ANNUAL RESEARCH SEMINAR

TENTATIVE PROGRAMME

Wednesday, 25th May 2016
Venue: Conference Hall, Tamil Nadu Forest Academy (TNFA)
Forest Campus, R. S. Puram, Coimbatore

INAUGURAL SESSION

0830 – 0900 hrs   Registration

0900 – 0905 hrs   Welcome: Dr. Shomita Mukherjee, Principal Scientist, SACON

0905 – 0910 hrs   Opening Remarks: Dr. K. Sankar, Director, SACON

0910 – 0925 hrs   Inaugural Address

0925 - 1000 hrs   Release of Publications:

- Patterns of distribution of selected faunal groups in the Agasthiamalai Hills, Western Ghats, Kerala, India. SACON Technical Report PR-147
- Impact of Hara Wind Power Project of CLP Wind Farms (India) Ltd. on Wildlife including Migratory birds and Raptors at Harapanahalli, Davangere, Karnataka. SACON Technical Report PR-145
- Assessment of conflicts between Peafowls and farmers in Coimbatore. SACON Technical Report PR-148
- Population status of Rhesus Macaque (*Macaca mulatta*) in Himachal Pradesh, India. SACON Technical Report PR-150
- National Nature Camping Programme at SACON
- Bird Diversity Profile of Coimbatore Wetlands
- Poster on Impacts of Wind turbines; A comparison of case studies from Gujarat & Karnataka
- Poster on Owls of Andaman Islands
- SACON Newsletter Vol 13 (i) January-March 2016
- Release of ENVIS publication
- A Day in Nilgiri Biosphere Reserve: A Lifescape to Experience

1000 - 1045 hrs   Dr. S. Bhupathy Memorial Lecture on "**Amphibians of India – Rapidly changing taxonomy and how many species**?" by Dr. Sushil Kumar Dutta, Member, RMAC, SACON

ARS 2016

TECHNICAL SESSION – I
Ecological Studies

Chair   :

Co-Chair(s)   :

2. Dr. P. A. Azeez, Senior Principal Scientist – I, SACON

1115 – 1135 hrs	Nest tree utilization by cavity nesting birds in the riverine forests of Athikadavu Valley, Western Ghats. **Dr. P. Balasubramanian, Senior Principal Scientist**
1135 – 1155 hrs	What drives species diversity along an elevational gradient? A case study of reptiles and birds in Agasthiamalai Hills, southern Western Ghats. **Madhumita Panigrahi, Project Fellow**
1155 – 1215 hrs	Burrow characteristics and internal occupancy of burrow dwelling vertebrates in Keoladeo National Park, Rajasthan. **Aditi Mukherjee, Project Fellow**
1215 – 1235 hrs	Exploring the sexual shape dimorphism of Painted Stork (*Mycteria leucocephala*) in India. **Dr. Mahendiran M, Scientist**
1235 – 1255 hrs	Nest site selection of White Bellied Sea Eagle (*Haliaeetus leucogaster*) along the Sindhudurg Coast of Maharashtra. **G. Babu Rao, Project Fellow**
1255-1320 hrs	Discussion and remarks by Session Chair and Co-Chair

1320 – 1400 hrs   LUNCH

TECHNICAL SESSION – II
Ecological Studies – Island

Chair   :

Co-Chair(s) 1.

2. Dr. S. Muralidharan, Senior Principal Scientist, SACON

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1400 – 1420 hrs	Effect of environmental and biological factors on the roosting pattern of edible-nest swiftlet *Aerodramus fuciphagus* in the Andaman Islands.

Akshaya Mohan Mane, PhD Scholar

1420 – 1440 hrs	Population status of Nicobar long-tailed macaque *Macaca fascicularis umbrosus* in the Nicobar Islands.

Avadhoot D. Velankar, **PhD Scholar**

1440 – 1450 hrs	Discussion and remarks by Session Chair and Co-Chair

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PARALLEL SESSION

SACON ALUMNI MEET

Venue: Conference Room, GIS Building, TNFA

1400 – 1420 hrs	Registration
1420 – 1425 hrs	Welcome Address: Dr. K.Sankar, Director, SACON
1425 – 1440 hrs	Inaugural Address: Dr. V.S. Vijayan, Founder Director, SACON
1440 – 1500 hrs	Self Introduction Session
1500 – 1510 hrs	Alumni Overview Presentation: Dr. Manchi Shirish S., Senior Scientist, SACON
1510 – 1610 hrs	Group discussion addressing the following:

