ANNUAL REPORT 2014-15

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ROLE & MANDATE

INTRODUCTION

In the early 80s of the last century there was a realization all over the world, including India, that natural resources were diminishing and that the environment was being degraded. At the same time, the understanding of environmental issues was still a little hazy, and the initial remedial responses to complex environmental problems had mixed outcomes of successes and failures.

The limitations of the early initiatives also brought into focus the inadequacy of trained manpower for wildlife management and of wildlife biologists to conduct research and overcome the paucity of researched information for promoting proper conservation planning. A need was felt for establishing an organization that, through multi-disciplinary research at the field level, could help the response to the challenges of biodiversity conservation and develop holistic approaches for managing wildlife and its habitats across the country and the region. This led to the setting up of the Wildlife Institute of India (WII) at Dehra Dun, in 1982.

In 1986, WII was granted the status of an autonomous institution of the Ministry of Environment and Forests, Government of India. WII is a premier training and research institution in the field of wildlife and protected area management in South Asia. Since its inception, WII has had the benefit of collaboration with international organizations such as UNDP, FAO, USFWS, IUCN and UNESCO. These collaborations have helped the institute build a competent faculty and staff through rigorous training and exposure to modern research and analytical techniques.

The institute's wide array of capacity building programmes provides a practical and realistic direction to the concept and practice of wildlife conservation by seeking the involvement and cooperation of local communities. By learning from its own and others' experiences, WII is traversing a path of hope and aspiration, which will help strengthen its inputs and efforts in finding answers in addressing wildlife conservation issues and challenges in the country as well as in the South Asian region.

OUR MISSION

Our mission is to "nurture the development of wildlife science and promote its application in the field in a manner that accords with our economic and socio-cultural milieu".

AIMS AND OBJECTIVES

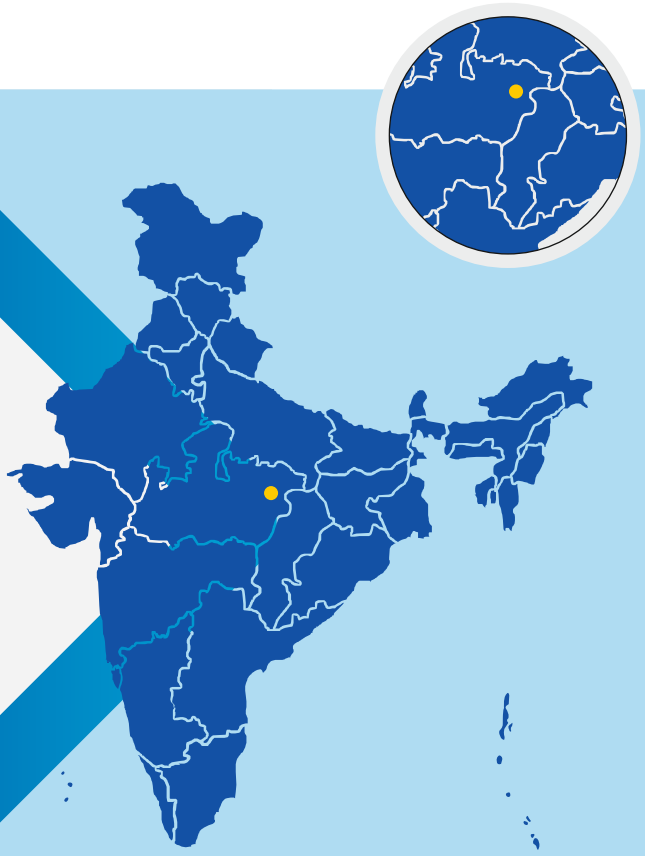
- To build up scientific knowledge about wildlife resources.
- To train personnel at various levels for conservation and management of wildlife.
- To carry out research relevant to management, including the development of techniques appropriate to Indian conditions.
- To provide information and advice on specific wildlife management problems.
- To collaborate with international organizations on wildlife research, management and training.
- To develop as a regional centre of international importance for conservation of wildlife and natural resource conservation.

RESEARCH

- Completed Projects
- Ongoing Projects
- Initiated Projects

COMPLETED PROJECTS

MONITORING OF REINTRODUCED GAUR *BOS GAURUS GAURUS* IN BANDHAVGARH TIGER RESERVE, MADHYA PRADESH



- Funding Source
  Madhya Pradesh Forest Department
- Investigators
  Dr. K. Sankar and Dr. Parag Nigam
- Researchers
  B. Navaneethan and Manas P. Manjrekar
- Date of Initiation
  January 2011
- Date of Completion
  March 2015

Objectives

The objectives of the project were to (i) study the ranging patterns of the reintroduced gaur; (ii) evaluate the habitat use patterns of the reintroduced gaur; and (iii) study the food habits of the reintroduced gaur.

Progress

The capture and translocation of 50 (14 male and 36 female) gaur from Kanha Tiger Reserve (KTR) to Bandhavgarh Tiger Reserve (BTR) was done in two phases: Phase I, during January 2011 (n=19) and Phase II, during March 2012 (n=31). Of these, individuals 27 gaur were fitted with radio collars. Two types of radio collars were used on the gaur i.e. GPS/satellite/VHF and very high frequency (VHF). A hand-held multichannel receiver, and a unidirectional hand-held three-element "Yagi" antenna and an H-type antenna were used to track the radio-collared animals.

The ranging pattern of the gaur was studied through regular tracking of radio-collared (n=27) individuals. During the study period, two radio-collared (GF5 and GF7) female gaur died naturally, and 17 radio collars stopped functioning.

Manas P. Manjrekar

To understand the habitat use, habitat variables such as terrain, broad vegetation type and distances to nearest water body, road and human settlement were recorded at each radio-collar location. Data on the food plants and parts eaten by the gaur was obtained using the scan sampling technique. Samples of the food plant parts eaten were collected for each season (summer, monsoon, winter), and these samples were later analysed in the laboratory at WII. Fresh dung samples of gaur were collected for each season (at least 50 samples per season), and these samples were also analysed.

The health of the reintroduced gaur population was evaluated every month during the reporting period. The reintroduced gaurs were tracked using radio-telemetry and approached using a vehicle (four wheel) or camp elephants or on foot till they were visible (<50 m). The reintroduced gaur population was classified into different age and sex classes. To calculate the body condition index (BCI) of a gaur, five parts of its body (flank area, ribs, pelvic girdle, vertebral column and lumbar shelf) were assigned scores with values between 0 and 2, with numerically higher values corresponding to poor body condition (0, good; 1, fair; 2, poor). Finally, these scores were added up for each individual to calculate the BCI of that particular individual. The total score was on a scale of 0–10. Individuals having a score of 6 and above were considered to be in poor body condition.

Information on the group size and age–sex composition of the gaur was collected through direct observation during the reporting period, covering all seasons (summer, monsoon and winter) in the study area. In all, 50 gaurs were reintroduced in Bandhavgarh Tiger Reserve (three adult males, 11 sub-adult males, 13 adult females, 21 sub-adult females and two yearlings).

Outputs & Outcomes

The estimated overall 100% MCP and 95% FKD home range of the reintroduced gaur were 405.2 km^2 and 146.9 km^2, respectively. It was observed that with the 100% MCP of all the demography classes, 22 gaurs had a home range of more than 100 km^2. The gaur largely used mixed forest, followed by bamboo and grassland, whereas sal forest and riparian forest were used according to their availability within the entire home range.

During the study period, a total of 82 species of food plant belonging to 29 families were recorded, which comprised 34 tree species, eight shrub species, 14 herb species, 23 grass species and three climber

Manas P. Manjrekar

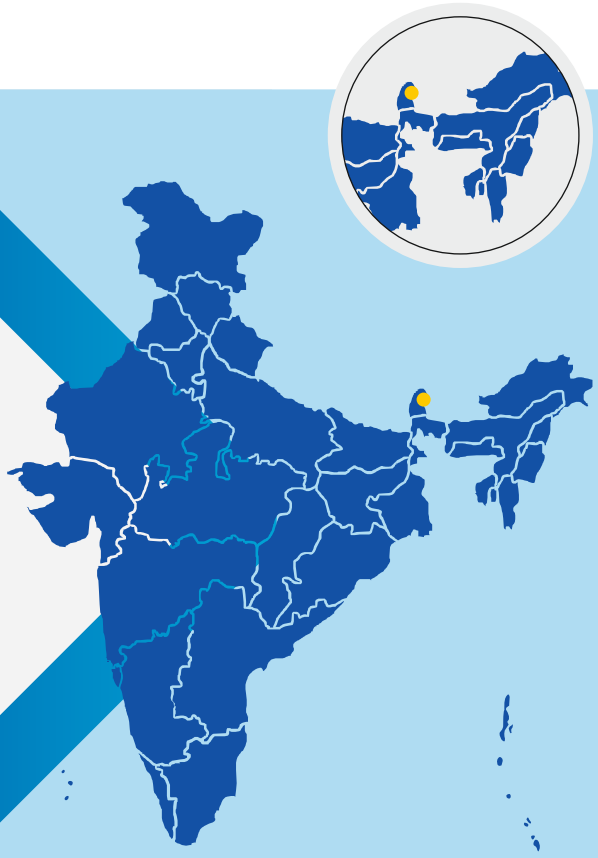
species. A total of 6724 gaur feeding records were collected in Bandhavgarh during the study period using the scan sampling technique. Overall, the major food items of gaur in Bandhavgarh identified on the basis of percent time spent feeding by the gaur were bamboo *Dendrocalamus strictus* leaves, grasses, herbs, *Shorea robusta* leaves, *Butea superba* (climber) leaves and *Chloroxylon swietenia* leaves. The percent time spent feeding by gaur in summer was highest for grasses (45.9%), whereas in the monsoon and winter it was highest for bamboo leaves (32.9% and 63.9%, respectively). A total of 301 dung samples were analysed during the study period. It was observed that the percentage frequency of occurrence of monocot plant fragments in the gaur dung samples was high in all the seasons (summer, 84.8%; monsoon, 90.3%; winter, 92.2%) compared with dicot plant fragments (summer, 11.3%; monsoon, 5.5%; winter, 4.8%). The percentage frequency of occurrence of bamboo fragments was observed to be highest in winter (30.5%), compared with 20.2% in summer and 17.1% in the monsoon. The percentage frequency of occurrence of fragments of the grass *Saccharum spontaneum* was observed to be 30% in summer, 6.8% in the monsoon and 10.6% in winter.

Milestone

Of the 50 gaur reintroduced, a total of 1933 body scores were examined for BCI for both sexes and all the age classes during the study period. It was observed that calves were always found in good body condition (100%). About 86.5% of the yearlings were observed to be in good body condition, as were 85% of sub-adult males, 80% of adult males, 75% of sub-adult females and 52% of adult females. During the entire study period, about 10% of the adult and sub-adult females were observed to be in poor body condition. Among the sub-adult males and adult males, about 2.8% and 1.0% of the individuals were observed to be in poor body condition, respectively.

During the study period, the group sizes of the gaur were found to vary from 1 to 31 individuals. The observed overall mean group size (MGS) of the gaur was 13.6±1.9 (SE). The observed overall typical group size (TGS) of the gaur was 17.1. By March 2015, the overall gaur population comprised largely adult females (n=22), followed by sub-adult females (n=14), calves (n=15), yearlings (n=13), sub-adult males (n=10) and adult males (n=5). In total, 19 mortalities were recorded during the study period, among which were 14 gaurs that were preyed on by tigers and two radio-collared gaur (GF5, GF7) died naturally. Two un-collared sub-adult gaur females went missing and were never reported again. A total of 47 calves were born in Bandhavgarh during the study period. The estimated overall growth of the gaur population was 58%, and the mortality rate was 24%.

MONITORING LAND USE BY WILDLIFE, LIVESTOCK AND HUMANS IN KHANGCHENDZONGA BIOSPHERE RESERVE



- Funding Source
  Ministry of Environment, Forest & Climate Change

- Investigators
  Dr. S. Sathyakumar and Shri Sandeep Kumar Gupta

- Researchers
  Nand Kishore Dimri, Rupak Karki, Suwankar Biswas and Sandhy Mitra

- Date of Initiation
  June 2011

- Date of Completion
  May 2014

Objectives

The objectives of the project were to (i) assess the distribution and land use patterns of carnivores, ungulates, livestock and humans in Khangchendzonga Biosphere Reserve (KBR) and (ii) develop a monitoring programme for monitoring patterns of land use by carnivores, ungulates, livestock and humans in KBR.

Progress

Field surveys for natural resource dependence and human–wildlife conflicts were carried out in 10 villages in the buffer zone of KBR, and samples were collected for genetic analysis.

Household surveys were conducted (n=122) across 11 different villages in the buffer zone of KBR. The major occupations of the local communities were agriculture and tourism related business. The West District of Sikkim is considered a major tourist attraction. About (43%) of the farm animals in all the villages were poultry, followed by goats (26%), cows (19%) and horses (<1%). In total, 377 conflict cases were recorded from 11villages from February 2014 to April 2014. The wildlife–human conflicts were mostly in the form of crop damage (n=288), followed by livestock depredation (n=87) and, recently, a few

cases (n=2) of human attacks by Asiatic black bears. The crops affected by the Asiatic black bear, Himalayan palm civet, rodents and Himalayan crestless porcupine include maize, potato, pumpkin, chilly, peas and other vegetables. The greatest number of cases of livestock depredation was recorded from the villages of Mangnam and Kongri-Naku, followed by Labdang and Karjee-Pokhri. The villagers usually used bamboo fences and scarecrow to protect their crops from the black bear and wild pig, but these fences were inefficient with small mammals. In the maize harvesting season (July–August) villagers maintained night vigils to protect their crops.

Outputs & Outcomes

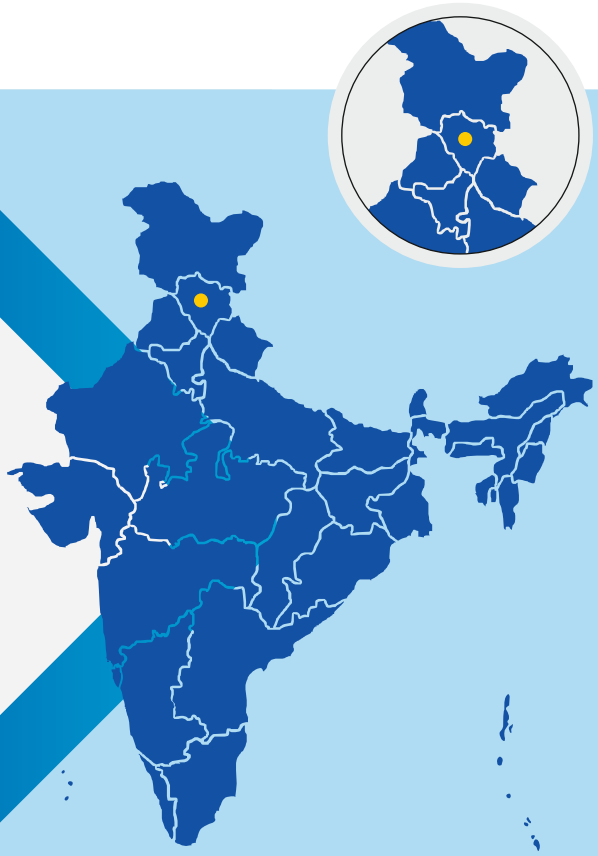
During the reporting period, short sequences of ca. 146 bp and ca. 381 bp were generated for all carnivore samples and ungulates samples, respectively. Protocols for PCR amplification of other samples that generated potentially degraded DNA were standardized.

Milestone

The dependence of the local communities in 11 villages in the buffer zone of KBR on natural resources was assessed along with information on the extent of human–wildlife conflicts.

Tapajit Bhattacharya

REPRODUCTIVE BIOLOGY AND BEHAVIOUR OF CAPTIVE AND WILD POPULATIONS OF WESTERN TRAGOPAN IN HIMACHAL PRADESH



- Funding Source
  Himachal Pradesh Forest Department
- Investigators
  Dr. K. Ramesh and Dr. Parag Nigam
- Researchers
  Lakshminarasimha R. and Vipin Upadhyaya
- Date of Initiation
  June 2011
- Date of Completion
  August 2014

Objectives

The objectives of the project were to: (i) maintain a studbook with information on genetic and demographic parameters; (ii) record the breeding chronology and growth pattern; (iii) assess nutrition, body condition and stress factors; (iv) determine the activity budget and record vocalizations; (v) carry out field surveys to estimate the population status in the wild; (vi) undertake population viability analysis to determine suitable founder populations and a reintroduction strategy; and (vii) monitor and study the habitat occupancy, behaviour and population growth of released birds.

Progress

The integrated approach employed in this project attempted to establish linkages between *ex-situ* and *in-situ* conservation. During the interim period, the efforts were focused on collection of data for the final season; data analysis and report writing. Overall the project involved the following steps:

Collate information on the ecology of the species under natural conditions	Derive the species' requirements and develop preliminary a "keeping system" for the birds	Critically evaluate the current keeping conditions and husbandry practices	Improve the situation in accordance with the keeping system developed

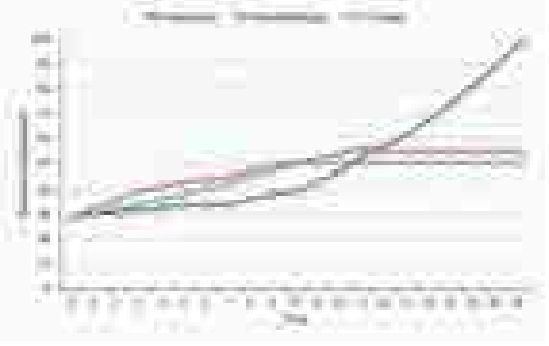
The initial step was to analyse the current situation and to improve it according to the requirements of the species, preparing the ground simultaneous for research. The keeping conditions of the birds were critically analysed with reference to the captive habitat, feeding regimes, reproductive management, stress factors and development of the captive population over the years.

Outputs & Outcomes

The science-based management regime introduced in the last three years has yielded exceptional results with the population of 17 birds in 2011 almost doubling to 32 in 2014 in the Sarahan pheasantry with an annual average growth rate of 20%, against the decreasing growth rate registered during the preceding periods. The proportion of normal eggs versus abnormal eggs was consistently low every year during the previous regime, while the trend was reversed and the number of normal eggs was higher every year during 2012–2014. Also, no mortality of birds (adults or chicks) due to disease was recorded during the project period. For the first time in the history of captive management of this species or its congeners, considerable breeding success has been achieved without the involvement of broody hens or incubators, and this has significant implications for cost-effective management, maintaining a population as a reserve or model and release in the wild. Therefore, the keeping system should be continued and improved.

Milestone

The current population size is the highest recorded since its establishment nearly two decades ago. The reproductive output of the population has significantly increased, with problems such as mortality during egg laying and production of thin-shelled eggs decreasing. The key achievement has been the expression of natural breeding behaviours and all the chicks born during the project period being naturally reared by tragopan hens. The GIS database generated as part of the study has immense value in the management of the habitat of the species and in developing or updating management plans for various protected areas in the state. The spatial modeling carried out using geographic data and habitat correlates of the sighting locations has yielded a list of possible sites that could be considered for experimental reintroduction or population reinforcement. However, robust field surveys should be carried out to evaluate the habitat parameters prior to deciding the reintroduction sites, in line with the IUCN guidelines for reintroduction of galliforms.



Projection of the Western tragopan captive populations. Status quo represents the projections based on demographic parameters averaged for past eight years. Birth-based projections indicate the growth of the population with 5-births/time intervals. The custom were projected with an $N_0 = 29$ to a target of $N_{10\text{-}20} = 50$, with sex ratio at birth for males at 50%.

MSTrIPES (MONITORING SYSTEM FOR TIGERS-INTENSIVE PATROLLING AND ECOLOGICAL STATUS)

- Funding Source
  National Tiger Conservation Authority
- Collaborating Agency
  WII–NTCA–ZSL
- Investigators
  Dr. Y.V. Jhala and Shri Qamar Qureshi
- Programme Developers
  Mr. Kevin Davey and Dr. Raj Amin
- Researchers
  Ashok Kumar, Anup Kumar Pradhan, Ninad Mungi, Srinivas Yellapu, Ashish Prasad, Rohan Bhagat, Sougata Sadhukhan and Syed Abrar
- Date of Initiation
  September 2011
- Date of Completion
  September 2014

Objectives

The project has the objective of implementing the MSTrIPES programme and orienting field staff members with the use of modern field techniques and patrolling protocols to improve existing protection measures.

The features of the programme are (i) user-friendly field protocols (Phase I methodology); (ii) a databank; (iii) a GIS and statistical tool for data processing; (iv) quantitative and qualitative databases; and (v) administration and maintenance at different administrative levels.

Ashok Kumar

Progress

MSTrIPES consists of the following four distinct stages: (i) Field training and data collection: This includes training field staff members in the use of GPS and sensitizing them about smart patrolling, daily patrols and seasonal (winter and summer) ecological surveys according to the protocol of Phase I. (ii) Data compilation: This includes training computer technicians for database preparation, multistage data for efforts and surveys, database maintenance at hierarchical levels and providing timely reports and maps for management. (iii) Analysis and interpretation: This includes two modules, a daily patrolling module (patrolling efforts, index of signs of human disturbance and indirect signs of animals, animal mortality, different actions taken by the field staff for any illegal activity) and an ecological module (spatially paired statistical comparisons, trend analysis, changes in human disturbance, use of pressure impression pads for determining abundance of carnivores and mega herbivores in an occupancy framework). (iv) Adaptive management: Integrating smart patrolling and ecological responses to different management actions into future decision making and policy designing.

Outputs & Outcomes

Bhadra Tiger Reserve: Bhadra was the only tiger reserve that used the patrolling and ecological module. Since the initiation of MSTrIPES, regular patrolling efforts were invested. At the same time, data about human disturbance was entered in the ecological module, which was used for analysing the change in the ecological status of the park during 2014–15.

Kanha Tiger Reserve: MSTrIPES was initiated in Kanha Tiger Reserve in 2012, and since then, patrolling data is being entered at the range level along, and reports are being submitted to the funding agency.

Corbett Tiger Reserve: MSTrIPES was initiated in 2013, but due to logistic issues the programme was implemented only during 2014, and since then data collection and entry are being carried out. The data from the ecological module need to be entered in the software.

Nagarjunasagar Srisailam Tiger Reserve: MSTrIPES was initiated in Nagarjunasagar Srisailam Tiger Reserve in 2011. Since then patrolling data are being collected from four wildlife divisions, namely Markapur, Atmakur, Achampet and Nagarjunasagar, and entered. The ecological data need to be entered in the software.

Sariska Tiger Reserve: MSTrIPES was initiated in Sariska Tiger Reserve in 2012. Since then, GPS-aided patrolling and data entry have been carried out regularly. However, no evidence of human disturbance was collected at all. The ecological data need to be entered in the software.

Anamalai Tiger Reserve: MSTrIPES was initiated in Anamalai Tiger Reserve in 2012. Since then patrolling data have been collected and entered in the software, and reports have been generated. The ecological data needs to be entered separately in the software.

Ranthambhore Tiger Reserve: An orientation workshop was organized in Ranathambore Tiger Reserve by WII in 2012. The workshop was designed to introduce the programme and provide training in handling GPS units and data collection methods for the forest staff.

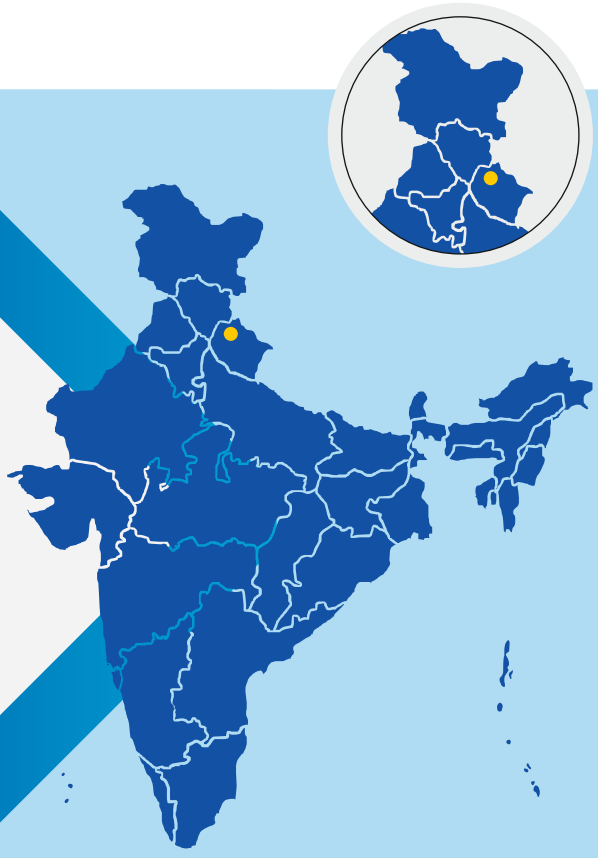
Management suggestions: Recording of track logs has to improve, which is why few data may have been collected compared with the actual patrolling done. Moreover, the GPS units should be updated regularly to improve the data collection.

- Staff members are reluctant to report illegal activities. Thus the actual illegal activity is more than is seen from the output. So illegal activities should be reported and action should be taken simultaneously.
- Patrolling needs to be continued regularly. This will further help adaptive management for taking management-oriented decisions.

Milestone

Reports were generated from all the tiger reserves. Ranthambhore concluded that data collection has improved after the repeated training sessions and that if the same effort is invested in the future, more information can be generated that will be helpful in guiding the park managers in improving the park. With successful completion of training in all the tiger reserves, the research team is ready to implement the software in all the remaining tiger reserves and protected areas.

ASSESSMENT OF POLLINATORS IN DIFFERENT AGRO-ECOSYSTEMS AND FOREST TYPES AROUND DEHRADUN



- Funding Source
  State Biotechnology Department, Department of Science and Technology, Government of Uttarakhand
- Investigator
  Dr. V.P. Uniyal
- Researcher
  Preeti Virkar
- Date of Initiation
  January 2012
- Date of Completion
  January 2015

Objectives

The objectives of the workshop were to (i) assess the types of pollinators in different agro-ecosystems and forest types around Doon Valley; (ii) assess the species diversity of different pollinator groups; and (iii) determine the cause of the decline of pollinators.

Progress

Several sampling methods are available for assessing the diversity patterns and abundance of pollinators. Observation plots and/or transects are used often, besides pan traps, which are passive methods. The research team deployed both active and passive methods for sampling pollinators. The active methods included counting pollinators (those belonging to four major orders, Coleoptera, Diptera, Hymenoptera and Lepidoptera) and net sweeping over vegetation. The passive sampling methods included the use of coloured pan traps (yellow, blue and white).

Transect Counting: Transect counting has been found to be effective for bees and butterflies. Similarly, flies and beetles were found be easily sampled using transects as sampling units. Random belt transects with an area of 500 m^2 each were laid in different habitats such as dense sal forests, open

Preeti Virkar

Preeti Virkar

forests and riverine forests, and these were used as sampling units to address the diversity patterns of pollinators. Different microhabitat variables (elevation, GPS location, vegetation, etc.) and microclimate variables (sunny/cloudy days, temperature, relative humidity, time of the day, etc.)were documented at the beginning and end of each transect. All the different pollinators encountered in each quadrat were recorded.

Sweep net sampling: Sweep net sampling was done on vegetation to collect pollinators for identification and comparison.

Coloured pan traps: Coloured traps (yellow, blue and white) are used for sampling bees. Each trap consists of a yellow bowl filled with clean drinking water (as a trap medium), common salt (as a preservative) and liquid detergent (to lower the surface tension). The yellow colour of the bowls resembles that of flowers and hence serves as an attractant for bees. Five bowls were placed, one in each quadrat.

Outputs & Outcomes

Sampling was carried out from September to November (after the monsoon) and during the peak flowering period (from March to May) in 2012, 2013 and 2014. Sampling was carried out in forest (riverine, open, sal and bamboo), plantations (tea, teak and pine) and agro-ecosystems (organic, conventional and kitchen garden). Other sampling habitats included thistle patches and homesteads. A total of 51 bee species were recorded from 60 sub-sampling units from 11 sampling sites. These bees belonged to four families, namely, *Apidae, Megachilidae, Andrenidae* and *Halictidae*. Bees of the family *Halictidae* were the most abundant, followed by the *Andrenidae* and *Apidae*. The family *Megachilidae* was the least abundant. Riverine forests supported the greatest bee abundance among all the habitats. Agro-ecosystems followed riverine forests with respect to bee abundance.

Forests harbour bees during periods of shortage of resources such as shelter, food and breeding sites. Agro-ecosystems in close proximity to forests had greater bee species richness compared with those further away. With increasing distance from forested habitats, the species diversity decreased. Similarly, the species abundance decreased in agro-ecosystems with increasing distance from forests.

A comparison between agro-ecosystems showed that organic farms supported a rich bee species diversity compared with conventional farms ($p=0.001$). Organic farms employ non-intensive, chemical-free biological farming methods that are environmentally friendly, supporting higher species diversity. In a meta-analysis, organic farming supported better species richness compared with conventional farms. The family compositions differed in the two agro-ecosystems.

Milestone

The project work been published so far in two journals and seven conference proceedings.

EVALUATION OF MHC HETEROZYGOSITY IN ISOLATED TIGER POPULATION

- Funding Source
  Grant-in-Aid
- Investigator
  Dr. S.K. Gupta
- Researcher
  Ajit Kumar
- Date of Initiation
  February 2012
- Date of Completion
  February 2015

Objectives

The objectives of the project were to (i) evaluate the levels of major histo-compatibility complex (MHC) Class-I polymorphism in tiger populations; (ii) evaluate the MHC heterozygosity level in the tigers of Ranthambhore and Bandhavgarh; and (iii) compare the heterozygosity levels of microsatellite and MHC markers.

Progress

The population of the tiger *Panthera tigris* tigris in India has been exposed over several decades to various anthropogenic influences that have possibly affected the genetic structure. DNA (30–50ng/μl) was extracted from scats with an OD260/OD280 ratio between 1.75 and 1.90, which increased the PCR success rate. The MHC Class-I gene was successfully amplified, and nine microsatellite loci were genotyped from samples representing the isolated tiger population of Ranthambhore Tiger Reserve and the connected populations of Bandhavgarh Tiger Reserve. The team detected significant differences between the expected and observed heterozygosity levels, which were 0.61 and 0.47, respectively, in the tiger population of Ranthambhore Tiger Reserve. However, in the

Figure 1 . *Image showing the amplified product with MHC Class- a1. Lane 1- 8 are scats and 9 to +ve are blood.*

Figure 2. *Image showing the amplified product with MHC Class- a2. Lane 1-8 are scats and 9 to +ve are blood samples.*

central Indian tiger population, the expected and observed heterozygosity levels were comparable. The mean polymorphic information content (PIC) value of the microsatellite loci (n=9) was 0.50. Direct sequencing of the amplified PCR product of the polymorphic MHC gene indicated that there were multiple heterozygous SNPs in single samples. The sequencing data suggested that positive amplicons need be cloned prior to sequencing to obtain unambiguous nucleotide sequences. The removal of false and spurious alleles from the sequence gave clear estimates of the MHC gene diversity in different tiger populations.

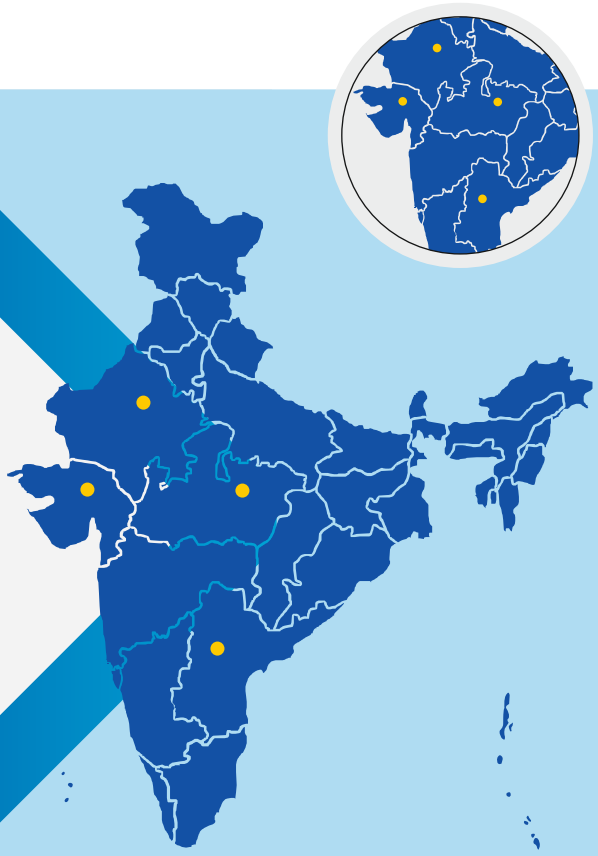
Outputs & Outcomes

The research team was successful in amplifying the MHC locus in faecal samples. The sequencing results suggest that further cloning of the PCR product is required. The teams have placed orders for procurement of the required equipment for cloning work, including a Class II Biological Safety Cabinet for culturing non-pathogenic E.coli strains for gene cloning.

Milestone

Successful amplification of the MHC loci in scat samples was achieved.

STUDY OF THE ECOLOGY AND MIGRATION OF THE LESSER FLORICAN *SYPHEOTIDES INDICA* THROUGH SATELLITE TELEMETRY



- Funding Source
  Grant-in-Aid

- Investigators
  Dr. K. Sivakumar, Dr. Y.V. Jhala (WII) and Dr. G.S. Bhardwaj (Rajasthan Forest Department)

- Researchers
  Omkar Dhavale and A. Mohan

- Date of Initiation
  March 2012

- Date of Completion
  March 2015

Objectives

The objectives of the project were to (i) study the migration and movement patterns of the lesser florican and to identify the non–breeding habitats using satellite tracking techniques; (ii) assess the current status and breeding distribution of the lesser florican in north–western India and Andhra Pradesh; (iii) study the habitat and breeding ecology of the lesser florican in north-western India; (iv) assess the status of the non–breeding habitat of the lesser florican; and (v) prepare a comprehensive conservation plan covering both the breeding and non–breeding ranges and the migration pathways of the lesser florican.

Progress

The lesser florican *Sypheotides indica*, a species endemic to the Indian subcontinent, is seen during the monsoon season in north-western India, where it breeds. Its population and range are continuously decreasing at an alarming rate due to loss of the breeding habitat and certain threats prevailing in the non-breeding habitats, which are believed to be located in south and south-east India. In this context, two male florican were tagged with PTTs in the agriculture fields of the Sonkhaliya landscape, near

WII Photo

the Nasirabad area, Ajmer district, Rajasthan. Florikin-I was tagged with an Argos PPT-100 (18g PTT (Platform no.125812)). It spent 112 days and left the breeding ground on 11 November 2014. The bird flew for 94 km south and settled down in grasslands to the north of Bhilwara, Rajasthan. The bird covered this distance in 5 days and 8 hours, with four stopovers. All the stopovers were in croplands and grasslands. Florikin-I flew at a speed of 0.73 km/hour, including the stopover time. Florikin-II was tagged with a 22g GPS/Argos PTT, which failed after 35 days but provided very precise insights into the lekking behaviour of the species.

Outputs & Outcomes

A total of 58 transects were laid over 91.9 km in seven sites of three states. A total of 57 florican were observed during the transect course. Analysis showed that uniform co-sign functions best fitted the data (uniform cosine function x^2 p=80.8, AIC=659.6) and the ESW was estimated at 213.7 m, with a range of 185.3–246.4 m. The detection probability was 0.56 (0.48–0.65). The generated global density estimate was 1.19 floricans/km^2 of contiguous area (0.75–1.88), and therefore the abundance was 1,091 florican (689–1729) in the contiguous florican habitat in three states (Rajasthan, Gujarat and Madhya Pradesh) in 2014.

Milestone

It was found that the florican could shift the displaying territory within an arena during a breeding season. Three times, a bird shifted his territory and spent considerable time in each territory and displayed. All the three territories of Florikin-II were within the home range of 6.8 km^2.

EVALUATION OF PHYSIOLOGICAL STRESS AND REPRODUCTIVE POTENTIAL IN REINTRODUCED TIGER POPULATIONS IN SARISKA TIGER RESERVE, RAJASTHAN AND PANNA TIGER RESERVE, MADHYA PRADESH

- Funding Source
  National Tiger Conservation Authority, New Delhi

- Investigators
  Dr. K. Ramesh, Dr. K. Sankar and Dr. G. Umapathy

- Researcher
  Manjari Malviya

- Date of Initiation
  July 2012

- Date of Completion
  July 2014

Objectives

The project has the following objectives: (i) assessment of faecal steroid concentrations to determine the stress level and reproductive status of the translocated tiger populations in Sariska and Panna tiger reserves, their sources and representative free-living populations; and (ii) identification of anthropogenic stressors and assessment of the magnitude of the pressures on the target tiger populations.

