

# **IX INTERNAL ANNUAL RESEARCH SEMINAR**

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*(24<sup>th</sup> September 2013)*

## **Programme & Abstracts**



**भारतीय वन्यजीव संस्थान**  
**Wildlife Institute of India**

# IX INTERNAL ANNUAL RESEARCH SEMINAR

24<sup>th</sup> September 2013

## PROGRAMME

**Seminar Chairperson: Shri Vinod Rishi, Former ADG (WL)**

0930 – 0935 h Welcome: Dr. K. Sankar, Research Coordinator, WII

**TECHNICAL SESSION – I**  
**Diversity, Distribution, and Population Assessment**

**Chair :** Dr. Sushant Chowdhury, Scientist ‘G’

**Co-Chair:** Dr. K. Sivakumar, Scientist ‘E’

- 0935 – 0955 h Monitoring wildlife using aircraft and other technologies.  
**Qamar Qureshi, Scientist ‘G’**
- 0955 – 1015 h Predicting distribution of wolves in Trans-Himalayan and Himalayan Landscape, India.  
**Shivam Shrotriya, Senior Research Fellow**
- 1015 – 1035 h Patterns of floristic diversity in cold-arid region of Nanda Devi Biosphere Reserve, western Himalaya.  
**Amit Kumar, Junior Research Fellow**
- 1035 – 1055 h Population characteristics and ranging pattern of the endangered Yellow-headed tortoise *Indotestudo elongata* in and around the Rajaji National Park, Uttarakhand.  
**Zehidul Hussain, Technical Assistant**
- 1055 – 1115 h Tea**
- 1115 – 1135 h Preliminary study on diversity of Moth (Lepidoptera:Heterocera) in Nanda Devi Biosphere Reserve, Uttarakhand.  
**Pritha De, Junior Research Fellow**
- 1135 – 1155 h Pollinator diversity in three selected forest types of Dehradun Forest Division, Uttarakhand  
**Preeti Shirish Virkar, Junior Research Fellow**
- 1155 – 1215 h Evaluating pattern of landscape use by dispersing Tigers (Stray) and modelling potential connectivity bottlenecks  
**Indraniil Mondal, Junior Research Fellow**
- 1215 – 1240 h Discussion

**TECHNICAL SESSION – II**  
**Molecular Genetics and Captive Management**

**Chair: Dr. S.P. Goyal, Scientist ‘G’**

**Co-Chair: Dr. S.A. Hussain, Scientist ‘G’**

- 1240 – 1300 h      Developing protocols for molecular tracking of Asian elephants in north-west India: A key issue in understanding crop raiding behaviour in elephants  
**Rahul De, UGC-Junior Research Fellow**
- 1300 – 1320 h      Use of molecular approach in addressing issue of genetic introgression in wild and domestic pigs in vicinity of Ranthambhore National Park, Rajasthan  
**Puneet Pandey, Junior Research Fellow**
- 1320 – 1415 h      Lunch**
- 1415 – 1435 h      Pedigree analysis for captive management of select threatened primates  
**Nilofer Begum, Junior Research Fellow**
- 1435 – 1450 h      Discussion

**TECHNICAL SESSION – III**  
**Animal-Habitat Interactions and Impacts of Climate Change**

**Chair: Dr. P.K. Malik, Scientist ‘G’**

**Co-Chairs: Sh. S. Sen, Scientist ‘F’**

- 1450 – 1510 h      Monitoring of tigers, co-predators & prey species in Tadoba-Andhari Tiger Reserve and adjoining landscapes, Maharashtra  
**Madhura P. Davate, Junior Research Fellow**
- 1510 – 1530 h      Current status of avifauna in Kibber Wildlife Sanctuary  
**S.Pawan Kumar, Junior Research Fellow**
- 1530 – 1550 h      Plant-Pollinator network along a gradient of agricultural intensification in Tripura.  
**Pushan Chakraborty, CSIR-Junior Research Fellow**
- 1550 – 1615 h      Tea**
- 1615 – 1635 h      Effects of climate change on Riverine Forests and indicator species along River Ganga in Uttarakhand: a Multi -Scale Approach  
**Ankita Sinha, Junior Research Fellow**
- 1635 – 1655 h      Discussion