- Course of action for taking the Alumni network forward
- Fora for regular interactions: e- newsletter, Web page, FB Page, Whatsapp, Regional meet
- Completion of Alumni database and updating profile pages
- Action Plan for Collaboration with SACON

1610 – 1615 hrs	Vote of Thanks: Dr. P. R. Arun, Principal Scientist, SACON
1615 – 1625 hrs	Group Photograph

ARS Continued

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TECHNICAL SESSION – III

Conservation Studies

Chair :

Co-Chair(s) :

2. Dr. R. Jayapal, Principal Scientist, SACON

1450 – 1510 hrs	Ecological and ethno-cultural examination of the rise and fall in rice diversity in southern India with special reference to Western Ghats.
	Dr. Mathew K. Sebastian, Principal Scientist

1510 – 1530 hrs	Phylogenetic affinities and past climate distribution of the Critically Endangered Forest Owlet (*Heteroglaux blewitti*).
	Pankaj Koparde, Project Fellow

1530 – 1550 hrs	Exploring nature through birds: A Science Communication Programme of SACON.
	Dr. P. Pramod, Principal Scientist

1550 – 1605 hrs   Discussion and remarks by Session Chair and Co-Chair

1605 – 1630 hrs   TEA

TECHNICAL SESSION – IV

Environmental Impacts and Monitoring

Chair :

Co-Chair(s) :

2. Dr. P.R. Arun, Principal Scientist, SACON

1630 – 1650 hrs	Impacts of wind power generation on select faunal components of a dry deciduous forest at Harapanahalli, Davangere, Karnataka.
	Anoop V., Junior Research fellow

1650 – 1710 hrs	Impact of wind turbines on the avifauna of Samakhiali, Kutch, Gujarat.
	Ramesh Kumar S., Project Fellow

1710 – 1730 hrs	Effects of environmental contaminants on the ecology and breeding biology of *Gyps* vultures in India.
	Roy Aditya Ashimkumar, Project Fellow

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1730 – 1750 hrs	Sensor observation services for real time particulate air pollution data.

Nishad K. A. Project Fellow

1750 – 1810 hrs	Discussion and remarks by Session Chair and Co-Chair

CONCLUDING SESSION V

Chair : Dr. Ramakrishna, Chairman, RMAC, SACON

Co-chair : Dr. K. Sankar, Director, SACON

1810 - 1820 hrs	Comments on the Annual Research Seminar		
1820 - 1830 hrs	Photographic Competition Awards	:	Dr. Mathew K. Sebastian, Principal Scientist, SACON
1830 - 1840 hrs	Best Presentation Awards	:	Dr. P.V. Karunakaran, Principal Scientist, SACON
1840 - 1850 hrs	Concluding Remarks	:	Dr. Ramakrishna, Chairman, RMAC, SACON
1850 - 1900 hrs	Vote of Thanks	:	Dr. P. Balasubramanian, Senior Principal Scientist, SACON
1930 - 2100 hrs	Dinner (TNFA Campus) – All are invited		

Thursday, 26th May 2016

1000 – 1300 hrs Meeting of the Research Monitoring & Advisory Committee (RMAC)
(Venue: Board Room, SACON – RMAC Members only)

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Nest tree utilization by cavity nesting birds in the riverine forests of Athikadavu Valley, Western Ghats

-P. Balasubramanian

Of the 158 bird species recorded in the riverine forests of Athikadavu Valley, Western Ghats, 32 species were (20.25%) cavity nesting birds. Of these cavity nesting birds, nine species (28.12%) were Primary Cavity Nesters (PCN) and 23 species (71.88%) were Secondary Cavity Nesters (SCN). A total of 54 tree species belonging to 23 families were utilized for nesting. Out of 302 nests recorded, 102 were excavated by PCN, the remaining nests belonged to the SCN. Of the 102 nest cavities excavated by PCN (notably barbets and woodpeckers) 92.15% were found in dead trees or dead branches of live trees. A higher percentage of PCN and SCN nests in the riparian habitat were located in *Terminalia arjuna* (12.75% and 14.50% respectively) followed by *Mangifera indica* (11.76% and 7.50% respectively). Among the various cavity nesters, Common Myna utilized the highest number of nest tree species (n=22) followed by Brown-headed Barbet (n=20) and White-cheeked Barbet (n=18). For the PCN birds, mean values of nest tree height, nest tree girth, nest height and girth at nest height were 19.23±4.97m, 277.77±127.04 cm, 10.91±3.20m, 68.00±39.04cm respectively. A major proportion (89.21%) of both primary and secondary cavity nester nests was located in tree branches. For nesting, the PCN largely chose dead substrate and the SCN used live substrate. Protection of snags is suggested as woodpeckers and barbets mainly rely on snags for nesting. Riparian forest species such as *Terminalia arjuna, Mangifera indica, Madhuca longifolia* and *Pongamia pinnata* favoured by cavity nesting birds could be planted on the degraded patches.