Progress

The interim period was mostly spent on data analyses and report writing. The entire sampling and analytical progress was made based on the following framework:

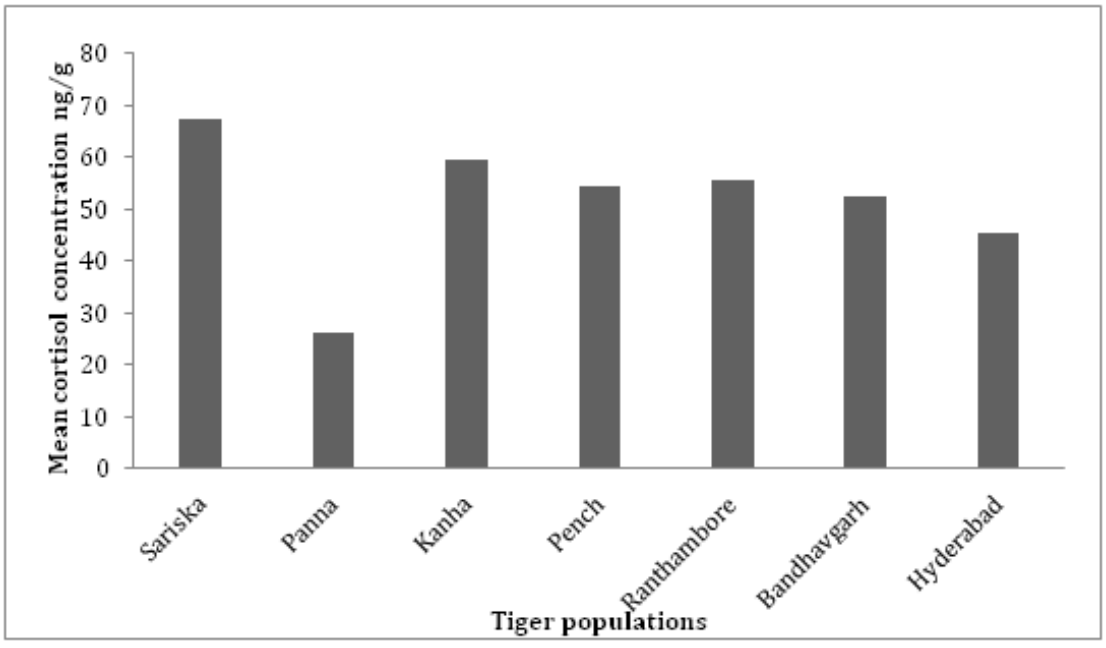
K. Ramesh

Stress	Stressors
Systematic collection of scat sample	Prey density, cover and disturbance
Hormonal analysis	Line transect, circular plot and satellite imagery
Cumulative stress values for tiger population and individual tigers	Mean values of potential stressors for tiger populations and individuals

Correlation of stress and stressors

Outputs & Outcomes

It was found that most female tigers in Sariska Tiger Reserve (STR) are fertile and cycling but are affected by high levels of physiological stress. Significantly, female tigers experience higher levels of stress compared with males. The overall stress level of tigers in Sariska was significantly higher than that in Panna Tiger Reserve (PTR), its source, Ranthambhore Tiger Reserve, and the other tiger reserves sampled (Kanha, Pench and Bandhavgarh) in Madhya Pradesh. The stress levels in the STR tigers were found to be even higher than in the captive tigers housed in Hyderabad Zoo. The overall prey density in Sariska was found to be much higher than in Panna, while anthropogenic disturbances were significantly higher in Sariska than in Panna. These facts clearly point to human-induced stress,

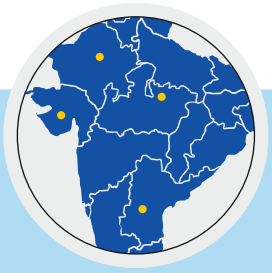


Mean faecal glucocorticoid metabolite (FGCM) concentrations of tigers in Sariska, Panna, Kanha, Pench and Ranthmabore Tiger Reserves and Nehru Zoological Park, Hyderabad.

which is potentially responsible for the poor breeding outcome in STR. Given that this is first ever study on physiological stress in wild tiger populations, the variations in the stress hormone within and between tiger populations offer greater insights into the overall conservation status of tiger populations and into managing captive populations with potential for conservation breeding.

Milestone

Reintroduction of a large carnivore like the tiger in a country like India with growing demands for land and increasingly degrading and fragmenting natural habitats is a challenge. However, in the case of PTR, it has been achieved successfully with even the F1 generation successfully breeding now. In the case of STR, it could not be achieved, leading to a lot of unscientific speculations. The results of this study have for the first time addressed this problem with a scientific approach. It is already known that monitoring stress in reintroduced animals is important for ascertaining animal welfare and reintroduction success. In fact, studies have related the partial success of reintroduction programs to stress in the reintroduced animals. Overall, the project has been able to explain the difference in the breeding successes of STR and PTR and has provided specific recommendations for the management of reintroduced populations.



ECONOMICS OF LIVING IN THE WILD: COST–BENEFIT ANALYSIS FOR THE FOREST CORRIDOR LINKING RAJAJI AND CORBETT NATIONAL PARKS

- Funding Source
  South Asian Network for Development and Environmental Economics, Kathmandu (SANDEE)

- Investigators
  Dr. Ruchi Badola and Dr. S.A. Hussain

- Researchers
  Pariva Dobriyal, Tanveer Ahmad and Goura Chandra Das

- Date of Initiation
  October 2012

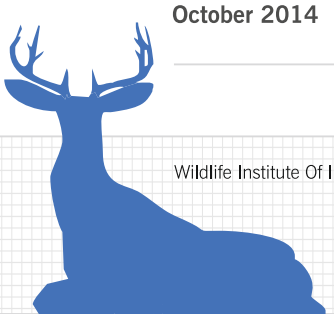
- Date of Completion
  October 2014

Objectives

The project has the following objectives: (i) assess use values and the benefits of the corridor forests accruing to the local communities residing in the corridor forests; (ii) assess the cost incurred by the local community due to wildlife presence in the corridor forest; and (iii) determine the spatial distribution of costs and benefits across different stakeholder groups.

Progress

Conservation goals are challenged when wild animals cause monetary loss to human communities. The present study was conducted in 37 representative villages and 757 randomly selected households in and around the forest corridor linking Rajaji and Corbett national parks to assess the benefits and costs accruing to the local communities from the forest, to identify factors governing human–wildlife conflict (HWC) and to design an incentive-based approach to mitigating HWC. Ordinary kriging was used to determine the conflict hot spots.



Goura Chandra Das

Overall, 84% of the households were dependent on forest resources, which contributed more to the incomes of households in the hills (21%) than in the plains (15%). Seventy-one percent of the households practiced agriculture, of which 69% experienced crop damage. Sixteen percent of the households experienced livestock depredation. The costs incurred due to HWC were higher than the benefits accruing from the forest. In both the hills and plains, the poor households derived more benefits from the forest than did the non-poor. At a 12% discount rate the Net Present Value (NPV) for the hills and plains was US$4282/household/ha and US$16,789/household/ha, respectively. These measures should be combined with other mitigation measures and policy actions in other sectors.

Outputs & Outcomes

A report titled "Human–Wildlife Conflict and Incentive-Based Mitigation Strategies in and around Rajaji–Corbett Forest Corridor, India" and a paper titled "Economics of Living in Wild" were the outcomes of the study. The paper was published in the proceedings of XIV World Forestry Congress, Durban, South Africa.

Milestone

An incentive-based package was designed to compensate the communities for not practicing agriculture in the conflict-prone areas, on the basis of the NPV of net profits from agriculture.

LAND USE PLANNING AND STRATEGIC ENVIRONMENTAL ASSESSMENT (PHASE 2)

- Funding Source
  Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

- Investigators
  Dr. V.B. Mathur, Dr. Asha Rajvanshi, Dr. S. Sathyakumar (WII) and Dr. Kerstin Bark (GIZ)

- Researcher
  Akanksha Saxena

- Date of Initiation
  April 2013

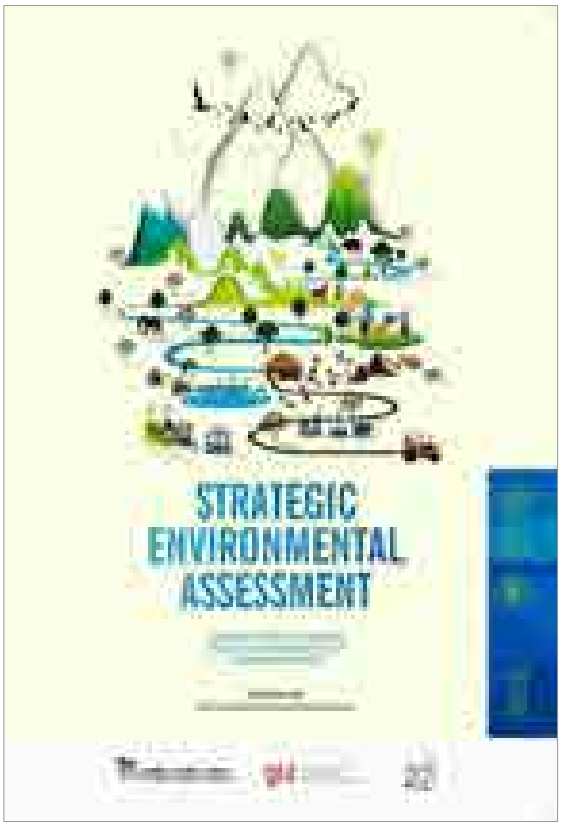
- Date of Completion
  February 2015

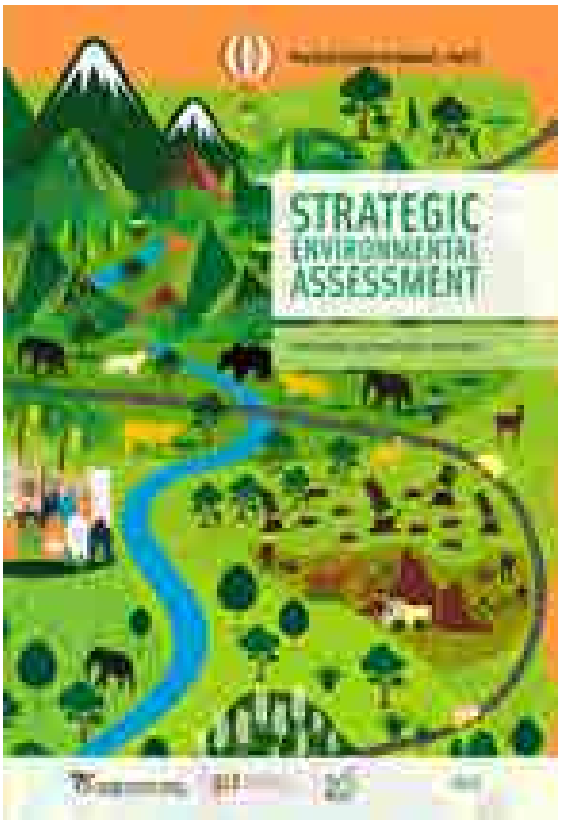
Objectives

The objective of this project was awareness raising and development of human capacities in India for improving the uptake of strategic environmental assessment (SEA) as an integrated planning instrument, initially in the context of landuse/ spatial and development planning to ensure more inclusive environment/nature-compatible planning processes. Other objectives were to (i) explore the potential for cooperation with the GIZ and KfW programmes in order to create a basis for the implementation of pilot projects and up-scaling them; (ii) organize information side-events for the expert appraisal committees of different sectors and other decision-makers (in pilot states, for example) and present the overall concept and practical international and Indian experience/case studies; (iii) develop appropriate learning resources; (iv) development of customized short-term training modules (3 days); and (v) organizing Indo-German exchanges with BfN experts.

Progress & Outcomes

(i) An Indo-German expert exchange has been started to support this process, which will continue based on the relationship created between WII, GIZ





and the Technical University of Berlin. (ii) Two key learning resources, the Best Practice Guidance Manual on SEA (Part-I) and the Practical Guidance Manual (Part-II), have been developed in the course of the project. (iii) Two training courses were successfully conducted under the project for trainers, planners, EIA practitioners, decision makers and policymakers to build capacity and improve the prospects of uptake of SEA.

The experience of coordinating this project has been enriching and rewarding. The following were some of the important lessons learnt: (i) The project has immensely contributed to building awareness about SEA in India as a promising approach/tool for integrated planning and design of policies, plans and programmes (P/P/P) for addressing the environmental, social and economic aspects of sustainability. (ii) The Best Practice Guidance manuals developed under the project have already become celebrated products, as is evident from their increasing use by trainers. (iii) Needs and mechanisms for capacity development in SEA are laid down well for a range of stakeholders including political decision makers, civil society organizations, universities, research institutions, training providers, EIA experts/consultants and landuse planners in the frame of information side-events and international conferences. (iv) The prospects of taking the SEA thinking in India forward through other GIZ programmes, such as CMPA and LandUse Planning and Management, are bright. (v) Given the experience with EIA, which took about 20 years to become an accepted practice in India, it is fair to expect that awareness raising for SEA and anchoring SEA as an approach in India will be a long-drawn process. (vi) Important Indian training providers are willing to integrate the SEA approach in their curricula and to offer training courses.

Milestone

The project has completed a full circle, with its start announced at a side-event at CoP 11, in Hyderabad, and showcasing of products and outcomes at a side-event in CoP 12, in South Korea.

INDO-NORWEGIAN PILOT PROJECT ON CAPACITY BUILDING IN BIODIVERSITY INFORMATICS

- Funding Source
  Norwegian Institute for Nature Research (NINA), Norway

- Investigators
  Dr. V.B. Mathur, Dr. S. Sathyakumar, Dr. Bivash Pandav and Dr. Gautam Talukdar

- Researcher
  Rupa

- Date of Initiation
  October 2013

- Date of Completion
  October 2014

Objectives

The project has the following objectives: (i) using camera trap data in decision making and showcasing the benefits of data sharing adapted to various users including decision makers, researchers and civil society; and (ii) building capacity so as to enable free sharing, access and dissemination of the biodiversity data in India to be used in policy making and evidence-based decision-making.

Progress

The collaboration with NINA and GBIF has been of great importance for the project as the team was able to implement international standards and tools and services, ensuring the data interoperability of this capacity-building project. The following are the outputs: (i) A Web portal for hosting geo-tagged camera trap images was created, and standardized camera trap data of 300 tiger images and associated metadata in Audubon core have been hosted. (ii) *Publishing Camera Trap Data: A Best Practice Guide* was prepared and has been made available online at http://www.gbif.org/resource/80927.

Camera trap photo

Outputs & Outcomes

The capacity-building pilot project has clearly proved its relevance in addressing the capacity building needs identified by the Intergovernmental Panel on Biodiversity and Ecosystem Services (IPBES). As the results of the project show, there are great international synergies in capacity building of biodiversity informatics, camera trapping, data mobilization, data repatriation, data management and data sharing policy improvement.

In addition, the case studies have demonstrated how biodiversity informatics, camera trapping, data mobilization and access policies can contribute to improved evidence-based decision making.

Milestone

The best practice guide aims to support managers and team members working in biodiversity projects with a camera trapping component. It gives recommendations on how to plan and execute the data capture and publishing components of the projects, making sure that they are compatible with existing international standards.

ONGOING PROJECTS

MONITORING OF REINTRODUCED TIGERS IN SARISKA TIGER RESERVE, RAJASTHAN

- Funding Source
  National Tiger Conservation Authority

- Investigators
  Dr. K. Sankar, Dr. P.K. Malik and Dr. Parag Nigam

- Researcher
  Dibyendu Kumar Mandal

- Date of Initiation
  February 2009

- Date of Completion
  March 2018

Objectives

The objectives of the project are to (i) study the home range and movement patterns of the reintroduced tigers and their dispersal patterns; (ii) assess the habitat use by the reintroduced tigers; (iii) study the food habits of the reintroduced tigers; (iv) estimate the populations of the prey species; and (v) suggest management recommendations for effective conservation of tigers in Sariska Tiger Reserve (STR).

Progress

All the tigers were monitored periodically in STR through ground tracking using the "homing in" and "triangulation" techniques and based on pugmarks. The minimum convex polygon (100% MCP) technique was used for home-range calculation. To evaluate the habitat use patterns, habitat variables such as terrain, broad vegetation type and distances to nearest water body, road and human settlement were recorded at each radio-collared locations. A total of 2,831 radio locations were recorded for all the individuals during the reporting period using a hand-held global positioning system (GPS). The diet and food preference of the tigers were estimated from scat analysis and from the kills. 152 scat samples

Pooja Chaurasia

were collected throughout the year and they were analyzed. 133 tiger kills were recorded over the year. A total of 38 transects were walked thrice in each season (summer, monsoon and winter) to estimate the prey densities.

Outputs & Outcomes

Tracking of nine adult tigers was carried out effectively using radio-telemetry, direct sightings, pugmark tracking and camera trapping. The tigress ST2, which had a non-functional radio collar, and tigresses ST7 and ST8, which are non-radio collared, were monitored on the basis of pugmark tracking, direct sightings and camera trapping during the reporting period.

The annual home ranges were estimated. A total of 152 tiger scat samples were collected, and 133 tiger kills were recorded. Seven prey species were recorded from the tiger scats. Livestock (buffalo and brahminy cattle) was found to be most frequent in the tiger kills (51.13%), followed by sambar, nilgai, chital, wild pig, peafowl and common langur. The density of peafowl was found to be the highest amongst all the prey species (110.72 $\pm$9.21/km^2), followed by nilgai, chital, sambar and wild pig. The overall wild ungulate density of Sariska during the study period was 43.26/km^2. The total livestock density was 110.09/km^2 in Sariska during the study period. The overall habitat use of tigers in Sariska was in the following order: *Zizyphus* woodland>*Butea* mixed forest>*Acacia* mixed forest>Scrubland>Riverine forest>*Boswellia* forest>*Anogeissus* forest. The prey preference order of tigers in 2014–2015 was sambar>chital>common langur>nilgai>livestock on the basis of scat analysis. Restricted grazing and village relocation (n=8) from the notified national park area is recommended for the survival of tigers in the future in Sariska.

Milestone

Two tigresses, ST2 and ST10, gave birth to two cubs each (one male and one female) during the reporting period. The total population of tigers in Sariska is now 13, with four cubs, which are 7 months old at present.

MONITORING SOURCE POPULATION OF TIGER IN KANHA TIGER RESERVE

- Funding Source
  National Tiger Conservation Authority

- Investigators
  Dr. Y.V. Jhala and
  Shri Qamar Qureshi

- Researchers
  Ujjwal Kumar and Neha Awasthi

- Date of Initiation
  June 2009

- Date of Completion
  December 2015

Objectives

The objectives of the project are to (i) monitor the source population of tigers in Kanha Tiger Reserve, estimate the tiger population within selected areas of the reserve and obtain survival and mortality information through a mark–recapture study; (ii) monitor prey and co-predator populations and the condition of the habitat in the tiger reserve; and (iii) gain an understanding of tiger dispersal patterns.

Progress

During the reporting period, the research team camera trapped an area of 777 km^2 in the core area and 494 km^2 in the buffer area of the tiger reserve with an effort of 18,575 and 4641 camera trap nights. In all, 74 and 20 individual tigers were photo captured at the two sites. Three tigers were collared in February 2014, and collection of data on the home range, movements and habitat use are in progress.

Outputs & Outcomes

Table 1. *Abundance estimate of tigers and leopards in Kanha Tiger Reserve, 2014*

Sampling Area	TAA	Mt+1 Tiger	Mt+1 Leopard	$\hat{D}$ MLSECR Tiger	$\hat{D}$ MLSER Leopard	Best Model Tiger	Best Model Leopard
Kanha core	777	74	85	6.10 se 0.71	9.79 se 1.03	g0(h2)(h2)	g0(h2)(h2)
Kanha buffer	494	20*	40**	2.01 se 0.48	6.32 se 1.41	g0(h2)(h2)	g0(h2)(h2)

TAA, trapping array area;Mt+1,unique individuals; $\hat{N}$, population of tigers; $\hat{D}$,densityper100 km^2 in Kanha; MLSECR, maximum likelihood spatial capture recapture; SE, standard error.

** Seventeen tigers are common to the core and buffer.*

*** Seven leopards are common to the core and buffer.*

The tiger density was computed to be 6.10 (SE 0.71)/100 km^2 in Kanha core and 2.01 (SE 0.48)/100 km2 in Kanha buffer.The prey status in Kanha Tiger Reserve was estimated using distance sampling on line transects. A total effort of 1,266 km was invested in sampling 211 spatial transect replicates and 633 temporal replicates. Amongst the ungulates, the chital had the highest density, 31.12 (4.85 SE)/km^2.

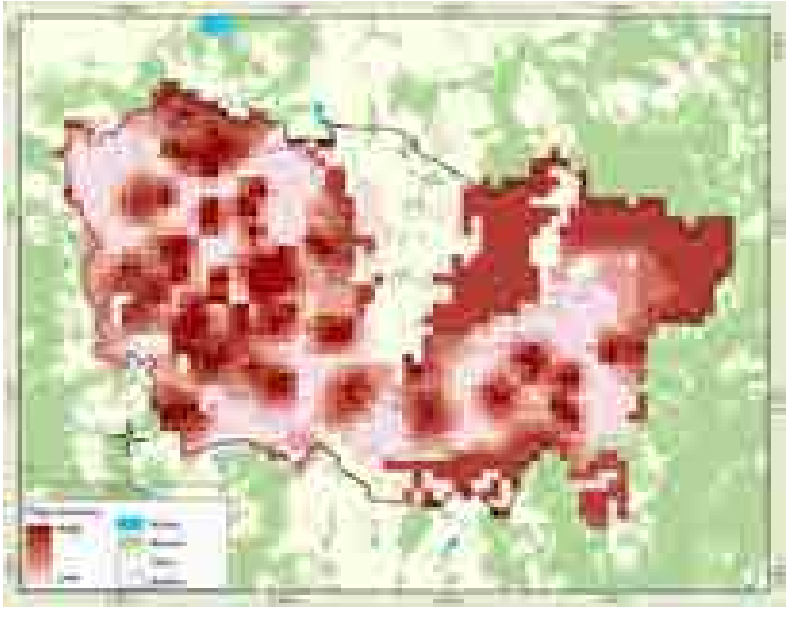
Table 2. *Abundance estimate of ungulates in Kanha Tiger Reserve, 2014*

Species	Group density/km^2		Density/km^2	
	Core	Buffer	Core	Buffer
Chital	03.03 SE 0.44	2.52 SE 0.42	31.12 SE 4.85	13.43 SE 2.59
Sambar	03.02 SE 0.35	1.22 SE 0.41	8.55 SE 1.05	3.30 SE 1.17
Gaur	01.12 SE 0.21	0.23 SE 0.12	5.65 SE 1.29	0.86 SE 0.46
Wild pig	01.32 SE 0.19	1.88 SE 0.41	6.79 SE 1.21	8.32 SE 2.23

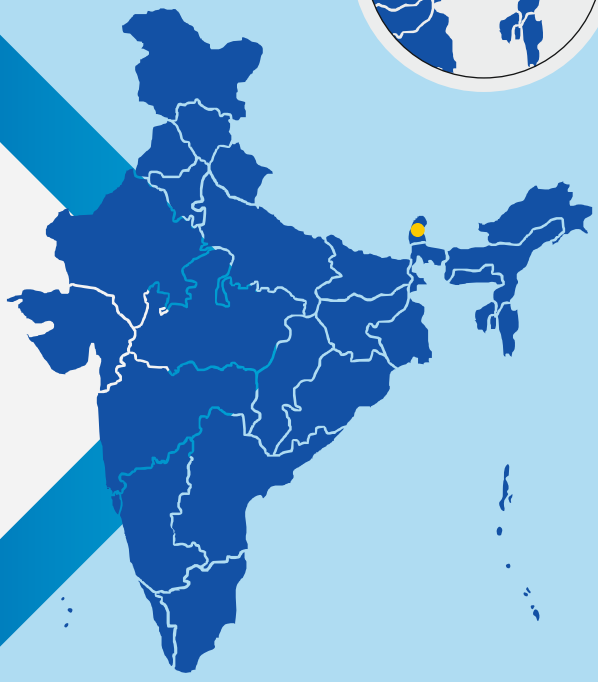
Temporal replicates: 633
Total effort: 1266 km
SE = Standard error

Milestone

Three tigers (one female, one sub-adult male and one resident adult male) were collared with GPS–Iridium satellite transmitters. These collared tiger are providing interesting insights into movement patterns, dispersal and general ecology. The team also estimated management strata-specific densities of the tiger, the leopard and their prey in the buffer (multiple-use area) and core (human-free) areas of the tiger reserve.



POPULATION ESTIMATION AND ECOLOGY OF THE TIGER IN SUNDARBANS TIGER RESERVE



- Funding Source
  National Tiger Conservation Authority, New Delhi

- Investigators
  Dr. Y.V. Jhala and Shri Qamar Qureshi

- Researchers
  Manjari Roy and Dipanjan Naha

- Date of Initiation
  October 2009

- Date of Completion
  December 2015

Objectives

The objectives of this project are to (i) develop a methodology for monitoring tigers, co-predators and their prey in the mangrove swamps; (ii) estimate the tiger population and density; (iii) estimate the population and density of prey species; (iv) assess the home ranges of tigers; and (v) suggest management recommendations for effective conservation of tigers in the reserve.

Progress

Camera trapping, boat transects and sign survey exercises were conducted in two ranges (West Range and Sajnekhali Range).

Radio-collaring of tiger: One tigress was captured and collared on 15 August 2014. GPS locations from the satellite-collared tiger were analysed using ArcView v3.3 (ESRI, Redlands, California) and Animal Movement extension v1.1 (Hooge & Eichenlaub 1997) to construct minimum convex polygon (MCP) and fixed kernel (FK) home ranges.

Camera trapping: A total area of 656 km^2 in the two ranges in three spatio-temporal blocks was covered. The research team used passive infrared Moultrie Digital Game cameras and Cuddeback Attack IR cameras. The distance between adjacent stations

was maintained at 2–4 km to ensure adequate area coverage as well as reduce the probability of missing any individual. Trapping stations comprised two cameras, at 40–45 cm height from the ground, facing each other across a maximum distance of 8 m to capture both flanks of an animal. As suitable game trails could not be found to set camera traps, attractants (food rewards), lures (non-food rewards) and fresh water containers (since the fresh water sources inside the reserve are negligible) were used to maximize photo-capture rates. The stations were inspected every two days to ensure that the cameras were functioning properly and to replenish the attractants/lures to minimize spatio-temporal heterogeneity among stations. The details of the blocks are provided here: Block I (Kendo Beat + Haldibari Beat). Photographs of tigers more than 1 year of age were used for analysis as younger animals rarely accompany mothers on foraging trips and are underrepresented in camera trap studies. The team identified individual tigers by their stripe patterns, and their detection history across sampling occasions was summarized into a standard "X matrix".

Sign survey: Twelve channels of varying widths representative of the camera trapped blocks were selected and new signs and degrees of decay of older signs were observed and recorded every alternate day simultaneously with the camera trapping exercise.

Boat transect: The team conducted boat transects during the camera trapping exercises for estimating prey density. For each observation, the team recorded the perpendicular distance from the observer to the animals, the perpendicular distance from the observer to the bank edge and the cluster size.

Data on the perpendicular distances of observations, pooled across previous years, was used in the detection function in DISTANCE v 6.0 as the number of sightings was extremely low.

Outputs & Outcomes

Radio-collaring of tiger: The total number of days used to estimate the home range was 112. She moved an average of 1.25 km/day (SE 0.15).

Camera trapping: The density of the tiger population came to 3.28 (SE 0.67). Keeping the detection function as half-normal, the model incorporating g0 as trap-specific response (bk) and sigma as 2 mixture (h2) was selected as the best fit model on the basis of the minimum Akaike Information Criterion (AIC). Considering the tiger occupancy to be about 1800 km^2 and the remaining area outside our sampled site to have a similar density, the population of tigers in the Sundarbans is likely to be between 47 and 71 adult individuals.

Boat transect: The global chital density was estimated at 5.34 chital/km^2 (SE 1.22), while the density in 2014 was estimated at 2.84 chital/km^2 (SE0.69). The best fit model based on the minimum AIC value was hazard cosine. The effective strip width was 22.98 m (SE 2.95), and the goodness of fit p-value was 0.85.

Sign survey: Analysis is in progress. The future persistence of tigers depends upon conservation measures rooted in protecting "representative, redundant and resilient" populations/habitats across the historical range over which the tiger has evolved. One such habitat, the mangroves, is exclusively represented by the Sundarbans, which support one of the largest contiguous international tiger populations. However, rigorous scientific research on the Sundarbans tiger is scanty due to the logistic constraints imposed by the tidal conditions, coupled with the ever-present threat from the tigers. This has led to a paucity of information on their basic ecology and population parameters. The camera trapping exercise, which was tailored to the local conditions, has enabled us to not only estimate the tiger population precisely but also monitor the pulse of this population in the last 3 years. The population of tigers remained stable.

The chital population has also remained stable, thereby providing stable sustenance to the predator population.

Milestone

The sign deposition, sign density and sign decay method of population estimation has the best potential due to the ease and economy of estimating these parameters and wider application across the Sundarbans. However, it must be noted that these are experimental approaches that will require additional data to develop models, evaluate them and then practically apply them to population estimation.

Camera trap photo

MONITORING SOURCE POPULATION OF TIGER IN CORBETT TIGER RESERVE

- Funding Source
  National Tiger Conservation Authority
- Collaborating Agency
  WII–NTCA–UKFD
- Investigators
  Dr. Y.V. Jhala and Shri Qamar Qureshi
- Researchers
  Shikha Bisht and Sudip Banerjee
- Date of Initiation
  October 2009
- Date of Completion
  December 2015

Objectives

The objectives of the project are to (i) monitor the source population of tigers in Corbett Tiger Reserve (CTR), estimate the tiger population within selected areas of the reserve and obtain survival and mortality information through a mark–recapture study; (ii) monitor prey and co-predator populations and the condition of the habitat in the tiger reserve; and (iii) gain an understanding of tiger dispersal patterns.

Progress

Monitoring a population on an annual/seasonal basis provides us with not only the number of tigers but also an indication of changes in tiger numbers, along with an understanding of the factors that are responsible for the change. Hence, under Phase IV, the research is concerned with detecting change, establishing its direction and measuring its extent and intensity in CTR. This will permit site-specific changes to be detected in time and addressed with timely intervention by the management. Camera trapping was carried out in two blocks in around 1300 km^2 of CTR. Corbett National Park was camera trapped during March–April 2014 and Sonanadi Wildlife Sanctuary was camera trapped during April–May 2014. A total of 418 camera traps were

deployed across CTR, which yielded 2,497 photographs of 168 tiger individuals. A total of 122 line transects were surveyed in CTR and its adjoining forest divisions (Amangarh and Najibabad forest divisions) for estimation of prey density. Each line transect was walked two or three times, with the total effort amounting to 535 km of walk. The sampling was done during February–June 2014.

Outputs & Outcomes

Estimation of population and density of tigers: Population and density estimates were made separately for the two blocks (Corbett National Park and Sonanadi Wildlife Sanctuary).

Table 1: *Estimates of population and density of tigers in the two divisions of Corbett Tiger Reserve (CTR), 2014*

	Sonanadi Wildlife Sanctuary	Corbett National Park
Total area (km^2)	615.6	641.6
Tiger individuals (Mt+1)	64	109
Total number of tiger individuals in CTR	168	
Density (SE)/100 km^2	7.2(0.9)	12.9(1.2)
Population estimate (SE) (Mh model)	69(5.7)	124(8.2)

Estimation of densities of wild prey species of the tiger: The chital was the most abundant prey (75.35+10.5/km^2), followed by the langur (25.60+6.61/km^2) and sambar (9.98+1.26/km^2) (Table 2).

Table 2: *Model statistics and parameter estimates of line transect-based (n=122 with three temporal replicates, total effort=535.03 km) distance sampling for prey species in Corbett Tiger Reserve (CTR) and its adjoining forest divisions, 2014*

Species	Model	x^{2}p	ESW (SE)	Number of groups	ES (SE)	p(SE)	ER/km	DS(SE) /km^2	D (SE) /km^2
Barking deer	Hazard/ cosine	0.81	32.26	84	1.40 (0.06)	0.46 (0.07)	0.16	2.43 (0.50)	3.40 (0.70)
Chital	Hazard/ polynomial	0.99	37.68	270	11.47) (0.68)	0.31 (0.021)	0.51	6.7 (0.82)	75.35 (10.5)
Elephant	Uniform/ cosine	0.94	66.99	32	5.91) (1.12)	0.59 (0.07)	0.06	0.50 (0.10)	2.40 (0.90)
Langur	Half-normal/ Hermite	0.77	32.3	70	12.44 (1.12)	0.48 (0.04)	0.13	2.03 (0.44)	25.60 (6.61)
Nilgai	Half-normal/ Hermite	0.98	39.42	23	4.52 (0.60)	0.53 (0.08)	0.04	0.55 (0.17)	2.62 (0.98)
Sambar	Half-normal/ Hermite	0.91	40.22	147	2.71 (0.13)	0.53 (0.03)	0.28	3.45 (0.40)	9.89 (1.26)
Wild pig	Half-normal cosine		34.58	52	6.90 (0.87)	0.51 (0.05)		1.41 (0.26)	9.11 (2.16)

x^{2}p,chi square; P value; ESW, effectives trip width; ES, mean group size; p, detection probability; ER, encounter rate; DS, estimated group density; D, estimated individual density

ECOLOGY AND CONSERVATION OF HIMALAYAN WOLF

- Funding Source
  MBZ-Species Conservation Fund and WII Grant-in-Aid

- Investigators
  Dr. Bilal Habib, Dr. Y.V. Jhala and Shri Salvador Lyngdoh

- Researchers
  Shivam Shrotriya and Hussain Saifee Reshamwala

- Date of Initiation
  August 2010

- Date of Completion
  May 2017

Objectives

The major objectives of the project are to (i) estimate the distribution and abundance of the Himalayan wolf in India and to identify viable populations that need to be protected; (ii) determine the food habits and consumption rate of the Himalayan wolf in different areas and the extent of its dependence on domestic livestock and wild prey populations; (iii) estimate the size of the home range/territory of selected Himalayan wolf packs and their relation to the biomass of the major prey; (iv) identify the needs of critical Himalayan wolf habitats, especially denning and rendezvous sites; (v) identify major factors affecting mortality and current and potential threats to surviving Himalayan wolf populations; (vi) evaluate the attitudes and concerns of local people living in and around Himalayan wolf habitats and conservation areas; and (vii) utilize the information obtained from achieving the above objectives for making management recommendations to conserve Himalayan wolf populations in India.

Progress

A simultaneous point count with a mark–recapture framework was used to estimate the populations and distribution of ungulates in Ladakh. The total

Salvador Lyngdoh

area surveyed was around 23,000 km^2. The area was gridded into 15×15 km^2 grids, and alternate grids were selected to cover the entire landscape. Four random points were generated in each grid cell, of which only one was selected on the basis of accessibility and logistics. A total of 33 observation points were surveyed. Each team surveyed two or three observation points nearby. Thus three sets of 12 simultaneous observation points were surveyed. Out of 231 possible surveys (33×7), the team could conduct 218 surveys. Only 13 surveys could not be conducted due to the weather and various other logistic difficulties.

Outputs & Outcomes

Except the Tibetan gazelle, all other species were sighted during this survey. The most commonly sighted species was the kiang, with a total of 425 groups recorded. The maximum group size of kiang was 116. A total of eight groups of blue sheep and six groups of Tibetan argali were recorded. The Tibetan antelope was recorded twice, and wild yak were recorded thrice, while no sightings were recorded for the Tibetan gazelle. Population estimates were made only for the kiang, blue sheep and Tibetan argali. The research team used five uncorrelated variables as predictors, namely, ruggedness, slope, elevation, distance to water and normalized difference vegetation index (NDVI).

Milestone

This was the first effort to survey a large landscape in the Indian Trans-Himalaya using a scientifically advanced sampling method to estimate ungulate populations. During the exercise, a staff of 16 people from the Wildlife Protection Department, Leh, Government of Jammu & Kashmir was trained to conduct point counts and trail transects. The methods employed could be implemented with minor field adjustments and have been proved to be efficient in logistic use. The method was best suited for common species with wide and even distributions, for example, the kiang and blue sheep. However, the chances of missing sightings were high for rare species with patchy or specific distributions. Repeated surveys over the years during the same season will help monitor the population trends, while seasonal surveys will help understand seasonal fluctuations in the populations.

Salvador Lyngdoh

REINTRODUCTION OF CHEETAH *ACINONYX JUBATUS* IN INDIA

- Funding Source
  Ministry of Environment, Forest and Climate Change
- Investigator
  Dr. Y.V. Jhala
- Researcher
  Bipin C.M.
- Date of Initiation
  March 2011
- Date of Completion
  December 2015

Objectives

The aim of the project is to establish free-ranging populations of cheetahs in Kuno Wildlife Sanctuary (WLS) and Nauradehi WLS, in Madhya Pradesh, and the Shahgarh landscape, - Rajasthan. The two or three populations of cheetah established in India are proposed to be managed as a meta-population with occasional "immigrants" brought in from Southern Africa, as and when needed. Within this larger goal, WII's mandate was to develop site-specific action plans to reintroduce the cheetah in collaboration with the state forest department.

Progress

The status of large mammalian predators and prey in Kuno Wildlife Division was assessed. Carnivore sign surveys were conducted on 71 routes (sanctuary, 57 (effort, 273km); buffer, 14 (effort, 71km)) and camera trap sampling was conducted in 117 locations over a period of 32 days (effort, 2438 trap days). Seventy-seven line transects (sanctuary, 51(effort, 240km); buffer, 26 (effort, 58km)) were sampled to estimate the prey densities (surveyed area, 750 km^2).