**CONCLUDING SESSION**

- 1655 – 1715 h      Concluding Remarks: **Shri Vinod Rishi, Former ADG (WL)**
- 1715 – 1720 h      Vote of Thanks: **Dr. K. Sankar, Research Coordinator**

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## Monitoring wildlife using aircraft and other technologies

- *Qamar Qureshi*

To estimate the abundance of wild animals we laid aerial transect and foot transect in Saurashtra part of Gujarat. We used single engine high wing Cessna aircraft for aerial transect. We covered 400 km length for wild ass survey and 3000 km for flamingoes and cranes over a total period of six months during winter and monsoon. We have covered 188 km transect length on foot in Little Rann of Kutch for Ungulate abundance estimation. We also carried out pilot testing of drones for their use in population monitoring. We used Multi-covariate Distance sampling and Horvitz-Thompson estimator for estimating abundance. The detection probability of animals was found to be affected by flying height and fatigue level of observers. The preliminary results are not sufficient to compare the efficacy of different methods.

<b>Project Title</b>	:	Evaluation of Methods to Estimate Wild Ass Population in Rann of Kuchchh, Gujarat
<b>Principal Investigator(s)</b>	:	Qamar Qureshi and Nita Shah
<b>Researcher(s)</b>	:	
<b>Funding Agency</b>	:	Wildlife Institute of India
<b>Project Duration</b>	:	04.02.2012 to 03.08.2014

## Predicting distribution of wolves in Trans-Himalayan and Himalayan Landscape, India

- *Shivam Shrotriya*

Understanding distribution pattern and the factors affecting the distribution of wildlife species is one of the important aspects of studying their ecology. Wolves in the Himalayan and Trans-Himalayan landscapes of India and adjoining countries are poorly studied when compared to many other large mammals of South Asia. This project was initiated in 2010 in order to collect baseline information on the status of wolves in the Himalayan region and investigate their ecology. First phase of the study, covering the states of Jammu & Kashmir, Himachal Pradesh and Uttarakhand, has been completed and results were published. Estimating the distribution of wolf and identifying the key areas of wolf presence were among the objectives of the first phase. A definitive distribution of the wolf is one of the final outcomes of the project, which is still under process and field data is being collected. The initial prediction of the distribution and designing further study based on these prediction is presented here. Maximum entropy model is popular among the ecologist for predicting the distribution of wildlife species. This is a robust method against correlated environmental variables which could lead to a bias towards auto-correlated variables, and less sensitive to the number of occurrence points. Software MaxEnt (version 3.3) was used to predict the distribution. The variables used as possible factors affecting the distribution were bio-climatic variables, topographic features, vegetation cover and human disturbance. Information from literature review, questionnaire surveys (n= 371) and field evidences was used to define the distribution. In the Himalayas, two lineages of wolves are reported in literature, therefore, a primary investigation of the differences in ecological niche of both the lineages was also carried out. There were no substantial differences observed in predicting ranges of different variables for both the lineages.

<b>Project Title</b>	: Ecology and Conservation of Himalayan Wolf
<b>Principal Investigator(s)</b>	: Dr. Bilal Habib, Dr. Y. V. Jhala, Sh. Salvador Lyngdoh
<b>Researcher(s)</b>	: Shivam Shrotriya, SRF
<b>Funding Agency</b>	: WII Grant-n-Aid and MBZ Species Conservation Fund
<b>Project Duration</b>	: 2010 to 2017

## Patterns of floristic diversity in cold-arid region of Nanda Devi Biosphere Reserve, western Himalaya

- *Amit Kumar*

Floristic diversity assessments are necessary to understand the present status and conservation of natural habitats. In ecological systems, habitats are shaped by physiographic and edaphic factors. These factors play a decisive role to form the structural and functional aspects of vegetation. The objective of this study was to identify various physiognomic units with respect to floristic diversity in Upper Dhauri Valley (UDV) in buffer zone of Nanda Devi Biosphere Reserve (NDBR). The valley had three watersheds viz, Amrit Ganga, Ganesh Ganga and Satyagad between 3000 to 6000 m asl. For this purpose, sample plots (50×50m) were laid across 72 sites, covering various landforms during June-September in 2011 and 2012.