Project Title	: Ecological investigation of woody vegetation and nest tree use by birds in the riverine forests of Athikadavu Valley, Western Ghats
Investigator(s)	: Dr. P. Balasubramanian
Researcher(s)	: Mr. P. Manikandan - Project Fellow
Funding Agency	: Ministry of Environment, Forest & Climate Change (MoEF& CC), Govt. of India
Project Duration	: 01.03.2012 to 01.03.2015

What drives species diversity along an elevational gradient? A case study of reptiles and birds in Agasthiamalai Hills, southern Western Ghats

-Madhumita Panigrahi

Understanding the distribution patterns of biotic communities and the underlying mechanisms have long been a central theme in ecology. One of the most widely tested patterns is the apparent decrease in species richness along latitudinal gradient from the tropics to the poles.Alternately, altitude has been used as a surrogate for latitude and species richness often shows a mid-elevation peak or 'Mid-Domain Effect' (MDE). We examined species distribution patterns of reptiles and birds along an elevational gradient in Agasthiamalai (50-1860m), southern Western Ghats. Reptiles were sampled using visual encounter surveys and birds were counted using variable-width circular plots across 18 elevational bands. We found that both, reptile and bird species richness, decreased with altitude and deviated significantly from the expected values as predicted by the MDE models (reptiles: r=-0.285, p=0.251; birds: r=-0.15, p=0.55). On the contrary, species richness of endemic snakes (r=0.622, p=0.006) and endemic lizards (r=0.461, p=0.054) showed a weak but significant MDE, also evident in endemic birds (r=0.71, p=0.001). Since both reptile (r=0.804, p=0.001) and bird species richness (r=0.808, p =0.001) declined with decreasingarea ofhigher elevations, we infer that an area-effect perhaps constrains the diversification of taxa, triggered by historical climatic events.Results of stepwise multiple linear regressions revealed that area (r^2=0.617, p=0.0005) and temperature (r^2=0.534, p=0.002) emerged as the most significant factors for reptile species richness.However, precipitation and MDE together (r^2=0.903, p=0.000) contributed most to species richness of endemic reptiles. On the contrary, temperature (r^2=0.802, p=0.000) was the most influential factor in explaining overall bird species richness.

Our results indicate that both historical and contemporary ecological factors may play significant roles in distribution of endemic taxa in tropical montane ecosystems..

Project Title	:	Patterns of distribution of selected faunal groups in Agasthiamalai Hills, Western Ghats, Kerala, India.
Investigator(s)	:	Late Dr. S. Bhupathy, Dr. Rajah Jayapal, &Dr. LalithaVijayan
Researcher(s)	:	Mr. Jins V. J.& Ms. Madhumita Panigrahi - Senior Research Fellows
Funding Agency	:	Department of Biotechnology, Govt. of India
Project Duration	:	30.05.11 to 31.12.14

Burrow characteristics and internal occupancy of burrow dwelling vertebrates in Keoladeo National Park, Bharatpur, Rajasthan

- Aditi Mukherjee

Burrows are engineered shelters providing crucial refuge and protection against temperature extremes, fire and predation. Burrowing animal assemblages are most common in arid and semi-arid habitats.The present work explored the external and internal burrow features to identify the factors determining the animal assemblages. Thestudyareawasoverlaidwith a 25hagridto systematically locateburrows. Burrow characteristics (external and internal) were recorded. Rayleigh Circular statistics was used to determine the circular uniformity in orientation of burrow openings. The internal architecture of burrow systems was studied using a burrow video camera. Degree of convolution and Reichman's index were used to determine complexity and linearity. Camera traps and burrow video camera were used to determine the presence of animals dwelling inside. Burrow characteristics were correlated with the presence of animals to identify factors determining their assemblage and co-occupancy.

