatore domain with 1km resolution. WRF-CHEM was compiled in Ubuntu 12.04 Linux distribution with parallel execution. Python based scripts for automatic daily routine simulation, visualization and evaluation are being tested. KDtree based algorithm is used to query the WRF-CHEM model output and data from spatially distributed real time particulate monitors for location based queries. The web application was enabled with real time visualization of WRF model output especially wind circulation and web-processing service based location queries. An android mobile phone application, with offline Coimbatore web map, is being developed for location based data dissemination.

These developments would make the data / information on particulate air pollution in Coimbatore available to all concerned as a test case and the methodology / platform developed can be replicated for other environment / conservation related issues.

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Identification of RNA transcripts present in avian sperm and their relation to fertility

Male fertility requires the production of an adequate number of normal mature spermatozoa with sufficient motility and the ability to undergo acrosome reaction in order to bind and penetrate the egg membrane for fertilization. Defects in any of these necessary characteristics can lead to male infertility. In addition, male fertility varies from breed to breed because of difference in semen characteristics. Therefore, selection of high fertility potential males is essential for captive breeding programs to achieve good fertility. Unsuitability of conventional methods for fertility evaluation forced us to investigate the most recent molecular approach i.e. sperm mRNA transcriptional profiling for the evaluation of male fertility, taking chicken sperm as a model, with the objectives: (i) optimization of the RNA isolation methodology in the sperms, (ii) molecular analysis of the population of RNA in spermatozoa, and (iii) expression analysis of fertility related genes in low and high fertility birds.

In the present study, 37490 specific probes were detected in chicken sperm and testis. Of these, 19629 were common in both sperm and testis, whereas 10277 probes were unique to sperm. Clustering of differentially regulated genes using hierarchical clustering based on Pearson coefficient correlation algorithm to identify significant gene expression patterns revealed six different functions governed by up and down regulated genes in sperm. The maximum numbers of up and down regulated genes were related to transcription, whereas least numbers of genes were associated with fertilization. Further, the mapping of differentially regulated genes on genome revealed the presence of maximum genes on chromosome 1 (up regulated-679, downregulated-831), and least on chromosome Z (up regulated-3, downregulated-5).

A large number of transcripts are being shared between sperm and testis indicating sperm RNAs are remnant RNAs of spermatogenesis process. During the sperm maturation in epididymis, sperms are enriched with specific foreign RNAs, which may have important roles during fertilization and early embryonic development.The maximum number of up and down regulated transcription factors indicated their role in controlling gene expression during early embryonic developmental stages very crucial in later development of the adults.

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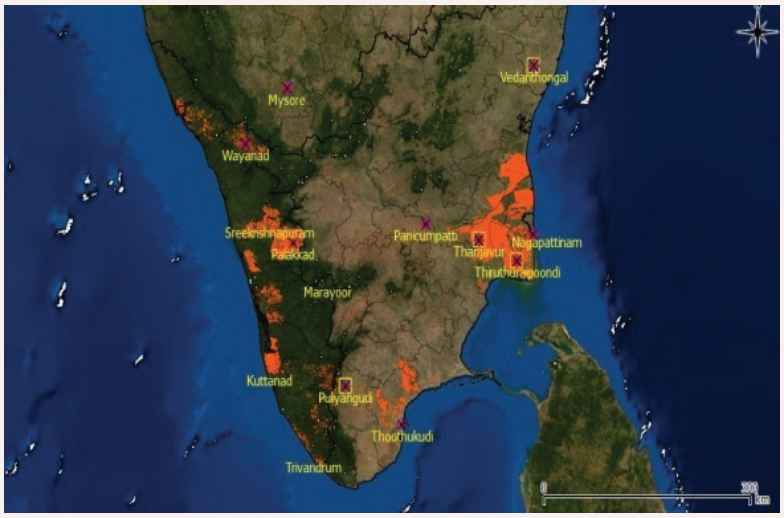
Ecological and ethno-cultural examination of the rise and fall in rice diversity in southern India with special reference to the Western Ghats



Rice is the staple food for half of the total human population. It is reported that few decades back 50,000 to 60,000 rice varieties were cultivated in India.Rice paddies, unique in several ecological characteristics, support ecosystem services such as regulating quality and quantity of water, decomposition of organic wastes, formation of soil, biological nitrogen fixation, local climate and biotic regulation and providing habitat for numerous species of plants and animals.. Hence a study has been taken with the objectives (i) to identify and document the diversity of the traditional rice varieties of Western Ghats and associated traditional knowledge, (ii) to identify Important Rice Areas (IRAs) based on rice biodiversity, ecological status, agronomical practices, commercial and socio religious importance, (iii) to study the historical changes in rice cultivation practices and explore the reasons for the same, and (iv) to assess and compare the ecological values / services of rice / rice paddies, traditional vs. modern.

Surveys were conducted in the coastal belt and traditional Important Rice Cultivating Areas (IRCA's) such as Cauvery delta regions of Tamil Nadu, the Western Ghats region of Idukki and Wayanad districts of Kerala, IRCA's such as Kuttanad and Palakkad areas, 'Kol' paddy fields Thrissur district, 'Pokkali' paddy fields of Thrissur and Ernakulum districts and 'Kaippadu' areas of Kannur district. One hundred and seventy three plant species, 57 bird species and 41 butterfly species were recorded from the paddy fields of Tamil Nadu. More than 200 plant and bird species each and 50 butterfly species were recordedfrom Kerala paddy fields.The survey could locate unique land races with neutraceutical properties such as 'Rakthasali' and 'Njavara'. It was revealed that several land races such as 'Komban' are surviving in isolated patches ranging from 10 cents to few acres due to religious, cultural and agro-climatic reasons by the efforts of communities (tribal and non tribal), individuals and nongovernmental organizations. Information about 300 traditional rice varieties was compiled. Samples of 85 varieties collected for educational purposes. Historical data on the rise and fall of paddy cultivation were also collected. The data collected were mapped on a "GIS Platform'.

Several traditional rice varieties are being cultivated in different parts of the country in isolated patches for various reasons; cultural, religious and dietary reasons being important of them. 'Kunjunju', a high yielding traditional variety, once very popular

in central Kerala and Palakkad district was located. 'Rakhtasali', a traditional variety, purported to be having high iron content also could be traced.

The Kurumbas of Muthanga area of Wayanad cultivate organically around 130 acres of paddy with traditional rice varieties. There are several other individuals and small organizations cultivating several rice varieties for conservation purposes spending time and energy. Unless governmental/institutional support is extended to them, their efforts cannot be sustained for long. Corporates and commercial enterprises are eyeing the neutraceutical properties of many varieties and recently the anti-diabetic property of a traditional rice variety was patented. It is imperative that intellectual property rights of the communities who have conserved the numerous land races are recognized at the earliest ensuring appropriate sharing of the benefits accrued through the commercialization of traditional varieties.