Paul Mckenzie/Barcottt Media

Outputs & Outcomes

The density estimates of the prey species in Kuno WLS are as follows: chital, 66.9±9.8SE/km^2; sambar, 5.7±1.1SE/km^2; nilgai, 4.2±0.9SE/km^2; wild pig, 4.6±1.0SE/km^2; chinkara, 1.0±0.4SE/km^2; grey langur, 12.7±2.9SE/km^2; peafowl, 8.1±1.6SE/km^2; and feral cattle, 1.2±0.6SE/km^2. The density estimates of prey species in the buffer zone are as follows: chital, 1.2±0.9SE/km^2; nilgai, 2.8±1.4SE/km^2; wild pig, 0.6±0.5SE/km^2; chinkara, 0.4±0.2SE/km^2; grey langur, 19.9±7.4SE/km^2; and peafowl, 1.3±0.8SE/km^2. During the camera trap sampling in Kuno WLS, the research team obtained 23 photographs of one adult male tiger, 435 photographs of 30 adult striped hyaenas (10 males, seven females, 13 unknown) and 189 photographs of 26 leopards (nine males, nine females, eight unknown (one cub)). The densities of adult leopards and striped hyaenas estimated using the maximum likelihood-based spatially explicit capture–recapture model were 10.3±2.4SE/100km^2 and 10.5±2.1SE/100km^2, respectively. The sign encounter rates of carnivores in Kuno WLS are as follows: tiger, 0.07/km; leopard, 0.89/km; striped hyaena, 0.3/km; sloth bear, 0.91/km; golden jackal, 0.83/km; Indian fox, 0.06/km; and jungle cat, 0.23/km. The sign encounter rates of carnivores in the buffer zone are as follows: leopard, 0.03/km; striped hyaena, 0.5/km; sloth bear, 1.02/km; grey wolf, 0.04/km; golden jackal, 0.31/km; Indian fox, 0.01/km; and jungle cat, 0.03/km.

Milestone

Site-specific action plans with recommendations /suggestions for reintroduction of the cheetah in Kuno WLS, the Shahgarh landscape and Nauradehi WLS were drafted in collaboration with the state forest department, Cheetah Task Force (CTF) and National Tiger Conservation Authority (NTCA) and submitted to the Ministry of Environment, Forest and Climate Change, Government of India. WII helped prepare an affidavit in collaboration with CTF and NTCA, which comprised responses to issues that were raised by the Honorable Supreme Court regarding reintroduction of the cheetah in Kuno WLS. The affidavit was submitted to the Honorable Supreme Court.

MONITORING SOURCE POPULATION OF TIGERS IN RANTHAMBHORE TIGER RESERVE, INDIA

- Funding Source
  National Tiger Conservation Authority
- Investigators
  Dr. Y.V. Jhala and Shri Qamar Qureshi
- Researcher
  Ayan Sadhu
- Date of Initiation
  September 2011
- Date of Completion
  December 2016

Objectives

This project aims to (i) monitor the source population of tigers in Ranthambhore Tiger Reserve (RTR) through intensive camera trap surveys and obtain survival and mortality information through a capture–mark–recapture study; (ii) understand and monitor tiger dispersal patterns and land tenure systems; and (iii) keep a vigil on dispersing tigers so as to provide an update to protected area managers regarding their locations for subsequent protection measures.

Progress

The intensive study area was sampled in a systematic manner by placing a pair of camera traps in each 2 km^2 grid from 30 April to 20 June 2014. Camera trap sites were selected on the basis of a reconnaissance survey to maximize the detection probability of tigers and co-predators. The local knowledge of forest guards was also taken into consideration during site selection. Mostly dirt roads, trails, fire lines and dry river beds were selected for camera placement since these areas are often used by the focal species. A total of 359 camera traps covering an area of 349.27 km^2 resulted in a sampling effort of 8159 trap nights. Line

transects (n=95) were walked during February–April 2014 to estimate the prey density in the study area. Transects of fixed bearing were placed in all major habitat types for maximum spatial coverage of each stratum (habitat) of the study area. GPS locations of the beginning points and end points of the transects, as well as the bearing of the line, GPS location, angular distance, animal bearing and habitat type were recorded for each sighting. Each transect was walked once in the morning between 0600 and 0800 hours, yielding an effort of 190.38 km. At every 400m along each line transect, plots were laid to assess the human disturbance, vegetation and dung counts.

Each tiger photo captured was identified using the Extract–Compare program and given a unique ID. The density was estimated using the Spatially Explicit Capture Re-capture (SECR) technique. The spatial location of each capture/recapture was considered to calculate the number of home range centres present in the sampling area. Non-habitat areas were masked out from the effective trapping area (ETA) using a habitat mask to get more realistic estimates. Density (ver. 5.1) was used for density estimation. Information regarding camera trap locations and the detection events (session, animal ID, occasion and camera trap ID) were imported into the software for analysis.

Demographic parameters such as litter size, female age at first reproduction, inter-birth interval and recruitment were estimated from long-term monitoring of the tiger population through camera trap surveys paired with tracking of tiger individuals with the help of the forest department. Life history events were recorded to get an account on these parameters.

Figure 1: *Distribution of camera traps (n=359) and line transect (n=95) in Ranthambhore Tiger Reserve, 2014.*

Outputs & Outcomes

A total of 39 adult tigers were photo-captured during the session, and the density ($\hat{D}$) was estimated at 6.5 (±1.04) tigers/100 km^2 (model, g0sh2; sigma, 1.52±0.05; g0, 05±0.003). A habitat mask was used to eliminate non-habitat areas from the survey area. The female age at first reproduction was recorded as 55.5 months (range, 34–68 months, n=10). The average interval between two successive litters was observed to be 32.1 months. The average litter size was 2.25 (range, 1–3 litters; n=28). The survival rate of tigers of known fate was estimated from 2 months of age (when they first sighted) to recruitment age (>2 years). A total of 37 cubs were monitored, of which 30 survived till recruitment age, five died (three natural deaths, two poisoned) and two went missing before recruitment age. The recruitment percentage of tigers was estimated by monitoring tigers of known fate from 2 months' age to the time they established their territories. Out of 37 cubs (22 males and 15 females), 16 (10 males and six females) succeeded in establishing their territories. The density of the prey base was estimated using DISTANCE 6.0. The density estimates for chital, sambar and nilgai were 33.8 (±6.52), 25.67 (±4.56) and 5.45 (±1.39), respectively. The density estimates for langur and peafowl were 41.56 (±13.79) and 25.5 (±8.02), respectively. Due to the insufficient sample size (<20), estimates could not be made for chinkara and wild pig.

Milestone

There is no major finding as yet as analysis is still in progress.

EVALUATION OF METHODS TO ESTIMATE WILD ASS POPULATION IN RANN OF KUTCH, GUJARAT

- Funding Source
  Grant-in-Aid
- Collaborating Agency
  Gujarat Forest Department
- Investigators
  Shri Qamar Qureshi and Dr. Nita Shah
- Date of Initiation
  February 2012
- Date of Completion
  June 2016

Objectives

The objectives of the project are to (i) compare estimates of the wild ass population made using various methods and the effectiveness of these methods; and (ii) develop cost-effective methods for monitoring the population.

Progress

The Little Rann of Kutch Sanctuary, having an area of 4953.71 km^2, is spread over five administrative districts (Rajkot, Surendranagar, Mehsana, Banaskantha and Kutch) of Gujarat. To estimate the density and abundance of the wild ass Equus hemionus khur, the research team laid (74) 382 km of vehicle transects, 318 km of foot transects and 413 km of aerial transects. The research team flew by aircraft at varying heights. The team used two observers at the right windows (front and rear) of the plane to calibrate or estimate the correction factor for observer bias. An unmanned Aerial Vehicle (UAV) was tested to finalize sampling design issues in terms of detectability and observer bias. Data were analysed using the Conventional Distance Sampling (CDS), Multi-Covariate Distance Sampling (MCDS)

and Mark–Recapture Distance Sampling (MRDS) methods. Observers, fatigue level, habitat type, distance and group size were taken as covariates.

Outputs & Outcomes

The wild ass population is distributed largely over 15,000 km^2 in the arid area of Gujarat. The khur is a highly endangered wild equid, with its range restricted now to India. The densities of the wild ass as determined using foot transects were 7.41±1.28 and 3.72 ± 0.76 and those determined using vehicle transects were 4.35 ±1 and 7.53±1.33 in winter and summer, respectively, and the aerial transect estimate of winter–summer was 3.54±1.22. There is a seasonal variation in the abundance and distribution of the wild ass, which is governed by the distribution of resources. The aerial survey standardization protocols indicate the effect of height in the photographs taken using the UAV. The variability in data was caused by observer detection variation, height, observer fatigue and non-availability of animals for detection. The future work will address the technical and analytical issues of the different methods.

Milestone

The research team calibrated correction factors for observer bias and optimized the parameters for abundance estimation using aerial survey method.

KAILASH SACRED LANDSCAPE CONSERVATION AND DEVELOPMENT INITIATIVE PROJECT: IMPLEMENTATION PROGRAMME IN INDIA

- Funding Source
  The International Centre for Integrated Mountain Development, Nepal

- Investigators
  Dr. G.S. Rawat, Dr. B.S. Adhikari, Dr. S. Sathyakumar, Dr. V.P. Uniyal, Shri Mukul Trivedi, Dr. K. Sivakumar, Dr. Gopi G.V.

- Researchers
  Arti Kala, Ajaz Hussain, Sumit K. Arya, Sweta Singh, Alka Chowdhary, Deep Shah, Mona Chauhan and Zareen Syed

- Date of Initiation
  March 2012

- Date of Completion
  December 2016

Objectives

The objective of the project is to conserve and develop the Indian part of the Kailash Sacred Landscape (KSL-India).

Progress

The project was successfully implemented for the second year. Predominantly, contributions on three assigned components and associated activities were made in the pre-defined 'Horizontal Transect' area, including 15 selected *Van Panchayats* (VPs). As envisaged, the WII team was able to develop first the vital geospatial database on spatial patterns, focusing on the entire landscape, eight constituent watersheds and seven out of the nine forest ranges of KSL-India. Adopting conventional field methods and modern tools (camera trap) for assessment of the floral and faunal diversity in the diverse forests of 15 VPs has given an ample understanding of the diversity, abundance and status of prominent and characteristic faunal species and management issues relevant to the forests of VPs. These forests constitute an important entity of the "matrix". Efforts have been made so far to provide confidence in dealing with matters related to VPs and participatory planning.

V.P. Uniyal

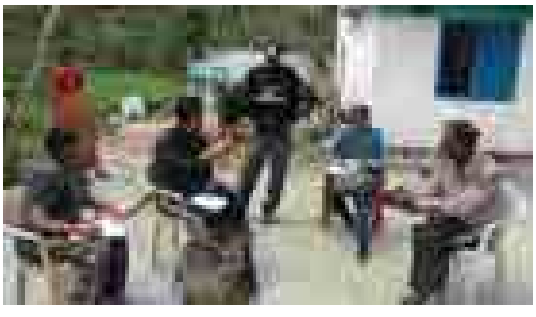
Outputs & Outcomes

Household surveys and extensive as well as intensive stakeholder meetings/consultations, besides collection of field data, have now provided an insight into livelihood patterns, the nature and extent of ecosystem services, human–wildlife conflict, and vulnerability across 15 VPs on the west–east 'Horizontal' transect. The WII team has involved youth in pilot monitoring efforts and deployment of camera traps in the field.

Since the inception of the project, significant contributions have been made towards capacity building of the frontline staff and awareness campaigns for the district administration, line agencies and young generation. Policy documents relevant to implementation of the landscape approach in the country have been reviewed. The experience gained and lessons learned through similar efforts in other large landscapes within the country and elsewhere are also being considered and incorporated in the present efforts.

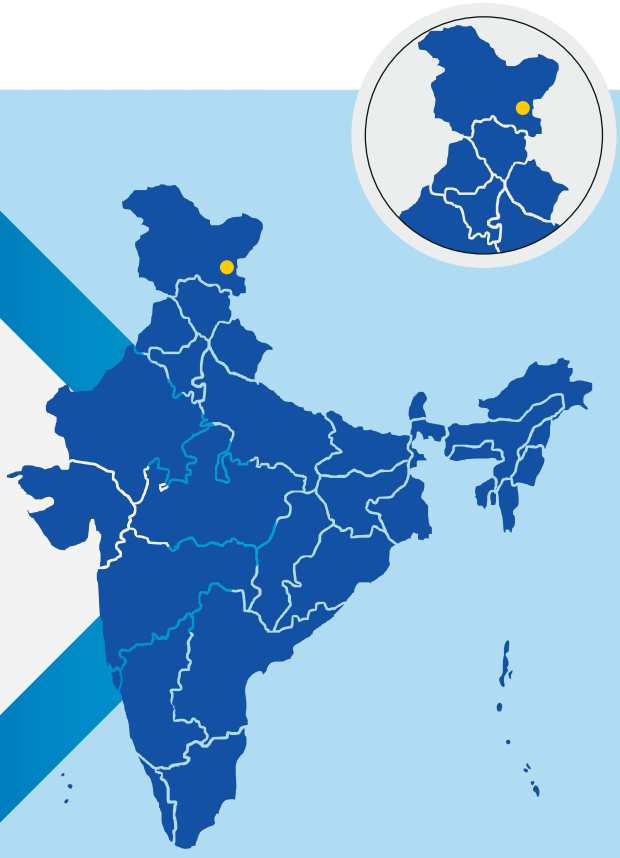
Milestone

Participating members of the WII team have been provided adequate opportunities for capacity enhancement through training workshops, field visits, interactions and exposure visits organized by ICIMOD. The Participatory Natural Resource Management (PNRM) planning in the selected pilot micro-watershed, Gokarneshwar Gad, in Bin Block, Pithoragarh has been initiated. Further, the project team actively participated in Jauljibi Fair. The integration of "conservation" and "development" in the current programme itself is a new approach for the stakeholders as well as participating team members. Every person/expert brings his or her specialization and expertise, and to mould each of them for wider integration across components /activities is also a tricky task. Gradually, these challenges are being overcome, and they are being appropriately addressed. In a nutshell, the WII team is fully confident as well as excited about making this prestigious initiative successful.



V.P. Uniyal

DISTRIBUTION PATTERN, HABITAT USE AND MOVEMENT OF BREEDING WATER BIRDS WITH RESPECT TO BLACK-NECKED CRANES AND BAR-HEADED GEESE USING TELEMETRY IN CHANGTHANG COLD DESERT SANCTUARY, LADAKH AND GHARANA WETLAND CONSERVATION RESERVE, JAMMU, JAMMU & KASHMIR



- Funding Source
  Department of Wildlife Protection, J&K
- Collaborating Agency
  Department of Wildlife Protection, J&K
- Investigators
  Dr. S.A. Hussain, Dr. Bilal Habib and Dr. Gopi G.V. (WII); Jigmet Takpa and Intesar Suhail (DWP, J&K)
- Researcher
  Neeraj Mahar
- Date of Initiation
  July 2012
- Date of Completion
  August 2016

Objectives

The objectives of the project are to (i) quantify the current status of water-birds, with special reference to the black-necked crane (BNC) and bar-headed goose (BHG), in the Changthang Cold Desert Sanctuary, in Ladakh, and Gharana Wetland Conservation Reserve, in Jammu; (ii) examine the habitat use and movement patterns of the BNC and BHG in the Changthang Cold Desert Sanctuary and Gharana Wetland Conservation Reserve; and (iii) use the information to devise an effective management strategy for wetlands in the wintering grounds of the cranes and the BHG as well as their nesting or feeding and roosting sites.

Progress

During the reporting period, the research team attained the first objective of the project in both the study areas. (i) Eighty-seven point counts were carried out in 14 major wetlands. (ii) The survey was conducted during the post-breeding season (17 to 21 September 2014) with the help of seven teams (two observers in each team). (iii) Surveys were carried out in between 0700 and 1100 hours. (iv) The minimum distance maintained between two points was 400 m in small wetlands. However, keeping the

Dhritiman Mukherjee

logistic constraints in mind, large lakes were sampled with a minimum distance of 2000–3000 m. (v) The total count method was used in small blocks in February 2015. (vi) Counts were conducted between 0700 and 1100 hours, and ground truthing was carried out to prepare a map of the wetland. (vii) The team collected 50 ground truth points using GPS. (viii) Shape files of the wetland, settlements and other classes were delineated using a combination of the ground truthing points and Google Earth.

Outputs & Outcomes

Changthang Wildlife Sanctuary: (i) Overall, 22 species of water-bird were recorded during our study, including 12 breeding species. (ii) The most abundant Anseriformes species were the bar-headed goose *Anser indicus*, which was recorded from seven wetlands, followed by the great crested grebe *Podiceps cristatus*, garganey *Anas querquedula* and ruddy shelduck Tadorna ferruginea. (iii) The fresh water lake Statspuk Tso, with 15 species, had the greatest species richness, followed by Yayatso, with eight species, Kyontso I and Puga, with six species each, and Tso Moriri, Dungti and Kyagartso, with five species each. Only one species, the green sandpiper *Tringa ochropus* was recorded in Kyontso II, the number of species being less than that of the neighbouring wetland, Kyontso I. (iv) Statsapuk (H=2.02) had the maximum diversity, followed by Kyontso (H=1.79), Dungti (H=1.47), Hanle-Indus River (H=1.1) and Yaytso (H=0.96), and Kyon Tso II (H=0.11) and Staklung (H=0.50) had the minimum diversity.

Status of water-birds in Gharana Wetland: (i) The most abundant bird species was the common teal *Anas crecca* (207.67±36.43), followed by the common moorhen *Gallinula chloropus* (23.33±5.78), gadwall Anas strepera (16.33±7.84), northern shoveller Anas clypeata (15.33±10.33), purple swamp hen (14.33±7.31) and common coot (12.67± 6.67). (ii) Previously geese were reported as being the most abundant species, but only two geese were recorded from Block 2; however, large flocks were flying and calling from Sialkot, Pakistan. (iii) Because the Gharana Wetland is in close proximity to the border and croplands, there is continuous cross-border firing and bursting of crackers by farmers, which could be a valid reason for the low occurrence of the key species in Gharana Wetland.

Milestone

The team recorded two passage migrants, namely, the red-necked phalarope *Phalaropus lobatus* and green sandpiper. Statspuk Tso was noted to be the most diverse wetland in present and previous studies in Changthang Wildlife Sanctuary.

The team also recorded a total of 31 wetland-associated species during the survey. These included eight species of *Anatidae*, seven species of *Ardeidae*, four species of *Rallidae*, three species of *Scolopacidae*, two species of *Charadriidae* and one species each of *Ciconiidae*, *Halcyonidae* and *Motacillidae* in Gharana Wetland.

LANDSCAPE ECOLOGY OF LARGE MAMMALS IN THE SHIVALIK–TERAI LANDSCAPE WITH FOCUS ON FLAGSHIP SPECIES AND ECOSYSTEM SERVICES

- Funding Source
  Grant-in-Aid
- Investigators
  Dr. K. Ramesh and
  Dr. Bivash Pandav
- Researcher
  M. Naveen
- Date of Initiation
  August 2012
- Date of Completion
  July 2016

Objectives

The objectives of the project are to (i) determine the spatial pattern of distribution and abundance of tigers in the landscape; (ii) quantify the impact of anthropogenic disturbance on the tiger and of livestock-mediated competition on the distribution and abundance of wild ungulate species; and (iii) evaluate the permeability of the landscape and long-term survival probability of tiger populations in this landscape.

Progress

Surveys were carried out in the entire landscape including corridors, quantifying the presence/absence of tiger and its prey species, along with the characteristics of the habitat and anthropogenic pressures. The sampling unit ranged from 1.5 to 5 km in length, divided into 250m segments. Disturbance indicators such as dung and sightings of livestock (cattle and buffalo), tracks and sightings of domestic dogs and people and signs of lopping and cutting were quantified within the 250m segments along the transects. At every 250m on each transect, concentric nested plots of 10m radius for trees and 5m radius for shrubs were laid. The vegetation canopy cover and signs of lopping and cutting were quantified in the 10m radius plots, while the 5m radius plots were used for recording shrub

cover and herb/grass cover. In addition to the information gathered from vegetation sampling, ground-truthing points were obtained from some point for interpreting the satellite data.

Cloud-free satellite images (Landsat 7 ETM at 28.5m resolution and Landsat 8 at 30m resolution) were used to map the forest cover and land-use patterns of the study area. The imagery was first processed for atmospheric correction, and the vegetation was classified using unsupervised isolate cluster analysis. Thereafter, a supervised revision of the classification based on the existing vegetation data was conducted using a supervised maximum likelihood classification. Topographic characteristics (altitude, slope and drainage), public roads, settlements and boundaries of protected areas were obtained from topographic maps and digital elevation models. All the GIS operations were carried out using ArcGIS (ESRI, Redlands, CA) and other specialized software.

Outputs & Outcomes

Tigers in the Indian Terai Arc Landscape (TAL) occur within nine disjunct habitat blocks known as tiger habitat blocks or THBs. In some cases, linear breakages or bottlenecks have resulted in discontinuity in the habitat, whereas in extreme cases habitat blocks are surrounded by matrix habitat, resulting in isolation. Our study showed that the corridors are poorly used by tigers (about 2% (±5) of the sampling units (Figure 1) only) and that these corridors had excessive anthropogenic pressures. However, elephants appeared to have negotiated the human pressure and have used 16% (±23) of the area. The corridors are not wide, and the connectivity is severely impaired by linear infrastructure and expanding developmental activities. The information generated in this study will offer a baseline for a conservation strategy since the viability of populations of large mammals will be guided by the functional status of corridors.

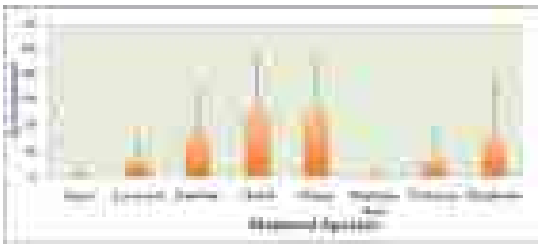


Figure 1: *Frequency of occurrence of signs of large mammals in the corridors of TAL*

Milestone

The project has brought out the temporal trend in the occupancy status of key wildlife populations and the current conditions of habitat including the corridors. It was possible to recognize that while the status of wildlife has largely remained constant, but there have been significant variations within the habitat blocks. It is also pertinent to recognize that the outcome of the project would further add value to landscape level conservation inputs in the landscape.

K. Ramesh

DEVELOPMENT AND MAINTENANCE OF STUDBOOKS FOR SELECTED ENDANGERED SPECIES IN INDIAN ZOOS

- Funding Source
  Central Zoo Authority
- Investigators
  Dr. Parag Nigam and Shri P.C. Tyagi
- Researcher
  Nilofer Begum
- Project Consultant
  Dr. Anupam Srivastav
- Date of Initiation
  September 2012
- Date of Completion
  September 2017

Objectives

The project was initiated with objectives of development of population management plans for identified species in captivity: (i) updating studbooks for the Asiatic lion, Bengal tiger, lion-tailed macaque, Indian one-horned rhinoceros, red panda, snow leopard, Tibetan wolf, clouded leopard, hoolock gibbon, Nilgiri langur, gaur (Indian bison), Indian wild ass, dhole (wild dog) and Bhutan grey peacock pheasant and (ii) initiation of new studbooks for the Indian gazelle (chinkara), brow-antlered deer (sangai), swamp deer (barasingha),four-horned antelope (chowsingha), mouse deer, serow, blue sheep (bharal), golden langur, pig-tailed macaque, stump-tailed macaque, Phayre's leaf monkey (spectacled leaf monkey), Indian wolf, Indian pangolin, white-backed or Bengal vulture, long-billed vulture, slender-billed vulture, Nicobar pigeon, cheer pheasant, Himalayan monal and western tragopan.

Progress

During the reporting period, activities were carried out to complete the project: (i) updating the existing red panda *Ailurus fulgens fulgens*, Tibetan wolf *Canis lupus chanco*, Asiatic lion *Panthera leo persica*,

Nilanjan Chatterjee

clouded leopard *Neofelis nebulosa*, snow leopard *Panthera uncia* and Nilgiri langur *Trachypithecus johnii* studbooks; and (ii) initiation of a new studbook for the blue sheep *Pseudois nayaur*.

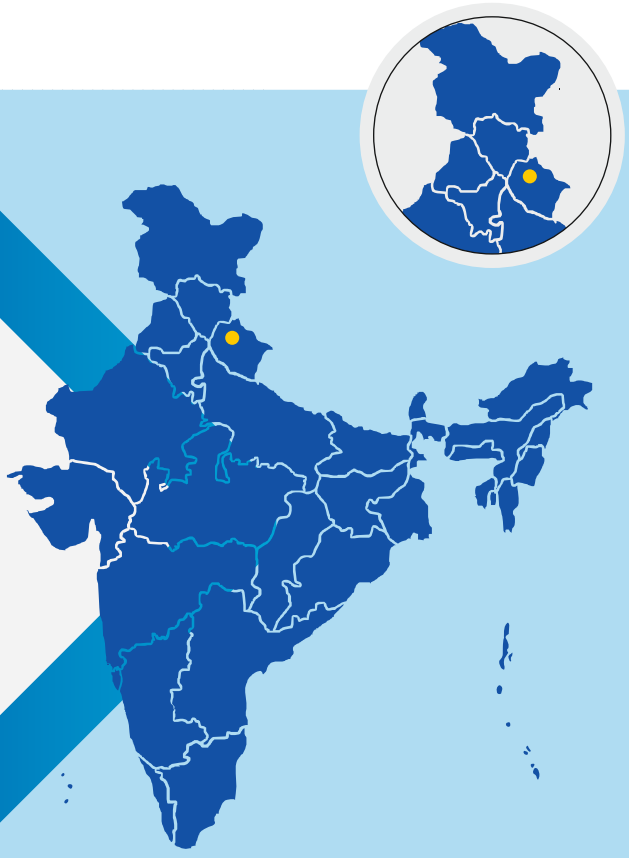
Outputs & Outcomes

The studbooks include a review of the literature relevant for managing the species in captivity and pedigree information about the species in Indian zoos. The pedigree information was used for detailed demographic and genetic analyses. These analyses formed the basis for the development of breeding recommendations and population targets for the species.

Milestone

National studbooks have been prepared for seven (mammals) of the 34 species (26 mammal and eight bird) during the reporting period. This has resulted in 35% of the studbooks being completed by the end of the reporting period. An additional 46% are in various stages of completion and are likely to be completed during the period 2015–16.

PATTERNS OF SPATIAL AND TEMPORAL HABITAT OCCUPANCY IN RELATION TO CROP-RAIDING BEHAVIOUR AND GENETIC VARIATION OF FREE-RANGING ASIAN ELEPHANTS *ELEPHAS MAXIMUS* IN NORTH-WEST INDIA USING NON-INVASIVE GENETIC SAMPLING



- Funding Sources
  Project Elephant, Ministry of Environment, Forest and Climate Change, Government of India; Asian Rhino and Elephant Action Strategy—WWF International; University Grants Commission; Operation Eye of the Tiger, India
- Investigator
  Dr. Parag Nigam
- Co-investigators
  Dr. S.P. Goyal, Shri Qamar Qureshi and Dr. A.C. Williams
- Researcher
  Rahul De
- Date of Initiation
  October 2012
- Date of Completion
  March 2017

Objectives

The primary objectives of this project are: (i) estimation and modelling of spatial and temporal habitat occupancy of elephants; (ii) providing baseline information on genetic structure using mtDNA and nuclear microsatellite variations across different populations; (iii) identification of any patterns in dispersal in terms of age and sex of elephant individuals; (iv) documenting and testing for population genetic differentiation and a recent bottleneck, if any; (v) examining the existence of any age-/sex- based patterns of crop depredation and incidences of habitual raiding in relation to cropping patterns; and (vi) investigating the social organization of Asian elephants.

Progress

During the reporting period, a total of 817 geo-referenced faecal samples were collected, of which 68.3% were collected through direct sightings of solitary males (n=95) and family herds (n=215). The age, class and sex of each animal were recorded when defaecation events were encountered. The research team recorded 81% of the samples from female individuals and 17% from male individuals. The sex was not determined for 2%, including calves, through sighting. Apart from the solitary elephants that were sighted, the group size ranged from two

Rahul De

individuals to a herd of 16 individuals, with group sizes of 5–7 being most common (53% encounters). The average group size did not vary significantly between distance classes of 1 km up to 7 km from the boundary of the protected area (PA), both inside and outside the PA. The frequencies of encounter for solitary males and cow herds were significantly different across distance classes from the PA boundary, showing dissimilar spatial patterns. The sighting frequency was higher (0.25 for bulls, 0.20 for cow herds) at 0–1 km than at >1 km inside the PA, substantiating the high risk of crop raiding along the boundary of RTR.

The team carried out a 28 point questionnaire survey in 34 locations stratified in six zones along the boundary of RTR and interviewed 90 respondents dependent on agriculture. It was found that a total of 11 combinations of five commercial crops (paddy, wheat, sugarcane, maize and mango) were cultivated in the area. Farmers cultivating only sugarcane reported the highest mean number of crop raids per year (107.5). The frequency of crop raids was greater along the southern boundary of RTR than in other parts of the RTR–human settlement interface.

Multi-locus microsatellite genotyping and identification of sex from faecal DNA samples were standardized. Baseline reference data on the frequencies of different alleles in the population were generated using high-quality tissue and blood samples from the study area that will be used to eliminate any false alleles being amplified from relatively inferior quality faecal DNA samples. The allele sizes ranged from 94 bp to 169 bp.

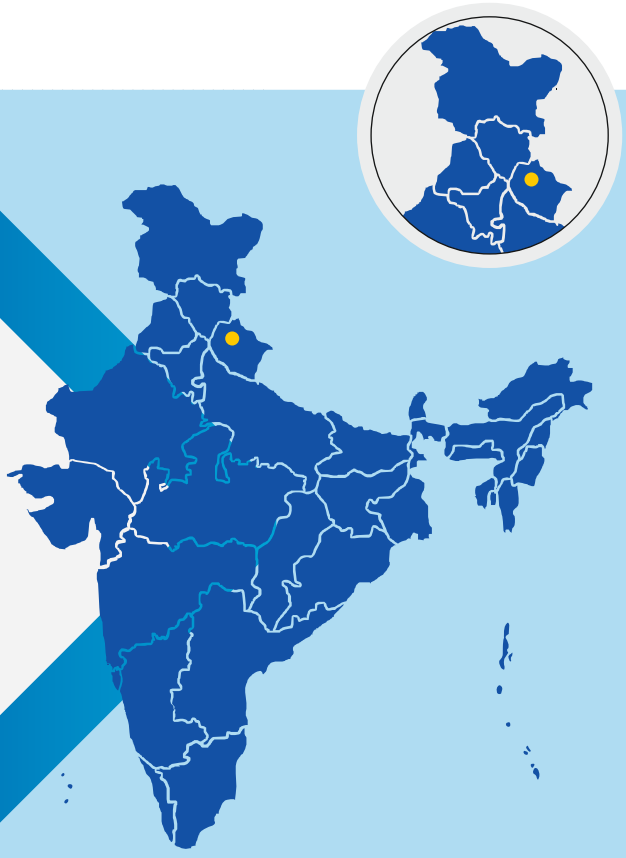
Outputs & Outcomes

It was found that winter was the primary reason of crop raiding as sugarcane and wheat were cultivated together in crop fields. Raids were most frequent during the period from 9 pm to 12 am. It was also observed that 85.3% of the settlements experiencing crop raiding were within 1 km of the park boundary, whereas 64.7% of the settlements were less than 500 m from the boundary.

Milestone

Baseline genetic data for the study population were established using high-quality tissue or blood samples. Hence, the data suggest that there is a need to determine spatial–temporal variations in cropping patterns within 1 km from the park boundary for understanding crop raiding behaviour.

DIVERSITY OF MOTH (LEPIDOPTERA: HETEROCERA) ASSEMBLAGE AND THEIR POTENTIAL ROLE AS A CONSERVATION TOOL IN DIFFERENT PROTECTED AREAS OF UTTARAKHAND



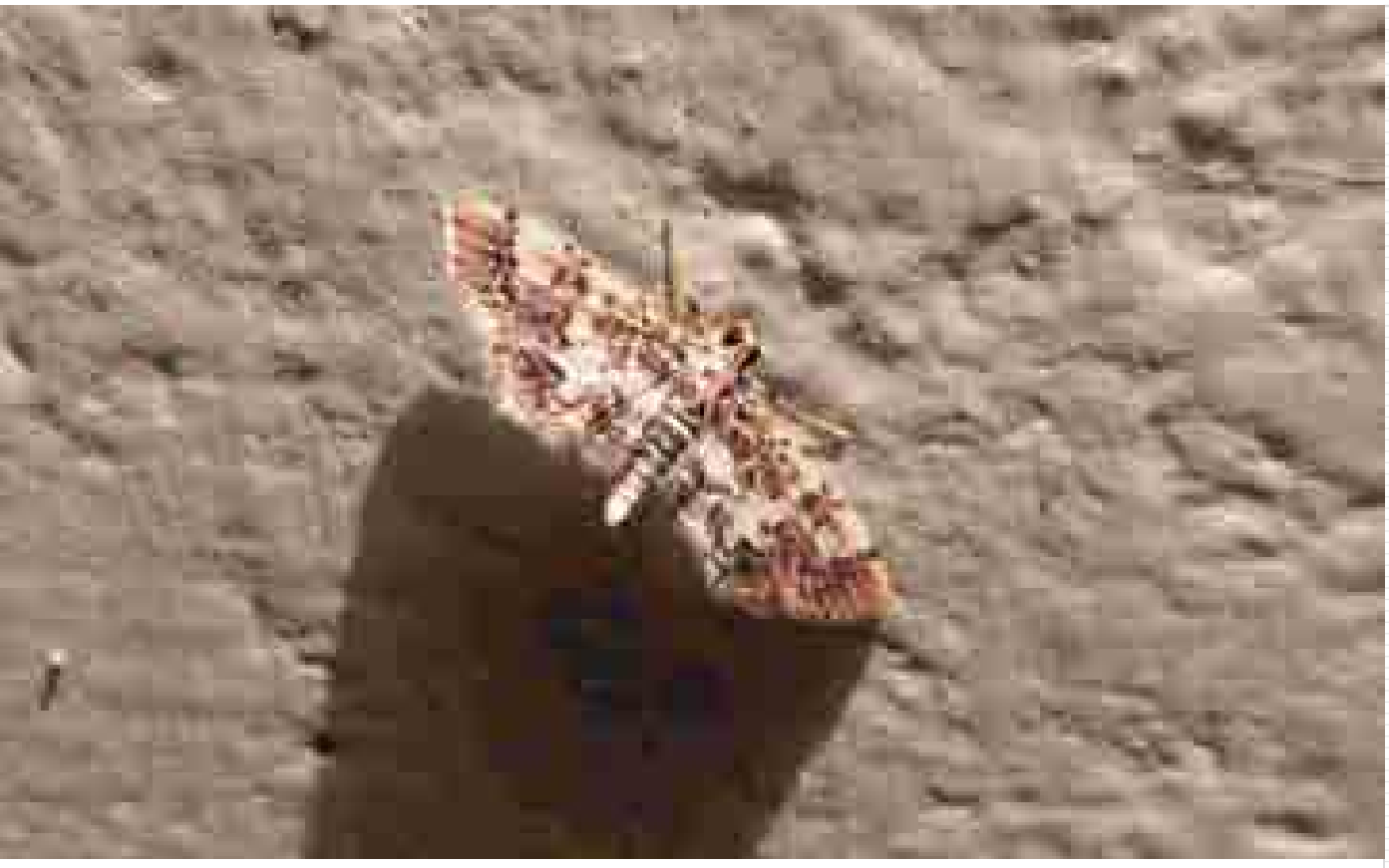
- Funding Source
  Department of Science & Technology, Government of India
- Investigator
  Dr. V.P. Uniyal
- Researcher
  Pritha Dey
- Date of Initiation
  November 2012
- Date of Completion
  November 2015

Objectives

The objectives of the project are to (i) document and prepare a taxonomic inventory of the rich moth fauna of the protected areas of Uttarakhand; (ii) assess and analyse the diversity and distribution of moth assemblages along elevation and vegetation gradients and the influence of anthropogenic disturbance factors on moth assemblages in different protected areas of Uttarakhand; and (iii) establish moth assemblages as surrogates for the entire insect community and use them as indicator taxa in rapid habitat-quality assessment programmes.

Progress

Intensive field work was undertaken from April 2014.Sampling was done at the pre-monsoon and post-monsoon stages till September 2014. Collection was done along two different gradients across 32 sites at every 200m within an elevation range of 2000—3800m. Sites were selected randomly across forest types (broadleaved, oak, deodar, birch). Collection was done for 3–4 hours, starting from dusk. The hourly variations of temperature, relative humidity and wind speed were noted. The presence of signs of anthropogenic disturbances such as like logging, lopping and grazing was also noted along 50m transects around



Pritha Dey

the site of collection. Vegetation sampling was done using the nested method in circular plots (20m radius plots for tree species, 10m radius plots for shrub species and four $1 \times 1 m^2$ random plots for herb species) within a 50m radius of the site. The observed individuals were sorted into morpho-species.

Recording moths: The present study intends to provide a complete inventory of the moth species found in the protected areas of Uttarakhand by collating the information gathered by earlier recorders and by fieldwork. The most widely adopted method of light trapping was used to attract moths in forest areas.

Preservation: After being manually collecting, the moths are transferred to bottles filled with benzene vapour. For temporary storage in the field, they are kept in insect envelopes with labels, and the envelopes are kept in ordinary cardboard boxes. The moths are then pinned on foam with the pin vertical so that the body comes firmly against the surface.

Identification: The collected specimen were identified and classified with the help of all available traditional taxonomic characters for the group. Identification of individuals is taken up with the help of the literature, and the genera and species so identified were compared with the reference collection available at the Zoological Survey of India, Kolkata. The traditional characters used for identification of moths are as per Hampson (1892) and Common (1990).

Vegetation sampling: Plant communities of each vegetation type were sampled using a series of nested quadrats. One set of quadrats was centred on the position of the light trapping station and the remaining two were randomly located 50 m from the centre. 10×10 m2 quadrats were used to quantify the species richness, abundance and diameter at breast height of all trees of dbh greater than 10cm.