A total of 44 burrow systems were located. The Rayleigh Z-test showed that burrow openings were randomly oriented. The burrow systems had a looping structure with a mean length andabove ground area of 13.33 ± 6.51m and 18.81 ± 9.92m^2 respectively. The Reichmann's Index of linearity indicated that all nine burrow systems had circular configuration. Burrow systems were occupied by six vertebrates, *viz*, Indian Crested Porcupine (ICP), Golden Jackal, Leaf-nosed bat, Indian Rock Python, Common Indian Monitor and an unidentified species of Gecko. The occupancy of ICP and gecko were not correlated with any internal burrow variable. Jackal occupancy was positively correlated and Python negatively, with mean chamber height. Bats showed a negative correlation with number of burrow branches and number of openings.

Co-occupancy of ICP (prey) and Python (predator) was negatively correlated with number of openings and mean chamber height. Co-occupancy of Bat (prey) and Python (predator) showed a negative correlation with number of burrow branches,number of openings, mean chamber height and mean chamber width.

Project Title	:	Spatio-temporal burrow use patterns of vertebrates in Keoladeo National Park, Bharatpur, Rajasthan, India.
Investigator(s)	:	Late Dr. S Bhupathy, Dr. H.N. Kumara & Dr.Manchi Shirish S.
Researcher(s)	:	Ms. Aditi Mukherjee, Project Fellow
Funding Agency	:	Department of Science & Technology (DST-SERB), Govt. of India
Project Duration	:	19.06.2013 to 18.06.2016

Exploring the sexual shape dimorphism of Painted Stork (*Mycteria leucocephala*) in India

- Mahendiran M

Morphological diversity, particularly sexual size dimorphism, for long has been quantified on the basis of univariate measurements of key traits. However, the traditional method faces several limitations, particularly not accounting the existing shape variability in two or three dimensions. These limitations could be circumvented by the application of geometric morphometrics, which examines the shape associations among an entire set of landmark points. Here, we tested the occurrence of Sexual Shape Dimorphism (SShD) in wild Painted Stork (*Mycteria leucocephala*) using the geometric morphometrics. We obtained measurements of externalbody parts of both sexes and juvenilesby making digital video recordings of copulating birds, in which the male and female could bereadily identified by their relative positions. We developed a method for *in situ* estimation of SShD through digital photographs, and identified the subtle difference in the bill shape between the sexes of Painted Storks. The partial warp scores suggests that males are larger than females, and variations in the bill shape are prominent between males and females. Clear variation in the shape of the bill among the juveniles and adults were inferred. (Partial Warp Scores: component 1 – 59.19%, eigen value = 3.8; component 2 – 12.22%, eigen value = 3.4, component 3 – 8.8%, eigen value = 2.4) Thus, we could demonstrate the utility of Geometric Morphometrics to understand the growth patterns and the expression of SShD in wild Painted Stork. Because the Painted Stork is a large bird with no apparent sexual dimorphism, our results aid in differentiating the subtle morphological variation between the sexes along its size and shape. Further, it could help testing a number of hypotheses on morphological variations.

Project Title	:	Assessment of the morphological diversity and the ecological patterns in the near threatened colonial waterbirds across Indian sub-continent using novel approach.
Investigator(s)	:	Dr. Mahendiran Mylswamy
Researcher(s)	:	Mr.Rajneesh Dweevedi - Project Fellow
Funding Agency	:	Department of Science and Technology (DST- SERB) Govt. of India
Project Duration	:	24.05. 2012 to 25.05.2015

Nest site selection of White Bellied Sea Eagle (*Haliaeetus leucogaster*) along the Sindhudurg Coast of Maharashtra

- G. Babu Rao

White-bellied Sea Eagle (WBSE) *Haliaeetus leucogaster* is a resident raptor distributed along the Indian coast, but little is known about its nest-siteselection in the Indian coast. Previous surveys during 1999 had documented a dense breeding population of WBSE along the Sindhudurg and Ratnagiri coast of Maharashtra, but failed to record thekey variables influenced the nest-site selection. In this context, we counted the nests of WBSE along the Sindhudurg coasts and the same was compared with earlier study. The nest-site selection of WBSE was assessed by comparing nest sites of WBSE with random sites within the focal area. The comparison was made at two levels: micro (patch level – explaining nest and nest site characteristics) and macro (2 km radius home range level – explaining composition and configuration of terrain, vegetation and anthropogenic factors). We surveyed nearly 90 kms of 120 kms of coastal line and the width ranged from 500 to 1000 mts. We recorded 46 nests of WBSE (0.511 nests/km), which was more than the previous survey (32 nests along the Sindhudurg coast). Among the three talukas surveyed, maximum of 27 nests were recorded from Malvan taluka. Nearly 80 percent of nests were found in *Casuarina* trees. Most of the nests were observed on trees which had high girth class (1.1 to 5.4 m) and height (20 to 40 m). Generalized linear Model with logit link was applied to identify the key factors influenced the nest-site selection at macro level. The results showed that altitude (low elevation; β= - 0.07516; SE=0.03973), road density (degree of anthropogenic pressure; β= -0.29468; SE= 0.11954) and distance to shoreline (proximity to foraging area; β= -7.691; SE=2.85876) were negatively influenced and area of dense vegetation (β=1.04195 SE=0.57269; availability of nesting area) and extent of beach area (β= 5.33313 SE=3.19762; availability of foraging area) positively influenced the nest site selection of WBSE in the study area. Retaining mature *Casuarina* trees along the Sindhudurg coast is required for the nesting success and long-term survival of the WBSE.