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ENVIS –Wetland ecosystems including inland wetlands

The ENVIS centre at SACON, a project of the MoEF & CC, focus "wetland ecosystems including the inland wetlands". The ENVIS centre aims at i) developing a database on wetland ecosystems to be uploaded on website with regional language interfaces, ii) establish and operate a distributed clearing house to answer and channel queries related to the thematic area, iii) establish linkages with information users, carriers and providers from government, academic, business and non-governmental organizations including that with ENVIS, iv) identify information/data gaps in the specified subject areas and action taken to fill these gaps and v) publication of ENVIS newsletters for dissemination of wetland information.

Research articles, news, events and laws relating to the wetlands are being collated from various sources. First hand information on wetlands are also collected from several institutions and departments associated with wetland research and management by online means. The research articles are categorized based on index words such as birds, hydrology, hydrobiology, migration, and flyways and linked to the ENVIS website for wider access and information dissemination.

The SACON ENVIS center during the past year moved its website to the NIC format. The center regularly updates the numeric and the generic database. We have created new databases for freshwater wetlands, mangroves, Myristica swamps, kids section and the associated aspects. The frequency of updating the website is minimum 50 per week. 30 new website links have been added to the existing ones. The website during April 2013 to March 2014 has had total hits of 115735 that include 3562 unique visitors. The center has also responded to all the queries it has received. We have published three issues of the "Sarovar Saurabh" SACONENVIS Newsletter and two posters on the 'World Wetlands Day'.

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Assessment of the morphological diversity and the ecological patterns in the near threatened colonial water birds across Indian sub-continent using a novel approach

Colonial nesting birds, distributed widely over the Indian subcontinent, receives considerable conservational attention, as many of them such as Black-headed Ibis (*Threskiornis melanocephalus*), Painted Stork (*Mycteria leucocephala*), and Oriental Darter (*Anhinga melanogaster*) are included in 'near threatened'category by BirdLife International. Nevertheless, there are several gaps in ecological information on these fish-eating, colonial nesting birds. Hence, a study to investigate the morphological diversity and ecological patterns of Painted Stork (*Mycteria leucocephala*) at selected heronries in north and south India using a novel technique, video graphic method, has been taken up.

One of the main hurdles in studying morphometrics in large birds is the difficulty in getting desired number of specimens due to legal restrictions. Therefore, one has to rely upon either museum specimens or chance encounters with dead specimens or non invasive methods.

During this study, images of the individual birds will be captured on a video camera and the video images will be analysed using specific software (MOTIC IMAGES PLUS 2.0). Since the video camera is not calibrated with the software the dimensions estimated were initially in arbitrary units and converted later into metric units by appropriate protocols. Then the dimensions of the following hard body parts such as lengths of bill, tibia, tarsus, left and right legs were taken after standardized method. Calibration of video images using actual specimens in the museums of Bombay Natural History Society and Zoological Survey of India was carrid out.

During the reporting period, a survey of selected heronries has been completed in both north and south Indian locations. Standardization exercise at lab using cardboard model images of birds are in progress. Preliminary works of the online heronry information system, an off shoot of the present project, has been initiated.

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NATURE EDUCATION

Nature Education Activities of SACON

Nature education Programs at SACON includes lectures, One-Day nature camps for school and college students, Worshops, SANF, Salim Ali Trophy Nature Competition, Coimbatore Bird Race, etc.,

One day Nature Camps:

23 one day nature awareness programs for school children, 11 for colleges and two for college teachers and two for forest officials were conducted in the campus during the reported period.1914 people participated in these Programs.

Workshop for school teachers:

A special workshop for teacher coordinators of various schools in Coimbatore was conducted on 21st of August 2013. 32 teachers attended the one day workshop, and two scientists and four research scholars from SACON gave talk.

Salim Ali Trophy Nature Competitions:

Inter-school competitions for the 'Salim Ali Trophy for Nature Awareness' for the reportng year was organized on 10th November 2013, in which 2100 students from 50 schools participated. 133 students from 18 schools won the prizes. G D Mat Hr Sec School (Coimbatore) claimed the overall 'Salim Ali Rolling Trophy' for the best school.

Sálim Ali Naturalist Forum (SANF) is a platform of nature education for all who love nature and wanted to contribute towards conservation of nature facilitated by SACON. Nature lovers of Coimbatore from different occupations like, businessmen, engineers, computer professionals, professors, doctors and students are members. During the year, SANF conducted several bird watching and trekking programs in forests, wetlands and other natural ecosystems in and around Coimbatore.

HSBC Coimbatore Bird Race

SACON and Salim Ali Naturalist Forum together organized the third Coimbatore Bird Race with the support of HSBC bank and Yuhina Eco-Media, Mumbai. Twenty five registered teams participated in the race covering bird habitats in and around the Coimbatore city. Some of the teams have members as old as seventy and many were smart budding birdwatchers from the schools. Each team comprised of four members with an experienced bird watcher as the leader. The teams spend an entire day spotting and identifying birds in an effort to record as many species of birds as possible. All of them together identified more than 200 species of birds in a day of counting.

Since the race was conducted during the migratory season, many birds sighted are long distance migrants such as Montagu's harrier, rose finch, sandpipers,and short distance migratory birds such as spot billed pelican and painted stork. The sighting of forest birds such as Bonelli's eagle, black eagle, crested serpent eagle and changeable hawk eagle in the City was exciting to the participants.

Monitoring Nature Through Birds

Monitoring Nature Through Birds (MNTB) was another science education Program of SACON executed in collaboration with partners such as India Biodiversity Portal, NCSTC Network, Nature Conservation Foundation, and NCBS.The project intents to inculcate scientific temperament, habit of careful observation, and learning directly from nature among children and nature lovers. It allows systematic documentation through participatory data generation on the status of biodiversity, with the students and teachers.

MNTB also aims to develop a web portal to collate and present the data, connect and coordinate the teams working in various parts of the country. An activity-based-learning module will be prepared that could be used in class rooms as well as in field by students.

As part of the project, a brain storming workshop was conducted on 18th and 19th of June 2013 for master resource persons and partners and a road map for future program was prepared. A module of education materials including three books, four postures and one CD was prepared. The field level activities of the project are progressing.

'Simple Tasks Great Concepts'- Teachers training Program for South India

The DST (Government of India), in consultation with Ecoscience Research Foundation (Chennai), SACON and some other organizations have planned to conduct a series of workshops to school teachers and students in Andhra Pradesh, Karnataka, Kerala, Puducherry and Tamil Nadu on 'Simple tasks great concepts', for creating awareness on science and use of simple science experiments to understand the concepts of science.

Responsibility of conducting the training in Tamil Nadu and some selected districts of Kerala, Karnataka and Andhra Pradesh is given to SACON and the trainings were planned and conducted in 3 batches during August to October.