Nine landforms viz. scrub steppe, camping site, bouldery slope, embedded rocky slope, moraine, herbaceous meadow, scree, stabilised debris and river bed were identified in the valley. Cluster analysis revealed 8 shrub and 10 herb communities in the area. In all, 311 species were recorded viz., 263 dicots, 36 monocots and 9 gymnosperms, which contributed 44%, 26% and 82% respectively of the total plant diversity of NDBR. Of total, 191 species are medicinal, of which 60% are endemic to Himalayan region. Asteraceae with 25 genera and 37 species is the dominant family. However, UDV also harboured 24 threatened species. Sixteen new species have been added to the flora of NDBR. The species richness was higher in Amrit Ganga (119) followed by Ganesh Ganga (97) and Satyagad (83), while it varied between landforms, from 12 species in camping site to 67 in moraines. The life form spectrum of study area showed the dominance of therophytes (64%). The variation in species diversity, patchy distribution, and population of threatened plants need to be considered while prioritising landforms for conservation in cold arid zone of NDBR.

<b>Project Title</b>	: Structural and functional attributes of plant communities in cold arid region of Nanda Devi Biosphere Reserve, Uttarakhand in relation to resource use pattern
<b>Principal Investigator(s)</b>	: Dr. B.S. Adhikari (P.I), Dr. G.S. Rawat (Advisor)
<b>Researcher(s)</b>	: Amit Kumar/JRF, Monideepa Mitra/JRF
<b>Funding Agency</b>	: MoF, New Delhi
<b>Project Duration</b>	: 2011 to 2014

**Population characteristics and ranging pattern of the endangered Yellow-headed tortoise *Indotestudo elongata* in and around the Rajaji National Park, Uttarakhand**

- *Zehidul Hussain*

The endangered Yellow-headed tortoise *Indotestudo elongata* is one of the least studied tortoise species and a detailed ecological study on it was taken up in the Rajaji National Park, which is also possibly the western most limit of the species distribution range. In total, 75 individual tortoises (38 male, 27 female and 10 juvenile) were captured, of which 42 were captured during summer of 2012. Around 90 man days were spent searching for tortoises and the captured tortoises were marked by filling notches into the marginal scutes of the carapace. The overall adult sex ratio was unbiased and most tortoises (76%) were in the age group of 11 to 20 years based on the count of the scute rings. Male tortoises were observed to be larger and heavier (SCL:  $257.7 \pm 23.7$  (mm); weight:  $2231.0 \pm 488.1$ (g); n = 38) than females (SCL:  $247.6 \pm 16.5$  (mm); weight:  $2154.7 \pm 299.5$  (g); n = 27, though male tortoises were found significantly different than females only in the straight carapace length (Z= -2.569, p= 0.01). The average carapace length of juvenile tortoises was  $159.0 \pm 30.2$  (mm) and weighed  $785.7 \pm 405.1$  (g). Most tortoises were captured in the month of June (67%), when they were mostly found buried under dense leaf-litter. In 2013, 24 tortoises (19 male and 5 female) marked in 2012 were recaptured and these were found in the same locality, where they were first captured. Tortoise captures declined during monsoon in the area. Three individuals (2 male and 1 female) were fitted with VHF transmitters and tracked for two months. Analysis of droppings showed representation of fruits of *Diospyros melanoxylon*, *Cordia dichotoma*. On two occasions, tortoises were observed feeding on carcass of Sambar.