Effect of environmental and biological factors on the roosting pattern of edible-nest swiftlet *Aerodramus fuciphagus* in the Andaman Islands.

- Akshaya Mohan Mane

Environmental conditions and biological rhythms of animals can alter their routine behavior. These changes are scarcely studied among the cave-dwelling animals. The endemic cave dwelling edible-nest swiftlet (*Aerodramus fuciphagus inexpectatus)* in the Andaman and Nicobar Islands is a known trogloxene, like bats (Chiroptera) and a diurnal forager. In order to investigate the effect of environmental and biological conditions on the roosting behavior of the the edible-nest swiftlet, we did 24 hour observations at the cave entrance (during January – May 2013-2014) covering different breeding stages of the study species such as nesting, egg laying, incubation, nestling and fledging of chicks. The observations revealed that more than 90 % individuals of the edible-nest swiftlet returned to the cave during Peak Roosting Hours (PRH) i.e. 1700 to 2000 hours. A Generalized Linear Model (GLM) depicted the association of the roosting activity of breeding edible-nest swiftlet with changes in lunar phases. Further, the roosting behavior of breeding edible-nest swiftlet varies with natural light, especially during lunar phases. The proportion of birds roosting in caves was comparatively high during the new moon phase when birds were at the nesting and fledging stage of their breeding cycle. Late arrival of the individuals depicts lunar phobic character of species. We presume that the lunar phobic character is a result of an anti-predatory strategy to avoid the active known predators (Owls) at caves entrances. Feeding habits and food requirement during different breeding stages may also be contributing to the change in the roosting pattern of the species. High protein requirement during nesting period for nest construction may results in late arrival of birds during the breeding stage.

Project Title	:	Conservation of Edible-nest Swiftlet in Andaman and Nicobar Islands, India.
Investigator(s)	:	Dr. Manchi Shirish S.
Researcher(s)	:	Ms.Akshaya Mohan Mane - PhD Scholar
Funding Agency	:	Ministry of Environment, Forest and Climate Change through Dept. of Environment and Forests, Andaman and Nicobar Islands
Project Duration	:	April 2009 to March 2014

Population status of Nicobar long-tailed macaque
Macaca fascicularis umbrosus in the Nicobar Islands, India

- Avadhoot D. Velankar

Natural disasters pose a threat to isolated populations of species with restricted distributions, especially those inhabiting islands. The Nicobar Long-tailed Macaque *Macaca fascicularis umbrosus,* is one such species found on the three islands (viz. Great Nicobar, Little Nicobar and Katchal) of the Andaman and Nicobar archipelago. These islands were hit by a massive tsunami, on 26[th]December 2004. We studied the distribution and population status of *M. f. umbrosus* on these islands and compared our results with previous studies. We surveyed (Jan 2013 to Apr 2014) on existing paths and trails in the three islands to obtain encounter rates as a measure of study species abundance. We evaluated the degree of inundation due to tsunami by using Normalized Difference Water Index (NDWI) on Landsat Imageries (Landsat 7 : year 2003, Landsat 8 : year 2014) of the study area before and after tsunami. The encounter rate of *M. f. umbrosus* groups per kilometre in Great Nicobar (effort 119.55km), Little Nicobar (effort 14.09 km) and Katchal (effort 78.50 km) was 0.30, 0.35 and 0.48 respectively with the mean group size of 39.83 ± 17.47SD in Great Nicobar and 43.50 ± 26.15 SD in Katchal. Encounter rate of Long-tailed Macaque obtained during the present study was compared with previous studies using GLM and it was found to be significantly higher (Walds $Z = 3.11$, $P = 0.002$), indicating increase in macaque population after sharp decline reported during 2006 study. Post tsunami, there was a significant change observed in the proportion of adult males, adult females and immatures, but mean group size did not differ as compared to pre tsunami time. Results showed that the population has recovered from decline caused by tsunami, but it cannot be ascertained whether it has reached stability in group size and composition because of the altered group structure. This study demonstrates the effect of natural disasters on island occurring species.