National Nature Camping Program – Coimbatore

National Nature Camping Program is an initiative of the MoEF in environment education for creating awareness, understanding and empathy in children for environment. Through this initiative it is hoped that every child who goes through middle school (Classes 6th to 8th) will get at least one opportunity for a 2-3 day camping experience, so as to motivate them towards conservation - oriented lifestyles; to encourage qualities of leadership, exploration, nature observation. The 'Nature experience' to children and teachers has huge potential to generate sensitivity towards nature appreciation and conservation, leading to positive environmental actions.

The pilot phase of this project happened across the country. 80 camps were allotted to various organizations and institutions throughout the country. Of these 8 camps were conducted in SACON, Anaikatty, Coimbatore, between18th February 2014 and 24th March 2014. Of these, six camps were for normal school children and the two for 'special children'.

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ACADEMIC PROGRAMMES

ZOOLOGY				
S Bhupathy				
	N Sathish Kumar	Ph D	Ecology of reptiles in high wavy mountains, Western Ghats	On going
	J V Jins	Ph D	Reptile communities of Agasthiyamalai Hills, Western Ghats	On going
	Madhumita Panigrahi	Ph D	Bird communities of Agasthiyamalai Hills, Western Ghats	On going
P Pramod	Chetan Nag	Ph D	Addressing the issue of taxonomic position of peninsular Indian Hanuman langurs (Semnopithecus entellus) through a multidisciplinary approach	Awarded
	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	Bird community of Andaman Island with emphasis on human associated and introduced birds	Submitted
	Suhirta Muhil M	Ph D	Ecology of Odonates in the Coimbatore	On going
	K Priya	M Phil	Genetic diversity analysis of Andaman day gecko Phelsuma andamanense by DNA fingerprinting	Awarded
S Manchi Shirish	Akshaya Mohan Mane	Ph D	Population dispersal studies of Edible nest Swiftlet in Andaman & Nicobar islands, India	On going
H N Kumara	K Santhosh	Ph D	Status, ecology and conservation of Lion Tailed Macaque in Sirsi-Honnavara forests of Western Ghats, Karnataka	On going
	Arijit Pal	Ph D	A study on reproductive behavior of Nicobar long tailed macaque (Macaca fascicularis umbrosa) in Nicobar Islands, India - Manipal University	On going

BOTANY				
P Balasubramanian	P Nehru	Ph D	Floristic diversity, dynamics and recovery of littoral forests of Nicobar Islands, India- a post Tsunami scenario	Awarded
	C Anbarasu	Ph D	Avian frugivory and seed dispersal in the shola forests of Nilgiris, Western Ghats, India.	Submitted
	P. Manikandan	Ph D	Study on nest tree preferences by cavity nesting birds in the riverine forests of Athikadavu Valley, Western Ghats	On going
ENVIRONMENTAL SCIENCES				
P A Azeez	J Ranjini	Ph D	Adaptation and tolerance of birds to urbanization – a critical evaluation with emphasis on life strategy	Submitted
	K A 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	Awarded
	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	Submitted
	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
	V Kirubhanandhini	Ph D	Levels of metal contamination in select species of birds	On going
	Mrs. Mythreyi Devarajan	Ph D	Impact of pesticides on select components of a rice field ecosystem	On going
	Mr. Aditya Roy Ashimkumar	Ph D	Effects of environmental contaminants on ecology and breeding biology of Gyps vultures	On going
B Anjan Kumar Prusty	Mohd. Zeeshan Malik	Ph D	Assessment of environmental changes in three districts (Jammu, Rajouri & Ramban) representing altitudinal gradients in Jammu region.	On going

2nd International Conference on Indian Ornithology

Following the success of the first International Conference on Indian Ornithology (ICIO) in 2011 and our institutional commitment to organize the conference biennially, SACON conducted the Second edition of the ICIO during 19-22 November, 2013. With the increasing realization of the crucial roles that birds play in regulating and maintaining natural ecosystem functions and cycles, the theme of the Second ICIO was chosen as 'Birds and their Ecosystem Functions & Services'.

The technical sessions of the Conference included one Keynote Address, three Plenary Lectures, and nine Lead Talks spanning across five symposia viz., Bird Populations & Life-history strategies, Bird-Ecosystem Associations, Birds in Conservation Planning, and Birdwatching, Ecotourism, & Eco-informatics. There was a parallel session on the second day in which a workshop was organized by the Wetland International to discuss various conservation issues of the Central Asian Flyway. A special session on citizen science initiatives in Indian ornithology with focus on Migrant Watch program was also held on the final day.

The Conference was inaugurated by Dr. J.R. Bhatt, Advisor to the Government of India, Ministry of Environment and Forests and climate change, and special guests of honour at the inaugural included Dr. K. Ramasamy, Vice-Chancellor, Tamil Nadu Agricultural University, Coimbatore, Dr. V.K. Melkani IFS, APCCF (Project Tiger), Tamil Nadu Forest Department, Dr. E.J. James, Vice-Chancellor (i/c), Karunya University, Coimbatore, and Dr. N. Krishnakumar IFS, Director, Institute of Forest Genetics and Tree Breeding, Coimbatore.

The Keynote Address of the Second ICIO was delivered by Dr. Cagan Sekercioglu, Professor of Biology, University of Utah, USA. The Plenary Lectures, on subsequent days, were given by Dr. Per Alstrom (Professor of Biology, the Swedish Species Information Centre, Swedish University of Agricultural Sciences), Dr. Taej Mundkur (Wetland International, the Netherlands), and Dr. Judit K. Szabo (Science Officer with East Asian Migratory Flyway and an Associate Professor in Charles Darwin University, Australia).

In total, 120 papers were presented in the Conference, of which 37 were oral presentations, 15 were speed talks, and 68 were posters. Geographically, the participants represented 18 States/UTs in India and bird studies from 24 States were

showcased in the proceedings. In addition, research works of ornithologists from 10 countries including Sweden, Australia, USA, UK, Turkey, South Africa, Singapore, France, Vietnam, and the Netherlands were also presented in the Conference. Altogether, 127 institutions and organizations pursuing avian research and bird conservation took part in the Second edition of the ICIO.

The Conference formally concluded on 22 November 2013 with a valedictory session in which Dr G. James Pichai, Vice-Chancellor, Bharathiar University delivered the presidential address. The closing ceremony was also marked by special addresses by Dr. Jay Samant (Advisor & Trustee, DEVRAAI, Kolhapur) and Dr. H.S.A. Yahya (Professor, Aligarh Muslim University, Aligarh).

Earlier, four pre-conference training workshops were conducted at the SACON campus on the eve of the main Conference on 19 November 2013. Over 85 student participants and other delegates registered for the workshops, which were organized in two parallel sessions. The themes of the workshops were i) research design in avian ecology and behavior, ii) R statistical platform to analyze ecological data, iii) recording and analysis of avian vocalizations, and iv) communication of natural science in local languages.