<b>Project Title</b>	: Ecology and conservation of Yellow headed Tortoise ( <i>Indotestudo elongate</i> ) in and around the Rajaji National Park, Uttarakhand
<b>Principal Investigator(s)</b>	: R. Suresh Kumar and Dr. Bivash Pandav
<b>Researcher(s)</b>	: Zehidul Hussain, Technical Assistant
<b>Funding Agency</b>	: The Mohamed bin Zayed Species Conservation Fund
<b>Project Duration</b>	: 01.06.2012 to 28.02.2014

**Preliminary study on diversity of Moth (*Lepidoptera:Heterocera*) in Nanda Devi Biosphere Reserve, Uttarakhand**

- Pritha Dey

The Lepidoptera are a globally distributed, charismatic group with around 100,000 described species, which has been given taxonomic attention, yet many still await description. Moths have important functional roles as selective herbivores, pollinators, detritivores, and prey for migratory passerines. Furthermore, they have shown promise as forest indicator taxa. Keeping this in view the present study has been initiated in the Nanda Devi Biosphere Reserve (NDBR), in the Western Himalayas, Uttarakhand. It was hypothesized that habitat heterogeneity of the landscape might play a vital role in structuring the moth assemblages. Therefore, the study aimed to document the rich moth diversity of the region, and assess habitat covariates that govern the diversity patterns along the elevation gradient. Well adopted method of collecting moths i.e. Light-trapping were used in six distinct locations in the landscape covering different habitat types. Vegetation Sampling was done in 20 × 20 m plots with the light trap at the centre ensuring homogenous vegetation cover. Moths belonging to five most diverse families (Noctuidae, Geometridae, Arctiidae, Crambidae, Lymantridae) were identified into morphospecies. The influence of climatic, topographic and anthropogenic effect on moth assemblages was investigated. The ongoing project expects to establish moth assemblage as a surrogate for entire insect community and use them as indicator taxa in rapid habitat-quality assessment program for conservation management.

<b>Project Title</b>	: Diversity of Moth ( <i>Lepidoptera:Heterocera</i> ) and their Potential role as a conservation tool in different Protected Areas of Uttarakhand
<b>Principal Investigator(s)</b>	: Dr. V.P. Uniyal
<b>Researcher(s)</b>	: Pritha Dey, Junior Research Fellow
<b>Funding Agency</b>	: Department of Science & Technology
<b>Project Duration</b>	: 26.11.2012 to 26.11.2015

## **Pollinator diversity in three selected forest types of Dehradun Forest Division, Uttarakhand**

- *Preeti Shirish Virkar*

Pollination is a significant ecosystem service, essential to many crops and wild plants at large. The recent decline of pollinators world over have important negative consequences on wild plant diversity, ecosystem balance and crops, ultimately affecting food security and natural resources. This decline is mainly due to the habitat loss and modern agricultural practices. Considering the key role of pollinators, this investigation was carried out in different forest habitats and agro-ecosystems in and around Dehradun during the period March 2012 to May 2013, with the objective to assess the diversity of pollinators. The present work assesses the pollinator diversity in three forest habitats viz. Sal dense (canopy >40%), open forest (<40%) and riverine forest. Stratified random sampling was used to sample bees in 60 sampling sub units (5m x 5m quadrats) on belt transects of 100m x 5m in each habitat. Species abundances of bees were recorded using point count and yellow pan traps. A total of 27 bee species belonging to four families Megachilidae, Apidae, Andrenidae and Halictidae were recorded. Family Apidae was the most abundant 52% (14 species), followed by the Megachilidae 29% (8 species), Andrenidae 15% (4 species) and Halictidae 4% (1 species). The ongoing project aims to include different forest habitats as well as agro-ecosystems to understand the pollinator diversity and the factors affecting their diversity patterns.

<b>Project Title</b>	: Assessment of pollinators in different Agro-ecosystem and Forest types around Dehradun
<b>Principal Investigator(s)</b>	: Dr. V.P. Uniyal
<b>Researcher(s)</b>	: Preeti S. Virkar/JRF
<b>Funding Agency</b>	: State Biotechnology Department, Govt. of Uttarakhand
<b>Project Duration</b>	: 31.01.2012 to 30.01.2015