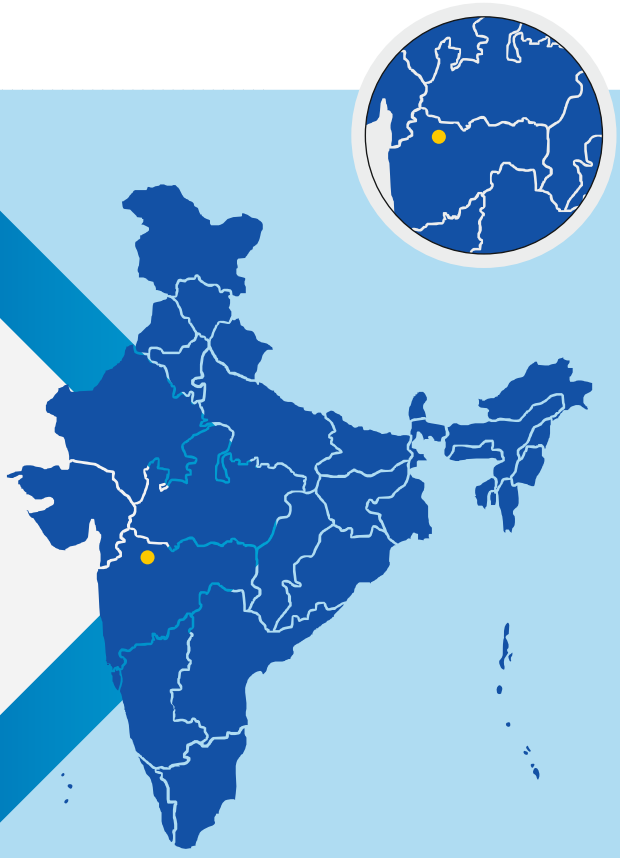
Outputs & Outcomes

The observations highlight the family Geometridae, which was most abundant at all the sites, with 475 individuals recorded. The number of morpho-species and individuals at the trap sites are negatively correlated with the elevation and temperature. The family Geometridae family, with such high abundance, has potential indicator species and can be studied in the long-term as indicative of environmental changes.

Milestone

The project work has so far been published in two papers and four conference proceedings.

LONG-TERM MONITORING OF TIGERS, CO-PREDATORS AND PREY SPECIES IN TADOBA–ANDHARI TIGER RESERVE AND ADJOINING LANDSCAPE, MAHARASHTRA, INDIA (PHASE I)



- Funding Source
  Maharashtra Forest Department, National Tiger Conservation Authority

- Investigators
  Dr. Bilal Habib, Dr. (Capt.) Parag Nigam (WII); Chief Conservator of Forests and Field Director, Tadoba Andheri Tiger Reserve, Chandrapur, and Dr. Vinay Sinha, Forest Department, Government of Maharashtra

- Researchers
  Madhura Davate, Anil Dashahare and Nilanjan Chatterjee

- Date of Initiation
  2012

- Date of Completion
  2017

Objectives

The objectives of the project are (i) mapping the current land use pattern, infrastructure, mining areas, villages, roads, power transmission lines, demographic profile, livestock population, dispersal corridors, prey and predator occupancy, etc. within the landscape surrounding Tadoba–Andhari Tiger Reserve (TATR); (ii) determining the spatial distribution and temporal dynamics of the habitat occupancy of tigers, co-predators and prey species and the relationship of these parameters to habitat-related variables; (iii) determining the population density, abundance and demographic structure of tigers and co-predators in the landscape; (iv) estimating the population density and abundance of key prey species in the landscape; (v) estimating the vital rates (survival, recruitment, temporal emigration, dispersal, etc.) of tigers and co-predators; (vi) studying tiger–leopard conflicts and socio-economic aspects; (vii) monitoring village translocation sites (Tadoba provides an opportunity to study the impact of village translocation); (viii) investigating the food habits of tigers and co-predators in the TATR landscape complex; and (ix) training the field staff for managing human–wildlife conflict and emergency situations.

Progress

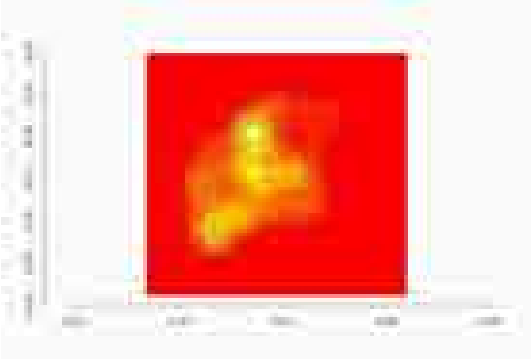
The TATR landscape complex is an important part of the Central Indian Tiger Landscape that will have a long-term future provided corridors continue to provide connections. The objective of radio-collaring was to study the home ranges, activities and movement patterns of the tiger and leopard. Precise estimates of such parameters at the individual and population levels are crucial in designing strategies for a long-term conservation programme.

Two tigers were fitted with GPS plus Iridium collars with activity and mortality sensors, and four leopards were fitted GPS Global Star collars. Tiger collars with two-way communication systems were pre-programmed to record locations at intervals of 5 hours. Later the frequency was increased to record locations at intervals of 2 hours and 1 hour. The activity pattern derived from the camera trap photographs was compared with the individual activity patterns of tigers obtained using data from the activity sensors. The leopard collars recorded locations at 5 hour intervals. They were tracked on the ground to obtain activity and movement information.

Outputs & Outcomes

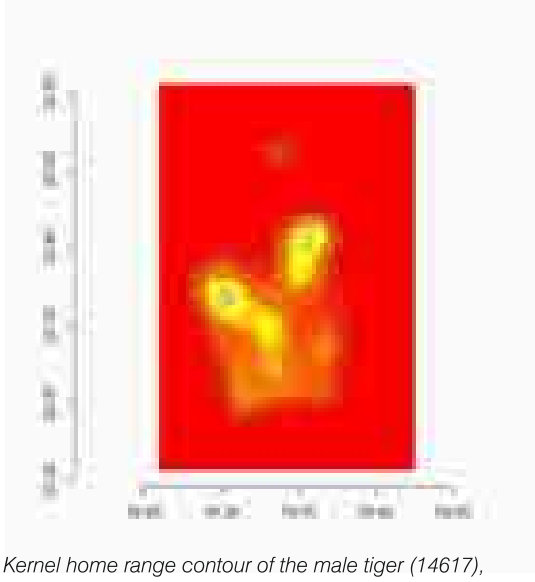
The study revealed that 200 fixes were adequate to attain home range stabilization for established individual tigers. The home range of the female tiger was approximately 40 km^2, with two cores of 18–24 km^2, while the male had a home range of 100 km^2, with a core of around 70 km^2. The average distances between consecutive fixes for the female and male tigers were 827 and 462 m, respectively. The activity pattern did not differ significantly between the data from the camera trap photographs and from radio telemetry. The home range of one male leopard was around 90 km^2, and that of a female leopard was around 40 km^2, while another relocated female leopard was observed to be moving over a large area, showing homing.

The proportion of core area utilization with respect to the home range area was similar for the male and female tigers; however, there were differences in the space usage, with the female using two core areas when raising two cubs and the male confined to one core area. The leopards showed variability in area utilization with respect to their status (dominant and transient) and presence of tigers in the vicinity.

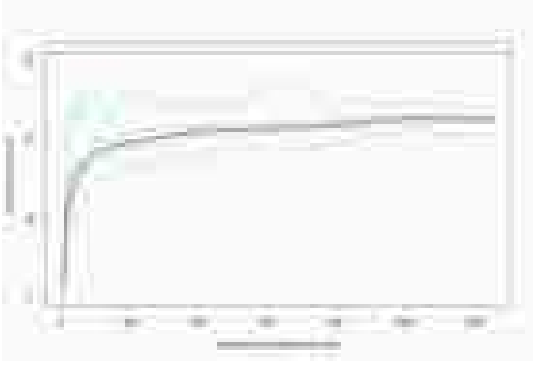


Kernel home range contour of the female tiger (14616), more intensive area use are shown in yellow

Graph showing the stabilization of the home range area of the female tiger (14616)



Kernel home range contour of the male tiger (14617), more intensive area use are shown in yellow



Graph showing the stabilization of the home range area of the male tiger (14617)

Map of area overlap between the male and female tiger (Male-yellow, Female-Purple).

Estimation of populations of tigers, leopards and prey species in 2014:

The core zone of TATR was sampled for a total of 7,584 trap nights spread over 22–24 trap days with 316 trap stations. This exercise yielded 54 unique tigers and 34 unique leopards the photographs were analysed using Program MARK.

Data from the line transect survey indicated that the densities of all prey species, gaur, sambar and chital were 30.45, 2.03±0.56, 4.68±0.76 and 5.10±1.22, respectively. The results indicate a high abundance of chital and sambar, followed by wild pig, gaur and barking deer.

This study intended to estimate the minimum numbers of tigers and leopards and the availability of their prey. Camera trapping is a well established and highly reliable method used to estimate the populations of animals with unique markings. During the trapping session, other animals such as the sloth bear, dhole, small Indian civet, palm civet, jungle cat, honey badger, hyaena, chital, sambar, nilgai, wild pig, chowsingha, common langur and peafowl were also photographed.

Table 1: *Population estimates for tiger and leopards in Tadoba-Andhari tiger reserve:*

Species	Individual ID	Flank	Trap nights	Occasions	Population size
Tiger (Mt+1)	54	Right (48)	7584	24	60±5.8
Leopard (Mt+1)	34	Left (32)	7584	24	37±5.2

Table 1: *Density estimates for prey species in Tadoba-Andhari tiger reserve:*

Species	Total effort (km)	Group density ± SE	Individual density ± SE
All prey	590	5.8±0.6	30.45
Chital	590	5.48±0.61	5.10 ± 1.22
Sambar	590	2.31±0.15	4.68 ± 0.76
Nilgai	590	2.83±0.50	2.83 ± 0.51
Wildpig	590	5.85 ± 1.02	5.89 ± 1.03
Gaur	590	3.29 ± 0.45	2.03 ± 0.56
Barking deer	590	1.14 ± 0.07	1.15 ± 0.07

Milestone

The analysis and data collection are still in progress.

PATTERN OF BIOMASS PRODUCTION BY WETLANDS AND ITS USE BY WILD UNGULATES IN KAZIRANGA LANDSCAPE

- Funding Source
  Science and Engineering Research Board, Department of Science & Technology

- Investigators
  Dr. S.A. Hussain, Dr. Ruchi Badola and Dr. Gopi G.V.

- Researchers
  Monika Sharma and Anita Devi

- Date of Initiation
  January 2013

- Date of Completion
  January 2016

Objectives

The project has the following objectives: (i) Map the wetlands of Kaziranga Tiger Reserve in terms of location, area and seasonality. (ii) Determine the biomass productivity of selected wetlands across various seasons. (iii) Derive the use of these wetlands by large herbivores in terms of biomass consumed and area utilized. (iv) Quantify the amount of biomass extracted by the local people and the impact of this extraction on the productivity of the wetlands.

Progress

A map of the area of inundation in the reserve was prepared using remote sensing data. A total of 108 plant species were recorded during the sampling period (January–December 2014). Twenty-eight families have been identified so far. The species richness and diversity were calculated from data collected from January to May 2014. In the areas inundated for >21 days to <6 months, the species richness was 5.6, and the Shannon diversity index was 1.15, whereas in the areas inundated for >6 months, the species richness was 6.9, and the Shannon diversity index was 0.726. The mean annual above-ground biomass productivity was

Anita Devi

found to be 3838.13±537.75 g/m^2 for wet grasslands and wetlands.

Silt traps (50×50 cm^2, n=31) were placed in selected wetland sites in May 2014 to examine the siltation rate of wetlands in the Kaziranga landscape. The initial results indicated that the highest silt deposition occurred in the eastern range, followed by the central range. An 8×6×3 m^3 greenhouse has been constructed and soil cores from depths of 0–30 cm, 30–60 cm and 60–90 cm have been placed in earthen pots to accelerate the germination of the seeds present in the soil core to examine the succession process. Collection of data from these is in progress.

A total of 164 soil samples have been collected for a period of 1 year from different depths in different inundation regimes inside the reserve. Laboratory analysis of the soil samples is in progress at the WII Research Laboratory.

Composition of diet and use of forage: To determine the use of wetlands by large herbivores, pellet samples were collected for three species of cervid (swamp deer *Rucervus duvaucelii,* sambar Rusa unicolor and hog deer *Axis porcinus*) and dung samples were collected for mega herbivores (Asian elephant *Elephas maximus*, Indian one-horned rhinoceros *Rhinoceros unicornis* and wild buffalo *Bubalus bubalis*). The samples were collected for micro-histological analysis to examine the food habits. A total of 1,336 pellet samples have been collected so far, of which 532 samples have been processed. A total of 363 slides have been prepared. A total of 305 dung samples of Asian elephant have been collected and 130 slides have been prepared. A total of 627 dung samples of Indian one-horned rhinoceros have been collected. Reference slides of 58 plant species have been prepared for identification of the forage species consumed. Of all the samples collected, the food habits of the swamp deer and hog deer have been examined so far.

During the pre-burning phase, the diet of the swamp deer was dominated by dicots, with the mean percentages of monocots and dicots consumed being 46.08±2.94% and 53.92±2.94%, respectively. In the post- burning phase monocots were dominant in the diet, with the mean percentages of monocots and dicots consumed being 55.68±0.37% and 44.32±0.37%, respectively. There were significant differences between the monocot and dicot utilization in the diet of the swamp deer in the pre-burning ($\chi^2 = 9.41$, df =

Anita Devi

1, $p<0.05$) and post-burning ($\chi^2 = 422.51$, df = 1, $p<0.05$) phases. Seven plant species were identified by micro-histological analysis of faecal fragments of swamp deer during the pre-burning phase, and nine plant species were identified in the post-burning phase.

Outputs & Outcomes

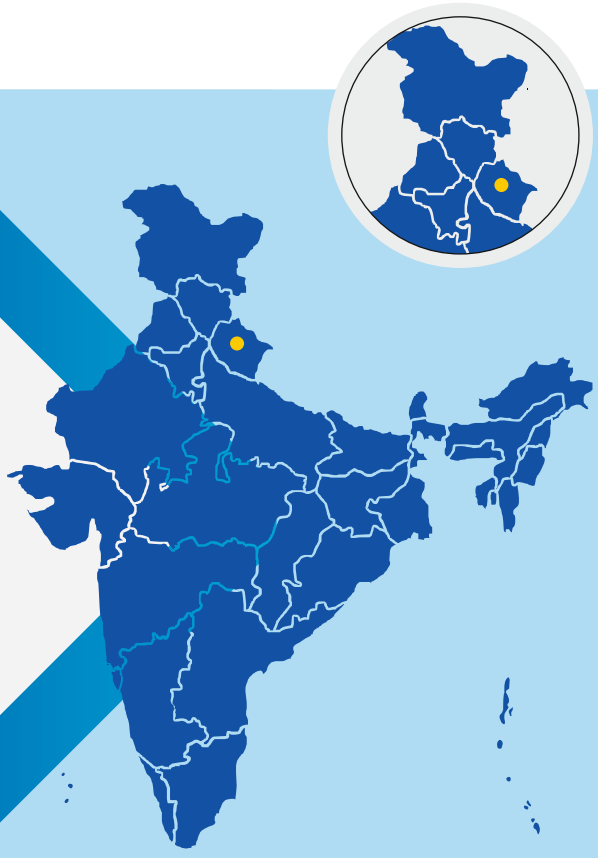
The mean percentages of monocots and dicots consumed by hog deer during the pre-burning phase were 48.7±2.64% and 51.3±2.64%, respectively. The mean percentages of monocots and dicots consumed by hog deer during the post-burning phase were 63.52±0.62% and 36.48±0.62%, respectively. Significant differences were observed between the monocot and dicot utilization by hog deer in the pre-burning ($\chi^2 = 74.14$, df = 1, $p<0.05$) and post-burning ($\chi^2 = 958.65$, df = 1, $p<0.05$) phases. Eight plant species were identified from faecal fragments of hog deer during the pre-burning phase, and nine plant species were identified during the post-burning phase.

The Ivlev electivity index was used to determine the diet preference of swamp deer and hog deer in terms of the four families of the identified species. The family Poaceae was most utilized by both swamp deer and hog deer during the pre-burning and post-burning phases. Studies of the food habits of the other cervids and mega-herbivores are in progress. To study the habitat use and time spent by the large herbivores, nine vehicle transects of 10 km each are being monitored at intervals of 15 days since February.

Milestone

A total of 26 villages located in the fringe areas of the reserve have been identified for the study, including eight villages in the eastern (Agaratoli) range, eight in the central (Kohora) range, six in the western (Bagori) range and four villages in the western (Burapahar) range. There were a total of 3,257 families in the sample villages, and the total population was 18,368 individuals. The mean family size was 7 ±2.0, literacy rate. Pilot testing of the questionnaire for the survey has been completed, and the survey is in progress.

EFFECTS OF CLIMATE CHANGE ON RIVERINE FORESTS AND INDICATOR SPECIES ALONG RIVER GANGA IN UTTARAKHAND: A MULTI-SCALE APPROACH



- Funding Source
  Department of Science and Technology, Government of India

- Investigators
  Dr. K. Ramesh and Dr. B.S. Adhikari

- Researcher
  Ankita Sinha

- Date of Initiation
  March 2013

- Date of Completion
  March 2016

Objectives

The objectives of the project are to (i) study the distribution pattern, range shift and population response of indicator species along the Ganga in Uttarakhand, from the foothills to the snout of the Gangotri glacier; (ii) quantify the structural and functional attributes of the vegetation along selected climatic ecotones; and (iii) detect major drivers of landscape composition and configuration in space and time and develop spatially explicit predictive models.

Progress

The broad vegetation types of the riverine vegetation of the Bhagirathi basin were studied through remote sensing and field surveys. Also, permanent plots for intensive vegetation sampling were identified in the different sub-basins for intensive study. In the remote sensing approach, the focus was on looking at the patterns of land cover and land use changes across the Bhagirathi basin and characterization of the typical riverine forest stands. Landsat data for three years (1993, 2003 and 2013) were used for the study, and the major forest types were described. Riverine avifaunal surveys were conducted during spring (March–May) and autumn (September–

K. Ramesh

November).Over 16 bird species were recorded, ranging from partially dependent species to obligate riverine species. The habitat associations of different riverine avifaunal species were looked at closely. The habitat preferences of three obligate riverine bird species provided insights into the key drivers of the species' persistence.

Outputs & Outcomes

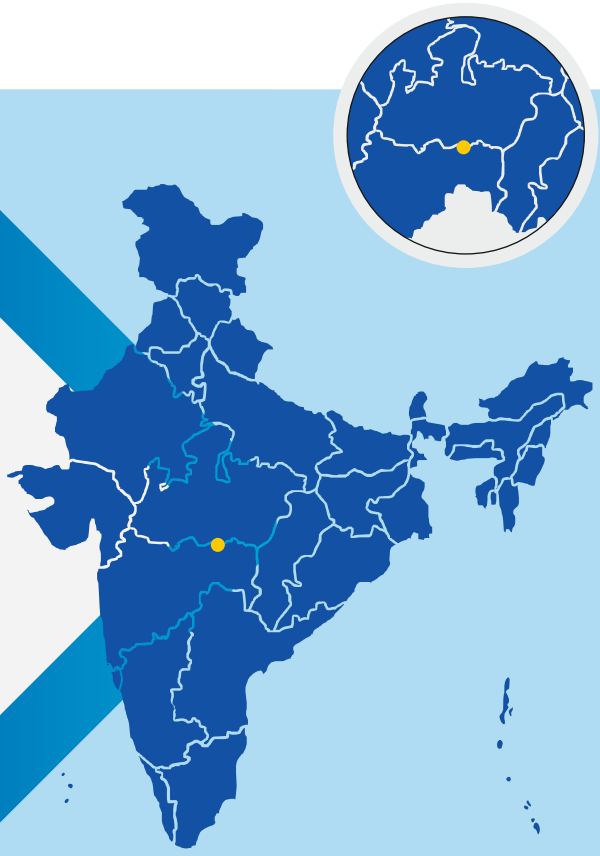
The riverine vegetation along the Bhagirathi includes tropical dry deciduous forests, tropical moist deciduous forests, Himalayan subtropical pine forests and Himalayan moist temperate forests progressively from the lower to the higher altitudes. Riverine forests were found to be significantly different in structure and function from the terrestrial forests. These were looked at in this important river basin to understand their current status, degradation in cover and species assemblages. Decadal change detection analysis brought forth significant facts about the vulnerability of the Bhagirathi basin to forest fragmentation and anthropogenic pressure. Fragstats analysis helped study the spatial pattern of the landscape and the class metrics of the land-cover features. It gave us an idea of the fragmentation pattern of the forests. The spatial pattern in much of the area has undergone changes, with higher patch densities in recent years.

Plumbeous water redstarts were found to be the most widely distributed and abundant among the obligate riverine species, followed by the white-capped redstarts. Among the partially dependent species, generalists such as the blue whistling thrush and white-browed wagtail were the most abundant. There was a clear response of the distribution ranges of the selected obligate species to the season. Brown dippers were found to be habitat specialists, opting for sites having an unmodified river flow with a natural bank substratum. On the other hand, white-capped redstarts were generalists and were found in a range of sites, adapting to modified banks and having no preference for a specific flow regime.

Milestone

The project has been able to establish significant baseline on the riverine vegetation structure and configuration, and also the indicator bird species. The relationship analysis has clearly demonstrated that the terrestrial and aquatic continuums have specific positive relationship and influences the overall pattern in wildlife here.

ECOLOGY OF TIGERS IN PENCH TIGER RESERVE, MADHYA PRADESH, PHASE-II



- Funding Source
  Grant-in-Aid

- Investigators
  Dr. K. Sankar, Shri Qamar Qureshi, Dr. Y.V. Jhala (WII); Dr. Rajesh Gopal and Shri Alok Kumar

- Researcher
  Anindita Bidisha Chatterjee

- Date of Initiation
  April 2013

- Date of Completion
  March 2016

Objectives

The project has the following objectives: (i) estimation of population dynamics, reproductive rate, survivorship, growth rate and longevity of tigers; and (ii) estimation of the density, distribution, growth rate, group size and composition of major prey species of the tiger.

Progress

A camera trap-based mark–recapture technique was used to estimate the population of tigers in the study area between February and March 2015. A total of 57 pairs of camera traps were deployed in 4 km^2 grids, covering an area of 278 km^2 (total, 3,648 trap nights). Each 4 km^2 grid was sampled by at least one pair of camera. Camera trapping devices were placed opposite one another to photograph both flanks of an animal simultaneously. Individual identification of tigers was done on the basis of examination of the position and shapes of stripes on the limbs and forequarters, and the sex of a tiger was identified by its relative body size and genitalia.

The team used a line transect-based density method to estimate the abundance of the prey species of the tiger. In all, 45 line transects (total effort, 180 km.) were walked in the Pench Mowgli Wildlife Sanctuary and Karmajhiri Range, Pench National Park.

Outputs & Outcomes

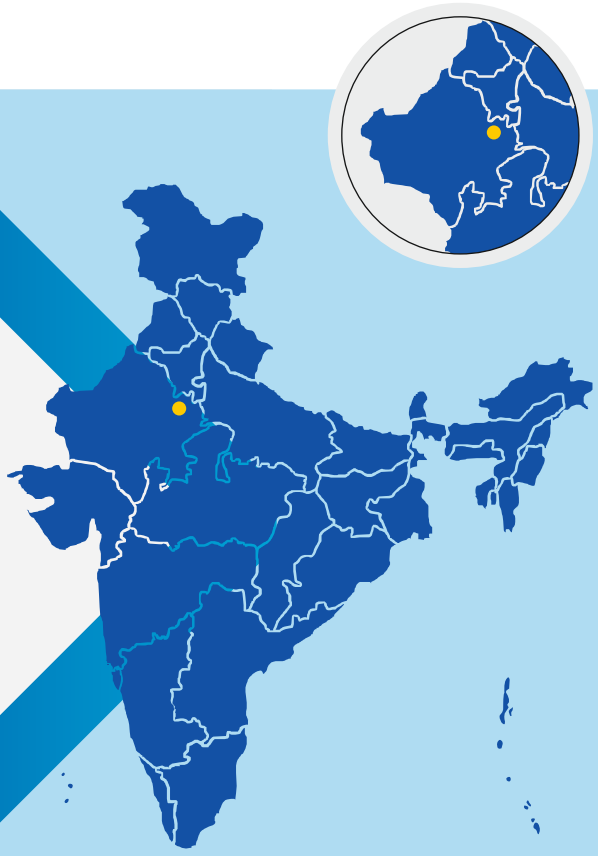
During February–March 2015 a total of 751 tiger photographs were obtained from a total effort of 3,648 trap nights. The trapping exercise has been carried out for 32 nights till date, and it is an ongoing process. A preliminary identification of the data obtained from the trapping exercise of 32 nights showed a total capture of 20 individual tigers. A total of 232 photographs of male tigers were obtained (five adult males and one sub-adult male). In all, 450 photographs of female tigers (nine adults and three sub-adult females) were obtained. The gender of two individual tigers (one adult and one sub-adult) in 46 photographs could not be identified.

The density of each prey species in the study area was calculated using the DISTANCE 6.0 software package. The chital density was estimated to be the highest among the ungulates, 54.4+7.8 SE/km^2. The estimated density of sambar was 4.6+1.0 SE/ km^2. The calculated density for common langur was the highest among all prey species, 67.3+10.7 SE/km^2.

Milestone

Twelve potential prey species were recorded on the line transects. There were seven ungulate species (chital, sambar, nilgai, wild pig, gaur, chowsingha and barking deer), two primates (common langur and rhesus macaque), one bird (Indian peafowl) and one small mammal (Black-naped hare).

ECOLOGY OF LEOPARD IN SARISKA TIGER RESERVE, RAJASTHAN



- Funding Source
  Grant-in-Aid

- Investigators
  Dr. K. Sankar and
  Shri Qamar Qureshi

- Researcher
  Dibyadeep Chatterjee

- Date of Initiation
  April 2013

- Date of Completion
  March 2016

Objectives

The objectives of the project are to (i) monitor trends in the breeding section of the leopard population; (ii) estimate and monitor the survival of breeding leopards over time; and (iii) estimate the densities of the available prey and evaluate the dietary competition between leopards and tigers.

Progress

Line transect sampling and analysis of scats of leopards were carried out to estimate the prey availability, prey selection and food habits of leopards. A total of 24 line transects were walked in both summer and winter in the study area. The total effort during 2014–15 was 189 km of walk. To study the food habits, 100 leopard scats were collected, washed and analysed to identify the prey remains. A total of 129 kills of leopards were recorded. A photographic capture–recapture technique was used to estimate the population and density of leopards in the study area. The study area was divided into two blocks of 80 km^2 area, and each block was subdivided into 2×2 km^2 grids. Two nights were considered as a single occasion, and so there were 52 occasions and a total effort of 3500 trap nights in 2014–2015. Individual capture histories of leopards were developed in a standard "X-matrix

format". The density was estimated using the likelihood-based spatially explicit capture–recapture (SECR) model in DENSITY 4.4. A total of 40 trapping stations were camera trapped by covering a minimum convex polygon (MCP) of 118.7 km^2 and an effective trapping area of 231.5 km^2.

Outputs & Outcomes

The density of leopards was estimated through a mark–recapture framework using camera traps. A total of 62 leopard photos were captured. Eleven adult female leopards and 12 adult male leopards were identified among the 24 individuals. The minimum convex polygon area of the sampled area is 122.99 km^2, and the effective trapping area is 223.19 km^2. The data have been analysed using the programs CAPTURE and DENSITY 5.0. These programs have selected heterogeneity (Mh) estimation as the appropriate model. The estimated population of leopards in the study area during the reporting year (2014–15) was 26 individuals, with the standard error (SE) being 2 (M0 Null). The estimated density of leopards was 15.82/100 $km^2$with SE being 1.71 under the minimum convex polygon using the half mean maximum distance moved (MMDM) model.

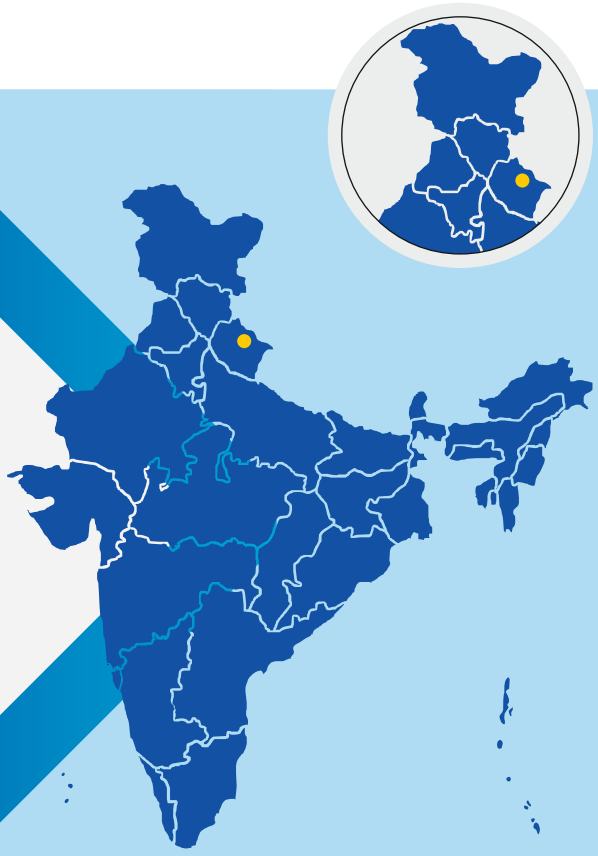
The abundance of prey species was estimated from line transects using DISTANCE 5. The total effort during 2014–15 was calculated to be 189 km. Peafowl was found to be the most abundant (121.24±10.82/km^2) prey species in the study area. Eight prey species were identified in 100 leopard scats. Sambar contributed the maximum (26.61%) to the leopard's diet, followed by chital, nilgai, rodents, cattle, birds, common langur and goats. The prey species composition in the leopard scat samples was compared with that in the tiger scat samples (n=152). Five prey species (sambar, chital, nilgai, common langur and domestic cattle) were recorded in the tiger scats. Of these, sambar contributed the maximum (68.45%) to the tiger's diet, followed by cattle, chital, nilgai and common langur. Data on the utilization (from scat analysis) and availability (from distance sampling analysis) of the prey species was compared, and an index of selection of each species was obtained. Based on the Ivlev selectivity index at the individual level, the prey species used by leopards were ranked as sambar>common langur>chital> nilgai> birds> domestic cattle. Using the same index at the individual level, the prey species used by tigers were ranked as sambar>chital>common langur> nilgai>domestic cattle.

In total, 129 kills by leopards and 252 kills by tigers were recorded in the study area. According to the kill records, nilgai contributed the maximum (16.3%) to the leopard's diet, followed by sambar, chital, common langur, peafowl and wild pig in terms of wild prey species. In terms of livestock, cattle contributed the maximum (32.6%) to the leopard's diet, followed by goats and buffalos. In the case of the tiger, according to the kill records, sambar contributed the maximum (25%) to its diet, followed by chital, nilgai, wild pig, peafowl and common langur in terms of wild prey species. In terms of livestock species, buffalos contributed the maximum (28.2%), followed by cattle and goats. The large number of livestock kills was mainly from the peripheral areas of Sariska Tiger Reserve. Sambar was found to be the most preferred prey species for leopard and tiger in the study area, and similar findings have been reported by previous studies conducted in Sariska.

Milestone

The food habits of leopard and tiger were done based on large number of kills. Kill based food habit study provided better insight for competition between tiger and leopard.

PROMOTING LIVELIHOOD SECURITY AND COMMUNITY PARTICIPATION IN FOREST CONSERVATION IN FRINGES OF KEDARNATH WILDLIFE SANCTUARY, WESTERN HIMALAYA



- Funding Source
  Uttarakhand State Council for Science & Technology

- Investigators
  Dr. Ruchi Badola and Dr. Syed Ainul Hussain

- Researcher
  Upma Manral

- Date of Initiation
  May 2013

- Date of Completion
  December 2015

Objectives

The objectives of the project are to: (i) quantify the extraction of forest resources by the local people; (ii) quantify the availability of major forest resources along the altitudinal gradient; (iii) estimate the contribution of agriculture and forests products traded by local people to their total income; (iv) facilitate the establishment of self-help groups in selected study villages; and (v) find ways and possibilities of transforming local goods into value-added products through value chain analysis and market surveys.

Progress

The study area is a part of the Kedarnath Wildlife Sanctuary (KWS) Landscape and falls in Madhmaheshwer and Kalimath valleys in Uttarakhand at an elevational gradient of 1000–2700 m. The study villages were sorted into three elevational categories: high-elevation villages (HEV, >1800m), mid-elevation villages (MEV, 1400–1800 m) and low-elevation villages (LEV, <1400m). A list of preferred woody species of fodder and fuel wood was prepared from a household survey and monitoring a forest entry/exit point, and the biomass availability of these was recorded. The vegetation

characteristics of forests were quantified by laying 20 transects with 732 plots and quadrats for trees (10 m radius), shrubs (5 m radius) and herb cover (1 m quadrats) at 200 m intervals on both sides of resource use trails. Within the villages, transects were laid along the trails and agricultural areas to enumerate the availability of fodder species and biomass. Species were noted on both the sides up to a width of 15 m, and the biomass was estimated visually. Socio-economic surveys were conducted in villages (n=16) selected on the basis of elevation and location with respect to KWS. Household-level surveys (n=410; 20–25% of each study village), focal group discussions and purposive sampling (n=100) of representatives of local institutions were conducted with semi-structured questionnaires having open-ended and close-ended questions.

Outputs & Outcomes

The households in the region were dependent on a range of strategies for income generation. No household had only a single livelihood. A mix of various income diversification strategies was used because of the complex interactions of the socio-ecological systems in the region, where the economic security of a household is prone to fluctuations. People pursue a range of strategies to increase their income and to mitigate the impact of stressors.

LEV had both higher species richness (18) and density (186.48/ha) of fodder tree species in the agro-forestry systems, followed by MEV (153.13) and HEV (97.66/ha). The fodder tree biomass was also greater in LEV (2.97 tons/ha), followed by MEV (2.48 tons/ha), and least in HEV (1.79 tons/ha). In forests, LEV had a lower overall tree density (193.51/ha), while MEV had the highest density (245.05/ha). The density and biomass of fodder trees in forests did not vary significantly along the elevation gradient; however, forest area accessible along the elevation gradient varied. Easy access to fodder in the surroundings resulted in more dependence on natural forests by HEV, which may not be sustainable in the long run.

The research team assessed the causes of the success and failure of previous self-help groups in the region. Most of the self-help groups failed to fulfill the purposes for which they were started, cultivation of vegetable or medicinal plants, promotion of dairy products, etc. In active self-help groups, members understood the benefits of saving and the financial security and self-reliance that came with being a member of a self-help group. There was better cooperation among members, and all were satisfied with the progress of the group.

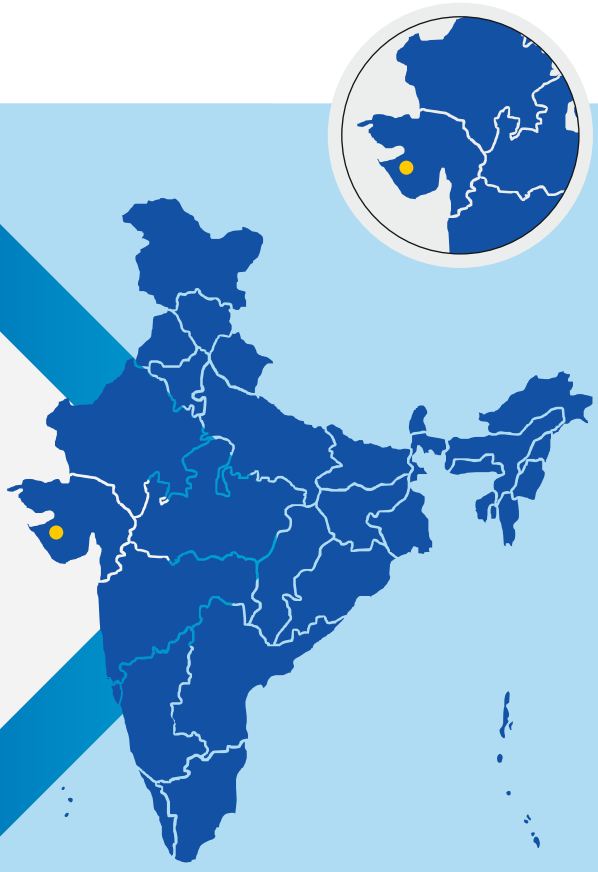
The team identified activities and products that could be promoted to improve the livelihood of the locals. The team found that vegetables such as pumpkin, bottle gourd and citrus fruits (Malta and *Pahadi* lemon) are wasted as almost all the households have one or two individuals of each plant. Thus the research team has proposed making value-added products from local vegetables and fruits.

Milestone

A significant difference was observed in the fuel wood consumption along the elevation gradient. HEV and villages inside KWS had more livestock numbers/household and consumed more fodder and fuel wood, which came from the forests of the sanctuary.

Upma Manral

ECOLOGY OF THE ENDANGERED ASIATIC LION USING SATELLITE AND GPS TELEMETRY



- Funding Source
  Department of Science & Technology, and WII Grant-in-Aid

- Investigator
  Dr. Y.V. Jhala

- Researchers
  Kausik Banerjee and Stotra Chakrabarti

- Date of Initiation
  June 2013

- Date of Completion
  June 2016

Objectives

This study was mandated by the Gujarat Forest Department and is aimed at quantifying the prey, predators, human disturbances, landuse patterns and local people's perception of the reintroduction of lions in Barda.