A post-conference field trip to the Silent Valley National Park (SVNP), Palakkad district, Kerala was organized for all the participants and delegates on 23 November 2013.

First DST-SERB School in Avian Biology

The Science and Engineering Research Board of Department of Science and Technology (DST-SERB), Government of India is a statutory body established to promote and support basic and applied sciences in the country. One of the key initiatives of the Board is to conduct a series of training workshops ('Schools') in each scientific discipline for researchers and also scientists in their early research career. In this series, SACON conducted the First DST-SERB School in Avian Biology at its campus between 26 December, 2013 and 7 January, 2014.

Earlier, the National Planning Committee of the School under the chairmanship of Dr. Vinod Kumar, Professor, University of Delhi scrutinized all the 80 applications received and selected 21 candidates to attend the First School. The final list comprised three faculty including one from Bangladesh, one in-service officer of the Ornithology Cell of the Indian Air Force, and 17 research scholars currently pursuing their PhD in avian biology. Two of them, however, could not attend the School due to some exigencies, making the final strength of the School participants at 19.

After the formal registrations of the participants were completed, the first School in Avian Biology was inaugurated on 26 December, 2013 at SACON. This was immediately followed by regular classes and lecture series. Typically, each day would start at 0930hrs with a 15-minute long quiz (from the lectures on the previous day) followed by four teaching sessions each with 1.5 hrs duration from 0945 to 1715 hrs.

The first three days of the School were covered by the Orientation Module and included introductory lectures on topics ranging from birds as model systems, biogeography

of Indian birds, avian evolution, avian brain and neurobiology, population genetics and molecular ecology, vocalizations in birds, to avian frugivory. This was followed by six Core Modules: i) avian phylogeny and biogeography, ii) physiology of seasonal processes in birds (incl. avian chronobiology, neurobiology, and endocrinology), iii) bird behavior, iv) ecology of bird communities, v) conservation biology, and vi) frontiers in avian biology. Besides the faculty from SACON, several leading experts were drawn from other institutions as teaching faculty in the School. They included Dr. Vinod Kumar (University of Delhi, New Delhi), Dr. Sangeeta Rani (University of Lucknow, Lucknow), Dr. K.S. Krishnan (National Centre for Biological Sciences, Bangalore), Dr. Dinesh Bhatt (Gurukula Kangri Vishwavidyalaya, Haridwar), Dr. Suhel Quader (Nature Conservation Foundation, Mysore), Dr. Kartik Shanker and Dr. S.P. Vijayakumar (Indian Institute of Science, Bangalore), and Dr. Monika Sadananda (Mangalore University, Mangalore). In the meanwhile, Dr. Doyil T. Vengayil, Scientist with DST, also visited the School and interacted with the participants.

A field trip to the Silent Valley National Park, Kerala was undertaken for a day on 6 January, 2014 to expose the participants to conservation issues at the grassroots level and the strategies for effective protected area management being successfully adopted in the Park.

The School formally closed on 7 January 2014 with a Validation Ceremony in which Dr. Dinesh Bhatt, Professor and Dean, Faculty of Life Sciences, Gurukula Kangri Vishwavidyalaya, Haridwar and Dr. P.A. Azeez, Director, SACON spoke on the need for such advanced training schools for capacity-building and gave away certificates and awards to all the participants who successfully completed the course. Ms. Parveen A. Shaikh of Bombay Natural History Society and Mr. Pankaj Koparde of SACON topped the course. A couple of participants also spoke on their personal experiences with the School and appreciated the programme in terms of the course structure, teaching inputs, logistics, and exposure to modern trends in avian biology.

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Akram, F., Ilyas, O. & B.A.K. Prusty. Impact of urbanization on the bird community structure in Aligarh city, UP, India. Second International Conference on Indian Ornithology (ICIO). 19-23 November, 2013. Sálim Ali Centre for Ornithology and Natural History. 179-181 pp.

Ganesan, K., Nambirajan, K., Kirubhanandhini, V., Roy, A.A. & S. Muralidharan. Incidences of Pesticide Poisoning in Birds in India during 2010-2013.Ecosystem services and functions of birds. Proceedings of the 2nd International conference on Indian Ornithology. 19-23 November, 2013. SACON, Coimbatore, India 109-111p.

Sharma, G., Kumar, M., Prusty, B.A.K. & P. A. Azeez. Environmental contaminants in Raptors and reported mortalities: a look at the SAARC Scenario. Eighth Asian Raptor Research Conservation Network (ARRCN) Symposium. 6-9 February, 2014. Ela Foundation, Pune, India.

Kumar, M., Sharma, G., B. Prusty, B.A.K. & P. A. Azeez. A preliminary assessment of avian diversity in satellite wetlands around Keoladeo National Park and associated agricultural landscapes. Second International Conference on Indian Ornithology (ICIO). 19-23 November, 2013. Sálim Ali Centre for Ornithology and Natural History.

Prusty, B.A.K. & P.A. Azeez (2014). New directions and approaches to ecotoxicological studies: Application of radio and GPS telemetry. Ecotone GPS Telemetry Workshop. 5 – 9 April, 2013. Conference Center "Wierzba" (Polish Academy of Sciences), Wierzba Village, Masurian Lake District, Poland.

Chandra, R., Sathya, V., Prusty, B.A.K., Azeez, P. A. & S. Mahimairaja. The Kolar Gold Mines, India: present status and prospects for phytomining. Shechtman 1st International Symposium on Sustainable Mining and Processing. June 29 - July 4, 2014. Cancun, Mexico.

Agarwal, R., Sastry, K.V.H., Mohan, J., Singh, R.P., Saxena, R. & V. Tripathi. (2013). Effect of alternate induced molting methods on post-molt egg quality parameters of White Leghorn hens. In: Proceeding of 11th World Conference on Animal Production. 15-20 October, 2014. China.

Agarwal, R., Sastry K.V.H., Mohan. J., Singh, R.P., Saxena, R. & V. Tripathi. (2013). Expression profile of Luteinizing Hormone Receptor Gene in hierarchal follicles and regressing oviduct tissues of White Leghorn hens during molting induced by organic zinc feeding. In: Proceeding of 11th World Conference on Animal Production. 15-20 October, 2014. China.

Saxena, R., Saxena, V.K., Tripathi, V., Singh, R.P., Agrawal, R. & B.P. Singh. (2013). Expression profiles of the IGF system genes in Naked Neck broilers under different dietary regimes. In: Proceeding of 11th World Conference on Animal Production. 15-20 October, 2014. China.

Saxena, V.K., Saxena, R. & R.P. Singh. (2013). Myostatin gene silencing by Lentivirus-mediated delivery of shRNA in chickens. In: Proceeding of 11th World Conference on Animal Production. 15-20 October, 2014. China.