## Evaluating pattern of landscape use by dispersing Tigers (Stray) and modelling potential connectivity bottlenecks

- **Indranil Mondal**

Habitat connectivity plays a paramount role in conserving the biodiversity of fragmented landscapes. Commonly, connectivity is measured using simple structural metrics, but recently, functional measures have been proposed, which accounts for behavioural aspects of investigated organisms and are ecologically meaningful. In India, most ecological studies on tiger (*Panthera tigris tigris*) have focused population estimation, home range and food habits within a few protected areas. No study in particular, has discussed explicitly about use of human-dominated landscape for dispersal by tigers outside forested corridors. This study aims to evaluate landscape use pattern by dispersing tigers and to map potential dispersal corridors. We propose to use movement data from collared dispersing individuals and habitat data along their movement path to model their landscape preference using habitat suitability models and novel landscape connectivity models like Graph Theory or Circuit Theory. We also intend to model/map bottlenecks or pinch-points along movement corridors, which are crucial for tiger conservation and are even coincidental with human-tiger conflict in the landscape. Using advanced landscape simulations models we aim to prioritize bottlenecks or pinch-points for restoration and recovery along dispersal pathways in selected landscape to provide management recommendations for effective mitigation.

<b>Project Title</b>	: Evaluating pattern of landscape use by dispersing tigers (Stray) and modelling potential connectivity
<b>Principal Investigator(s)</b>	: Dr Bilal Habib
<b>Researcher(s)</b>	: Indranil Mondal, Project Biologist
<b>Funding Agency</b>	: National Tiger Conservation Authority (NTCA)
<b>Project Duration</b>	: 19.08.2013 to 18.08.2014

## Developing protocols for molecular tracking of Asian elephants in north-west India: A key issue in understanding crop raiding behaviour in elephants

- **Rahul De**

The north-west Indian elephant population is under severe pressure driven majorly by depletion of key natural resources and major land use changes. It results in frequent incidents of crop raiding which inflict economic and emotional loss to humans as well as retaliatory killing of elephants. Thus, it necessitates a regular monitoring of elephants in conflict prone areas to help in identifying habitual raiders and their land use patterns. With advancement in molecular genetic techniques, tracking individuals through non-invasive multi-locus genotyping has been made possible. Therefore, we discuss preliminary findings of developing a microsatellite octaplex assay for molecular tracking of elephant individuals in north-west Indian landscape. DNA was extracted from 87 elephant tissue samples from across the north-west Indian elephant habitat to standardize separate amplification of eight potentially co-amplifiable microsatellite loci and a cumulative unbiased probability of identity value ( $P(ID)_u$ ) of  $4.098 \times 10^{-7}$  was recorded, whereas biased probability of identity ( $P(ID)_b$ ) and sibling identity ( $P(ID)_{sib}$ ) were  $6.124 \times 10^{-7}$  and  $2.724 \times 10^{-3}$  respectively. These eight loci were then co-amplified in 17 field collected faecal samples in triplicate. An amplification success rate of 92.6% was achieved for the panel in non-invasive samples. About 85.4% of the amplifications generated Relative Fluorescence Unit (RFU) values in the recommended range of 200 to 5000. On basis of RFU, profile conspicuousness and relative ease of allele calling, electropherograms were categorized into quality scores of 1 (best) to 4 (worst); only 5.4% of the dataset belonged to the 'worst' category. Consensus in allele calling was achieved in 94.8% cases and stochastic genotyping error rate was calculated to be 5.2%. It has also been observed that five of the most informative loci were sufficient to obtain a  $P(ID)_{sib}$  of  $1.25 \times 10^{-2}$  suggested as cut-off in literature.

<b>Project Title</b>	: Patterns of spatial and temporal habitat occupancy in relation to crop raiding behaviour and genetic variation of free-ranging Asian elephants ( <i>Elephas maximus</i> ) in north-west India using non-invasive genetic sampling.
<b>Principal Investigator(s)</b>	: Dr. S.P. Goyal, Sh. Qamar Qureshi, Dr. Parag Nigam and Dr. A.C. Williams
<b>Researcher(s)</b>	: Rahul De, JRF-UGC
<b>Funding Agency</b>	: OETI, WWF-AREAS, UGC and WII Grant-in-Aid
<b>Project Duration</b>	: 2012 to 2015