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

- Mathew K. Sebastian

Rice paddies, unique in several ecological characteristics, provide invaluable and irreplaceable ecosystems services. Till a few decades back 50,000 to 60,000 rice varieties were cultivated in India that has reduced to a few hundred now. A study was undertaken to (i) identify and document the diversity of the traditional rice varieties of Western Ghats and associated traditional knowledge, (ii) identify Important Rice Areas (IRAs) based on rice biodiversity, ecological status, agronomical practices, commercial and socio-religious importance, and (iii) study the historical changes in rice cultivation practices and explore the reasons for the same.

Our study documented information on591 traditional varieties from five states. Of these, 141 are from Kerala, 122 from Tamil Nadu, 182 from Maharashtra and 77 from Goa. We recorded 173 plant, 57 bird and 41 butterfly species from the paddy fields of Tamil Nadu,; 144 plant, 189 bird, and 51 butterfly species from Kerala; 169 plant, 74 bird, 42 butterfly and 30 odonate species from Karnataka; 144 plant, 29 bird, 36 butterfly and 24 odonate species from Maharashtra and sevenodonate and 16 bird species form Goa.

Kuttand paddy ecosystem, Pokkali and Kole paddy ecosystem, hill areas of Wayanad, and Kanthalloor Kerala, Cauvery delta basin in Tamil Nadu, Shimoga, Sagar, Medini areas in the Western Ghats of Karnataka, parts of Vikramgarh, Jawahar, Sangamner, Akole and Radhanagari Taluk in Maharashtra and the entire Khazan fields of Coastal area of Goa were identified as IRCA's.Historical data on the rise and fall of paddy cultivation was collected and mapped on a "spatial platform'.

Specific-management and conservation action plans include recommendations that benefit the individual and institutions involved in the conservation of traditional rice varieties while ensuring intellectual property rights of the communities involved.

Project Title	:	Ecological and Ethno-cultural examination of the rise and fall in rice diversity in southern India with special reference to Western Ghats..
Investigator(s)	:	Dr. Mathew K Sebastian, Dr. P. A. Azeez & Dr. Arun, P.R.
Researcher(s)	:	Ms. Chaithra Shree J. – Research Fellow
Funding Agency	:	Indira Gandhi National Centre for Arts, Ministry of Culture, Govt. of India
Project Duration	:	July 2012 to December 2014

Phylogenetic affinities and past climate distribution of the Critically Endangered Forest Owlet (*Heteroglaux blewitti*)

- Pankaj Koparde

The Forest Owlet *Heteroglaux blewitti*, belonging to a monotypic genus, is a Critically Endangered species endemic to Central India. Since the discovery of the species, the taxonomic placement of the species hasbeen debatable. The aim of the study was to resolve phylogenetic affinities of the species andexplore how past and current climatic conditions could have determined its distribution.To resolve phylogeny, we sequenced two mitochondrial and three nuclear genes, generating 3608bpof data, from moulted feathersof *H. blewitti*, *Athene brama,* and *Glaucidium radiatum,* and museum samples of *Athene superciliaris*. We constructed phylogenetic trees using Maximum Likelihood and Bayesian analyses on the datasets. To determine the species climatic niche,we useda niche modelling approach,spanning present conditions, the Mid-Holocene, Last Glacial Maxima (LGM) and the Last Interglacial time periods. We found a conflict in *H. blewitti* position when compared mitochondrial and nuclear phylogenetic trees, however both datasets supported its inclusion in *Athene sensulato*. Oriental *A. brama* and Palearctic *A.noctua* formed a sister group, whereasNearctic and Neotropical *A. cunicualria* and Madagascan *A.superciliaris* formed a sister group. Our results showed that *H. blewitti* is evolutionary distinct, but nested within *Athene*. Temperature Seasonality explained most of the variation in past and present distribution of the species. We validated the present distribution model through field surveys, suggesting that the current distribution range of the species is underestimated. Past distribution models showed that the species has been restricted to Central India possibly since the LGM; however the area under suitable niche has reduced significantly after LGM. To further understand functional connectivity in *H. blewitti* populations and role of habitat connectivity, a population genetic approach is recommended.