NEWSLETTER

Aarif, K.M. & S. Babu. Heaven for migratory birds. PATHEMARI-INTACH. January-June 2013, 11-12 pp.

TALKS/LECTURES DELIVERED

Prusty, B.A.K. Talk on "Chemical Pollution of Bird Habitats" in First DST-SERB School in Avian Biology at SACON on 28th December 2013.

Babu, S. Presented "Occupancy and conservation of large mammals in Megamalai Landscape" as part of the workshop on the science and practice of linking Periyar-Agastiyamalai landscape for large mammal conservation.

Balasubramanian, P. Gave a talk on "Bulbuls-a common bird around us" through FM Radio, Nagerkoil.

Balasubramanian, P. Lecture delivered on "Bird diversity and its conservation in India" for the UGC sponsored National level Staff Seminar at Saradha College, Salem.

Balasubramanian, P., Lecture delivered on "Bird Conservation" for ACF in-service trainees at CASFOS, Coimbatore.

Balasubramanian, P., Lecture delivered on "Current trends in Ornithological Research" at Nirmala College for Women, Coimbatore.

Balasubramanian, P., Lecture delivered on "Plant-animal interactions" for the DST sponsored Avian Biology Course participants at SACON.

Balasubramanian, P. Lecture delivered on "Role of birds in ecosystem maintenance" at the Vellalar College for Women, Erode.

Balasubramanian, P. Lecture delivered on "Wetland Management" for forest range officers at Tamil Nadu Forest Academy, Coimbatore.

Balasubramanian, P. Lecture on "Plant-animal interactions" delivered for refresher course (Evolutionary Ecology of Plants and Animals) participants at PSGR Krishnammal College for Women, Coimbatore.

Muralidharan, S. Birds - indicators of environmental contamination: an Indian scenario at Periyar University, Salem on 18th February 2014.

Muralidharan, S. Corrosion and the Environment at Avinashilingam University for Women, Coimbatore on 27th January 2014.

Muralidharan, S. Incidences of pesticide poisoning in birds in India at Bharathidasan University on 26th February 2014.

Muralidharan, S. Pesticide contamination in birds and India – status report at Avian School of Biology, SACON.

Muralidharan, S. Pesticide contamination on birds and, Eutrophication - Threats to wetlands. Refreshers course organised by the Bharathiar University on 12th April 2013.

Pramod, P. Invited Guest lecture on "Biodiversity Conservation" at Bharathiar University, Coimbatore on 23rd September 2013.

Pramod, P. Invited Lecture on "Conservation of Nature" at Govt. Moyans Model Girls High School, Palakkad on 6th July 2013.

Pramod, P. Invited lecture on "Learn and Teach about Nature" at Isha Home School on 18th July 2013.

Pramod, P. Invited Lecture "Experiencing Nature" at Isha Home School on 22nd October 2013.

Pramod, P. Invited lecture on "Experiencing Nature" at Sivanjali Trust, Vadavalli on November 2013.

Pramod, P. Invited lecture in the National Seminar on Biodiversity Conservation at University College Trivandrum on 21st March 2014.

Pramod, P. Invited lecture on "Inspiration from Nature" at Venkataswara College, Gopichettipalayam on 23rd August2013.

Pramod, P. Invited lecture on "Biodiversity conservation" at Krishnammal College for women on 26th November 2013.

Jayapal, R. Delivered an invited talk on "Changing Taxonomy of Birds: Implications for Indian avifauna" at the annual meeting of the Sálim Ali Naturalists Forum (SANF) at SACON on 23rd February 2014.

Jayapal, R. Delivered an invited talk on "Waterbirds of Coimbatore Wetlands" on the occasion of the World Migratory Bird Day on 11th May 2013 at SACON organized by SACON Wetlands Division and Nature Conservation Society, Coimbatore.

Singh, R.P. Talk on "Application of real-time PCR and gene based mechanism of sex determination in birds" in International training course on "Gene based techniques for research in biotechnology" in Indian Veterinary Research Institute, Izatnagar.

Singh, R.P. Talk on "Avian Reproduction" in DST-SERB School in Avian Biology at SACON.

Singh, R.P. Talk on "Molecular Sexing in day old chicks by PCR" in International training on "Vent chick sexing" in Central Avian Research Institute, Izatnagar.

Manch, S. Delivered a lecture on "Bird Capture and Morphometry" at the DST-SERB School in Avian Biology" at SACON held during 26th December 2013 to 7th January 2014.

Manchi, S. Delivered a lecture on "Bird Conservation Strategies" at the DST-SERB School in Avian Biology" at SACON held during 26th December 2013 to 7th January 2014.

Manchi, S. Delivered an invited talk titled "Avian Conservation in India" on the occasion of "Inauguration of Zoology Association" at Sangamam Hall, PSG College of Arts and Science, Coimbatore on 6th September 2013.

Manchi, S. Delivered an invited talk titled "Conservation of the Narcondam Hornbill" during two days workshop on "Hornbill Conservation" at Kulgi Nature Camp, Kulgi on 28th September 2013.

Workshops/Seminars/Conferences attended

Balasubramanian, P. National workshop on Tree seed science and Silviculture, 28-29 November 2013. IFGTB, Coimbatore.

Balasubramanian, P. Workshop on reassessment of endemic plants from southern Western Ghats, 16-17 August 2013. Bharathiar University, Coimbatore.

Balasubramanian, P. Workshop on shola reforestation, 17 February 2014. Tamil Nadu Forest Department, Ooty.

Quadros, G., Khan, H. & G. Gurav. "International workshop on Mangrove conservation in India" 26-27 July, 2013. GEC, Govt. of Gujarat.

Hemambika, B., Begam A.J., Kirubhanandhini V., Babu S., Mahendiran M. & Q. Goldin. National Conference on Recent trends in Zoological research, 25-26 March 2014. St. Allyosius College, Thrishur.

Meetings

Singh, R. P. Attended a meeting in MoEF, Delhi on 26/6/2013 regarding Conservation of the Great Indian Bustered and rationalization of Desert National Park in Rajasthan"

Quadros, G. Consultation meeting on "Water and Biodiversity" on 22 May 2013. MoEF, New Delhi.

Quadros, G. First stake holder consultation meeting on India's Fifth National report and developing national targets on biodiversity for updating of National Biodiversity Action Plan on 30th July, 2013. WII, WWF and MoEF at WWF India, New Delhi.

Pramod, P. Master Resource person & National Evaluator National Children Science Congress.

Singh, R. P. Attended a meeting in MoEF, Delhi on 24th May 2013 regarding " Alteration of Schedules of Wild life (Protection Act), 1972"

Singh, R. P. Attended a meeting in MoEF, Delhi on 26th June 2013 regarding Conservation of the Great Indian Bustered and rationalization of Desert National Park in Rajsthan"

Singh, R. P. Member of ad-hoc Animal Committee of Ministry of Environment and Forest, New Delhi.