## Use of molecular approach in addressing issue of genetic introgression in wild and domestic pigs in vicinity of Ranthambhore National Park, Rajasthan

- Puneet Pandey

Breeding and genetic hybridization between wild and domestic pigs is thought to have seriously impacted the wild populations globally in terms of introgression of alien alleles. These may affect the genetic fitness, overall immunity and result in behavioral alterations. In order to conserve the gene pool of wild pigs, assessment of key genetic parameters is necessary to evaluate effect of hybridization with domestic pigs. Therefore, the present study was planned to assess the effect of interaction of wild and domestic pigs in a human dominated landscape in and around Ranthambhore National Park, Rajasthan, India.

A total of 71 blood samples were collected of wild ( $n = 6$ ) and domestic ( $n = 65$ ) pigs. These samples were subjected to genetic analysis using mitochondrial (control region; 650 bp) and microsatellite markers (10 loci). In the amplified mitochondrial control region fragment, two haplotypes with one segregation site was recorded in wild pigs whereas 13 different haplotypes with 24 segregation sites were recorded in domestic pigs. The overall haplotype diversity was  $0.6 \pm 0.13$  and  $0.79 \pm 0.04$  for wild and domestic pigs respectively. Using 10 polymorphic microsatellite markers, observed heterozygosity was 0.74 and 0.72 whereas expected heterozygosity was of 0.65 and 0.85 in wild and domestic pigs respectively. Average number of alleles was 3.9 and 14.2 while the effective number of alleles was 3.2 and 7.7 for wild pigs and domestic pigs respectively. We discuss the level of introgression between wild and domestic pigs using mitochondrial and nuclear markers.

<b>Project Title</b>	: Study of genetic diversity in wild ( <i>Sus scrofa cristatus</i> ) and domestic ( <i>Sus scrofa domestica</i> ) pigs to find level of hybridization between them in the vicinity of Ranthambhore National Park.
<b>Principal Investigator(s)</b>	: Dr. S.P. Goyal and Dr. Parag Nigam
<b>Researcher(s)</b>	: Puneet Pandey, Junior Research Fellow
<b>Funding Agency</b>	: Grant-in-aid
<b>Project Duration</b>	: One year and one month

## Pedigree analysis for captive management of select threatened primates

- *Nilofer Begum*

Pedigree analysis involves examining patterns and characteristics of individual life-history traits to understand population stability and dynamics. This forms an important aspect of captive animal management. Thirteen out of the 29 primate species found in India are housed in various Indian zoos. Pedigree analysis of six threatened primates' viz. Lion tailed macaque (LTM), Golden Langur (GL), Nilgiri Langur (NL), Pig tailed macaque (PTM), Phayre's leaf monkey (PLM) and Hoolock gibbon (HG) are discussed here.

Studbook data for the species was compiled using SPARKS 1.54 and subsequent analysis was performed using PMx 1.2. The data was used to calculate life-history traits and analyze population trends. A cumulative total of 216 individuals comprise the living zoo population of primates (% composition: LTM- 37.5; HG- 22.22; PTM- 20.37; NL- 11.57; PLM- 5.55 and GL- 2.77) which includes both captive- and wild-born individuals. Preliminary analysis indicate considerable proportion of wild born individuals in different populations (% w/b: GL- 84; HG- 78; PLM- 50; LTM- 38.46; PTM- 36.76; NL- 22.5). Though all the species have bred in captivity (% c/b living: NL- 76; LTM- 53.1; PLM- 50; PTM- 47.7; GL- 33.33; HG- 20.8), population analysis indicate negative growth rates and low retention of genetic diversity (GD: PTM- 0.92; HG- 0.91; LTM- 0.88; NL- 0.77; PLM- 0.625; GL- 0.625) over subsequent generations. Though sex ratios for most primate populations were found to be equal, records show solitary housing practices for majority of species. Genetic analysis was limited by a large number of wild born individuals and the need for accurate pedigree records.

Pedigree analyses provided an overview of the demographic and genetic status of captive populations. Management recommendations based on these analyses along with knowledge of natural history of the species and appropriate husbandry practices form an integral part of captive management regimes for primates.