Progress

The research team used extensive feeding experiments (n=68) on a wide size range (4.4–130 kg) of obligate carnivores - the lion, leopard, jungle cat and domestic cat in Sakkarbaug Zoological Park, Gujarat to show that patterns of consumption to scat production against prey size were similar across obligate carnivores only after accounting for the effect of carnivore size. The use of an allometric mechanism allowed us to develop a common biomass model to compute the prey biomass consumed from scats of obligate carnivores. The team demonstrated that prey utilization and digestibility act as additional constraints to an optimally foraging predator. Hitherto this aspect has not been considered in optimal foraging theory. The results suggest that carnivores will tend to gain little in terms of digestible biomass from prey that is larger than the carnivores.

A male lion feeding from an adult sambar kill

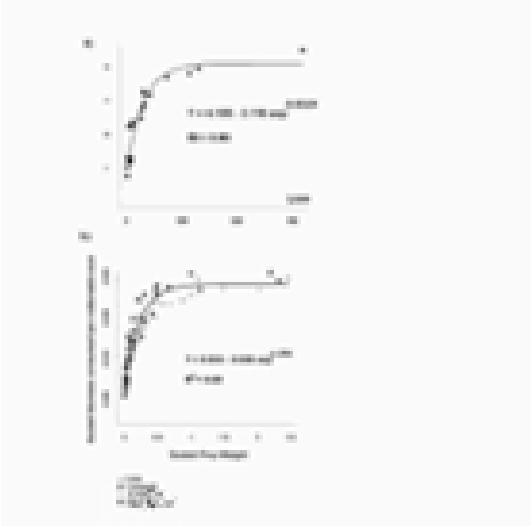


Fig 1a. *Biomass model developed by regressing biomass consumed per collectable scat (Y axis) with prey weight (X axis) obtained from feeding trial data on lion (n=19).*

Fig 1b. *Common biomass model for tropical felids developed by regressing biomass consumed per collectable scat / predator weight (Y axis, scaled biomass consumed per collectable scat) with prey weight/predator weight (X axis, scaled prey weight) using data from 68 feeding trials on lion, leopard, jungle cat and domestic cat.*

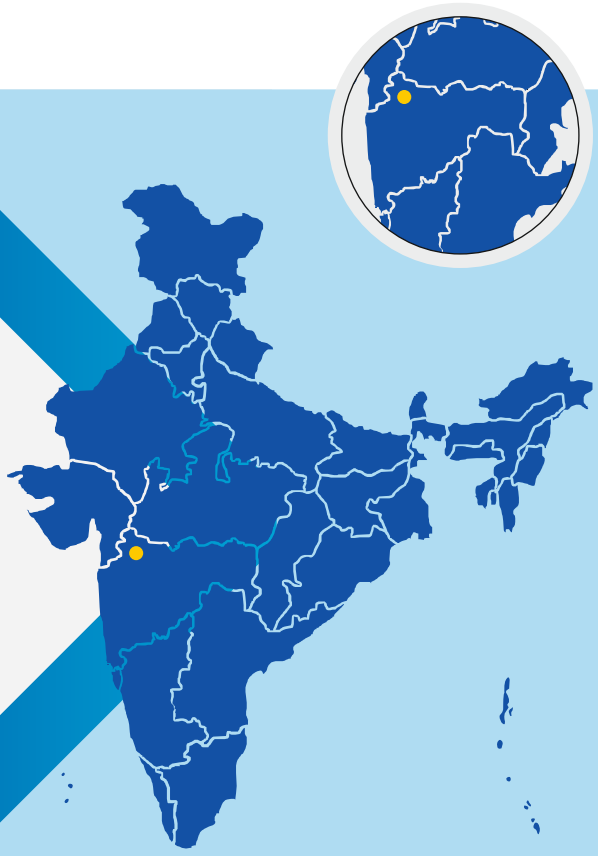
Outputs & Outcomes

Using the common biomass model, the research team showed that the present understanding of carnivore diets, primarily gained using models developed on other carnivores without asymptotic and allometric corrections, is fraught with substantial biases. The results suggest that consumption per scat and digestibility were asymptotic, while carcass utilization declined with prey size. These additional costs, combined with handling time and risks accrued in killing prey make prey larger than the predator unprofitable.

Milestone

The implications in understanding human–carnivore conflict are enormous since domestic livestock consumption by carnivores significantly reduced in studies that were reviewed.

EVALUATING LANDSCAPE USE BY DISPERSING/ STRAY TIGERS AND MODELLING POTENTIAL CONNECTIVITY BOTTLENECKS



- Funding Source
  National Tiger Conservation Authority

- Investigators
  Dr. Bilal Habib, Dr. Parag Nigam and Dr. Gautam Talukdar

- Researcher
  Indranil Mondal

- Date of Initiation
  August 2013

- Date of Completion
  August 2015

Objectives

The project has the following objectives: (i) evaluation of landscape use by dispersing/stray tigers in India and (ii) generation of connectivity maps for the Tadoba–Andhari Tiger Reserve (TATR) landscape complex and identification of the major barriers to and bottlenecks in connectivity.

Progress

The research team studied locations of tiger presence and human–tiger conflict from around TATR. They studied them against habitat features such as land use, vegetation type and distance from human habitation, roads and source of water to calculate a coefficient to be used to define the cost surface for connectivity analysis. The coefficients, besides being helpful in generating the cost surface, also indicate the contributions of various factors that determine the use of the landscape by dispersing/exploring tigers. The research team used 296 presence locations and 52 absence locations for analysis using logistic regression.

Variables in model	β	S.E.	Wald	df	Sig.
Distance from PA	-0.001	0.001	10.034	1	0.002
Distance to drainage	0.001	0.001	2.130	1	0.144
Distance to Roads	0.001	0.001	6.724	1	0.010
Distance to forest	-0.009	0.004	3.850	1	0.050
Southern Dry Mixed Deciduous Forest	1.550	0.615	6.344	1	0.012
Constant	0.958	0.913	1.100	1	0.294

The team interpreted the β values as indicating that a few individual were actually exploring areas away from PAs and venturing into human-dominated areas. But it seemed that they were using the fragmented forest patches as refuges. In contrast, the shy ones were sticking close to PAs and using forest corridors, dominated by Southern Dry Mixed Deciduous Forest, and river channels for movement.

Using the cost surface generated by the aforementioned logistic regression analysis, the team delineated corridors using circuit theory analysis. Besides investigating the use of human-dominated landscapes by tigers, the team tried to model pinch points or bottlenecks in the corridors areas. The research team got very promising results, considering the fact that actual conflict locations did coincide with the locations of pinch points identified.

Figure: *Pinchpoints with actual conflict locations*

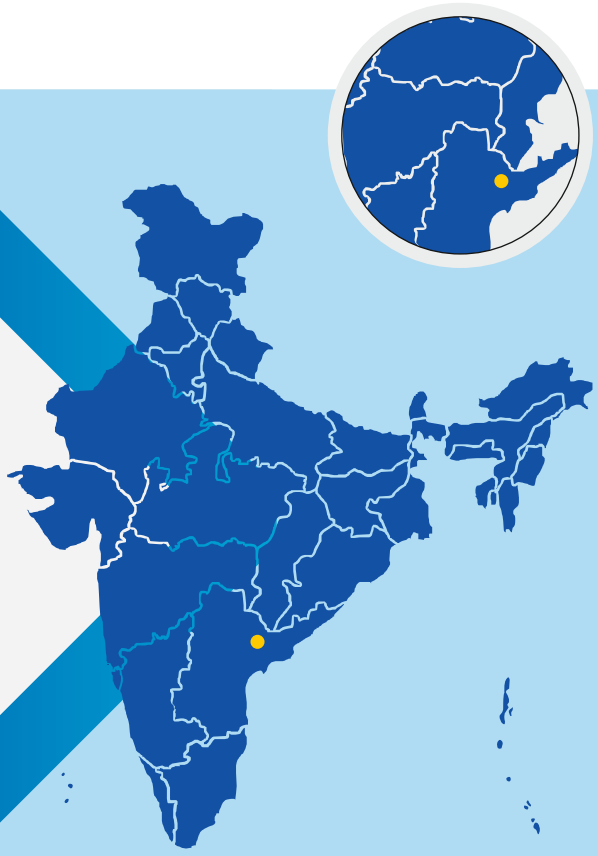
Outputs & Outcomes

As indicated by the above analysis, fragmented forest patches are being used by the tiger in this landscape as stepping stone corridors. It is suggested that the forest department undertake occupancy surveys to ascertain the presence of the tiger in or use of these patches. Positive signs indicate that these patches need more protection from degradation and anthropogenic pressure. Villages around these patches also need to be sensitized to prevent human–tiger confrontations leading to conflict. The same holds true for pinch points that have been identified. Predictive modelling of pinch points may provide clues to managers so as to target proactive and pre-emptive management interventions for conflict prevention/mitigation and connectivity conservation.

Milestone

There is no major finding as yet as analysis and data collection are still in progress.

DEVELOPMENT OF KNOWLEDGE MANAGEMENT SYSTEM FOR CONSERVATION OF COASTAL AND MARINE BIODIVERSITY IN THE EAST GODAVARI RIVER ESTUARINE ECOSYSTEM, INDIA WITH RESPECT TO CLIMATE CHANGE AND PAYMENT OF ECOSYSTEM SERVICES



- Funding Source
  UNDP-GEF Marine Programme
- Investigator
  Dr. K. Sivakumar
- Co-Investigators
  Dr. J.A. Johnson, Dr. Gopi, G.V., Dr. Panna Lal and Shri Ritesh Kumar (WI-SA); Dr. P. Bhadury (IISER); and Dr. P.S. Raja Sekhar (AU)
- Researchers
  Paromita Ray, Giridhar Malla and Priyamvada Bagaria
- Date of Initiation
  August 2013
- Date of Completion
  August 2016

Objectives

The main objective is to establish a knowledge management system (KMS) for the East Godavari River Estuarine Ecosystem (EGREE) in Andhra Pradesh. The objectives include (i) assessing and predicting the impact of climate change on the biodiversity, community structure and functioning of the ecosystem in EGREE; (ii) assessing and predicting the impact of climate change on the distribution pattern and community structure of the primary producers, mangroves, reptiles, birds and mammals with special reference to threatened species in EGREE; (iii) assessing and predicting the impact of climate change on the socio-economic and demographic profile of the coastal communities in EGREE; and (iv) preparing a long-term conservation and preparedness plan to safeguard the marine biodiversity and coastal communities of EGREE from the adverse impacts of climate change.

Progress

The resource selection of the smooth-coated otter *Lutrogale perspicillata* was studied in the Coringa Wildlife Sanctuary, where a two-dimensional interface of fishermen–otters is present: fishermen fishing in the habitat of otters and otters feeding in

Fish landing centre in EGREE region *K. Sivakumar*

the aquaculture farms of fishermen. This is resulting in conflict between otters and humans in the region. The fishermen's traditional ecological knowledge of otters in and around Coringa Wildlife Sanctuary had also confirmed that otters largely feed in the wild but visit aqua farms occasionally for food or to play in. Further, about 79% of the people in the region felt that otters visit their farms at night, which confirms the nocturnal behaviour of otters around human habitations, and is supported by previous studies.

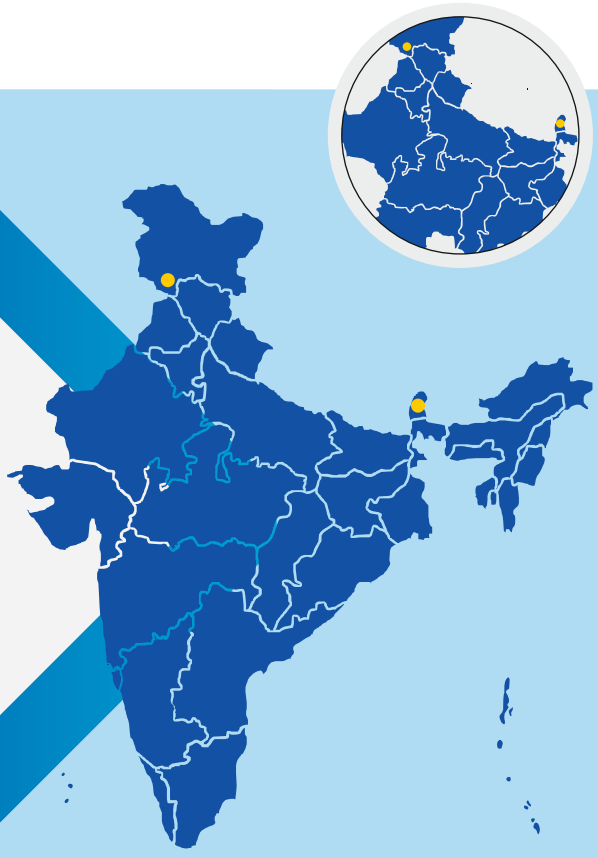
Outputs & Outcomes

This study found that poor fishermen could not bear even the meager loss caused by otters. Further, the study found that less educated people were against the otters in the region. Therefore, additional livelihoods and awareness education need to be provided to the poor fishermen for the long-term conservation of otters in the region. EGREE Foundation of Andhra Pradesh, a foundation established with support from the GoI–UNDP–GEF Project to sustainably manage the Godavari estuarine system, has already initiated some programmes in this regard. But the programmes should focus more on fishermen with low incomes. It is also proposed to have otter proof fencing for aqua farms, especially those farms located along the Ramanapallam creeks. Developing eco-tourism in the sanctuary with the involvement of fishermen and small-scale farm owners can also change their attitude towards otters.

Milestone

The influence of salinity on the structural components of the mangrove (density, complexity index, importance value index, above-ground biomass, carbon content, etc.) had a significant negative relationship. It was estimated that the stock of carbon in the mangroves of EGREE is 148 mt/ha. Therefore, the economic value of the mangroves with respect to their carbon sink potential was estimated approximately Rs.2,54,208/ha.

CAUSES OF AVIAN DIVERSITY GRADIENTS ALONG THE HIMALAYA



- Funding Source
  Department of Science & Technology

- Investigators
  Shri R. Suresh Kumar, Dr. Sandeep Gupta, Dr. Pratap Singh and Dr. Dhananjai Mohan (Uttarakhand Forest Department)

- Researchers
  Suresh Kumar Rana and Ashutosh Singh

- Date of Initiation
  August 2013

- Date of Completion
  August 2016

Objectives

The objectives of the project are to (i) understand distributions, densities and habitat associations in the western and eastern parts of the Himalayan range for a select group of closely related birds; (ii) study genetic differentiation across the range of species shared between the east and west; and (iii) combine the results in an evaluation of the ecological and historical hypotheses to explain the diversity gradients in the Himalaya.

Progress

The first season of fieldwork was started in April 2014, during the breeding season of the birds, in the previously established 5ha grids. The previous studies show that 12 out of 16 species of flycatcher breeds in the 1000–2000 m elevational range, with the maximum diversity at 2000 m. In the eastern Himalaya there is a mid-elevational peak similar to that of other passerine birds, as reported in the previous study. To study the differences in the habitats at 2000m and at the foothills in both the eastern and western Himalaya, all the trees were recorded with the botanical names, girth and height, along with the canopy cover, in the same 5ha grids established for the census of the flycatchers. In the

eastern Himalaya, one grid was studied in the foothills (at 200m, in Chapramari Wildlife Sanctuary). A total of 67 trees species (1234 trees) were recorded. The tree density was 247 trees/ha, with a basal area of 31.38 m^2/ha. Another grid at 2000m elevation, in Neora Valley National Park, was also studied. Thirty-five tree species (1636 trees) were recorded, with a tree density of 327 trees/ha and a basal area 47.26 m^2/ha. Similarly, in the western Himalaya, one grid was studied at 2000m, in Patnitop of Batote Forest Division, Jammu & Kashmir. Only seven species of tree were recorded within the grid, with a total basal area of 55.6m^2/ha. One more grid, in Ramnagar Wildlife Sanctuary, at an elevation of 450 m (foothills of the western Himalaya), will be studied during the second year of fieldwork.

Outputs & Outcomes

Bird songs of the flycatcher species that occur in both the eastern and western Himalaya were analysed. The songs were analysed for syntax and six frequency–time parameters, low frequency, high frequency, centre frequency, bandwidth, song length, and peak frequency, to compare the song divergence in the eastern and western populations of select species of flycatcher. There was a significant difference between the low frequency and the peak frequency of *Cyornisrubeculoides*. There was a significant difference between the low frequency and centre frequency of *Eumyiasthalassinus*. The song of *Ficedula superciliaris* has a very different low frequency, high frequency, centre frequency and song length. There were no differences between the frequency–time parameters of the eastern and western populations of *Ficedula strophiata*, *Niltava sundara* and *Ficedula tricolor*. When the team analysed note sharing in Ficedula strophiata and *Eumyiasthalassinus*, it was found that more notes were shared (sung by two or more males) in the west than in the east. Analysis of other flycatcher species is currently in progress.

The preliminary findings of the first year's fieldwork shows that there is greater tree diversity (67 species) in the foothills within a 5ha plot established for the flycatcher census than at 2000m (35 species), where a peak in the diversity of passerines has been reported. These results are in contrast with the finding that there is greater diversity of plants in the mid-elevations, as determined by secondary interpolation of plant elevational ranges. However, tree sampling has been conducted only in a single plot of size 5 ha at the two elevations in an effort to assess the alpha diversity and beta diversity. The actual pattern of plant diversity is being studied through vegetation sampling in multiple plots of size 0.1ha during the ongoing field season.

The vocalization studies of *Ficedula superciliaris* show that there are significant differences between the low frequencies, high frequencies, centre frequencies and song lengths of the eastern and western populations. There is a difference in the supercilium of these populations: it is wide in the west and very fine to non-existent in the east. Other species showing significant variations are *Eumyiasthalassinus* (low frequency and centre frequency) and *Cyornisrubeculoides* (low frequency and peak frequency). It was also observed that birds in the east sing with higher frequencies compared with those in the west.

Milestone

There is no major finding as yet as analysis and data collection are still in progress.

WII Project Team

WII Project Team

LONG-TERM MONITORING OF ANTARCTIC WILDLIFE AND HABITATS IN ANTARCTICA

- Funding Source
  National Centre for Antarctic & Ocean Research (NCAOR), Goa, Ministry of Earth Sciences and WII Grants-in-Aid

- Investigators
  Dr. K. Sivakumar, Dr. S. Sathyakumar and Dr. S. Mondal

- Researcher
  Anant Pande

- Date of Initiation
  September 2013

- Date of Completion
  May 2017

Objectives

The objectives of this programme are (i) to monitor indicator species such as penguins and birds in the Indian sector of operation in Antarctica using satellite telemetry; (ii) to understand the movements of the avifauna in and around the Indian sector of operation in Antarctica; (iii) to assess habitat use by tagged individuals and determine key habitats for the species; and (iv) to monitor any changes in the movement patterns over years in relation to climate change.

Progress

WII had participated in the Indian Scientific Expeditions XIV, XV and XVI to Antarctica (1994–1995 to 1996–1997) to initiate and implement the monitoring programme "Developing a Long-Term Monitoring Programme for Birds and Mammals in the Indian Ocean and Antarctica". During these three years, WII could collect baseline data on the status and distribution of mammals and birds of India Bay, Antarctica and standardized the methodology for long-term wildlife monitoring. During the 28th, 29th, 33rd and 34th In SEA, WII collected baseline data on the status and distribution patterns of birds and mammals in the Larsemann Hills area and continued the wildlife survey along the Princess Astrid Coast. During the 34th InSEA, the nesting ecology, behaviour and habitat of certain

Anant Pande

birds were studied in the Larsemann Hills. Genetic samples of birds (feathers) were collected during the last expedition. These samples will be analysed for site fidelity and population genetics.

WII is also monitoring changes in the abundance and distribution of wildlife in the southern oceans (Indian Ocean and Atlantic Ocean).

Outputs & Outcomes

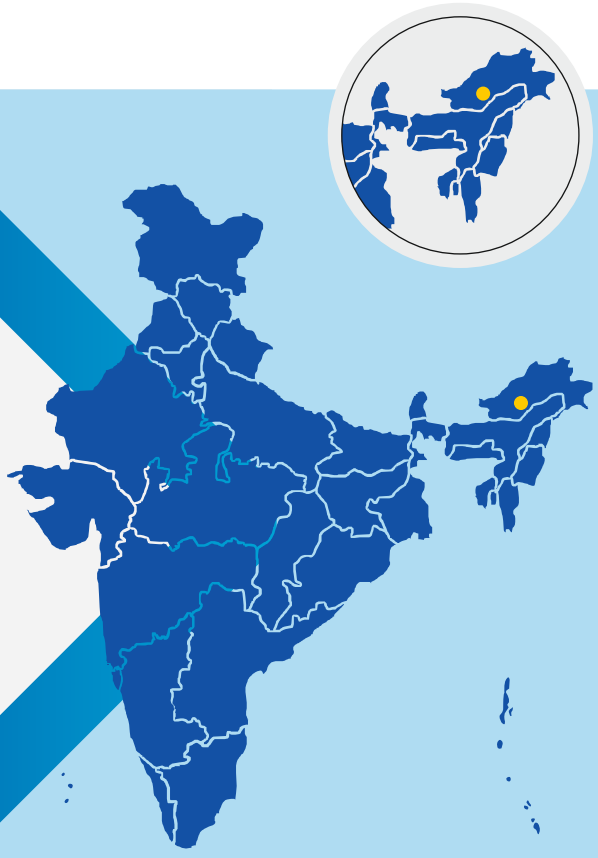
WII could collect very valuable data on birds and mammals in the Indian Southern Ocean in its last seven expeditions. These can be used as baseline data to detect changes in the wildlife populations in this region in relation to climate change.

Milestone

Some of the research findings have been published in a paper and a chapter in a book.

K. Sivakumar

ECOLOGY, TAXONOMY AND CONSERVATION OF FISH DIVERSITY IN SUBANSIRI RIVER BASIN OF ARUNACHAL PRADESH, NORTH-EAST INDIA



- Funding Source
  Department of Science & Technology, New Delhi

- Investigators
  Dr. J.A. Johnson, Dr. K. Sivakumar and Dr. Gopi G.V.

- Researcher
  Sutanu Satpathy

- Date of Initiation
  October 2013

- Date of Completion
  October 2016

Objectives

The objectives of the project are to (i) investigate the distribution and abundance of fish species in different types of streams, rivers and river basins along the altitudinal gradient; (ii) inventory the existing aquatic habitats and fish communities in headwater streams; (iii) assess the condition of the habitat and macro- and micro-habitat utilization patterns of fishes in streams of the Subansiri river basin; (iv) identify the human-induced perturbations in the availability of resources and the trend of resource usage by the fish assemblages in different streams and rivers; and (v) identify the rare, endangered and economically important cultivable species in the rivers and provide options for conservation of threatened species.

Progress

During the reporting period, 32 streams/rivers in the upper Subansiri river basin comprising the catchment area from Dopoji to Natcho were surveyed for fish diversity. A total of 34 species of primary freshwater fish belonging to 16 genera, six families and two orders were recorded from the study area. The maximum species richness was found in Sippi stream, near its confluence with the

J.A. Johnson

Subansiri river. The snow trout *Schizothorax richardsonii* was most dominant locally (distributed in nine streams), followed by *Barilius bendelisis*, *Garra gotyla, Neolissochilus hexagonolepis* and *Schizothorax progastus*. Two species, namely, *Psilorhynchus arunachalensis* and *Schistura arunachalensis,* are strictly endemic to Arunachal Pradesh, and many species are endemic to the north-eastern Himalaya. Four species need confirmation of identity. These are one species each of *Schistura, Glyptothorax, Exostoma and Botia.*

Outputs & Outcomes

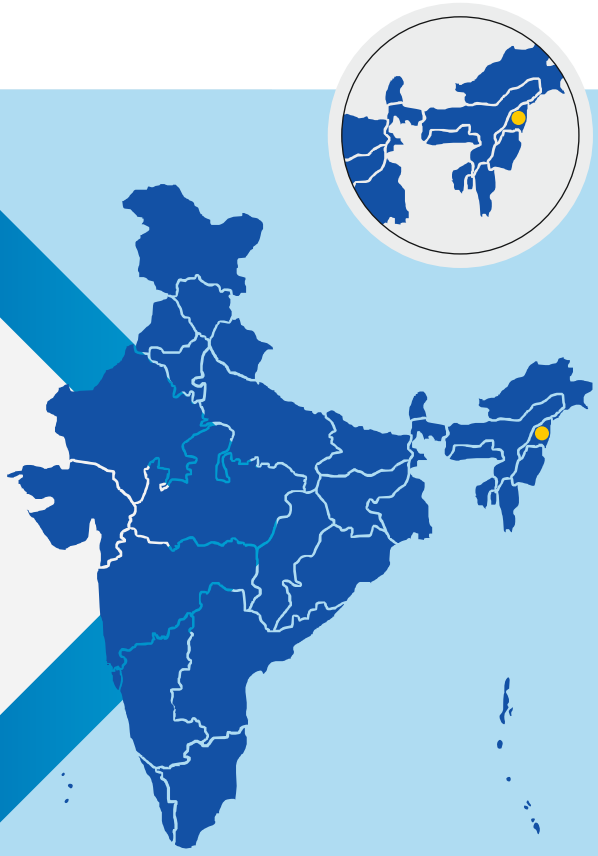
The altitude of the study streams ranges from 240 to 910m above mean sea level. The present study showed that the altitude is a surrogate for ambient temperature. The water temperature in the streams ranged from 9°C to 24°C. The riparian forest cover in the upstream areas is in good shape, and the extent of less disturbed riparian cover is 90–100%.But in the lower valley, the forest was completely modified for agricultural and other landuse patterns.

Baseline data on the fishes of the upper Subansiri river basin were established.

Milestone

In the current year, regular seasonal sampling for habitat assessment, fish sampling and documentation of other habitat variables will be carried out.

SATELLITE TRACKING THE LONG-DISTANCE MIGRATION OF AMUR FALCON *FALCO AMURENSIS* IN NAGALAND, INDIA



- Funding Source
  CMS Raptors, MoU

- Investigator
  Shri R. Suresh Kumar

- Date of Initiation
  November 2013

- Date of Completion
  November 2016

Objectives

The objectives of the project are to (i) deploy modern technology in the form of lightweight satellite tags fitted to a small number of Amur falcons trapped in Nagaland to track their amazing migration journeys; (ii) better understand the behaviour and ecology of the Amur falcon during its presence in Nagaland, along the migration routes and in the wintering areas in Africa; (iii) utilize Web-based tools to actively apply the information gained to raising awareness about the international importance of the Amur falcon and to promote falcon conservation activities, particularly amongst local communities in Nagaland; and (iv) demonstrate the value and effectiveness of international collaborative actions under the auspices of the CMS Raptors MoU to promote the conservation of migratory birds of prey.

Progress

Two of the three Amur falcons satellite tagged in November 2013 at their roost site in Nagaland continued to transmit data. They returned to Nagaland from their breeding areas for the second time. During the reporting period, efforts were made to understand the behaviour and ecology of the Amur falcon during its presence in Nagaland, along the migration routes and in the wintering areas in Africa.

Outputs & Outcomes

The satellite tracking of Amur falcons has helped understand their migratory routes and stopover sites. This study has also generated a lot of awareness and stopped the killing of the birds in Nagaland. Local communities in Tamenglong district, in the adjoining state of Manipur, have also taken up the protection of Amur falcons in their area.

Milestone

For the first time, satellite tracking of a long-distance migrant like the Amur falcon has been taken up, from Nagaland. The entire track of its movements from the breeding area to the wintering area and back has been mapped.

Amur Falcon Partnership

Department of Forests, Ecology, Environment and Wildlife, Government of Nagaland

NAGA

PANGTI

STATUS OF TIGERS, CO-PREDATORS AND PREY IN INDIA, 2014

Nilanjan Chatterjee

- Funding Source
  National Tiger Conservation Authority

- Investigators
  Dr. Y.V. Jhala, Shri Qamar Qureshi (WII) and Dr. Rajesh Gopal, NTCA

- Researchers
  A team of following volunteers: Minoshka Xavier, Mirza Ghazanfar Ullah Ghazi, TabassumYasmin, Tamali Mondal, Sayari Bhattacharya, Meghna Bondopadhyay, Gaura Chandra Das, Raja sekhar Bandi, Anusree Bagchi, Bhavya Iyer, Prakash Mehta, Michelle Irengbam, Subrata Gayen, Manisha Nair, Monideepa Mitra, Naman Goyal, Ritu Negi, Rajat Rastogi, Sankarshan Chaudhari, Urvi Gupta, Bhawana Pant, Sonali Agarwal

- Date of Initiation
  January 2014

- Date of Completion
  December 2015

Objectives

The objective of the project was to evaluate the status of tigers, co-predators and their prey in India.

Progress

Since 2006 the status of tigers in India is being assessed every 4 years within the distribution range of the tiger across all potential habitats in 18 Indian states. The third cycle of country-wide assessment of the status of the tiger and its key habitat components was initiated. The major findings regarding the status of tigers in India have been published. The final report is nearing completion.

Surveys for occupancy and relative abundance estimation covered about 4,73,580km^2 of wildlife habitat with an effort of 6,72,560 km of walk on 87,679 spatial replicates and 90,750 transects. The condition of the habitat and human impacts were estimated from 1,63,292 plots sampled on line transects. The research team deployed remote cameras across 51 sites at 9,735 locations, obtaining 30,922 usable photo-captures of tigers and 17,143 photo-captures of leopards. Computer-aided comparisons of stripe patterns and rosettes yielded estimates of 1,686 individual tigers and 1,647 individual leopards from these photographs.

Nilanjan Chatterjee

The team used likelihood-based spatially explicit capture–recapture (SECR) in a joint distribution framework with covariates of prey abundance, habitat characteristics and human footprint in package SECR (program R) to estimate the abundances of the tiger and leopard within each landscape.

Outputs & Outcomes

The tiger serves as an icon for conservation across the forested systems of Asia. Tigers were found to occupy 89,164 km^2 in 2014 in India. The abundance of prey, large forest extent and minimal human impact explained the tiger occupancy. Occupancy surveys had high detection probabilities, ranging between 0.28 and 0.48. The tiger occupancy was best explained by the existence of remote, undisturbed forests with good prey populations. Tiger population (excluding < 1 year cubs) was estimated to be 2,226 (SE range 1945 to 2,491) in India. Amongst tiger reserves Corbett had the largest tiger population estimated at 215 (range 169-261) tigers, four tiger reserves (including Bandipur, Nagarhole and Kaziranga) had over 100 tigers. Tiger Reserves accounted for over 70% of all the tigers in India.

The leopard population in India was estimated to be 7910 (SE range, 6574–9172). The state of Madhya Pradesh had the highest number of leopards, at 1,817, followed by Karnataka, with 1,129 leopards. The leopard population was estimated only within forested habitats in tiger-occupied states. Therefore, the estimate should be considered as a minimum number since leopards, unlike tigers, are also found outside forests. This was the first attempt to estimate the leopard abundance at landscape scales.

The tiger occupancy and abundance have substantially increased in the Shivalik Hills and Gangetic Plains landscape, primarily due to the improved status of tigers in the state of Uttarakhand. The Rajaji–Corbett tiger population is now contiguous with the Dudhwa–Pilibhit population since the intervening forests of Haldwani and Terai divisions, along with new protected areas such as Nandhor Wildlife Sanctuary, have tiger occupancy and a reasonable tiger density. The landscape will benefit from supplementation of the tigers in western Rajaji, which will improve the occupancy of the Shivalik forests, in Uttar Pradesh, and Kalesar Wildlife Sanctuary, in Haryana. Maintaining and enhancing trans-boundary corridor connectivity between India and Nepal is an essential element of tiger, elephant and rhino conservation in this landscape. This connectivity is threatened by the new India–Nepal border road, and special care is needed to ensure that proper mitigation measures are in place.

The status of the tiger has improved within the central Indian landscape, with an increase in tiger

occupancy and numbers. This increase has been contributed primarily by the states of Maharashtra and Madhya Pradesh. Indrawati Tiger Reserve, in Chhattisgarh, was assessed for the first time. The sampling was limited to accessible areas of Palamau Tiger Reserve, in Jharkhand. Conservation efforts need to focus on the tiger populations in Orissa (Similipal–Satkosia tiger reserves), Palamau landscape and northern Andhra Pradesh (Kawal Tiger Reserve). The Sanjay–Guru Ghasidas–Palamau landscape holds promise for expansion of the tiger population in the future, provided planned conservation investment continues. The tiger populations in the central Indian landscape are highly fragmented, and some are quite small numbers. Therefore, their survival is dependent on the corridor connectivity. The corridors in this landscape are threatened by developmental activities such as mining and infrastructural development. Madhya Pradesh has also taken the initiative to provide resources for corridors such as Kanha–Pench and developed a corridor-specific management plan.

The Western Ghats landscape has maintained its tiger status across all the three states, Karnataka, Kerala and Tamil Nadu. The world's largest tiger population (Nagarhole–Bandipur– Mudumalai–Wayanad–Satyamangalam–BRT) has further increased to about 585 tigers in 10,925 km^2. New protected areas declared by Karnataka on the border with Goa have helped the dispersal of tigers into this state and their movement further north into Radhanagari Wildlife Sanctuary and Sahyadri Tiger Reserve. This region needs more conservation focus as it holds great potential for the conservation of tigers and biodiversity.

Only selected areas were sampled in the North-eastern Hills and Brahmaputra Flood Plains landscape. Therefore, the tiger occupancy and numbers from this region are minimal estimates. The tiger population in Kaziranga–Karbi Anglong–Paake–Nameri–Orang is the largest source in this landscape (about 163 tigers) and should be managed as a single meta-population with strategies to address movement corridors between these populations. Dibang and Namdapha were assessed through scat DNA and opportunistic camera traps and show good promise for tiger and biodiversity conservation but need more conservation investment.

Genetic analysis based on a panel of 11 micro-satellites of 158 tiger individuals from across India has shown that at the country scale the tiger population of the North-east is genetically different.

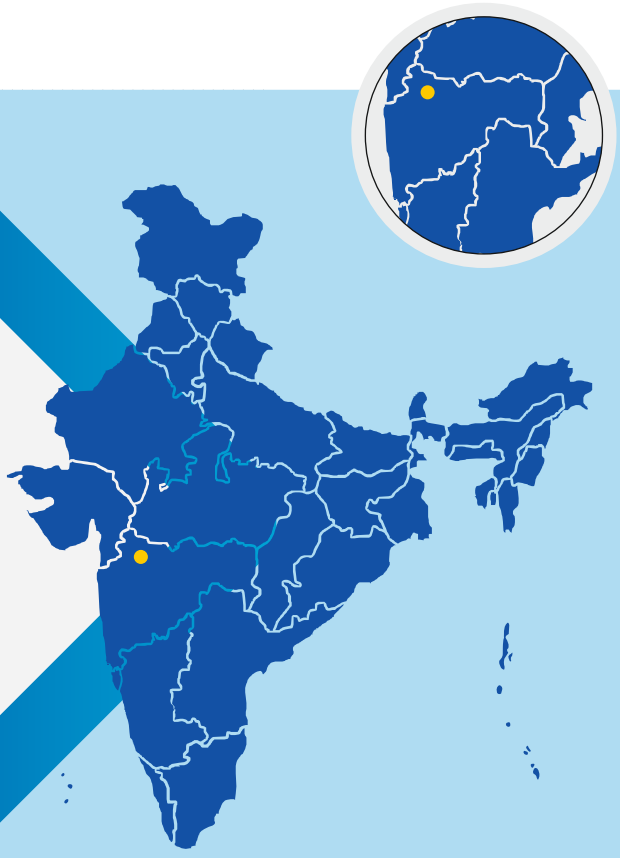
Milestone

The most unique genetic unit of tigers is from Orissa, and this needs high conservation priority as the population is declining. The western arid zone tigers of Ranthambhore–Sariska had a genetic composition different from those of the terai and central Indian tigers, with some genetic contribution from both these regions. At the local scale, the tiger populations south of the Palghat gap differed from those of the northern Western Ghat population. The tigers from Sayadhari (extreme northern Western Ghats) shared their genetic makeup with the tigers from central India.

A reduction in the poaching of tigers and prey and incentivized voluntary relocation of human settlements from the core areas of tiger reserves have been the primary drivers for the improved tiger status in India. The implementation of MSTrIPES, landscape-scale tiger management plans inclusive of buffer and corridors and use of green infrastructure for mitigating the impacts of development, especially on corridors, need to become the norm across India.

Camera trap photo

TRACKING THE GREAT INDIAN BUSTARD *ARDEOTIS NIGRICEPS* AND MAPPING ITS POTENTIAL HABITAT ACROSS THE DECCAN LANDSCAPE, MAHARASHTRA, INDIA



- Funding Source
  Maharashtra Forest Department
- Investigators
  Dr. Bilal Habib, Dr. Gautam Talukdar, Shri Suresh Kumar and Shri Mukul Trivedi
- Researcher
  Vaijayanti Vijayaraghavan
- Date of Initiation
  January 2014
- Date of Completion
  January 2016

Objectives

The objectives of the project are to (i) determine the present status and distribution of the great Indian bustard (GIB) in the Deccan region; (ii) study the movement patterns and spatial habitat use by the GIB; and (iii) predict and locate potential bustard habitats in the Deccan through a landscape-level approach.

Progress

Current status and distribution of GIBs in Maharashtra: Past and current locations of GIBs, acquired from the literature, were mapped and compared. The locations were categorized as historic locations (<1950s), fairly recent (1950–1980) and recent locations (>1980s).