Goldin. G. ational Consultation on Ecologically Sensitive Area. National Centre for Sustainable Coastal Zone Management, Anna University, Chennai. 10-11 October 2013

Pramod, P., Member – Academic Core committee for National Children's Science Congress, NSCTC, Department of Science and Technology, Govt. of India

Pramod, P., Member – MoEF- Technical Expert committee for Setting up National Museum in Hyderabad.

State level consultation meeting on Grassland and Fire organized by Kerala Forest and Wildlife Department on the eve of First World Wildlife Day Celebration at Thiruvananthapuram on 3 March 2014.

Report

Arun P. R and P. Rajan. 2014. Impact assessment of prospecting exploration activities through 3D seismic data acquisition by Oil India Ltd on mangrove fauna at Kakinada, Andhra Pradesh. Techcal report submitted to OIL India Ltd Kakinada.

Prusty, B.A.K., Azeez, P.A. & P.V. Karunakaran. 2013. Identifying criteria for delineating ecologically sensitive areas along Indian coast. Sálim Ali Centre for Ornithology and Natural History (SACON), Coimbatore. Discussion Paper submitted to the National Centre for Sustainable Coastal Management, Chennai. pp 15.

Manchi, S. 2014. Reassessment of the impact of nest collection on the Edible-nest Swiftlet in the Andaman Islands. Sálim Ali Centre for Ornithology and Natural History, Coimbatore. SACON Technical Report – 126. Submitted to WWF-India, New Delhi. pp 34.

Muralidharan, S., Ganesan, K., Nambirajan, K. & V. Kirubhanandhini. 2013. Monitoring and Surveillance of Environmental Contaminants in Birds in India. Sálim Ali Centre for Ornithology and Natural History. Progress Report submitted to MoEF. pp 1-14.

Muralidharan, S., Ganesan, K., Nambirajan, K., Navamani, P. & K. Maharajan. 2013. Contamination Status of Rivers in Kerala: Fish as an Indicator. Sálim Ali Centre for Ornithology and Natural History. Final Report. pp 76.

Singh, M., Sasi, R., Kumara, H.N. & W. Kaumanns. 2013. Status of primates in the wet forests of Parambikulam landscape, Kerala, India with special reference to the Lion-tailed Macaque Macaca silenus. Technical Report, University of Mysore and Sálim Ali Centre for Ornithology and Natural History, India. (PR- 117).

Pramod, P., Rajan, P. & S. Muhil. 2013. DNA Clubs of Andaman and Nicobar Islands 2009-2013. Report submitted to Department of Science and Technology, Govt. of India.

Pramod, P. 2013. Simple Tasks Great Concepts; Report of the teachers Training programme. Submitted to Department and Science and Technology Govt. of India.

Pramod, P. and Chaithrasree. J. 2014. National Nature Camping Programme at SACON Campus, Coimbatore. Report submitted to Ministry of Environment and Forests, Govt. of India.

Books:

Jayapal, R., Babu, S., G. Quadros, P.R. Arun, P. Pramod, H.N. Kumara, and P.A. Azeez (Eds). 2013. Ecosystem Services and Functions of Birds. Proceedings of the Second International Conference in Indian Ornithology (ICIO) 2013 held during 19-23 November, 2013 at SACON. Published by Sálim Ali Centre for Ornithology and Natural History, Anaikatty, Coimbatore, India (ISBN: 81-902136-0-4). 232 pp.

Pramod, P. &J. S. Chaithra. 2014. Common Birds of Coimbatore. Published by Sálim Ali Centre for Ornithology and Natural History, Coimbatore India. 232 pp. ISBN 81-902136-0-5.

Pramod, P., Rajan, P. & S. M. Suhirtha Muhil M. 2014. How to Study Birds. Published by Sálim Ali Centre for Ornithology and Natural History, Coimbatore, India. 232 pp. ISBN 81-902136-0-6.

Pramod, P., Divyapriya, C. & Rajan, P. 2014. Learn about Birds. Published by Sálim Ali Centre for Ornithology and Natural History, Coimbatore, India. 232 pp. ISBN 81-902136-0-7.

Pramod, P., Divyapriya, C. & Rajan, P. 2014. Fun with Birds. Published by Sálim Ali Centre for Ornithology and Natural History, Coimbatore, India. 232 pp, ISBN 81-902136-0-8.

Chapter in books:

Singh. D., & G. Quadros. A study of Maharashtra Nature Park for its role in Environment Education. National Conference on Biodiversity: Status and Challenges in Conservation FAVEO 2013. 29-30 November, 2013. B.N.Bandodkar college of Science, Thane Maharashtra.

Khot, K., Quadros, G. & V. Somani. Ant diversity in an urban garden at Mumbai, Maharashtra. National Conference on Biodiversity: Status and Challenges in Conservation FAVEO 2013. 29-30 November, 2013. B.N.Bandodkar college of Science, Thane, Maharashtra.

Shashidharan, N. & G. Quadros. Bridging gaps: Open source geospatial technology as a public participatory tool for landscape assessment. National Conference on Biodiversity: Status and Challenges in Conservation FAVEO 2013. 29- 30 November, 2013. B.N. Bandodkar college of Science, Thane Maharashtra.

Jagadesan, R., Babu. S., Mohan, A. & A. Sankari. 2013. Nest and nest site characteristics of birds in three selected habitats of Theni Forest Division, Tamil Nadu. In: Ecosystem services and Functions of Birds (Eds. Jayapal, R., Babu, S., Quadros, G., Arun, PR., Pramod, P., Kumara, HN. and Azeez), pp 184-186.

Jayakumar, S., Babu. S. & R. Nagarajan. 2013. Nest and nest-site characteristics of Yellow-wattled Lapwing Venellus malabaricus in Southern Tamil Nadu. In: Ecosystem services and Functions of Birds (Eds. Jayapal, R., Babu, S., Quadros, G., Arun, PR., Pramod, P., Kumara, HN. and Azeez), pp 187-188.

Kumara, H.N., Singh, M., Irfan-Ullah, M. & S. Kumar. 2013. Status, distribution and conservation of Slender Lorises in India. In Leaping Ahead (Eds. Masters, J., Gamba, M. and Genin, F). Developments in Primatology: Progress and Prospects 43, 10.1007/978-1-4614-4511-1_38. Springer Science & Business Media, New York 2013, pp. 343-352.

Dubey, P.K. & R. P. Singh. 2013. Stem cells and drug discovery: novel approaches in human and veterinary therapeutics. Recent Advancements in Biotechnology (in 12 Vols). Published by Studium Press LLC, Huston, USA (In press). Please see documentary evidence at page 14.