<b>Project Title</b>	:	Development and maintenance of studbooks for selected endangered species in Indian zoos
<b>Principal Investigator(s)</b>	:	Dr. Parag Nigam (PI) & Shri P.C. Tyagi (Co-PI)
<b>Researcher(s)</b>	:	Nilofer Begum, Junior Research Fellow
<b>Funding Agency</b>	:	Central Zoo Authority (CZA)
<b>Project Duration</b>	:	September 2012 to August 2017

## **Monitoring of tigers, co-predators & prey species in Tadoba-Andhari Tiger Reserve and adjoining landscapes, Maharashtra**

- *Madhura Davate*

Tadoba - Andhari Tiger Reserve (TATR) is one of the important protected areas of Central Indian Highlands. Home to a wide array of flora and fauna including tiger, leopard as apex species, it forms important connecting link between major central Indian tiger reserves. Tiger being an umbrella species also ensures the survival of other faunal species given the due efforts for its conservation. Monitoring of tigers and co-predators in TATR landscape is critical for long term survival of species within the landscape which have witnessed many incident of human-animal conflict.

To understand the dynamics of tiger population in TATR, a study has been initiated to monitor tigers, co-predators and prey species over a period of 10 years with focus on population dynamics, dispersal and human-animal conflict. The study has been started with the sampling for carnivore and herbivore occupancy, land use, infrastructure development in 22 out of total 163 grids (13x13 km<sup>2</sup>) spread over an area of 6512 km<sup>2</sup>. Long term monitoring would also be facilitated by satellite collaring of Tigers and Co-predators to understand dispersal pattern and landscape use. The project also aims at monitoring village translocation sites and human animal conflict within the landscape. The presentation will focus on recent field work and will also discuss the pattern of landscape use by leopards captured from human – dominated landscape.

<b>Project Title</b>	: Long Term Monitoring of tigers, co-predators & prey species in Tadoba-Andhari Tiger Reserve and adjoining landscapes, Maharashtra, India.
<b>Principal Investigator(s)</b>	: Dr. Bilal Habib, Sh. V K Tiwari, Dr. Parag Nigam, Sh. Mukul Trivedi
<b>Researcher(s)</b>	: Madhura Davate & Anil Dashahre, Junior Research Fellow
<b>Funding Agency</b>	: National Tiger Conservation Authority & Maharashtra Forest Department
<b>Project Duration</b>	: 04.04.2013 to 03.04.2013

## Current status of avifauna in Kibber Wildlife Sanctuary

- *S.Pawan Kumar*

The Himalaya represents one of the richest biodiversity regions of the world. The geographical location, elevation, and wide range of habitats have resulted in remarkable assemblage of biodiversity. The trans- Himalayan region or cold deserts has harsh climate with long severe winters and short summers. Birdlife in trans-Himalaya is characterized by a marked seasonal variation with summer and winter visitors from central Asia and northern Tibetan Plateau. There are eight IBAs in trans-Himalayan region, which includes Chushul marshes, Hanle plains, Hemis NP, Pangong Tso, Tso Kar basin, Tso Morari and Kibber WLS. Although there have been several avifaunal studies in the trans-Himalayan region, they have mostly focused on wetlands of eastern Ladakh. Present study was conducted in Kibber WLS (3,600 m to 6,700m) to understand the current status of birds and their habitats during the months of June and July, 2013. Transects (n=10) were laid to estimate bird density in Kibber WLS and its surrounding areas. Apart from that, opportunistic trail surveys were also carried out. A total of 41 bird species belonging to 15 different families were recorded out of 1395 observations (n=4261). The birds belonging to families such as Passeridae, Fringillidae, Corvidae and Alaudidae were most abundant. These 41 species shared a total of 10 feeding guilds out of which Granivores (46.2%)>Ground Insectivores (12.8%)>Carnivores (5.1%) birds were the most dominant categories. The density estimate of birds in Kibber WLS was (calculated using software DISTANCE 6.0) was  $11.81 \pm 2.19$  birds/ha.