Radio telemetry: (i) Through extensive field surveys, a male adult GIB was radio collared on 25 December 2013 using a solar-powered Argos/GPS PTT in Wanoja village, in Warora taluka, of Chandrapur district. (ii) Subsequently, on the basis of data received from the PTT, locations are visited by the researcher to characterize the habitat utilized by the GIB.

Characterization of land use systems: (i) Questionnaire surveys were conducted with farmers

Raja Purohit

to understand the cropping pattern of the region and to quantify the resources utilized during farming. (ii) Farmers were also important in identifying areas used by GIBs and guided the daily field surveys. (iii) Daily field surveys were conducted between 0600-1000 hours and between 1600 and 1700 hours. Through these, it is hoped to sight GIBs and note the habitats (crop type/grassland) utilized by them. (iv) The study area was mapped using a Garmin GPS eTrexsystem and ArcGIS 9.3.

Outputs & Outcomes

Current status and distribution of GIBs in Maharashtra: Maps were generated on the basis of past locations of GIBs in the state. The maps provide a visualization of the reduction in range of the GIB over the years. GIBs were well distributed across the western regions of Maharashtra in historic times.

Radio telemetry: Through radio telemetry, the research team received 59 Argos locations and 63 GPS locations. These locations formed three clusters that showed the presence of GIBs in agriculturally dominated areas. The first cluster consisted of the villages of Wanoja, Marda and Ekona. These villages are well-established breeding sites for GIBs since almost a decade. The second cluster of locations included the villages of Salori, Bandara and Majara Rai, and the third included Kotbala and Bhatala. The last received location of the bird was from Kotbala, which is 23 km away from the collaring site, in Wanoja. These locations were later characterized by the researcher.

Characterization of land use systems: (i) *Cropping pattern:* Cotton and soyabean are the *kharif* crops, and wheat, sorghum and chickpea are the *rabi* crops. When there is sufficient rainfall, the farmers grow cotton and soybean in almost equal proportions. Once the soybean has been harvested, the rabi crops are grown at the same location. The monsoon of June 2014 brought limited rainfall. As a result, the cropping pattern was altered. The percentage of cotton crops increased, and the percentage of other crops was reduced.

The number of GIB sightings in the study area was also very low. With increased cotton cultivation, sighting the bird becomes difficult. The birds may have also migrated to others areas as the tall cotton crops may have proved to be visual obstructions to mate location during the breeding season.

(ii) Land use system: The accompanying table highlights the land use system in GIB habitat.

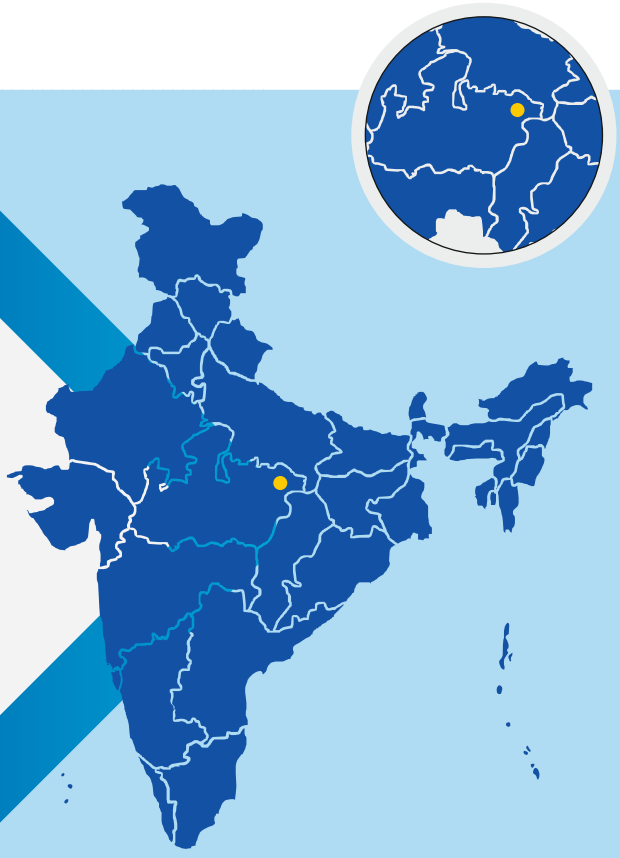
Landscape element	Inference
Small crop holdings + growth of a minimum of two crops on each land holding	Mosaicked landscape of crops
Low rainfall led to growing crops that needed less water.	Less intensive and mechanized traditional farming system
Less farming resources	
Traditional land sparing	

Milestone

The study highlights the elements contributing to the survival of bustards in a dynamic and disturbed agricultural ecosystem. Several aspects of the study are to be explored, but it is evident that the traditional land use system practiced by the farmers plays an important role in conserving these birds.

INITIATED PROJECTS

EVALUATION OF PREY AVAILABILITY AND HABITAT SUITABILITY FOR TIGER AND ITS RANGING PATTERNS IN SANJAY TIGER RESERVE, MADHYA PRADESH



- Funding Source
  Madhya Pradesh Forest Department

- Investigators
  Dr. K. Sankar, Shri Qamar Qureshi, Dr. K. Ramesh and Dr. Parag Nigam (WII) and Field Director, Sanjay Tiger Reserve, Madhya Pradesh

- Researchers
  R. Rajasekar and Azim Mujawar

- Date of Initiation
  June 2014

- Date of Completion
  June 2017

Objectives

The objectives of the project are to (i) evaluate the current status of the prey base in Sanjay Tiger Reserve (STR), Madhya Pradesh; (ii) assess the suitability of the habitat for tigers in STR; (iii) study the ranging and dispersal patterns of tigers using radio-telemetry; and (iv) equip the forest department staff at the ground level with enough knowledge and resources so as to continue the monitoring of tigers in the park after the project is completed.

Progress

Prey species abundance in the study area was estimated by line-transect method under distance sampling technique. In total, 22 line-transects were walked covering 134 km^2 during monsoon (August - October 2014). In total, 28 line-transects were walked covering 224 km^2 during winter (November 2014 to February 2015). Two replicates were walked on both seasons. On each sighting of potential prey species on line transects, group size, animal bearing and angular sighting distance were recorded. Program DISTANCE 5.0 was used to estimate the density of prey species. Tree layer, shrub layer, ground cover, canopy cover, weed abundance, pellet abundance, anthropogenic pressure (wood

Camera Trap photo (Credit - R. Rajasekar)

cutting/lopping) were quantified along the line transects at every 400 m sampling point. Carnivore Sign Survey was carried out in selected beats during monsoon (total effort = 72.11 km in 12 beats) and winter (total effort = 363.56 km in 25 beats). GPS location, major vegetation type, major terrain type, sign type and condition were recorded for every carnivore species sign that were encountered. Thirty seven pairs of cameras were deployed in session-I and 32 pairs of cameras were deployed in session-II in a sampling area of 276 km^2 to estimate tiger population and abundance. Camera trapping session was done in block wise for a period of 45 days during the reporting period.

Outputs & Outcomes

The overall prey densities and mean group size were estimated for all prey species. The half normal key function with cosine adjustment was the best fitted model for density estimation of prey species on the basis of the lowest Akaike information criteria (AIC). The estimated densities of all the prey species (common langur, nilgai, four-horned antelope, black-naped hare, chinkara, jungle fowl and livestock) were higher in winter (0.91±0.24 SE) compared with the monsoon (0.28±0.65 SE). A total area of 72.11 km^2 was sampled during the monsoon and 363.56 km^2 in winter for assessing the presence of carnivores. The encounter rate of sloth bears was found to be higher in both the seasons. It was 0.4511 and 0.48537 for the monsoon and winter, respectively.

Milestone

Five individual tigers (one female and four males) were identified on the basis of camera trap photographs taken in the study area.

RESOURCE SELECTION BY BLACK KITES *MILVUS MIGRANS*

- Funding Source
  Raptor Research & Conservation Foundation, Mumbai

- Investigators
  Dr. Y.V. Jhala, Shri Qamar Qureshi (WII) and Dr. Fabrizio Sergio (CSIC, Spain)

- Researcher
  Nishant Kumar

- Date of Initiation
  July 2014

- Date of Completion
  July 2016

Objectives

The objectives of the project are to: (i) monitor black kite nests in 60 sample plots for the breeding success and growth rate of the chicks; (ii) evaluate differences in foraging habits of kites across the city and the impact of these differences on the growth and survival of nestlings; (iii) understand the spatial usage of cities by breeding and non-breeding members of the subspecies *govinda* and *lineatus* of the black kite; and (iv) conduct an ethnographic survey to discern the religio-cultural relations of black kites with humans.

Progress

This year, the team surveyed 212 kite nests to gather survivorship data, through a network of 40 sampling plots of 1km^2 each distributed on the gradient of urbanization throughout the city. While the team estimated the overall breeding density to be consistent (2013—15 nests/km^2; SE, 7.9; 2014—18.3 nests/km^2; SE, 7.9; 2015—17.02 nests/km^2; SE, 7.32) in the city since the 1960s, the contribution of human refuse to the diet of the kites, the ecosystem service provided through scavenging and the impact of the diet on the kite physiology, survivorship, behaviour, etc. are yet to be determined. The breeding success (nests that

Nishant Kumar

released at least one fledgling against the total number of nests) in the 2014–2015 season was 39.26%, a drop from the estimates for 2013–2014 of 48% and 55.52%, likely caused by the heavy rains of March 2015 and heat, humidity and incidence of avian pox.

The research team has under analysis a 3-year dataset on the nestling growth rates to discern the impacts of provisioning by parents under different levels of urbanization. This will be supported by the camera trapping efforts, on 17 nests located at five different sampling units. The camera trap data will also be used to study variations in parent–offspring relationships in all sampling units. The effort to understand the city's kites and their spatial dynamics in the urban landscape, with data from satellite tagging of two kites since April 2014 (more to be tagged subsequently), is aimed at differentiating breeders and non-breeders of the sub-species *govinda* and *lineatus.*

Outputs & Outcomes

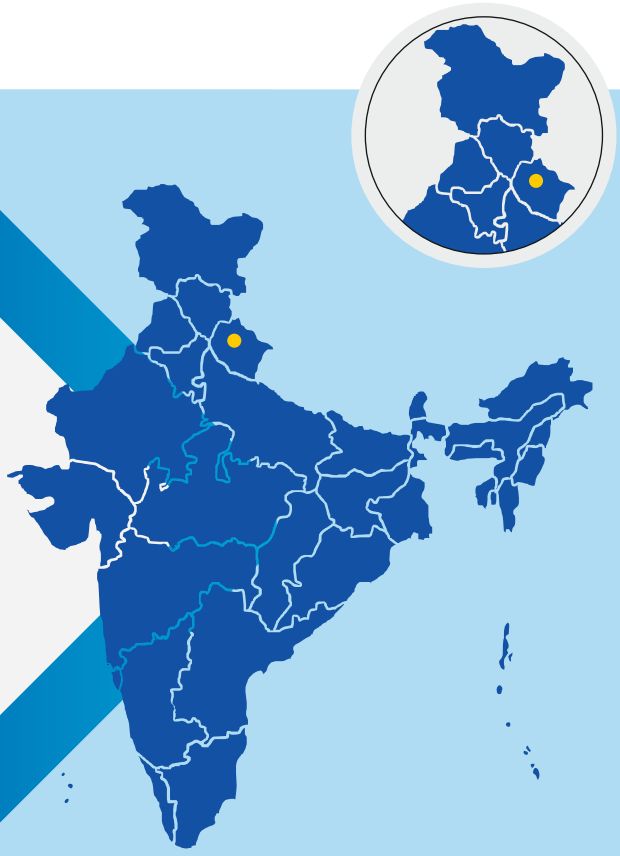
The study has found numerous associations of religious and cultural beliefs that affect kites both positively (for example through the ritual of offering meat chunks to these birds to get rid of sins) and negatively (people regarding the kites as bad omens and sacrificing them for black magic). The ethnographic survey raised a concern about the gradual decline in the human–bird relationships when the team learnt that 67% (N=43) of the youngest respondents (age<30 years) wrongly identified black kites. The same age group had half the compassion score of their elders for the bird fauna.

It is widely known that such knowledge is inherited by the younger generation from their grandparents. The surge in the number of nuclear families has adversely impacted the ideal transfer of this heritage of compassion for the environment. It will be important to replicate this survey with more black kite-specific questions and through a larger, trained force of interviewers. The results illustrate the possibilities of understanding the impacts of urbanization on birds (using kites as model species) and their specific adaptations to overcome the limitations on offer while encashing the opportunities.

Milestone

Three black kites were tagged with satellite and GPS transmitters. These tagged kites are providing excellent insights into the movement patterns and general ecology of the kites. The camera trapping effort has resulted in rich insights about the nesting ecology.

ASSESSMENT AND MONITORING OF CLIMATE CHANGE EFFECTS ON WILDLIFE SPECIES AND ECOSYSTEMS FOR DEVELOPING ADAPTATION AND MITIGATION STRATEGIES IN THE INDIAN HIMALAYAN REGION



- Funding Source
  Department of Science & Technology, under the National Mission on Sustaining the Himalayan Ecosystem (NMSHE) Programme
- Investigators
  Dr. V.B. Mathur, Dr. S. Sathyakumar (Nodal Scientist), Dr. G.S. Rawat, Dr. Asha Rajvanshi, Dr. Ruchi Badola, Dr. Pratap Singh, Dr. V.P. Uniyal, Dr. K. Sivakumar, Dr. K. Ramesh, Dr. J.A. Johnson, Dr. Gautam Talukdar and Dr. Abhijit Das
- Project Associates
  Tapajit Bhattacharya, Nishikant Gupta and Sujata Upgupta
- Project Scientists
  Manish Bhardwaj, Devendra Kumar, Krishnendu Mondal, Arun Kumar
- Project Fellows
  Ranjana Pal, Shashank Arya, Sohini Choudhury, Naitik Patel, Aashna Sharma, Pamella Bhattacharya, Tanvi Gaur and Kamalika Bhattacharya
- Project Assistants
  Raut Shailendra, Priyanka Kasyap, Neha Aswal, Sonam Priyadharsini, Anshu Shukla, Shagun Thakur and Pooja Kala
- Date of Initiation
  August 2014
- Date of Completion
  July 2019

Objectives

The main goal of the project is to develop strategies to mitigate the effects of climate change on wild animal species and ecosystems in the Indian Himalayan Region (IHR).To achieve the goal, the following research/task components have been identified under the theme 'Fauna and Ecosystems': (i) identify the drivers of landscape change (climatic and anthropogenic) in the IHR (Ganges River Basin) and their effects on the ecological and social systems; (ii) conduct focused research on wildlife aspects (terrestrial and aquatic fauna, micro-flora and their habitats) and human dimensions in the IHR (Ganges River Basin) for framing evidence-based policy measures; (iii) develop monitoring and decision support systems (DSS) for indicator species in the IHR (Ganges River Basin); (iv) undertake climate change scenario analyses and visualization for predicting potential effects on the fauna and ecosystems as a strategy to communicate with stakeholders and to influence policy and decision making; (v) develop a spatial and inter-operable database to facilitate policy decision making; and (vi) build capacities within WII and among other stakeholders for sensitization and development of action plans for mitigation of the

Greater blue sheep, Pseudois nayaur *Shashank Arya*

impacts of climate change and for enhancing capabilities for negotiations at national and international forums.

Progress

Following the sanction from the DST, the first year grant was received by WII in August 2014. Following this, in-house meetings were held amongst the participating faculty members to work out the strategy for the inception of the project. The advertisement for recruitment of project personnel was brought out in November 2014. The written test and interviews for the short-listed candidates were held during 28–30 January 2015. The selected candidates joined WII in the first week of March 2015 and completed their joining formalities. The newly engaged project personnel were exposed to a series of orientation lectures by senior faculty members of WII and later underwent a field orientation visit to Rajaji National Park between 30 March and 1 April 2015. The design for the Landscape Ecology and Visualization Lab was finalized, and the procedures for initiating the work were completed and awarded to the CPWD as per the decision taken by the Finance Committee meeting held on 30 March 2015. Procedures for purchasing equipment were initiated in March 2015.

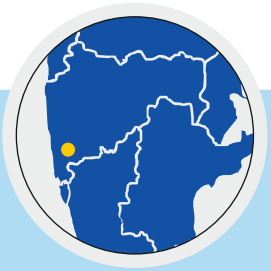
Outputs & Outcomes

WII has developed the organizational, conceptual and methodological frameworks for achieving the proposed objectives. WII has identified a few collaborators and partners to initiate discussions on the theme "Focal sites, work components and harmonization of research design" so as to build synergies.

Tapajit Bhattacharya

Milestone

The project inception workshop was held on 23 March 2015. The research methodology and approach of the project were finalized after the workshop.



CAPACITY BUILDING FOR PARTICIPATORY MANAGEMENT OF COASTAL AND MARINE PROTECTED AREAS IN INDIA WITH SPECIAL REFERENCE TO FOREST SECTORS

- Funding Source
  GIZ Indo-German Biodiversity Programme

- Investigators
  Dr. K. Sivakumar, Dr. J.A. Johnson, Dr. G.V. Gopi and Dr. C. Ramesh

- Date of Initiation
  September 2014

- Date of Completion
  December 2017

Objectives

The objective of the project is to customize the existing Capacity Needs Assessment (CNA) tool and to prepare the "Conceptual and Situation Analysis" of the capacity development systems, structures and tools relevant to marine protected areas (MPAs) in India with special reference to forest sectors, and building capacity for participatory management of coastal and marine protected areas in India.

Progress

Based on the field assessment studies, the major gaps in the capacities of the forest sectors of all the coastal states are inadequacy of the baseline data on biodiversity, infrastructure and leadership qualities to involve all the stakeholders in policy making; a lack of inter-sectoral coordination and adequate skills for effective management of MPAs; and a lack of the necessary infrastructure and equipment to carry out the applied research and development of a research framework for improved conservation of coastal and marine protected areas in all the four coastal states.

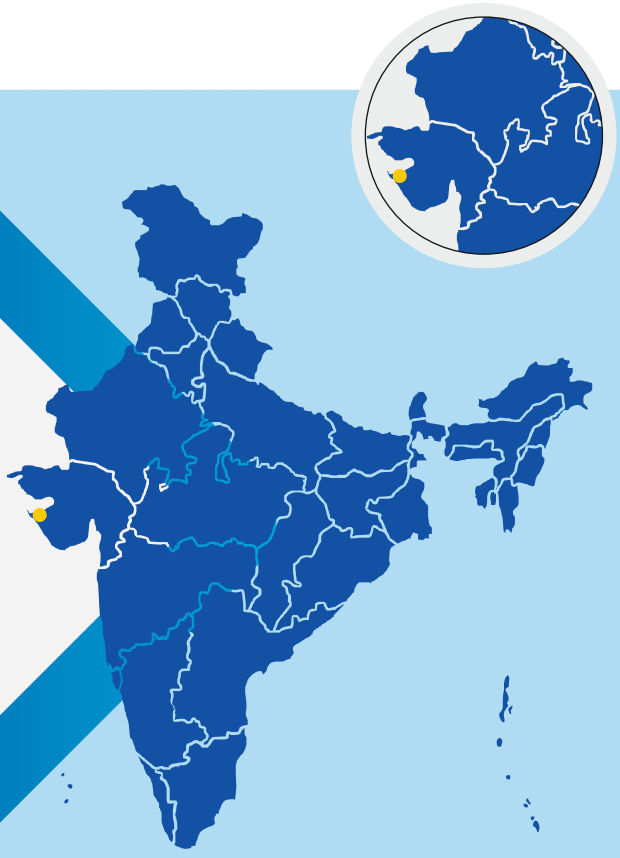
Outputs & Outcomes

The major possible interventions of the HCD measures of the forest sector and youth of the local

populations of all the project states have been identified as the following: they require a conducive environment to consult, debate, understand and mutually agree upon a common goal, that is, conservation of marine protected areas with the involvement of the stakeholders identified, including of local communities; existing policies need to be enhanced through participatory approaches in the management of protected areas; capacity building of resource organizations is to be carried out in terms of emerging issues such as climate change, endangered species and invasive species with better linkage and understanding; tackling of issues related to lack of funds and manpower for the applied research; and training for developing leadership and establishment of knowledge-based systems with participatory approaches for effective management of marine protected areas.

Milestone

A "Special Certificate Course on Coastal and Marine Biodiversity and Protected Area Management" for the field-level staff of the forest departments was organized from 12 January to 6 February 2015 at Tarkarli, in Malvan, Maharashtra jointly by WII and *Deutsche Gesellschaft für Internationale Zusammenarbeit* (GIZ) GmbH. This course was intended to enable the participants to have a sound understanding of the concepts and issues related to managing coastal and marine biodiversity, coastal and marine protected areas, ecological and socio-political contexts, conservation approaches and the legal–policy framework between terrestrial and coastal marine protected areas as well as to acquire the necessary skills for conducting assessments of and monitoring coastal and marine habitats and species, preparing field reports and developing operational plans for MPAs based on management effectiveness guidelines under supervision.



ASSESSMENT OF CONSERVATION VALUE OF MANGROVES OF GUJARAT

- Funding Source
  National Centre for Sustainable Coastal Management

- Investigators
  Dr. G.V. Gopi, Dr. K. Sivakumar and Dr. G. Talukdar

- Researchers
  M. Gadhavi, N. Gokulakannan, Shahid Ahmed Dar, Tabassum Yasmin and Devanshi Kukadia

- Date of Initiation
  October 2014

- Date of Completion
  March 2015

Objectives

The project has the following objectives: (i) identification of contiguous patches of mangroves along the coastal region of Gujarat; (ii) demarcation of the boundaries of all such mangrove patches that lie outside the marine protected areas; (iii) collection of biological data with respect to each of the mangrove patches identified; and (iv) organization of a stakeholders' consultation for determining the threshold conservation value for delineation of "highly sensitive areas" (on the basis of criteria to be developed by the National Centre for Sustainable Coastal Management (NCSCM)).

Progress & Outcomes

The project envisaged identifying contiguous patches within the identified ecosystems falling outside protected areas and collating secondary and field data to assess the health of the ecosystem in each of these patches. A total length of 1,650 km of the coast was surveyed within a short duration of 45 days. A total of 53 patches (19 in Kutch, 14 on the Saurashtra coast, eight in the Gulf of Khambhat and 12 along the south Gujarat coast) were identified and delineated. Very good, dense mangrove forests are found in the western part of Kutch district along the

Google earth

creek systems. At the tail end of the Gulf of Kutch there are very unique mudflats containing mangrove forests. There is only a patchy distribution of scrubby mangrove forests in between sandy stretches along the Saurashtra coast, and in the Gulf of Khambhat, there are good patches of scrubby forest on intertidal mudflats. In the south Gujarat, particularly in the Purna and Ambika estuaries, very good, diverse mangrove forests were documented.

Currently the ownership of the mangrove areas is distributed among various stakeholders, such as BSF, GMB, FD and the government as well as private port authorities in Kutch and Amreli districts, where dense mangroves are present. An area of 581.80 km^2 has been notified as mangrove forests (reserved forests) in Abdasa, Lakhpat and Mundra talukas in Kutch district by the state government through notifications in 1969 and 1975,andan extent of 77.70 km2in Madiya-Miyana taluka, in Morbi district, has been notified as a mangrove forest under the Indian Forest Act (IFA), 1927. There are no notified mangrove forests in nine coastal districts under the IFA, 1927.Very patchy, scrubby forests are found in these districts, and hence they are under anthropogenic and industrial pressure. Industrialization, port and jetty construction and other development pressures were observed near the mangrove forests.

Milestone

The data collected and collated under this project have been uploaded into the ESA Knowledge System, developed by NCSCM, which will help assess the conservation value on the basis of the broad criteria developed for the purpose through stakeholder/expert consultations.

EVALUATING ECOLOGICAL STATUS OF LEOPARD IN KALESAR NATIONAL PARK, HARYANA

- Funding Source
  Haryana Forest Department

- Investigators
  Dr. Bilal Habib, Dr. Gautam Talukdar, Dr. Parag Nigam, Dr. Bivash Pandav and Shri Salvador Lyngdoh

- Researcher
  Rajorshi Ray

- Date of Initiation
  October 2014

- Date of Completion
  October 2015

Objectives

The objectives of the project are to (i) evaluate the current status of the leopard in Kalesar National Park; (ii) estimate the population size and density of leopards in Kalesar National Park; and (iii) assess the status of key prey species.

Progress

Camera trapping was carried out to get a basic understanding of the leopard movement in Kalesar National Park and study the temporal activity and space use along with the prey. Camera trap data were collected between October 2014 and January 2015. Intensive camera trapping was done in Kalesar with camera traps deployed in 1.0×1.0 km^2 grids. The total area covered in this exercise was 70.6 km^2. Camera stations were placed along roads, trails or streambeds to maximize photo-captures. Camera trapping was done for 42 days in two blocks (21 days per block). The data were then analysed using Microsoft Excel 2013 and the "SECR" package in the R platform (version 3.0.1).

Outputs & Outcomes

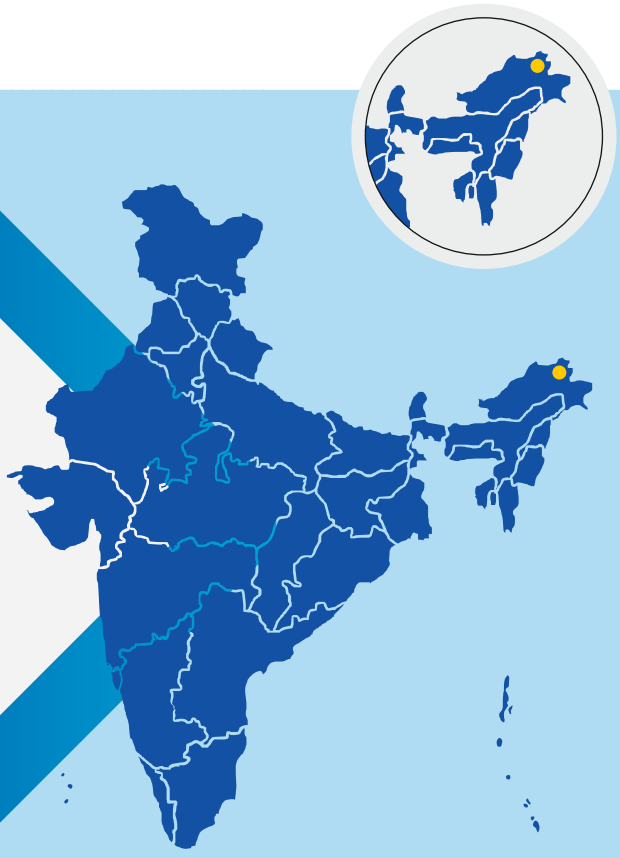
(i) The camera trapping exercise recorded a total of 18 mammalian species. (ii) The population of

leopards was estimated to be 22±1.0 (22.0–25.4). (iii) The density was estimated to be15 individuals/100 km^2 (SE=3.54). (iv) Leopards display bimodal activity peaks and seem to use areas in Kalesar Wildlife Sanctuary more than they do the Kalesar National Park. (v) The temporal data suggest that there is a significant overlap between the temporal activity patterns of the leopard and the wild pig (Δ=0.86), nilgai (Δ=0.83) and sambar (Δ=0.81).

Milestone

The rusty spotted cat was reported for the first time from this area.

ESTABLISHING ECOLOGICAL BASELINES FOR LONG-TERM MONITORING OF TIGERS, CO-PREDATORS AND PREY SPECIES IN DIBANG WILDLIFE SANCTUARY AND ITS ADJOINING LANDSCAPES IN ARUNACHAL PRADESH, INDIA



- Funding Source
  National Tiger Conservation Authority, New Delhi
- Investigators
  Dr. G.V. Gopi, Dr. Y.V. Jhala and Shri Qamar Qureshi
- Researcher
  Aisho Sharma Adhikari
- Date of Initiation
  November 2014
- Date of Completion
  March 2018

Objectives

The objectives of the project are to: (i) determine the distribution and abundance of tigers, co-predators and their prey in different land use, land cover type and disturbance regimes in and around Dibang Wildlife Sanctuary; (ii) evaluate the effects of environmental features and anthropogenic pressure on the occupancy patterns of tigers, co-predators and prey; (iii) determine the factors governing the niche differentiation among tigers, co-predators and their prey; (iv) assess local people's knowledge, beliefs, attitudes and perceptions about conservation of tigers, co-predators and their prey; and (v) identify areas that have high conservation value as well as those that are under threat for tigers, co-predators and their prey, with the ultimate aim of planning a long-term monitoring and conservation strategy.

Progress & Outcomes

Recent surveys have documented signs of wild tigers in the temperate forests of Dibang Valley district in Arunachal Pradesh. This landscape is unique in having a tiger population at an altitude above 2,065 m, representing one of the very few tiger habitats at such high elevations in India. However,

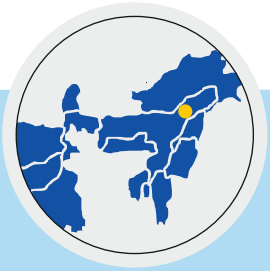
Camera trap photo

there is a complete lack of knowledge about the ecology of the tigers, co-predators and their prey.

The study is being carried out in Dibang Wildlife Sanctuary, in Arunachal Pradesh, which extends over an area of 4149 km^2 and lies between 95° 17' and 96° 38' E and 28°38' and 29° 27' N. A preliminary sign survey was carried out in February and March 2015. A total of six sign surveys were conducted in Dri Valley and Angi Pani Valley, with efforts of 22.87 and 16.3 km, respectively. In Dri Valley, the encounter rates were 0.35, 0.04, 0.08, 0.21 and 0.04 for the tiger, leopard, small cats, small carnivores and barking deer, respectively, and the encounter rates in Angi Pani Valley were 0.18, 0.12, 0.06 and 0.24 for the black bear, barking deer, wild pig and serow, respectively.

Milestone

The project has begun recently, and intensive data collection is underway. The preliminary results reveal that the sanctuary holds a good diversity and abundance of tigers, co-predators and their prey. Systematic long-term research and monitoring of the entire landscape is being planned and will be undertaken.



GENETIC ASSESSMENT OF SAMBAR *RUSA UNICOLOR* POPULATION IN NORTH-EAST INDIA

- Funding Source
  Science & Engineering Research Board, Department of Science & Technology

- Investigators
  Dr. S.K. Gupta and Dr. S.A. Hussain

- Researcher
  Mirza Gazanfar Ullah Gazi

- Date of Initiation
  November 2014

- Date of Completion
  November 2017

Objectives

The objectives of the project are to: (i) study the molecular systematics of the sambar to understand its phylogenetic relationships with other cervids; and (ii) examine the intra-species phylogenetic relationship among sambar populations in two landscapes of India.

Progress

The project was initiated with the engagement of the researcher. A field visit was planned to collect biological samples from Kaziranga National Park, Assam. Sample analysis is in progress. It is proposed to collect more samples from forest areas of the North-east. The procurement of equipment and permissions is in progress for further sample collection. The research team has started molecular work in the lab on the collected samples. Pellet and antler samples of sambar from Kaziranga National Park were collected.

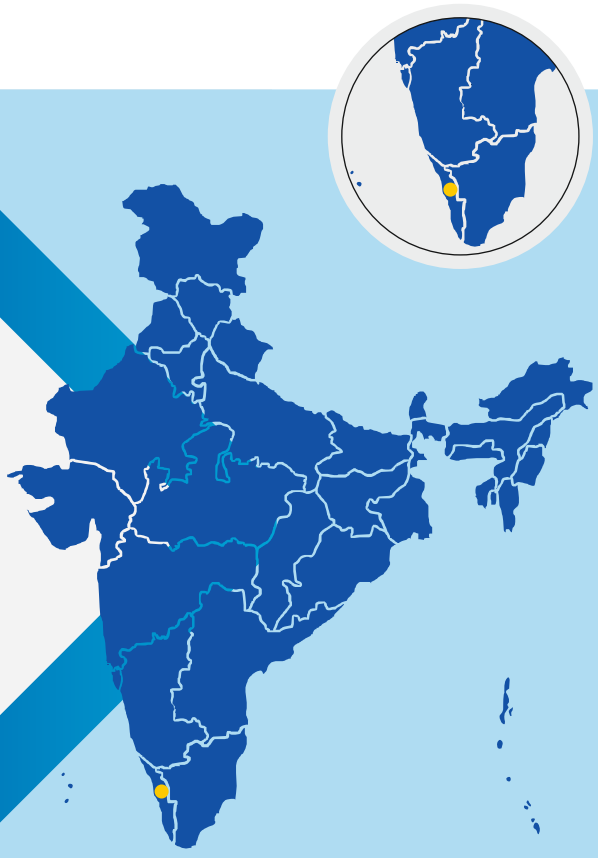
Outputs & Outcomes

During the reporting period, permission to collect biological samples from the states of Manipur, Arunachal Pradesh, Nagaland and Meghalaya was received. The team procured essential equipment and reagents for molecular analysis. A second field visit has been initiated to collect biological samples from the above-mentioned states.

Milestone

There are no major findings yet as analysis and sample collection are still in progress.

ASSESSMENT OF THE COMPATIBILITY OF THE DEVELOPMENT PLANS AND LAND USE PATTERNS WITH THE OBJECTIVES OF BIODIVERSITY CONSERVATION AND RESOURCE PLANNING IN THE MUNNAR LANDSCAPE AND SUGGESTING MEASURES TO ENHANCE PROJECT OUTCOMES



- Funding Source
  UNDP

- Investigators
  Dr. Asha Rajvanshi and
  Dr. A.K. Bhardwaj

- Researchers
  Debojyoti Mukherjee and
  Akanksha Saxena

- Date of Initiation
  December 2014

- Date of Completion
  March 2016

Objectives

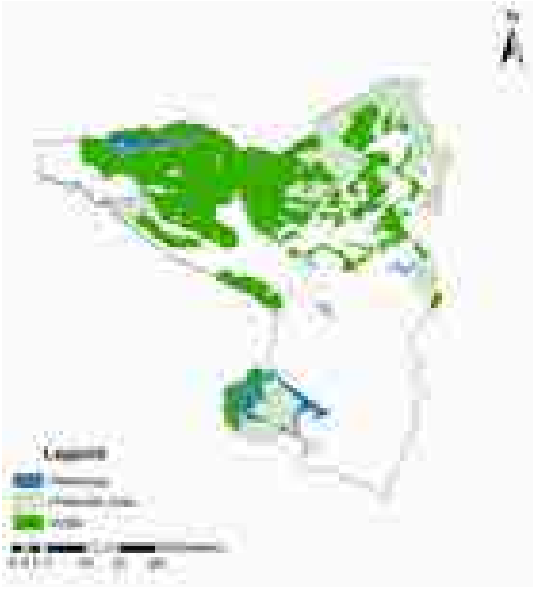
The objectives of the project are to (i) assess the compatibility of the development objectives with the objectives of biodiversity conservation and resource planning within the defined project area of the Munnar landscape and suggest measures to enhance compatibility; and (ii) assess the sustainability of projects, sectoral development plans and landuse patterns in the context of the ecological, social, economic and environmental attributes of the High Range Mountain Landscape (HRML).

Progress

A literature review was carried out to understand site-specific issues with regard to conservation and its conflicts with the prevalent human activities and land use pattern. It was found that the conflicts between development and conservation in the landscape are largely a result of incompatible land use types, resulting in issues such as loss of biodiversity, man–animal conflicts, proliferation of invasive weeds and loss of habitat connectivity and quality. Land use and cover maps have been created using key layers of information to supplement these findings.

The literature on conservation and prioritization of

conservation in human-dominated landscapes within the Western Ghats indicates that management of semi-natural ecosystems and agro-ecosystems needs to be prioritized for conservation in areas that are not protected. Involvement of the community and development of strategies for balancing tourism have also been identified as key areas for conservation management.



Outputs & Outcomes

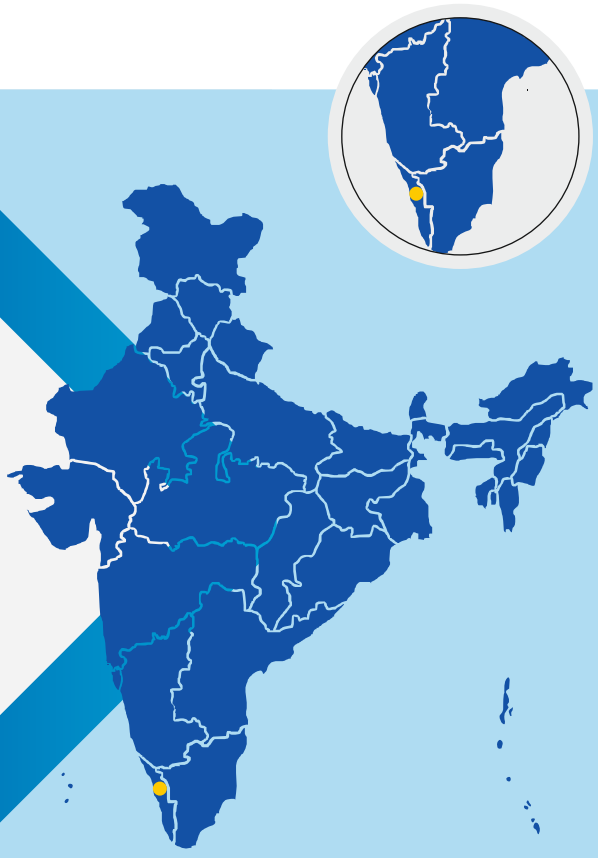
On the basis of a review of similar studies carried out in Vietnam, Ghana and China, it was decided to adopt an SEA approach for assessing the environmental compatibility of landuse plans and activities.

The study is still in progress. Once data are available after a field visit, threat assessment, planning and consequent realignment of activities will help generate a regional plan that is environmentally, socially and economically sustainable.

Milestone

There is no major finding yet as analysis and data collection are in progress.