Tejaswi, K.P.P, Kumara, H.N. & S. Kumar. 2013. Gaadli. In The Macaque Connection: Cooperation and Conflict between Humans and Macaques (Eds. Radhakrishna, S., Huffman, M.A. and Sinha, A). Developments in Primatology: Progress and Prospects 43, DOI 10.1007/978-1-4614-3967-7-8. Springer Science & Business Media, New York 2013, pp. 127-133.

Thangalakshmi, R., Eswaran, R. & M. Mahendran. 2013. Preliminary observations on the bird diversity, environmental and sociological aspects of selected wetlands of Madurai, India. (Ed John Joseph) Food security, issues and concerns, Shanlax publications Madurai.

Nguyen, T.D. & M. Mahendiran. 2013. Foraging behavior of White-headed babbler Turdoides affinis – A model organism for ecosystem services (Eds. Jayapal, R., babu….Azeez) Ecosystem services and functions of birds. Proceedings of the Second international Conference on Indian Ornithology, SACON, Coimbatore, India. ISBN 81 -902136-0-4.

University Details

14th to 17th February, 2014 – Invited as resource person for the Refresher Course organised by the Academic Staff college of University of Mumbai in collaboration with B.N. Bandodkar College of Science, Thane. Conducted a practical session on the wetland benthic evaluation and a interactive session on “Sustainable Development of Wetland and Terrestrial ecosystems”

INFRASTRUCTURE

SACON campus 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 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, and various birds. The tanks are connected with fresh water supply for everyday replenishment.

Laboratory: Currently, our laboratory is equipped with 1) UV-Vis Spectrophotometer, Perkin Elmer Model Lambda 35,2) HPLC Agilent Technology Model 1100 series with DAD and Florescence detector, 3) Water Quality analyzer - Multi Parameter TROLL - 9500, Portable PC testr35, Eutech instruments, 4) Ultra Deep Freezer (-80°C), New Brunswick, Model U 410 Premium, 5) Deep freezers (-20°C), Carrier, Model CHP-30, Cryo Make, and refrigerators Model LG and Samsung, 6) Flame Atomic Absorption Spectrophotometer (AAS) Perkin Elmer, Model 3300 with 13 lamps, 7) Mercury Hydride Generator, Perkin Elmer, 8) Gas Chromatograph, Hewlett Packard Model 5890 Series II with three detectors, (Electron Capture Detector - ECD, Nitrogen Phosphorous Detector -NPD and Flame Photometric Detector - FPD), 9) ANG generator, Claind, Model ANG 2381HC, 10) Microwave Digestion System, Milestone Model 1200, 11) Dissolved Oxygen (DO) Analyzer, 12) Biochemical Oxygen Demand (BOD) Incubator, Sanyo Model Mir 154, 13) Flame Photometer, Systronics 128, 14)

Vertical Laminar Flow Chambers, 15) Respirable Dust Samplers, 16) Ultra Centrifuge, 17) Microprocessor research centrifuge, 18) Walk-in cold room, 19) Rotary Flask Evaporator Model Cyberlab RE-10, 20) Micrometer, 21) Digital Camera, 22) Thermo-hygrometer, 23) All Quartz Double Distillation unit, 24) Millipore water purification system, 25) Hot-air Oven, 26) Binoculars, 27) Induction Hot Plate, 28) Digital Caliper, 29) Soxhlet Mantle, 30) Ultrasonic water bath, Crest 275, 2.7 lts, 31) Desiccators, 32) Blenders, 33) Rotary spinner, and 34) Inverted microscope.

Library and documentation: SACON library has 3263 Books, 2508 Back Volumes, 2706 Maps, 91 CD/DVDs, 101 Project Technical Reports, 34 PhD Thesis, 62 Current Periodicals {62 (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.

ANNEXURE

Annexure : Details of ongoing projects

No.	Project title	Investigator	Collaborating agencies	Research Fellows	Duration	Budget (Lakhs)	Funding source	Date of commencement	Date of completion	Current status
1	Identification of RNA transcripts present in chicken sperm and their relation to fertility	Dr. Ram Pratap Singh	Central Avian Research Institute, Izatnagar 243 122, Bareilly, India	Shafeeque	3 years	21,00000	Department of Science and Technology, Government of India	Jul-12	Jul-15	Ongoing
2	Conservation of the Endangered Species and Habitats - The Edible-nest Swiftlet in the Andaman and Nicobar	Dr. Manchi Shirish S	Environment and Forests, Andaman and Nicobar Islands	Akshaya M Mane and Mr Punyamurty Khristodas.	5 years	51,24,814 (Sanctioned) Rs. 27,41,400 (Received)	Environment and Forests, Andaman and Nicobar Islands	Apr-09	Mar-14	Ongoing
3	Reassessment of the impact of nest collection on the Edible-nest Swiftlet in the Andaman Islands	Dr. Manchi Shirish S	Environment and Forests, Andaman and Nicobar Islands	..	1 year	1.95000	Small Grant Program, WWF India.	Sep-11	Aug-12 (Extended up to May 2013)	Ongoing
4	Status, Ecology and Conservation of Narcondam Hornbill Aeceros narcondami on Narcondam Island, India	Dr. Manchi Shirish S	Environment and Forests, Andaman and Nicobar Islands	..	1.5 year	6,07,200.00/-	Environment and Forests, Andaman and Nicobar Islands	May-11	Oct-12 (Extended up to October 2013)	Ongoing
5	Patterns of Distribution of Selected Faunal Groups in the Agasthiamalai Hills, Western Ghats, Kerala, India	PI: Dr. S Bhupathy CoPI: Dr. Lalitha Vijayan	..	Jins, J V and Madhumita Panigraghi	3 years	Rs. 24.90 lakhs	Department of Biotechnology, Govt. of India	Aug-11	Aug-14	Ongoing

6	Spatio-temporal burrow use patterns by vertebrates in Keoladeo National Park, Bharatpur, Rajasthan, India	Dr. S Bhupathy	..	Aditi Mukherjee		Rs.42,61,000/-	Dept. of Science and Technology, Govt. of India	Jun-13	Jun-16	Ongoing
7	Determining the taxonomic and conservation status of the Forest Owlet (Heteroglaux blewitti).	Dr. Shomita Mukherjee, Dr Robin Vijayan and Dr Prachi Mehta	National Centre for Biological Sciences, Bangalore and Wildlife Research and Conservation Society, Pune.	Pankaj Koparde	3 years	30,52,000/-	Department of Biotechnology, Govt. of India	Apr-13	Mar-16	Ongoing
8	Ecological species sorting in relation to habitat structure in the small cat guild of Eaglenest Wildlife Sanctuary, Arunachal Pradesh.	Dr. Shomita Mukherjee, Dr PV Karunakaran, Dr Ramana Athreya	Indian Institute of Science Education and Research, Pune	To be recruited	3 years	Rs 48,08,000.00	Dept. of Science and Technology, Govt. of India	Nov-13	Oct-16	Ongoing
9	Social organization, behaviour and phylogeography of Macaca fascicularis umbrosa on the Nicobar Islands, India	PI: Dr. Honnavalli N. Kumara CoPI: Prof. Mewa Singh & Dr. Shomita Mukherjee	CES, Bangalore	Mr. S. Vinoth, Mr. Partha Sarathi Misra andMr Avadhoot D. Velankar	3 years	38.54 lakhs	Science and Engineering Research Board (DST)	Jul-12	Jul-15	Ongoing
10	A survey of slender Loris in parts of Kerala and Tamil Nadu, India	PI: Dr. Honnavalli N. Kumara CoPI: Mr. R. Sasi	..	..	23 months	1.97 lakhs	Primate Conservation Inc.	Feb-12	Dec-13	Completed