<b>Project Title</b>	: A Survey of the Avifauna in the Important Bird Areas (IBAs) of the Trans-Himalayan Region
<b>Principal Investigator(s)</b>	: Shri Subharanjan Sen , Dr. G.S.Bharadwaj
<b>Researcher(s)</b>	: S .Pawan Kumar (Junior Research Fellow)
<b>Funding Agency</b>	: WII Grant in Aid
<b>Project Duration</b>	: 2012 to 2015

## **Plant-Pollinator network along a gradient of agricultural intensification in Tripura**

- *Pushan Chakraborty,*

A network can be defined as a representation of the interrelations between different nodes interacting among each other in a given system, the nodes being the elementary components of the system and the edges connecting them. The mutualistic relations between plants and pollinators can also be represented as a network structure where plants and pollinators form the two nodes. In recent times, there is a trend to study plant-pollinator communities in a network approach. The complex nature of the functional diversity of the plant-pollinator systems, in terms of a network, prevents the decline of any one of them upon the loss of the other. So, a more diverse community (including both crops and weeds) may provide more tolerance to any attack or local extinction in the network. In this study, we aim to assess the plant-pollinator network along an agricultural intensification gradient. The study is being carried out in the north-eastern Indian state – Tripura. Floral visitors on different crops and non crops are being studied in the three nodes (low mid and high) of agricultural intensification gradient. To get the abundance of floral visitors, two 10 m × 4 m belt transects are laid for each crop and for detailed behavioral observations, point transects of 1 m × 1 m are laid, for each crop and non crop in different study sites. The same observations were made from 0700h to 1700h. Voucher specimens of floral visitors have been collected to be identified up to genus level. In the coming months, some day-night exclusion studies will be incorporated in the network analysis.

<b>Project Title</b>	: Plant-Pollinator network along a gradient of agricultural intensification in Tripura
<b>Principal Investigator(s)</b>	: Dr. V.P.Uniyal, WII and Dr.Parthiba Basu, Kolkata University
<b>Researcher(s)</b>	: Mr. Pushan Chakraborty, JRF-CSIR
<b>Funding Agency</b>	: CSIR
<b>Project Duration</b>	: 28.02.2011 to 27.02.2018

## **Effects of climate change on Riverine Forests and indicator species along River Ganga in Uttarakhand: a Multi -Scale Approach**

- **Ankita Sinha**

Climate is a key determinant of the structure and functioning of ecosystems, patterns of species distribution and dispersal. The effects of climate variability and change are quite significant along the water course and associated wildlife habitats. Riverine habitats, although occupy small proportion of the landscape, play a critical role in maintaining regional biological diversity, by acting as biological corridor and facilitating range limits. The river Ganga is listed among 'the top 10 rivers in the world at risk' because of over extraction of water resources, and sharp vegetation changes in recent years as a response to climatic and anthropogenic effects. The proposed study focuses on the ecology of riverine forests along the upper Ganga region within the state of Uttarakhand and aims to (1) assess the structural and functional attributes of vegetation along selected climatic ecotones; (2) identify possible indicator taxa, their distribution pattern, range-shift and population response along the river; (3) detect major drivers of landscape composition and configuration in space and time. The study involves hierarchical sampling and analytical framework across spatial/functional units. Preliminary survey was carried out in the months of April-May 2013. The Bhagirathi basin has been divided into five sub-basins. The elevational change in vegetation has been documented. We confirmed the presence of the targeted riverine bird species. Structural details would be quantified using Remote Sensing and GIS tools. Climatic and anthropogenic data would be obtained based on primary as well as secondary sources. Field data would be linked to climatic and anthropogenic data at multiple scales (site, sub-basin and region) and quantitative response would be established between response and explanatory variables. The relationship would be used as basis for constructing scenario based and probabilistic models to characterise current and altered pattern of climatic and anthropogenic effects on riverine habitats and bird species in the upper Ganga.

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<b>Principal Investigator(s)</b>	: Principal Investigator: Dr. K. Ramesh; Co-Investigator : Dr. B. S. Adhikari
<b>Researcher(s)</b>	: Ankita Sinha, Junior Research Fellow
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