EVALUATION OF ECOSYSTEM SERVICES OF MUNNAR HIGH RANGE MOUNTAIN LANDSCAPE: REVIEW OF AVAILABLE LITERATURE ON PROTOCOLS USED FOR ASSESSMENT OF ECOSYSTEM FUNCTIONS



- Funding Source
  UNDP

- Investigators
  Dr. Ruchi Badola and Dr. Syed Ainul Hussain

- Researchers
  Chongpi Tuboi, Pariva Dobriyal, Shruti Sengupta, Goura Chandra Das, Aditi Dev and Amanat Gill

- Date of Initiation
  January 2015

- Date of Completion
  January 2016

Objectives

The objectives of the project were to (i) identify the major ecosystem services provided by the High Range Mountain Landscape (HRML); (ii) derive the numerical value of these services; (iii) identify factors affecting the sustained flow of the identified ecosystem services; and (iv) suggest measures to maintain a continuous flow of these services without impacting the integrity of the landscape.

Progress

An extensive literature review was conducted to understand the crucial services provided by Munnar HRML, southern Western Ghats. Due to time and resource constraints, only six ecosystem services have been selected: (i) timber, (ii) carbon stock, (iii) water provisioning (soil moisture content and water yield), (iv) soil nutrient content, (v) recreation and (vi) non-timber forest products.

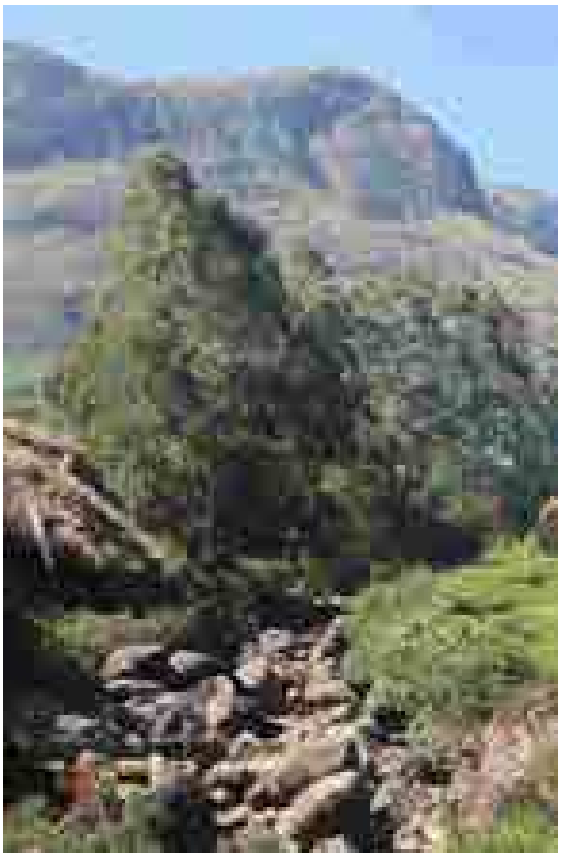
Methods were selected to assess the functional and economic value of these services on the basis of resource efficiency, accuracy of results and spatial coverage. The forest yield method will be used for timber and carbon in the above-ground biomass, while the biomass expansion factor will be used to quantify the carbon in the below-ground biomass. The dry biomass weight and the Walkley-Black

S A Hussain

method will be used, respectively, to determine the carbon in the leaf litter and soil. Time domain reflectometry and the timed volume method will be used to assess the soil moisture and water yield, respectively. Standard laboratory methods will be used to assess the soil nutrient retention by different land use land cover classes. The travel cost method will be used to assess the recreational value of the landscape. The primary data for each ecosystem service will be supplemented with estimates derived from secondary literature. The net functional and monetary values generated during the project phase using different methods for different ecosystem services could be used as the baseline information for monitoring in the future and could contribute significantly to improving the quality of the landscape for sustaining the flow of ecosystem services and maintaining its biodiversity value.

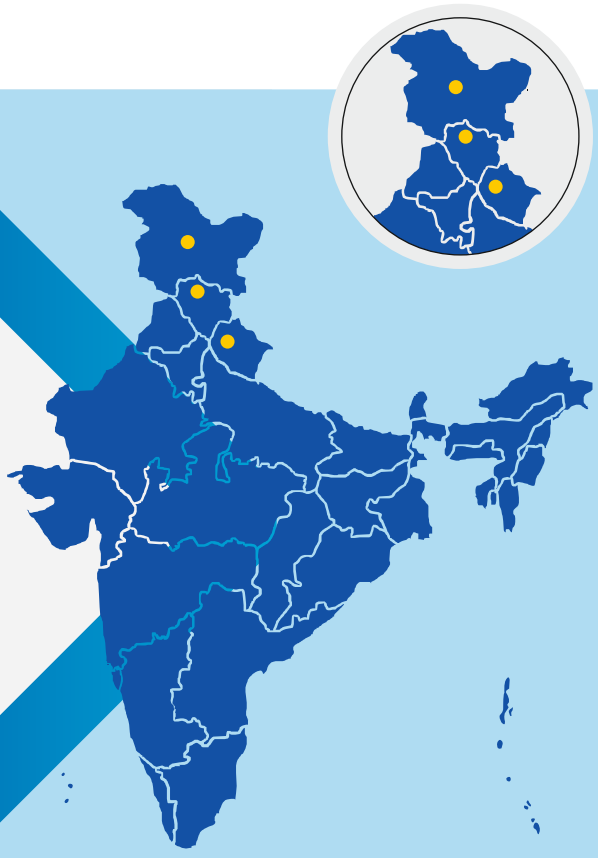
Outputs & Outcomes

The second report based on the literature review ("Evaluation of Ecosystem Services of Munnar High Range Mountain Landscape: Review of Available Literature on Protocols Used for Assessment of Ecosystem Services") has been submitted to UNDP.



S A Hussain

POPULATION GENETIC STRUCTURE AND GENE FLOW IN BROWN BEAR *URSUS ARCTOS ISABELLINUS* IN INDIA (JAMMU & KASHMIR, HIMACHAL PRADESH AND UTTARAKHAND) AND EXTENT OF GENE FLOW BETWEEN POPULATIONS OF INDIA AND PAKISTAN: CONSERVATION AND FORENSIC IMPLICATIONS



- Funding Source
  Department of Science & Technology

- Investigators
  Dr. S. Sathyakumar
  and Dr. S.P. Goyal

- Researchers
  Tawqir Bashir and
  Sujeet Kumar Singh

- Date of Initiation
  February 2015

- Date of Completion
  January 2018

Objectives

The project has the following objectives: (i) Determination of a spatial distribution and occupancy model for the brown bear in Jammu & Kashmir, Himachal Pradesh and Uttarakhand; (ii) determination of the genetic diversity and genetic differentiation within and between populations and sub-divisions, if any, in the brown bear populations in Jammu & Kashmir, Himachal Pradesh and Uttarakhand; (iii) determination of the level of gene flow between brown bear populations in India and Pakistan by utilizing the genotyping data of Bellemain *et al* (2007); (iv) estimation of the genetic drift, genetic assignment, first generation migrants, effective population size (Ne) and gene flow (Nm) of the brown bear populations of Jammu & Kashmir, Himachal Pradesh and Uttarakhand and between the brown bear populations in India and Pakistan; (v) identification of the degree of genetic isolation among the brown bear populations of Pakistan and its causes using GIS information; (vi) identification of the geographical barriers to the gene flow between the brown bear populations in India and Pakistan; and(vii) application to forensics by assignment of poaching cases to the population in India.

Sujeet Kumar Singh

Progress

Following the letter of grant and receipt of the first installment of funds from DST, a research biologist was engaged in February 2015. The procedure for engaging a research associate was initiated. A literature review and planning for field surveys were carried out during the reporting period. Letters requesting permission for non-invasive sample collection (faeces/hair) from the brown bear distribution ranges were sent to the states of Jammu & Kashmir, Himachal Pradesh and Uttarakhand.

Outputs & Outcomes

The mtDNA genome has been widely used in understanding phylogeography as well as for maternal lineages. Therefore, the research team has downloaded most of the available mtDNA sequences in the public domain at the National Center for Biotechnology Information (NCBI).

The available literature on the mtDNA of the brown bear indicates that European brown bears are divided into two major lineages, the eastern and western lineages. The eastern lineage is widely distributed in the Eurasian continent, from north-eastern Europe to far eastern Russia. In North America, four groups have been identified among the extant brown bears.

Phylogenetic analyses showed that the brown bear population on Hokkaido Island, Japan, comprises three lineages, the central, eastern and southern lineages, and that these lineages differ in the proportions of the skull. In summary, there is a possibility that the southern Hokkaido lineage groups, with North American lineage, and Tibetan brown bears will be recognized as distinct lineages.

To elucidate the phylogenetic status and migration history of the Himalayan brown bears with the information available from around the world on the brown bear, it is important to get the mtDNA data of the Himalayan brown bear. Unfortunately we do not have any information on the mtDNA of the Himalayan brown bear, which is distributed in India and Pakistan. Therefore, the team aims to generate mtDNA data in the proposed study, which will help us understand the phylogenetic history of the Himalayan brown bear and its maternal lineages.

WII has appropriate facilities for preserving tissues, blood, faecal material and hair. All the samples were catalogued and the latitude and longitude of the locations where they were collected were noted. The Bombay Natural History Society, Mumbai has been requested to provide biological samples (skin and hairs).

ACADEMIC & TRAINING ACTIVITIES

Academic programme

XIV M.Sc. in Wildlife Science

During the period of report, the M.Sc. students were taken to various protected areas/wildlife sanctuaries/national parks of Gujarat and Madhya Pradesh from 23 March to 5 April 2014. The students were taken to Kedarnath Wildlife Sanctuary and the buffer zone of Nanda Devi Biosphere Reserve for the High Altitude Ecology & Techniques Tour from 4 to 13 May 2014. The teaching inputs for Semester III started from July 2014. The students were taken to Sathyamangalam, Mudumalai and Periyar Tiger Reserves, Pampadam Shola National Park, Valkadu, Gulf of Mannar, Kurusadai, Dhanushkodi and Nallathani Islands, SDMRI and coral restoration sites in Tuticorin from 2 to 22 October 2014 as part of the Conservation Practice & Management Tour. As part of activities of Semester IV, the students proceeded for field studies of dissertation projects in different states in the first week of December 2014.

The titles of the dissertation proposals of the students are as follows:

Name of the student	Dissertation topic
Aneesh C.R.	Riverine habitats under changing landuse: A resource selection study of smooth-coated otter *Lutrogale perspicillata* Geoffroy, 1825 in Kabini river and tributaries
Dipak Anand	Vegetation structure, distribution and carbon sequestration potential of mangrove along soil salinity gradient in Coringa Wildlife Sanctuary, Andhra Pradesh
Pallavi Surendra Ghaskadbi	A whistle amongst growls: Dholes in a multi-predator system in dry deciduous forests of India
Keshab Gogoi	Factors governing the spatial density and distribution of Asiatic lion *Panthera leo persica* in Gir protected area
Devanshi Vijay Kukadia	Avian responses in mangrove forests to varying landscape effects in coastal Gujarat
Pragya Aishwarya Lama	Activity patterns and food habits of Phayre's leaf monkey *Trachypithecus phayrei phayrei* in free - ranging and captive conditions in Sepahijala Wildlife Sanctuary, Tripura
Leela Prasad Nadendla	Resource selection, abundance and conservation of smooth-coated otters in and around Coringa Wildlife Sanctuary
Harshvardhan Singh Rathore	Responses of leopard to varying density of tigers in Rajaji National Park
Preeti Sharma	Toads on roads: Effect of road barrier on the movement ecology of common Asian toad
Animesh Talukdar	Assessing prevalence of parasitic diseases in swamp deer *Rucervus duvaucelii* - livestock interface
Nikit Sanjay Surve	Ecology of leopard in Sanjay Gandhi National Park, Maharashtra with special reference to its abundance, prey selection and food habits
Varsha Raj M.	Assessing population status, roost site selection and fruit damage by the Indian flying fox *Pteropus giganteus* in southern Karnataka
Benjamin Ng Nakho Ziipoa	Impacts of land use practices on diversity and abundance of bee forage plants in Senapati district of Manipur

M.Sc. Dissertations Supervised by WII Faculty Members

Acharya, I.P. 2014. **Ungulate distribution, abundance and habitat use in Phibsoo Wildlife Sanctuary, Bhutan.** Forest Research University, Dehradun. Supervisor: Dr. S. Sathyakumar.

Debojyoti Dutta.2015. **Call characteristics of common Asian toad in Doon Valley.** Forest Research University, Dehradun. Supervisor: Dr. Abhijit Das.

Devi, A. 2014. **Food habits of swamp deer and hog deer in Kaziranga National Park, Assam, India.** Guru Govind Singh Indraprastha University, Delhi. Supervisor: Dr. S.A. Hussain.

Koustuv, Sasaru. 2014. **Morphometric criteria to identify faecal pellets of sympatric ungulate species in Tadoba–Andhari Tiger Reserve, Maharashtra.** Forest Research Institute University, Dehradun. Supervisor: Dr. Bilal Habib.

Sharma, M. 2014. **Plant species composition and aboveground biomass production of wet grasslands of Kaziranga National Park, Assam, India.** Guru Govind Singh Indraprastha University, Delhi. Supervisor: Dr. S.A. Hussain.

Uddalak Tathagato Bindhani.2015. **Warty winders: Individual identity of common Asian toad based on natural wart pattern.** Forest Research University, Dehradun. Supervisor: Dr. Abhijit Das.

Status of Doctoral Research in WII

Ph.D. Degrees Awarded

Bashir, T. 2015. **An assessment of abundance, habitat use and prey selection by carnivores in Khangchendzonga Biosphere Reserve, Sikkim.** Saurashtra University, Rajkot. Supervisor: Dr. S. Sathyakumar.

Poudyal, K. 2014. **Developing spatial database and habitat modelling for ungulates in Khangchendzonga Biosphere Reserve, Sikkim.** University of Calcutta, Kolkata. Supervisor: Dr. S. Sathyakumar.

Raut, N. 2014. **Floristic study with special reference to population status of ethno-medicinal plants in Uttarkashi District, Western Himalaya.** Forest Research Institute University, Dehradun. Supervisor: Dr. G.S. Rawat.

Rautela, D. 2015. **Phylogeny of genus *Berberis* and genetic diversity of its two threatened species across the altitudinal zone in Uttarakhand.** Forest Research Institute University, Dehradun. Supervisor: Dr. G.S. Ginwal. Co-supervisor: Dr. G.S. Rawat.

Singh, P. 2014. **Study of altitudinal and geographical song variation and inter-specific interaction among *Phylloscopus* warblers in the Himalaya.** Forest Research Institute University, Dehradun. Supervisor: Dr. G.S. Rawat. Co-supervisor: Dr. T. Price.

Thounaojam Sanggai Leima 2015. **A study on the people–protected area interface at Keibul Lamjao National Park, Manipur.** Forest Research Institute University, Dehradun. Supervisors: Dr. Ruchi Badola and Dr. S.A. Hussain.

Theses Submitted

Bhatt, P. 2015. **Ecology and management of savanna vegetation in Sariska Tiger Reserve, Rajasthan.** Forest Research Institute University, Dehradun. Supervisor: Dr. G.S. Rawat. Co-supervisor: Dr. K. Sankar.

Dobriyal, Pariva. 2015. **Assessment of provisioning services and recreational value of Nanda Devi Biosphere Reserve.** Saurashtra University, Rajkot. Supervisors: Dr. S.A. Hussain and Dr. Ruchi Badola.

Gupta, S.K. 2014. **Assessment of genetic variation in sambar deer *Rusa unicolor*.** Saurashtra University, Rajkot. Supervisor: Dr. S.A. Hussain.

Registered for Ph. D.

Kumar Suresh. 2015. **Plant diversity gradients along the Himalaya: A comparison between the east and the west.** Saurashtra University, Rajkot. Supervisor: Dr. G.S. Rawat. Co-supervisor: Dr. Trevor Price, University of Chicago.

Singh Sweta. 2015. **Geospatial analysis of forest fragments and their use by wild ungulates in Kailash Sacred Landscape—India.** Saurashtra University, Rajkot. Supervisor: Dr. G.S. Rawat. Co-supervisor: Dr. S. Sathyakumar.

Training Programmes

XXXV P.G. Diploma Course in Advanced Wildlife Management Concluded

The 10-month course concluded on 30 June 2014. During the reporting period, the Management Term Paper Exercise was held at Panna Tiger Reserve in Madhya Pradesh during 6–14 April 2014. The trainees undertook the exercise under the supervision of the faculty members of this institute. The information and data collected were analysed, and a term paper report was prepared by each of them. The Management Plan Exercise was held at Parambikulam Tiger Reserve, in Kerala, during 6–30 May 2014. The officer trainees visited the protected area to carry out this exercise in order to develop and improve their understanding of wildlife communities and ecosystems, the people–park interface and the various intricacies of wildlife management, which invariably involve collecting data on the resource base and analysing it to generate prescriptions for conservation planning. The knowledge assimilated by them during the course is tested in the preparation of a management plan. The officer trainees successfully carried out the field exercise and submitted management plan documents. On 23 June 2014, the *viva-voce* examination for the officer trainees was held at the institute.

All the officer trainees have successfully completed the course, and six of them were awarded the Honours Diploma for securing marks of 75% and above. The valedictory function of this course was organized on 30 June 2014. Dr. Anmol Kumar, IFS, Director General, Forest Survey of India, Dehradun graced the function as the chief guest, and Dr. S.K. Khanduri, Inspector General of Forests (Wildlife), MoEFCC, Government of India spared his valuable time to be the guest of honour. The awards and prizes were presented to the officer trainees by both the dignitaries. The following officer trainees were awarded on this occasion.

Ms. Monali Sen and Ms. G.A.P. Prasuna jointly bagged the institute's gold medal for the "Top Trainee", obtaining the highest aggregate marks in all modules including the field exercise. Ms. Amandeep Kaur received the Wildlife Preservation Society Silver Medal for the "Second in Merit" for obtaining the second highest aggregate marks in all modules including the field exercise. The silver medal for the "Best All Round Wildlifer" for obtaining the highest marks in the Techniques Tour Journal, Management Tour, Management Term Paper, Management Plan and viva-voce was awarded to Ms. G.A.P. Prasuna. Mr. Venkatesh Sambangi won the N.R. Nair Memorial Silver Medal for the best management plan for obtaining the highest marks in the management plan. The Best Management Term Paper A.K. Chatterjee Silver Medal for obtaining the highest marks in the management term paper was given to Mr. M. Abdur Rahman. He also bagged the Silver Medal for the Best Foreign Trainee for obtaining the highest marks amongst the foreign trainees. Ms. Monali Sen also received the Book Prize for the Top Trainee in Wildlife Biology.

Commencement of XXXVI Post-graduate Diploma Course in Advanced Wildlife Management

The XXXVI Post-graduate Diploma Course began on 1 September 2014 with 20 officer trainees. Of these, 16 officers are from 14 Indian states and four are foreign nationals from Bangladesh. Four Indian officers have joined the course after completing their induction training during 2014 as Hari Singh Fellows.

The course has an intense field component, with as many as eight field tours. The officer trainees have undertaken six field tours. The following day trips and field tours/exercises were undertaken by the officer trainees as an integral part of the course for obtaining field exposure. The wildlife orientation training programme at Corbett Tiger Reserve, Kalagarh and adjoining areas was undertaken during the period 22–27 September 2014. The officer trainees were oriented towards wildlife conservation and familiarized with animal tracks and signs. They observed wild animals and birds in the field. They visited Kendarnath Wildlife Sanctuary and Nanda Devi Biosphere Reserve between 27 October and 2 November 2014 for the high-altitude tour. The techniques tour was carried out at Rajaji National Park during 1–15 December 2014. During the tour, the officer trainees were taught various field techniques used to count animals and evaluate habitats and used GPS and camera traps.

During the wetland tour, the officer trainees visited Keoladeo National Park, Bharatpur from 1-3 January 2015 and National Chambal Sanctuary, Dholpur in Rajasthan and National Chambal Wildlife Sanctuary, Morena, in Madhya Pradesh, from 19-25 January 2015. The officer trainees visited Sundarbans Tiger Reserve, Kaziranga National Park, Gibbon

Sanctuary, Jaldapara National Park and Padmaja Naidu Himalayan Zoological Park from 15-27 February 2015 as part of the management tour. They learnt the range of wildlife management strategies and practices related to management of habitats of endangered species, protection of wildlife and control of biotic pressure and wildlife interface conflicts and tourism.

Special Certificate Course in Wildlife Management Concluded

The 3-month Special Certificate Course in Wildlife Management commenced on 1 September 2014. A request from the Bangladesh Forest Department was received by WII for conducting a 3month certificate course. A total of 16 officers of the rank of Wildlife and Biodiversity Conservation Officer and equivalent were nominated for the course under the project "Strengthening Regional Cooperation for Wildlife Protection" by the Government of Bangladesh. The course has been tailored to meet the requirements of the participants.

Kuldeep Chauhan

The participants underwent classroom sessions from 1 September 2014 to 15 October 2014. Theoretical sessions were organized at the institute. These provided an overview of wildlife and management issues. During the course, the following five tours were organized from 16 October 2014 to 30 November 2014: (i) Orientation Tour to Rajaji National Park; (ii) Human Dimensions of Wildlife Management Tour to Rajaji National Park; (iii) Wetland Tour to Bharatpur National Park and National Chambal Sanctuary; (iv) Wildlife Techniques Tour to Kanha National Park; and (v) Wildlife Management Tour to Marine National Park, Jamnagar, Khijadia Bird Sanctuary and Gir Lion Sanctuary, in Gujarat, and Sundarbans Tiger Reserve, Jaldapara National Park and Gorumara Wildlife Sanctuary, in West Bengal.

The participants were evaluated for each module and tour through assignments and written examinations. All the 16 participants have successfully completed the course.

The Wildlife Conservation Gold Medal for Top Trainee and the institute's Medal for Wildlife Management were awarded to Mr. Raju Ahmed. The institute's Medal for the All Round Wildlifer was bagged by Mr. Allama Shibili Sadik.

XXX Certificate Course in Wildlife Management Commenced

The 3-month XXX Certificate Course began on 1 November 2014. WII received an overwhelming response from the various states of the country for this course. Finally, 21 candidates were selected for the course. The officer trainees were from five states of the country (one each from Himachal Pradesh, Haryana and Telangana, two from Meghalaya and 10 from Madhya Pradesh). There were also six officer trainees from Malaysia. Since it is a paid course, the entire training cost has been borne by the respective state governments and the Malaysian Government.

Of the 90 days of training, 35 days were spent in the field and the rest of the time was used for classroom training sessions. During the course, the following tours were organized: (i) For the Orientation-cum-Techniques Tour, the officer trainees were taken to Panna Tiger Reserve in Madhya Pradesh from 23 November to 5 December 2014. (ii) For the Wetland Tour, they visited Keoladeo National Park, in Rajasthan, to understand the various issues related to wetlands. (iii) For the Management Tour, they were taken to several protected areas and zoological parks in Gujarat during 11–24 January 2015. The trainees also visited Corbett Tiger Reserve, Uttarakhand and nearby areas. The officer trainees were assessed for each module.

On 29 January 2015, the *viva-voce* examination was held at the institute. This was followed by an open feedback session. All the officer trainees completed the course successfully, and 16 of them were awarded honours certificates for securing marks of 75% and more. The following medals were given for outstanding performances of the trainees: The institute's Gold Medal for the "Top Trainee" was given to Shri Praveen Sharma; the institute's Silver Medal for the "Best All Round Wildlifer" was given to Ms. Monika Mandloi; the institute's Silver Medal for "Wildlife Management"was given to Shri Shanbormiki Law; and the institute's Silver Medal for the "Best Foreign Trainee" was awarded to Mr. Abdullah Zawawi Bin Yazid.

CAPACITY BUILDING PROFESSIONAL EXCHANGE

WORKSHOPS, SEMINARS AND CONFERENCES ORGANIZED BY WII

A Training Programme on "Veterinary Intervention in Wildlife Management", Dehradun, 2–5 April 2014. The course was organized by WII. The training programme was financially supported by CAMPA funds, Uttarakhand Forest Department and the Environment & Forest Department, Bihar. The workshop was attended by 30 participants, including managers and veterinarians from Uttarakhand and Bihar. The training was organized with the objectives of providing exposure to the participants on various aspects of wildlife health management, enhancing the capacities and capabilities of veterinary professionals in managing wild animals and enabling them to appreciate conservation challenges besides understanding the strategies required for wildlife conservation.

The 4-day training programme included 3 days of theoretical input at the institute and a one-day field visit to Rajaji National Park. Hands-on training on the use of immobilization equipment and a demonstration of the procedures used in studying wild animals, including health management of captive elephants, was provided at Chilla Elephant Camp and Rajaji National Park. The workshop provided an insight into ethical and professional management of wild animals.

Workshop on "Digital Libraries Consortia for MoEFCC Institutions", Dehradun, 2 May 2014. The MoEFCC comprises autonomous institutes (WII, ICFRE, IIFM and GBPHIED), centres of excellence (CEE, CES, SACON, etc.), offices (ZSI, BSI, FSI, IGNFA, etc.) and several collaborative science and technology institutes. A digital library consortium is needed by these institutes for a variety of reasons: (i) to avoid paying multiple times by individual entities for the same e-resources; (ii) to cope with the information explosion; (iii) to meet the diversity of user needs; and (iv) to overcome the financial crunch resulting from the increasing cost of e-resources.

A workshop was organized at WII to discuss the existing library situation and to evolve plans to meet the challenges of planning and managing e-resources by the libraries. The workshop was attended by a total of 27 participants, including 15 members from WII and 12 members from eight MoEFCC institutes. Two resource persons were also invited as guest faculty members for the workshop.

Dr. V.B. Mathur, Director, WII stressed the importance of information technology in the growth of any institution. He suggested that it was necessary to jointly work together with all the institutes of MoEFCC to get good business deals in respect of subscription to e-resources.

Release of "Fifth National Report to the Convention of Biological Diversity (CBD)", New Delhi, 5 June 2014. The preparation of national reports is an unqualified obligation of all countries that are signatories to the Convention on Biological Diversity (CBD). Towards the fulfillment of these reporting obligations, India has prepared the Fifth National Report (NR5). The NR5 elucidates the national status and trends of biodiversity and progress in implementing the National Biodiversity Action Plan and national actions with respect to achievement of biodiversity targets. A team comprising officers from the MOEFCC, the National Biodiversity Authority and WII were involved in the preparation of NR5 through an extensive stakeholder consultation process. This report was released by Shri Prakash Javadekar, Hon'ble Minister of Environment, Forest and Climate Change on 5 June 2014 during the World Environment Day celebrations.

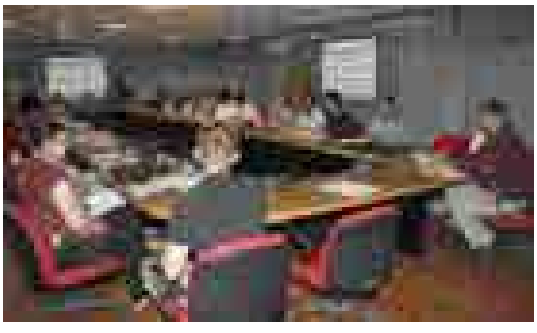
Training Workshop on "Wildlife Health Management", Dehradun, 10–13 June 2014. The training workshop was organized by WII in collaboration with the Uttar Pradesh Forest Department and Department of Animal Husbandry, Government of Uttar Pradesh. The workshop was aimed at enhancing capacities of field veterinarians of Uttar Pradesh in wildlife conservation, with special emphasis on the health management of free-ranging and captive wildlife. A total of 25 field veterinarians working with the Animal Husbandry Department, from 14 districts of Uttar Pradesh, attended the workshop.

The training programme involved 3 days of classroom sessions at the institute and a 1-day field tour to Rajaji National Park. The participants were briefed about the issues and challenges of wildlife conservation, tools and techniques used to capture wild animals, wild animal medicine, general field procedures, wildlife forensics and recent advances in wildlife research. The field component included exposure to various drug delivery systems, including a hands-on exercise on dart preparation and target practice, health management of captive elephants at Chilla Elephant Camp, Rajaji National Park and an orientation visit to Rajaji National Park. Input was provided by eminent resource faculty members from both within and outside the institute.

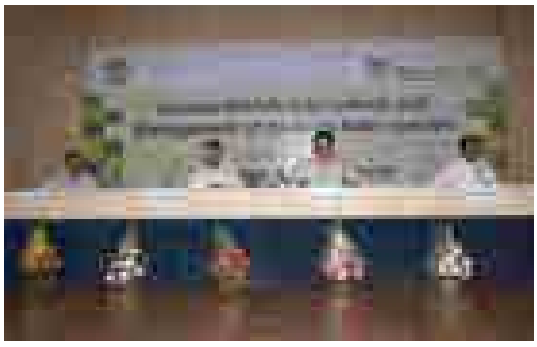
Two-day Training Workshop for Indian Forest Service Officers on "Management Effectiveness Evaluation of Protected Areas",Dehradun, 17–18 July 2014. The workshop was sponsored by the MoEFCC, Government of India. A total of 17 officers participated in the workshop. There were nine sessions in the course, including "Management Effectiveness Evaluation (MEE) Framework", "Management Effectiveness Evaluation (MEE) of Tiger Reserves (2005–2010)" and "MEE of Tiger Reserves 2012–2015".

Six groups of participants and WII faculty members were made for six elements of the MEE framework for discussion. They made their presentations on group work. In all, six participants made group presentations. The background material was also supplied to the participants:"MEE of Tiger Reserves, Process and Outcomes"; "Review of Tiger Reserves by IUCN 2006"; "IUCN: Evaluating Effectiveness - A Framework for Assessing Management Effectiveness of Protected Areas", 2nd edition, by Marc Hockings et al;"Technical Manual for MEE of National Parks and Wildlife Sanctuaries for 2012–2013"; and some more.

Workshop on "Open Standards for the Practice of Conservation", Dehradun, 21–22 July 2014.WII, in collaboration with experts from the Colarado State University, Conservation Coaches Network and the Nature Conservancy, organized this workshop. The Conservation Measures Partnership (CMP) has worked over the past decade to combine principles and best practices in adaptive and results-based management to create the "Open Standards (OS) for the Practice of Conservation". The workshop comprised two components, the introductory seminar, which was attended by 42 participants, and the workshop, which was attended by 22 participants (faculty members, researchers and M.Sc. students). The workshop gave an overview of OS as a best conservation practice, highlighted the benefits and provided information on various resources such as websites and organizations. The participants were introduced to the benefits and uses of the OS methodology and established first steps in a conservation management plan for Khiron Valley, a biodiversity-rich high-altitude site in the western Himalaya. The OS brought together common concepts, approaches and terminology in conservation project design, management and monitoring to help biologists and field managers improve the practice of conservation. A follow-up online survey was carried out to assess the effectiveness of this workshop. The participants appreciated the OS methodology and expressed keen interest in learning more about the same.



Workshop on "Human–Wildlife Interactions and Management of Invasive Alien Species", Dehradun, 23–24 July 2014.WII organized the workshop. Dr. V.B. Mathur, Director delivered his welcome address and drew the attention towards the title of this workshop, wherein the term *human–wildlife interactions* was used instead of the commonly used *human–wildlife conflicts.* He said that the term *interaction* implies both negative and positive associations between humans and wildlife. He emphasized that *preventative* strategies could be used to reduce the negative impacts of human–wildlife interactions and may be in the form of change of land use and cropping patterns, guarding and monitoring livestock and voluntary relocation of human populations in areas of intensive



wildlife conflicts. Dr. R.B.S. Rawat, Former Principal Chief Conservator of Forests & Head of Forest Force, Government of Uttarakhand also graced the occasion and delivered the opening remarks.

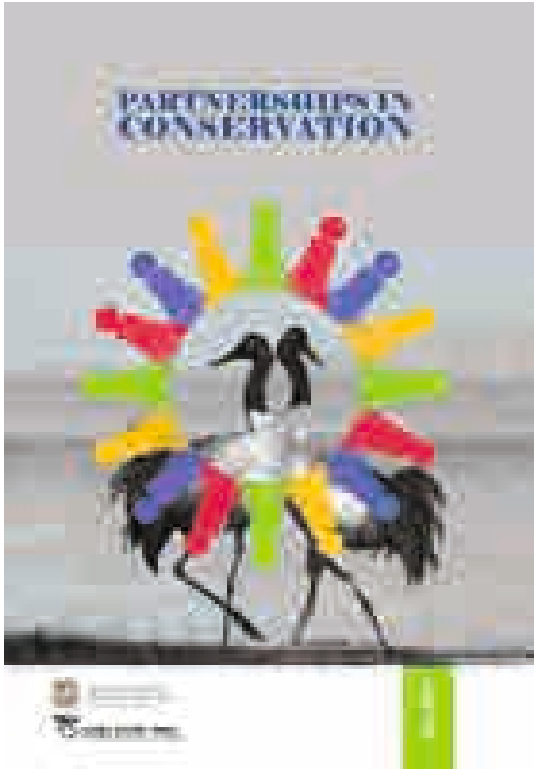
Biodiversity Concerns and Human Well-being: Towards Landscape Approach, Thiruvananthapuram, Kerala, 28–29 July 2014. The objectives of the workshop were to (i) sensitize the participants about the relevance of the landscape approach for biodiversity conservation and human well-being; (ii) discuss and debate on existing experiences of linking biodiversity conservation and community livelihoods; and (iii) evolve the framework (policy, administrative, institutional and planning) required for effective implementation of the landscape approach.

It was organized by WII in association with the Kerala Forest and Wildlife Department. A total of 76 participants attended the workshop.

Meeting on "Developing Partnerships and Funding Conservation Initiatives under Corporate Social Responsibility (CSR)", New Delhi, 13 August 2014. A meeting with the representatives of public sector undertakings (PSUs) and Chief Wildlife Wardens was held in Indira Paryavaran Bhawan, MoEFCC under the chairmanship of Dr. S.S. Garbyal, Director General of Forests & Special Secretary to Government of India.

Dr. S.K. Khanduri, Inspector General of Forests (Wildlife), MoEFCC, in his opening remarks, explained the purpose and importance of the meeting that was being convened for the first time to initiate a dialogue with the representatives of PSUs for seeking their active cooperation in the task of conservation of endangered species. Dr. V.B. Mathur, Director, WII gave an overview of the institute's mandate and activities. He informed the participants that MoEFCC has identified 16 terrestrial and six marine species that require immediate conservation/management interventions and for which species recovery plans have been prepared or are being prepared. Effective implementation of these plans will require active cooperation and financial support from PSUs.

A document titled *Partnership in Conservation* was released on this occasion (http://wii.gov.in/images//images/documents/CSR_Partnerships_Conservation.pdf). The document provides details of the initiatives needed to strengthen field conservation. Twenty representatives from 11 public sector units (PSUs) and 11 Chief Wildlife Wardens or their representatives participated in this meeting.



X Internal Annual Research Seminar (IARS), 18-20 August 2014 **and XXVIII Annual Research Seminar (ARS) of WII, Dehradun,** 21 August 2014.

The X Internal Annual Research Seminar (IARS) was chaired by Shri Vinod Rishi, Former ADG (WL), MoEF, Government of India, New Delhi. During the IARS, a total of 47 presentations were made by research fellows and faculty members of the institute under three categories in 10 technical sessions: Biodiversity and drivers of change; Studies on avifauna; Ecology of large mammals and wildlife techniques; Conservation genetics and bio-informatics; Conservation and development; Park–people interface; Species communities & landscape ecology; Large carnivores and their prey; Conservation genetics & *ex-situ* conservation; and Diversity and distribution of flora and fauna. The following were adjudged as the five best oral presentations, and the researchers were awarded book prizes:

Best Presentation Awards

X Internal Annual Research Seminar

I Stotra Chakrabarti
A new home for lions?

II Sutirtha Dutta
Prioritizing, planning and assessing the recovery of bustards

III Nishant Kumar
Breeding ecology of an urban raptor, Black Kite, *Milvus migrans govinda* in Delhi

IV Ankita Bhattacharya
Developing habitat suitability maps for key mammalian species for Askot landscape, Uttarakhand

V Amrita Laha
An assessment of the socio-economic status of local communities for conservation planning: A case study of Gori valley, Askot landscape, Uttarakhand

The XXVIII Annual Research Seminar of the Institute was chaired by Prof. R. Sukumar, Chairman, Training, Research and Academic Council (TRAC) of WII. A total of 12 presentations were made by the faculty members of WII, showcasing the outcome of the specific research studies conducted by them during the last 5 years or so, in four technical sessions: Ecological studies; Conservation and development; Long-term research on large mammals and re-introduction; and Forensics in wildlife conservation and veterinary interventions.

About 350 delegates attended the ARS, including the Principal Chief Conservators of Forests, Chief Wildlife Wardens and other senior officials

representing state forest departments, delegates representing NGOs, scientists, wildlife experts, faculty members, researchers, M.Sc. students of the institute and IFS probationers from Indira Gandhi National Forest Academy, Dehradun.

In the concluding session, comments on the ARS were made. Dr. Sukumar, Chairman, TRAC mentioned that the faculty members have provided a history of the breadth of projects taken up by the institute during the ARS. Dr. V.B. Mathur, Director, WII emphasized on how the institute is also moving from a protected area-based approach to a landscape level approach', which was highlighted in the Dean's presentation and represented in the awards given to the best presenters during the IARS. He remarked that a change in the structure of the ARS had been attempted for the first time and that he was happy to have received good feedback, with people appreciating having been able to learn about the research being carried out at WII during the past 5 years or so.