Project Title	:	Determining the taxonomic and conservation status of the Critically Endangered Forest Owlet.
Investigator(s)	:	Dr.Shomita Mukherjee, Dr. Robin Vijayan & Dr.Prachi Mehta
Researcher(s)	:	Mr. Pankaj Koparde - Program fellow
Funding Agency	:	Department of Biotechnology, Government of India
Project Duration	:	10 April 2013 to 31 July 2016

Exploring nature through birds: A Science Communication Programme of SACON

- P. Pramod

Exploring Nature through birds (ENTB) is a science education programme of SACON executed in collaboration with many partners such as Salim Ali Naturalist Forum, Salim Ali Nature Club Network, many local and Regional NGOsand reaching out through a web interphase nationally. First phase of this programme titled "Monitoring Nature through birds", is supported by the National Council for Science, Technology and Communication of Department of Science and Technology, Government of India. This project intents to communicate the scientific temperament, habit of careful observation and learning directly from Nature among children. It also aims to nurture the habit of systematic documentation which in turn supports participatory data generation on the status of common birds. The activities planned were:

1. Selection of target species of birds for the activities.

2. Preparation and dissemination of a module of books and posters for children and nature lovers for communicating ornithology and ecology among public.

3. Development of a web interphase for students and nature lovers to enable them to submit their nature observations and interact.

Activity-based-learning module with three books and four posters were prepared and is being used in classrooms as well as in field by students. Nearly 1000 module sets were distributed to students across the country. ENTB is integrated into the nature education web site of SACON (www.saconeducation.org) which collates and presents the data as well as connects and coordinates the teams working in various parts of the country. SACON expects to take this forward as a nationwide citizen science programme to monitor populations and life of common birds.

Project Title	: Nature Education Programmes of SACON
Investigator(s)	: Dr. P. Pramod
Researcher(s)	: Ms. C. Divyapriya - Programme Fellow
Funding Agency	: Department of Science and Technology Govt. of India
Project Duration	: 01.03.2013 to 31.5.2016

Impacts of wind power generation on select faunal components of a dry deciduous forest at Harapanahalli, Davangere, Karnataka

- Anoop V

In recent times wind energy has gained acceptance across the world because of its pollution free and environmental friendly features. Although, wind-farm related impacts on wildlife, especially birds and bats, are reported elsewhere,in India very few studies have investigated thisissue. This study was conducted in Davangere District of Karnataka. The major objectives of this study were to estimate, (i) the direct mortality of birds and bats (ii) flight patterns and (iii) population of birds at wind farms. Totally seven bird mortalities were found below the turbines with an estimated annual mortality of 0.47 birds/turbine. These included Indian Pitta, White Throated Kingfisher, Little Swift and an unidentified raptor. We found 18 bat mortalities during the study period with an estimated annual mortality rate of 12 bats/turbine. All 18 bat mortalities were of the same species *Taphozous melanopogon.* The comparatively higher rates of bat mortalities recorded during May and October and correspondingly higher annual bat mortality rate estimate of 12 bats per turbine during the present study period is of concern. Bird abundance was slightly lower in the wind farm compared to the surroundings. Our flight height study revealed that raptors are more prone to collision than other species as we observed most raptor flight was within the collision risk zone.

Project Title	:	Impact of Hara Wind Power Project of CLP wind farms (India) Ltd. On wildlife including migratory birds and raptors at Harapanahalli, Davangere, Karnataka
Investigator(s)	:	Dr. Arun, P.R & Dr. Rajah Jayapal.
Researcher(s)	:	Mr. Anoop V - PhD Scholar
Funding Agency	:	CLP windfarms (India) Pvt.Ltd.
Project Duration	:	January 2014 to May 2015

Impact of wind turbines on the avifauna of Samakhiali,Kutch,Gujarat

- Ramesh Kumar S

Wind energy is among the most preferred forms of renewable energy and India is the 5[th]largest wind energy producer in the world. Wind turbines are known to have multiple impacts on birds, such as mortality due to collision and displacement from the wind farm area. We conducted studies in Samakhiali region of Kutch, Gujarat from September 2012 to April 2014 to document the displacement of land birds due to wind turbines and bird collisions with turbines. Totally, 174 species of birds were recorded from the study area including Endangered Steppe Eagle and Vulnerable Dalmatian Pelican, Common Pochard and Sarus Crane. There was a difference in species richness and abundance of land birds between turbine and non-turbine areas (Control Site).This difference was mainly due to the proximity presence of turbine rather than the proximity to road, village, water body and coastal area.In contrast to other land birds, the raptor composition was similar in turbine and control sites. During the study period, 47 bird carcasses were recorded belonging to 11 species with maximum mortality seen in Eurasian Collared Dove (n=10) followed by Common Pigeon (n=6). The mortality of birds was influenced by the number of birds and flight time within the collision risk zone rather than by their morphological characters such as body length, wing length and body mass.New wind farms should be installed after conducting a detailed study on the possible impacts of turbines on the avifauna of that area.