ANNEXURE

11	Evaluating the status of NTFP trees and development of a model for sustainable harvest of Garcinia gummi-gutta in Aghanashini -Lion tailed Macaque Conservation Reserve, Western Ghats, India	Dr. Honnavalli N. Kumara	..	K. Santhosh	21 months	8.85 lakhs	Rufford Small Grants	Apr-12	Dec-13	Completed
12	Ecological investigation of woody vegetation and nest tree use by birds in the riverine forests of Athikkadavu Valley, Western Ghats	Dr. P. Balasubramanian	..	P.Manikandan	3 years	10.72 lakhs	MoEF, Govt. of India.	Apr-12	Mar-15	Ongoing
13	Status and distribution surveys of selected CR/EN/ VU taxa in wild	Dr. P. Balasubramanian	..	C. Anbarasu and L. Prakash	20 months	5, 64,400	Tamil Nadu Forest Department	Aug-13	Mar-15	Ongoing
14	Monitoring and Surveillance of Environmental Contaminants in Birds in India	Dr. S. Muralidharan	..	Mr. K. Ganesan, Mr. K. Nambirajan & Ms. V. Kirubhanandhini	3 years	48, 36, 000/-	MoEF, Govt. of India	Mar-10	Mar-13	

15	Surveillance of Waterfowl at Nalabana Bird Sanctuary, Chilika Lake, Odisha	Dr. S. Muralidharan	..	..	6 months	90,000/-	MoEF, Govt. of India	Oct-13	Mar-14	Ongoing
16	Impact Assessment Of Prospecting Exploration Activities Through 3d Seismic Data Acquisition By Oil India Ltd. On Mangrove Fauna At Kakinada, Andhra Pradesh	Dr. P. R. Arun	..	Rajan. P	6 months	10,35,000	OIL India Limited	July-13	Jan-14	Completed
17	Cumulative Environmental Impact Assessment (CEIA) studies of Hydro-Electric Projects of Sutlej river basin in Himachal Pradesh (HP)- Faunal Aspects	Dr. P. R. Arun		Dr.M.Murugesan, C.Ramesh, C.Shanthakumar and R. K. Sony	12 months	55,56,000	Govt. of Himachal Pradesh	May 12	June 13	Completed
18	Monitoring the impacts of Jangi Wind power farm (91.8 MW) with special reference to birds and bats	Dr. P. R. Arun		Mr. Samsoor Ali and Mr. Ramesh Kumar	3 years	58,33,000	M/s Genting Energy	July 11	Dec 14	Ongoing

ANNEXURE

ANNEXURE

19	Cumulative Impact Assessment study of Hydro Power Projects on river Yamuna, Tons and tributaries (UK)- Faunal aspects	Dr. P. R. Arun		Dr. G. Srinvas and Mr. Shanthakumar	18 months	43,23,000	Uttarakhand Jal	Jan-13	Jun-14	Ongoing
20	Study of Impact of Wind power project on wildlife including migratory birds and roosting of Raptors, Davangere, Karnataka	Dr. P. R. Arun		Mr. V. Anoop	14 months	16,46,000	CLP, Wind Farms	Nov-13	Jan-14	Ongoing
21	Assessment of the impact of agrochemicals on avifauna in the catchment of Keoladeo National Park, Rajasthan	PI: Dr. B. Anjan Kumar Prusty CoPI: Dr. P.A. Azeez	Institute for Forest Genetics and Tree Breeding (IFGTB)	Mr. Gopesh Sharma and Mr. Manish Kumar	3 years	35.95 lakhs	SERB, DST, Govt. of India, New Delhi	Aug-12	Aug-15	Ongoing
22	Owl Assemblage and occupancy in Andaman archipelago, India	PI: Dr S Babu CoPI: Dr. Honnavalli N. Kumara	..	Mr. S Suresh Marimuthu and Mr. N Rajeshkumar	3 years	41, 17,000/-	Science and Engineering Research Board (DST)	Jun-13	Jun-16	Ongoing
23	Ecological and ethno-cultural examination of the rise and fall in rice diversity in southern India with special reference to the Western Ghats	PI: Dr.Mathew K Sebastian CoPI: Dr. P.R.Arun & Dr.P.A.Azeez	..	Mr. Riyas. MJ and Ms. Aparna	2 years	14.75 lakhs	Indira Gandhi National centre for Arts, Ministry of Culture, GoI	Jul-13	Jul-15	Ongoing

24	ENVIS –Wetlands Ecosystems including inland wetlands	Dr. Goldin Quadros	..	Dr. (Ms.) Hemambika B,Ms. A. Julfia Begum and Mr. M. Srinivasan .	..	707060/-	MoEF, Govt of India	..	..	Ongoing
25	Assessment of the morphological diversity and the ecological patterns in the near threatened colonial water birds across Indian sub-continent using novel approach	Dr. Mahendiran Mylswamy	..	Ms. Kalpana	3 years	16, 45, 000	Dept. of Science and Technology, Govt. of India	May-12	May-15	Ongoing
26	Nature Education Activities for Coimbatore at SACON	Dr. P. Pramod	..	..	long term	..	SACON & local sponsors for various programmes	..	..	Ongoing
27	Monitoring Nature Through Birds	Dr. P. Pramod	..	Ms. C. Divyapriya	3 years		Dept.of Science and Technology	Mar-13	Mar-16	Ongoing
28	Simple Tasks Great Concepts'- Teachers Training programme for South India	Dr. P. Pramod		Ms. J. Chaithra Shree	4 months		Science &Technology & Ecoscience Foundation			completed
29	National Nature Camping Programme – Coimbatore	Dr. P. Pramod	..	Ms. J. Chaithra Shree	5 months		MoEF, Govt of India			completed
30	Vatavaran Environment and Wildlife Film Festival and Forum	Dr. P. Pramod	..	..	3 months		Centre for Media Studies, New Delhi			completed

ANNEXURE

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