Project Title	: Monitoring the impacts of Jangi Wind power farm (91.8 MW) with special reference to birds and bats.
Investigator(s)	: Dr. Arun, P.R.
Researcher(s)	: Mr. Samsoor Ali M &Mr. Ramesh Kumar S - Senior Research Fellows
Funding Agency	: M/s Genting energy Ltd
Project Duration	: July-2011toDecember-2014

Effects of environmental contaminants on the ecology and breeding biology of *Gyps* vultures in India

- Roy Aditya Ashimkumar

Three resident *Gyps* species, (*G.bengalensis*, *G.indicus, G.tenuirostris*), have undergone population declines of over 99% in India and are listed as Critically Endangered (IUCN, 2004) and placed in Schedule I of the Indian Wildlife Protection Act (1972).The prime cause for the decline is Diclofenac Sodium, a Non-Steroidal Anti-Inflammatory Drug (NSAID). Despite its ban in the veterinary sector since 2006, misuse of human Diclofenac formulations in this sector continues to be a major threat. *G.bengalensis*is the most severely impacted species in Central Gujarat. A study focusing on ecology, breeding biology, habitat occupancy and environmental contamination is being conducted to suggest measures towards their conservation.Nesting and feeding sites of vultures were identified, mapped, and monitored to obtain account of active nests, breeding success and to study foraging behavior. Fifty nests of *G.bengalensis*were located and monitored since 2012. Breeding success ranged between 45% and 50% in four breeding seasons during 2012-13 and 2015-16. Nesting sites were located amidst human settlements, on large trees, near village ponds. Nest heights rangedfrom 10m to 21m. Seventeen species of trees were used as nest sites, while neem (*Azadirachta indica*) was the most common. Tissue of dead vultures and livestock carcasses from feeding sites were collected for estimating residues of various NSAIDs and other organic contaminants. During the study period (3 yrs), 108 dead *G.bengalensis* were located, of which kite flying accounted for 44%, and dehydration, visceral gout and illness accounted for 56% of deaths. Forty nine dead *G.bengalensis* were examined. While 23 showed sings of visceral gout, 11 were due to poisoning and the remaining showed kite string injuries. Tissue analysis revealed the presence of Diclofenac in a majority of vultures and very high levels of DDT in others.

Sensor observation services for real time particulate air pollution data

- Nishadh K. A.

The data collected and disseminated under various air pollution monitoring programs in India suffer from data non interoperability restraining their uses by a wider array of stakeholders. Most of the data currently are not in open-access, machine-readable formats and the metadata, and application programming interfaces are yet to be enabled. These limitations hinder integration with air quality modeling systems and volunteer information systems to address intrinsic data gaps in pollution monitoring and management. That results in inadequate decision-making regarding management options or generation of public awareness. In this context, the present study was taken up with the objective of addressing the technical requirements of real time particulate air pollution monitoring to incorporate data interoperability measures in it. We opted for open source software and hardware methods for real time particulate pollution monitor development. We used Sensor Observation Service (SOS), a widely used set of standards as the base for enabling interoperability measures. The study was carried out between 2013 and 2015 in Coimbatore urban and surrounding regions for testing and validating the developed real time particulate pollution monitors.

Four real time particulate pollution monitors were developed using low cost laser based indoor particulate profiler. The functionality of the monitors assessed by field deployment in different parts of Coimbatore found to be reliable in terms of data collection and real time communication. The PM2.5 and PM10 pollution levels recorded by the monitor have reflected the temporal pollution variability in the field-testing. IstSOS python programming language-based application of SOS was adopted to enable interoperability in real-time data. Accordingly, advantages and limitations of using low cost particulate pollution monitor in terms of interoperable data formats and the utility of the system in second tier urban centres taking Coimbatore as a type case was demonstrated.

Project Title	:	Real time air pollution modelling and dissemination of location basedinformation using mobile devices
Investigator(s)	:	Dr. P. A. Azeez & Dr. R. Mohanraj
Researcher(s)	:	Mr. Nishadh K. A. - PhD Scholar
Funding Agency	:	Department of Science & Technology (NSDI-NRDMS), Govt. of India
Project Duration	:	27.02.2013 to 30.11.2014