Training-of-Trainers Workshop on "Strategic Environmental Assessment (SEA)", Dehradun, 2–4 September 2014. Considering the potential usefulness of the SEA tool for land use planning, the Federal Agency for Nature Conservation (BfN) of Germany funded a project on "Land Use Planning and Strategic Environmental Assessment" within the framework of the CBD COP 11 Presidency. This project was jointly implemented by GIZ and WII. One of the objectives of this project was raising awareness and development of human capacities in India for improving the adoption of integrated planning instruments such as SEA.

The workshop had the following objectives: (i) to provide technical knowledge on the concepts and approaches of SEA and share international experiences with its application; (ii) to provide an overview of the main conceptual and methodological approaches of SEA applicable in the Indian context; (iii) to increase practical knowledge for building SEA through case work and illustrate the benefits of SEA through case examples; (iv) to familiarize the participants with interactive training methods, based on the "Experiential Learning Cycle" (adult learning) and the Harvard Case Methodology, as well as presentation and moderation/facilitation skills; and (v) to enable the participants to deliver future SEA training.

The course was organized by WII and the *Deutsche Gesellschaft für Internationale Zusammenarbeit* (GIZ). A total of 15 training providers, environmental and planning experts and experts from the consulting sector (EIA consultants)) attended the workshop.

Capacity Building Workshop on "Understanding Human–Wildlife Conflict and Its Management", Dehradun, 15–30 September 2014. The workshop was organized with funding support from the Gujarat Forest Department. In all, 22 frontline staff members of the Gujarat Forest Department took part in the workshop. The training workshop was organized by WII to enhance the capacity of the Gujarat Forest Department in conflict resolution strategies. The workshop was aimed at providing exposure to various aspects of human–wildlife conflict and its management and to enable the participants to appreciate the diverse and difficult conservation challenges so as to create a better understanding of the strategies used for effective conservation management.

The 15-day training included both theoretical and field input. The theoretical sessions were organized at WII. The field component included an orientation visit to Rajaji National Park to highlight challenges in managing wild animals and wild habitats. The second component of the field tour was organized at

Shimla to understand wildlife management initiatives being carried out in the state. The third component of the field tour included visits to various wildlife facilities at Agra and a visit to the Elephant Rehabilitation Centre and Agra Bear Rescue Facility of Wildlife S.O.S. The last component of the field tour included a visit to various facilities and institutions in Chennai. The concluding session of the workshop was held on 29 September 2014 at Guindy National Park. Dr. H. Basavaraju, Additional PCCF (WL), Tamil Nadu was the chief guest and presented certificates of participation to the participants.

21st Meeting of the Governing Board (GB21) of the GBIF and Associated Events, New Delhi, 16-18 September 2014. Global Biodiversity Information Facility (GBIF), MoEFCC and WII organized the 21st meeting of the governing board (GB21) of the GBIF and associated events at India Habitat Centre, New Delhi, India. In all, 100 delegates from 32 countries and four international organizations and other GBIF participants attended the meeting. Shri Prakash Javadekar, the Hon'ble Minister of Environment, Forest & Climate Change (Independent Charge), Government of India inaugurated the meeting on 16 September 2014.

The GBIF Public Symposium took place on 17 September and featured a series of dynamic presenters, who highlighted developments in GBIF's infrastructure and community, as well as innovative research uses of GBIF-mediated data, offering a broad overview of recent developments in biodiversity informatics and its benefits to society.

Stakeholder Workshop on "Strategic Environmental Assessment (SEA)", GIZ, New Delhi, 10-12 November 2014. As a follow-up of the first successful ToT workshop jointly organized by GIZ and WII in Dehradun, the second capacity building effort involved organizing a stakeholder workshop on strategic environmental assessment (SEA) under the project "Land Use Planning and Strategic Environmental Assessment" within the framework of the CBD COP 11 Presidency, which was jointly implemented by GIZ and WII. As one of the major outputs of the project was the development of "training resources for furthering the uptake of SEA in the region", the workshop aimed to test and validate the learning resources.

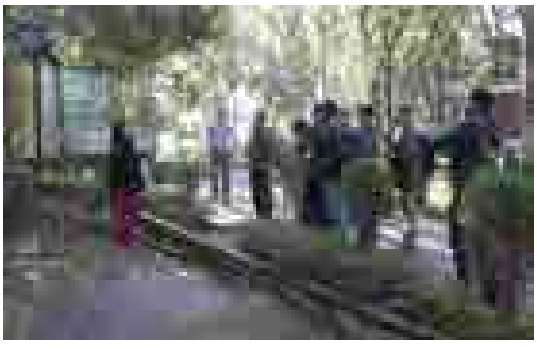
The workshop has the following objectives: (i) to "road-test" the Best Practice Guidance Manual; (ii) to provide an overview of the main conceptual and methodological approaches of SEA that could be applied in the Indian context; (iii) to increase practical knowledge about the practice of SEA through case work; and (iv) to illustrate the benefits of SEA through real examples. It was organized by WII and the *Deutsche Gesellschaft für Internationale Zusammenarbeit* (GIZ).

The workshop was targeted at government representatives from different ministries and departments; environmental and planning experts of public administration and research institutions; experts from the consulting sector such as EIA consultants, planners and academia; and NGO representatives/civil society.

Biodiversity Concerns and Human Well-being: Towards Landscape Approach, Pachmarhi, Madhya Pradesh, 17–19 November 2014. The objectives of the workshop were to (i) disseminate the core concept of the landscape approach for biodiversity conservation; (ii) discuss and debate on the need for, impediments to and bottlenecks encountered in putting this approach on the ground; (iii) share existing experience with linking biodiversity conservation and sustainable livelihoods; and (iv) guide the evolution of the framework (policy, administrative, institutional and planning) required for effective implementation of the landscape approach in the Satpura landscape.

It was organized by the Madhya Pradesh Forest Department in collaboration with WII. In all, there were 100 participants at the workshop.

Workshop on Master Planning for Zoo Education, Dehradun, 15-18 December 2014. WII was entrusted with the task of organizing a training-cum-plan development workshop for identified zoos in the country. The workshop was attended by managers and personnel from 13 identified zoos.



Dr. V.B. Mathur, Director, WII shared his thoughts on the *in-situ* and *ex-situ* approaches to conservation and deliberated on the role zoos can play in conservation. He also emphasized the research needs for developing education plans and suggested the use of visitor feedback as a tool to understand site-specific needs.

Shri B.S. Bonal, IFS, delivered the keynote address and addressed various issues, ranging from continuity of personnel at zoos to financial and policy aspects of the conservation education activities of zoos. He concluded his address by highlighting the various treaties signed by the country that emphasize the importance of conservation education and the role zoos need to play and requested the participants and resource faculty to work towards the development of education plans for participating zoos.

The format for the visitor use management master plan was discussed and finalized. Based on the format, the participants prepared the plan for their respective zoos, with inputs from resource persons, during the workshop.

Workshop on "Wireless Sensor Networks for Protection of Wildlife and Human", Dehradun, 20 December 2014, and **Follow-up Meeting,** 21 December 2014. A workshop was organized at WII as efforts to enable the meeting of the project partners involved in the Indo-US collaborative project "Wireless sensor networks for protection of wildlife and humans" and for sharing the progress of the project and follow-up efforts with key stakeholders, namely, MoEFCC and selected state forest departments. The participants included the project team from Indian Institute of Information Technology, Allahabad (IIITA); Indian Institute of Science, Bangalore (IISc); Ohio State University, USA (OSU); senior officials from Project Elephant and Project Tiger; officials from the Uttarakhand Forest Department; representatives of Wildlife Trust of India and World Wide Fund for Nature - India; and faculty members and researchers of WII.

Dr. V.B. Mathur, Director, WII addressed the participants and elaborated the relevance and challenges in wild management that require technological inputs, keeping in view the regulations prevailing in the country. Shri Vinod Rishi, former Additional Director General, Ministry of Environment & Forests explained the way the technology has been used in wildlife management. He explained a few cases where such options are critically required. During the technical session, Prof. M. Radhakrishna, of IIITA, Dr. Anish Arora, of OSU, and Mr. Ravi Teja and Mr. Bharat Dwivedi, of IISc, made presentations. The presentations were primarily focused on "pervasive wireless sensor network technology for forest, wildlife and human protection". The technology is an integration of four components (an optic fibre sensor, radar and passive infrared (PIR) sensors. Shri S.S. Bist, former Director of Project Elephant, MoEFCC and currently Emeritus Professor at WII, suggested that this technology could be used in the management of captive elephants, monitoring wild animals and systems to warn people about crocodiles so that they can be kept away from those places.

A follow-up meeting was held on 21 December 2014 wherein Dr. V.B. Mathur, Director, WII, Shri R.K. Srivastava, Director, Project Elephant, Prof. M. Radhakrishna, Dr. Anish Arora, Dr. Anil K. Singh and Dr. K. Ramesh participated. The primary objective of the meeting was to take stock of the situation and plan the future course of action. After the discussion, it was decided that the activities might be redefined to meet immediate challenges such as elephant deaths and human–wildlife conflict issues while continuing the efforts in Panna and other tiger reserves. A project may be developed for submission for funding to Project Elephant with the following components: (i) revisiting elephant corridors and movement patterns, involving remote sensing and GIS tools, GPS/satellite telemetry and three-dimensional mapping of vulnerable sites for technological solutions; (ii) pilot implementation of wireless sensor networks in Rajaji National Park and North Bengal Forest Division; (iii) up-scaling activities for resolving human–wildlife conflicts on roads, railway tracks and agricultural areas in the priority sites across the country. The project will be

submitted by WII, involving all stakeholders and interested parties, and will include both technologists and biologists.

Attachment of Officer Trainees of Indian Revenue Service (Customs & Central Excise) Group-A (65th Batch) with WII, Dehradun, 5–16 and 19–30 January 2015. The training module aimed at sensitizing the young officers of the 65th batch of the Indian Revenue Service (Customs & Central Excise) towards the wildlife trade in the country and their role in checking it. The course was attended by a large number (111 officer trainees) in two groups.

Various inputs including introduction on importance of biodiversity and its conservation, status of endangered species including flagship species like tiger and it's monitoring, special inputs on illegal trade in wildlife articles including butterflies, *shahtoosh,* rhino horn, skins, and tiger bones. Inputs were given on the role of wildlife forensics in dealing with wildlife cases. The officer trainees were also given basic information on the implementation of the Wildlife Protection Act, 1972, CITES and other international conventions. Most of the inputs were provided by the senior faculty members of the institute and guest speakers from esteemed organizations.

The officer trainees were provided an opportunity to interact with the IFS Probationers at Indira Gandhi National Forest Academy to improve inter-service coordination. A visit to the Forest Research Institute was also arranged for the officer trainees. Apart from being provided classroom inputs, the officers were also taken to Corbett Tiger Reserve. Jungle safaris in the Dhikala and Bijrani areas of Corbett Tiger Reserve sensitized them towards flagship and keystone species. The young and enthusiastic officer trainees had the privilege of interacting with the top officials of the tiger reserve.

Special Certificate Course on "Coastal and Marine Biodiversity and Protected Area Management", Tarkarli, Malvan, Maharashtra, 12 January to 6 February 2015.The "Conservation and Sustainable Management of Coastal and Marine Protected Areas (CMPA)" project of the Indo-German Biodiversity Programme of GIZ aims at strengthening capacities of key training and learning organizations relevant to marine protected areas (MPAs). In this context, the special certificate course for field-level staff members of the forest departments at the Indian Institute of Scuba Diving and Aquatic Sports (IISDA), at Tarkarli, in Malvan, Maharashtra was jointly organized by WII and *Deutsche Gesellschaft für Internationale Zusammenarbeit* (GIZ) GmbH. This course was intended to enable the participants to have a sound understanding of the concepts and issues related to managing coastal and marine biodiversity, coastal and marine protected areas, ecological and socio-political contexts, conservation approaches and the legal–policy framework between terrestrial and coastal marine protected areas as well as to acquire the necessary skills to carry out assessment and monitoring of coastal and marine habitats and species, prepare field reports and develop, under supervision, operational plans for MPAs based on management effectiveness guidelines.

A total of nine participants from Tamil Nadu, Maharashtra, Andhra Pradesh, Lakshadweep Islands, and Andaman & Nicobar Islands participated in this 1 month course. The course curriculum and training methodologies were developed exclusively for this course. They were pilot tested and refined for future courses.

Training Workshop on "Wild Animal Capture and Restraint", Dehradun, 2–4 February 2015. It was sponsored by the Uttarakhand Forest Department. A total of 33 forest officials and field veterinarians from Uttarakhand participated in the workshop. The workshop was jointly organized by WII and the Uttarakhand Forest Department. The workshop was aimed at enhancing the capacities of the forest officials and field veterinarians from Uttarakhand in wild animal capture and restraint. A total of 30 field staff members including Sub-Divisional Officers, Range Officers and Forest Guards from various forest divisions and field veterinarians of the Animal Husbandry Department attended the workshop.

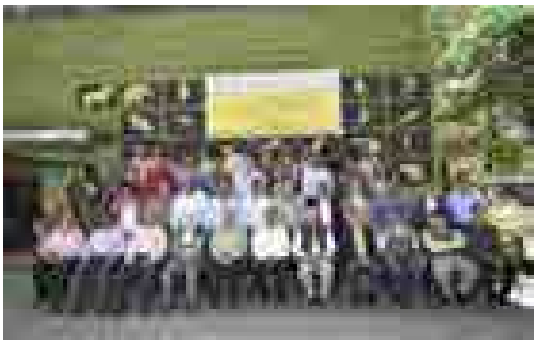
The training programme included a two-day classroom session at Corbett Wildlife Training Centre, Kalagarh and one-day of field inputs at the Wildlife Transit Rehabilitation Centre, Chidiyapur. The participants were briefed about issues and challenges of wildlife conservation, wild animal capture techniques, field emergencies and their management and general field procedures. The field component included exposure to various drug delivery systems including hands-on exercises in dart preparation and target practice besides a live demonstration of immobilization of a leopard at the Wildlife Transit Rehabilitation Centre, Chidiyapur.

Inputs were provided by WII faculty members and forest officials from the Uttarakhand Forest Department.

Three Week Compulsory Training Course on "Wildlife Management for Indian Forest Service Officers", Dehradun, 16 February to 5 March 2015.The course was conducted by WII for the IFS officers sponsored by the MoEFCC, Government of India, New Delhi. A total of 17 participants attended the course. This course was designed to meet the following objectives: (i) to provide an exposure to the current situation in wildlife and biodiversity conservation; (ii) to provide a foundation of modern concepts in wildlife science; (iii) to facilitate the understanding of various conservation approaches and good wildlife management practices; (iv) to enable participants to appreciate the conservation challenges and the strategies to be developed for effective wildlife and biodiversity conservation; and (v) to enhance skills in the latest tools and techniques of wildlife management that are essential contributors to conservation practices in the field.

The course included classroom sessions and field visits to Rajaji National Park and Corbett Tiger Reserve. A 3-day techniques tour was organized to Rajaji National Park during 26–28 February 2015 to expose the officers to a range of techniques such as line transects, sign surveys and camera traps. A 2-day management tour was organized during 2–5 March 2015 to Corbett Tiger Reserve, Ramnagar to expose the participants to various management issues and practices such as habitat management, water regime management, fire management and protection measures.

Workshop on Conservation and Management of Natural World Heritage Sites in Periyar Tiger Reserve, Thekaddy, 23–24 February 2015. A 2 day workshop on "Conservation and Management of World Natural Heritage Sites in the Western Ghats" was held at Thekkady, Periyar Tiger Reserve, Kerala. The workshop was jointly organized by the MoEFCC, the Kerala Forest Department, Periyar Foundation and the UNESCO Category 2 Centre at WII to facilitate experience sharing amongst site managers of the World Heritage Sites in the Western Ghats and to initiate the development of a roadmap for holistic management of natural heritage. Representatives from the states of Kerala, Karnataka, Tamil Nadu and Maharashtra participated in this workshop. Shri Vinod Ranjan, ADG (WL), MoEFCC delivered the valedictory address of the workshop.



IIRS User Meet, Indian Institute of Remote Sensing, Dehradun, 26–27 February 2015. The objective of the workshop was to apprise the participants about advances in space applications, remote sensing and GIS technological advancements *vis-à-vis* the role of the IIRS in research and capacity building. The workshop was organized by WII.

The user meet enabled and explored new opportunities with user organizations in government, non-government and private sectors dealing with infrastructure planning, rural and urban development, environmental conservation, natural resources and disaster management. It also provided an interface with the remote sensing and GIS industry for newer avenues and explored the placement opportunities of students. The distance learning programmes of IIRS, under EDUSAT, and improvements in the course content and delivery mechanism were also discussed.

Training Workshop on "Wildlife Health Management", Dehradun, 9–13 March 2015. The Uttar Pradesh Forest Department sponsored this workshop. In all, 25 field veterinarians of Uttar Pradesh attended the workshop. The workshop was organized by WII in collaboration with the Uttar Pradesh Forest Department and Department of Animal Husbandry, Government of Uttar Pradesh. It was aimed at enhancing the capacities of field veterinarians of Uttar Pradesh in wildlife conservation with special emphasis on management of the health of free-ranging and captive wildlife. The workshop was attended by 25 field veterinarians from different regions of Uttar Pradesh.

The training programme involved 4 days of classroom sessions at the institute and a one-day field visit to Rajaji National Park. The participants were briefed about the issues and challenges of wildlife conservation, tools and techniques used in capturing wild animals, wild animal medicine, general field procedures, wildlife forensics and recent advances in wildlife research. The field component included exposure to various drug delivery systems, including a hands-on exercise in dart preparation and target practice and health management of captive elephants at Chilla elephant camp, Rajaji National Park.

National Mission on "Sustaining the Himalayan Ecosystem (NMSHE) Project Inception Workshop", Dehradun, 23–24 March 2015. Eight National Missions have been launched under the National Action Plan on Climate Change (NAPCC) by the Government of India to study and monitor the impacts of climate change. The NMSHE is being coordinated by the Department of Science and Technology (DST). WII has been identified as the Task Force Coordinator of "Fauna and Micro-flora". WII's project "Assessment and Monitoring of Climate Change Effects on Wildlife Species and Ecosystems for Developing Adaptation and Mitigation Strategies in the Indian Himalayan Region" has been recently initiated. The project inception workshop was held at WII, Dehradun to discuss the process of networking for research and data sharing to enable finalization of the research plan. This workshop was attended by 39 participants including academicians, managers, scientists and researchers associated with conservation of Himalayan biodiversity and sustainable management.

Dr. V.B. Mathur, Director, WII described the wonders of the Himalayan ecosystem and their importance in his opening remarks. Dr. S. Sathyakumar, Nodal Scientist, NMSHE introduced the WII–NMSHE project, including the objectives, proposed study areas, tentative methodologies, project deliverables and project monitoring framework, with specific outputs within specified timelines.

The first session of the workshop was on "Climate change impacts on fauna and their habitats in the Indian Himalayan region". It comprised five presentations on various animal groups, each covering the state of knowledge on climate change impacts and the approach and methodology used in investigations. The next session consisted of three presentations from the remaining animal groups. The workshop consisted of a group exercise. The participants were divided into four groups. Each group was involved in a 3-hour long discussion regarding the methodologies that could be adopted during the field work. Brief descriptions of the presentations and the detailed discussions were presented for improving the methodological approach.

Workshops, Seminars, Conferences and Meetings Attended by WII Personnel

Strategies for Biodiversity Conservation and Rural Livelihood Improvement (BCRLI) in Little Rann of Kutch, Askot, Agasthyamalai and Satpura Landscape, India Habitat Centre, New Delhi, 3–4 April 2014. The objectives of the workshop were to review the activities of the project BCRLI in the existing landscapes of Askot, Uttarakhand and Little Rann of Kutch, Gujarat and to formulate strategies for the new landscapes of Agasthyamalai, Kerala and Tamil Nadu and of Satpura, Madhya Pradesh and Maharashtra. It was organized by MoEFCC, Government of India. Dr. A.K. Bhardwaj participated in the workshop.

Second National Consultation of "Khangchendzonga Landscape Conservation and Development Initiative", Gangtok, Sikkim, 9 April 2014. Dr. S. Sathyakumar participated in this national consultation as an expert and provided inputs for the development of the feasibility report "Khangchendzonga Landscape Conservation and Development Initiative", which was being prepared by G.B. Pant Institute of Himalayan Environment & Development for submission to the International Centre for Integrated Mountain Development.

First Meeting of the International Planning Committee of the Proposed Asia Protected Areas Partnership, Bangkok, Thailand, 24–25 April 2014. The objective of the meeting was to discuss and formulate the strategies of Asian protected area partnerships. Dr. A.K. Bhardwaj participated in the meeting, which was organized by IUCN.

38th Session of the World Heritage Committee, UNESCO in Doha, Qatar, 18–22 June, 2014. The 38th session of the UNESCO World Heritage Committee (WHC) was organized in Doha, Qatar. India is currently a member of the 21 member WHC. The official Indian delegation included representatives of the Ministry of Culture, Archaeological Survey of India, MoEFCC and WII besides the Indian Ambassador to UNESCO. Dr. V.B. Mathur, Director, WII participated in this meeting as part of the official Indian delegation. In this meeting, *inter-alia,* the following items relating to Indian sites were discussed: (a) State of Conservation Report of Manas and Keoladeo World Heritage Sites; and (b) UNESCO Category 2 Centres. The inscription of the Great Himalayan National Park, Himachal Pradesh on the UNESCO World Heritage List was the highlight of the 38th Session of WHC.

Experts Consultation Meeting on Frameworks for Long-Term Environmental Monitoring and Ecosystem Management Framework for Hindukush Himalaya, Chengdu, P.R. China, 11–15 May 2014. Dr. S. Sathyakumar participated in this meeting and provided inputs for the development of the long-term environmental and ecosystem framework for the Hindukush Himalaya that was being prepared by the International Centre for Integrated Mountain Development.

Meeting of Tri-state National Chambal Sanctuary Management Committee, New Delhi, 20 May 2014. As a member of the Tri-state National Chambal Sanctuary Management Committee, Dr. S.A. Hussain attended the meeting held under the chairmanship of the ADG (WL) at Paryavaran Bhawan.

Technical Workshop and Review Meeting of the WII–NINA–GBIF Project "Capacity Building in Biodiversity Informatics", Trondheim, Norway, 20–26 May 2014. The objective of the workshop was to enhance the capacity in biodiversity informatics so as to take policy decisions about biodiversity management and conservation issues, using evidence-based camera trap data. It was jointly organized by Norwegian Institute for Nature Research (NINA) and WII. The workshop and meeting were organized specifically to review the project, solve the technical issues in implementation of the project and explore potential fields of scientific collaboration. Dr. Gautam Talukdar attended the workshop.

First Meeting of the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) Task Force on Capacity Building in Trondheim, Norway, 21–23 May 2014. The first meeting of the IPBES Task Force on Capacity Building was organized in Trondheim, Norway. Dr. V.B. Mathur, Director, WII participated in this meeting. Work done during the meeting was based on the agenda agreed on by the IPBES Bureau and MEP at their third meeting in March 2014.

Visit to Kusheshwar Asthan and Bareila Bird Sanctuary, Bihar, 3–8 June 2014. Dr. S.A. Hussain visited Kusheshwar Asthan and Bareila Bird Sanctuary and provided inputs for management planning of these wetlands.

Global Snow Leopard and Ecosystem Protection Program (GSLEP) Action Planning, Leadership and Capacity Development, Issuk-kul Region, Kyrgyz Republic, 5–11 June 2014. Dr. S. Sathyakumar participated in the GSLEP Action Planning, Leadership and Capacity Development meeting and provided inputs in the various group discussions, formulating strategies and action plans for conservation of the snow leopard.

Meeting on ESZ around Okhla Bird Sanctuary, New Delhi, 9 June 2014. Dr. S.A. Hussain participated in the meeting on ESZ around Okhla Bird Sanctuary, which was held at the Indira Paryavaran Bhawan, Jor Bagh, New Delhi. The meeting was chaired by the Secretary, E&F.

National Training Programme on "Planning & Conducting Environment Audit", Jaipur, 24–25 June 2014. Dr. Asha Rajvanshi conducted a 2 day training workshop on "Planning and Conducting Environmental Audits - EIA and EMS". The training programme was organized by International Centre for Environment Audit and Sustainable Development (iCED). Dr. Rajvanshi made presentations on the following: (i) Environmental Impact Assessment: Relevance for Sustainable Development; (ii) Assessment of Cumulative Impacts of Hydropower Projects on the Wildlife; (iii) Values of Alaknanda and Bhagirathi Basins, Uttarakhand; (iv) Reconciling Conservation and Development: The Concept of Biodiversity Offsets; (v) SEA: A New Generation Tool for Environmental Impact Assessment; (vi) Public Participation in EIA; (vii) Mitigation Options to Encourage Green Developments; and (viii) Framework for Biodiversity-Inclusive Impact Assessment.

Fourth Multidisciplinary Expert Panel and Bureau Meetings of the Intergovernmental Platform for Biodiversity and Ecosystem Services, Bonn, Germany, 8–10 July 2014. The Fourth Multidisciplinary Expert Panel (MEP) and Bureau meetings of the Intergovernmental Platform for Biodiversity and Ecosystem Services (IPBES) were held at Bonn, Germany. MoEFCC, Government of India deputed Dr. V.B. Mathur, Director, WII for this meeting in his capacity as UN–IPBES MEP member.

Gender Integrated Panning Course, Kathmandu, Nepal, 14–18 July 2015. Dr. Gopi G.V. participated and presented a paper at the course, which was organized by International Centre for Integrated Mountain Development.

Consultation Meeting on "Curricula Development on Hydro-diplomacy in the Ganges–Brahmaputra–Meghna River System", Bangkok, Thailand, 15–16 July 2014. Dr. Asha Rajvanshi attended this consultation meeting, which was organized by International Union for Conservation of Nature (IUCN).

Asian Regional Nodes Workshop of the Global Biodiversity Information Facility, Tsukuba, Japan, 17–18 July 2014. The workshop had the following objectives: (i) collaborative scientific initiatives; (ii) content and data mobilization; and (iii) engagement.

The workshop was organized by the National Museum of Nature and Science, Japan. Asia Region encouraged GBIF for continuous financial support for mentoring program to advance closer relationship and informatics in countries of Asia. Asia Region asked GBIF for continuous support for the implementation of regional meeting. Dr. Gautam Talukdar represented WII at the workshop. The Asia nodes agreed that an annual regional meeting is necessary: (i) to increase the consistency in taxonomy for the users; continuous updating of the "backbone taxonomy" is expected. (ii) The Asia region encouraged GBIF to develop software for potentially multi-lingual use. The Asian region is one of the most diverse regions in the world in terms of language, and increasing localized language-based software will greatly help people understand and increase the fitness for use.

23rd Annual General Meeting of SACON Society at Indira Paryavaran Bhawan, Ministry of Environment, Forest and Climate Change, New Delhi, 30 July 2014. Dr. V.B. Mathur, Director, WII participated in the 23rd Annual General Meeting of SACON Society at Indira Paryavaran Bhawan, MoEFCC, New Delhi.

Meeting of Academic Council of the FRI (Deemed) University, Dehradun, 4 August 2014. Dr. V.B. Mathur, Director, WII participated in the meeting of the Academic Council of the Forest Research Institute (Deemed) University, Dehradun.

Meeting of the Standing Committee of National Board for Wildlife (NBWL), MoEFCC, New Delhi, 12 August 2014. Dr. V.B. Mathur, Director, WII participated in the meeting of the Standing Committee of NBWL at MoEFCC, New Delhi, convened under the chairmanship of the Hon'ble Minister of Environment, Forest and Climate Change.

First Meeting of Advisory Committee on World Natural Heritage Matters (ACWNHM), MoEFCC, New Delhi, 20 August 2014. Dr. V.B. Mathur, Director, WII participated in the first meeting of the Advisory Committee on World Natural Heritage Matters (ACWNHM), held at Indira Paryavaran Bhawan, MoEFCC, New Delhi under the chairmanship of the Additional Director General (Wildlife), MoEFCC.

Meeting of the Apex Academic Committee of the Cell on Technology-Based Monitoring of Forests at Indira Gandhi National Forest Academy, Dehradun, 12 September 2014. Dr. V.B. Mathur, Director, WII participated in the meeting of the Apex Academic Committee of the Cell on Technology-Based Monitoring of Forests.

Global Biodiversity Information Facility (GBIF) Governing Board Meeting 21 (GB 21) and Associated Events in India Habitat Centre, New Delhi, 15–18 September 2014. Dr. V.B. Mathur, Director, WII participated in the Global Biodiversity Information Facility (GBIF) Governing Board Meeting 21 (GB 21) and Associated Events.

Sikkim Biodiversity Conservation Project (SBCP) Meeting, Gangtok, Sikkim, India, 18–19 September 2014. Dr. S. Sathyakumar participated in this meeting, which reviewed the progress of SBCP and provided inputs in the development of endangered species conservation projects and biodiversity research and monitoring in the state.

Indo-French Workshop on "Strengthening Capacity for Inventory of Fauna in Biodiversity Hotspots in India and Its Neighbouring Countries", Hyderabad, 14–17 October 2014. This was organized at Laboratory for Conservation of Endangered Species (LaCONES), Hyderabad. The workshop had the objective of initiating interactions between scientists/taxonomists in India and France on ways of promoting and strengthening capacity in inventorying faunas in biodiversity hotspots in India and neighbouring countries. The idea was to share the experiences of scientists in India and other countries to present the approaches used by them and the limitations faced by them in advancing their

research. It was organized by the Indo-French Science Council. Dr. Gautam Talukdar and Dr. Abhijit Das attended the workshop.

The following issues were discussed during the workshop: (i) Faunal inventories should not be restricted only to hotspots. Gap areas and gap taxa are important for faunal surveys and collections. (ii) Administrative and legal limitations should be reformed in order to facilitate making inventories of fauna. (iii) Type specimens are indispensable—the access and sharing of data from them is essential for high-quality taxonomic work. (iv) It is essential to use technology to create platforms for use by taxonomists to strengthen their work and improve the visibility of their work. (v) There is urgency in documenting the fauna. Therefore, the government was urged to create national fellowships for cataloguing biodiversity to encourage upcoming taxonomists and provide financial support for capacity building.

IUCN World Parks Congress (WPC) 2014 in Sydney, Australia, 12–18 November 2014. Dr. V.B. Mathur, Director, WII and Regional Vice-Chair for the IUCN World Commission on Protected Areas (WCPA—South Asia) was invited to participate in the IUCN World Parks Congress at Sydney, Australia and to provide technical contributions to a range of special side events and activities, including the inauguration of the Asia Protected Areas Partnership and the launch of the Protected Planet—Asia Report and the Forum on Protected Areas, Climate Change and Resilience in Asia. Other events in which Dr. Mathur was invited to contribute were the following:

(i) The Kenton Miller Award for Innovation in Protected Areas Management— invited as a member of the selection panel.

(ii) Technical sessions IVa and IVb: Financing Protected Areas— invited to be a lead speaker on "Financing for Biodiversity Conservation and PA Management".

(iii) Technical Session on "Responding to Climate Change"— invited to present a paper on "Participatory Climate Change Adaptation Plans for Natural World Heritage Sites in India".

(iv) Technical Session on "Protected Area Management Effectiveness"— invited as member of the expert discussion panel on "Protected Area Management Effectiveness Systems".

(v) Launch of e-book "The Protected Areas: Governance and Management Book"— invited to be present in this side event as lead author of the chapter "Managing Threats in Protected Areas".

(vi) Side event on "Role of Universities/Scientific Institutions in Protected Area Management"— invited to this event to provide inputs on "Training in Protected Area Management".

(vii) Closing Sub-plenary— invited to present the recommendations of Stream I, "Reaching Conservation Goals".

The World Park Congress is organized once in ten years and is one of the world's most influential gatherings of people involved in protected area management. The congress served as a mid-term Aichi Biodiversity Target 11 summit, providing conservation leaders the opportunity to take stock of progress and suggest new, bold approaches for moving forward on protected areas and biodiversity conservation. This event showcased India's recent contributions in protected area management, conservation of natural heritage and evaluation of management effectiveness.

First Meeting of the Committee to Review the Implementation of the National Wildlife Action Plan (2006–2016) and to Develop the National Wildlife Action Plan 2017–2031, New Delhi, 24 November 2014. Dr. V.B. Mathur, Director, WII participated in the first meeting of the committee to review the implementation of the National Wildlife Action Plan (2006–2016) and to develop the National

Wildlife Action Plan 2017–2031 under the chairmanship of Shri J.C. Kala, former Secretary to Government of India.

Regional Workshop on "Access and Benefit Sharing Mechanism in the Trans-boundary Landscapes", Dehradun, 25–27 November 2014. Dr. G.S. Rawat participated in regional workshop, which was organized by the Uttarakhand State Biodiversity Board and International Centre for Integrated Mountain Development (ICIMOD). This workshop was organized with the objective of sensitizing scientists and natural resource managers to the issues pertaining to the Nagoya Protocol and various action imperatives of member countries towards their commitment to the Convention on Biological Diversity. The workshop was attended by a large number of senior policy makers and scientists from India, Nepal, Bhutan, Bangladesh and Myanmar. Dr. Rawat represented WII at the workshop and took part in panel discussions and group works.

Landscape Workshop, Gandhi Nagar, Gujarat, 26–29 November 2014. The objective of the workshop was to discuss various issues related to landscape management and ecotourism. It was organized by the Gujarat Forest Department. Dr. A.K. Bhardwaj participated in the workshop.

DST–SERB School in Herpetology, Madras Crocodile Bank Trust (MCBT), Chennai, 2–6 December 2014. Dr. Abhijit Das attended the workshop. It was organized by the Madras Crocodile Bank Trust. The DST–SERB Herpetology School was organized at MCBT to train young, enthusiastic students about herpetology.

Eighth Meeting of the ESZ, New Delhi, 3 December 2014. Dr. S.A. Hussain participated in the eighth meeting of the ESZ held at MoEFCC and provided advisory services regarding the declaration of ESZ and regional planning.

Workshop on Landscape Management of KMTR, 17–23 December 2014. The workshop was organized by the Tamil Nadu Forest Department. The objective of the workshop was to discuss the outcomes of the ecodevelopment programme of KMTR and formulate strategies for the coming landscape project under BCRLIP. Dr. A.K. Bhardwaj represented the institute at the workshop.

First Meeting of the Consultative Committee of the Members of Parliament attached to the MoEFCC, Bandipur National Park, Karnataka, 4-5 January, 2015. Dr. V.B. Mathur, Director, WII participated in the first meeting of the Consultative Committee of the Members of Parliament attached to the MoEFCC at Bandipur National Park, Karnataka under the chairmanship of Shri Prakash Javadekar, Hon'ble Minister of State (Independent Charge), Environment, Forest and Climate Change, Government of India.

Third Plenary Meeting of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) in Bonn, Germany, 12–17 January 2015. The Executive Secretary, Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) invited Dr. V.B. Mathur, Director, WII to participate in the third plenary meeting of the IPBES at Bonn. Dr. Sujata Arora, Director, MoEFCC and Dr. V.B. Mathur participated in this meeting as part of the Indian delegation.

Meeting of the Punjab State Board of Wildlife, Chandigarh, 17 January 2015. Dr. S.A. Hussain attended the meeting and provided technical and intellectual inputs.

Workshop on Wetland Conservation and Management, Chennai, 2–3 February 2015. The objective of the workshop was to restore wetlands in Tamil Nadu. It was organized by the Tamil Nadu Forests Department. The workshop was organized to conserve and restore Pallikarani wetland, in Tamil Nadu. The Secretary, Environment, Government of Tamil Nadu chaired the workshop. The Chief Wildlife Warden of Tamil Nadu, wetland scientists and other forest department officials attended the workshop. As a part of the workshop delegation, Dr. J.A. Johnson made a presentation on "Riparian vegetation index: An ecosystem assessment tool for river restoration."

Consultative Meeting on the Conservation of Black-Necked Crane in AP, Dirang, Arunachal Pradesh, 9-10 February 2015. At the request of Shri Ravi Singh, Secretary General, WWF-India, Dr. S.A. Hussain, attended the consultative meeting on conservation of the black-necked crane.

Meeting of Technical Committee of Quality Council of India, New Delhi, 17–18 February, 2015. Dr. V.B. Mathur, Director, WII participated in a meeting of the Technical Committee of the Quality Council of India at the office of NABET, New Delhi.

Field Visit of Sri Lankan Wildlife Officers to Protected Areas of South India, 18–26 February 2015. The objective of the field visit was to impart training to the offices regarding the best practices of protected areas of south India. It was organized by the Tamil Nadu Forest Department. Dr. A.K. Bhardwaj provided inputs during the field visit.

National Seminar on 'Wildlife Diversity in India and the Conservation Challenges', Goa University, 19–21 February 2015. It was organized by the Department of Zoology, Goa University. Key note address on the "Wildlife Diversity in India and the Conservation Challenges" at the national seminar sponsored by Department of Science & Technology on "Life and life processes: Sustainable development". Shri R. Suresh Kumar participated in the seminar.

Education Programme for School Students, Bharatpur, 28 February 2015. Dr. J.A. Johnson participated in the Ghana Bird Fair, organized by the Rajasthan Forests Department for school students, and provided inputs. He made a presentation on "Natural history of birds and fishes of Bharatpur".

Ninth Meeting of the ESZ, New Delhi, 2 March 2015. Dr. S.A. Hussain participated in the ninth meeting of the ESZ, held at MoEFCC, and provided advisory services on declaration of ESZ and regional planning.

IGNFA Techniques Tour at Panna National Park, 7–15 March 2015. As a resource faculty member, Dr. J.A. Johnson provided field inputs for the officer trainees of Indira Gandhi National Forest Academy during the techniques tour held at Panna National Park.

Consultative Meeting on "Forestry Intervention for Cleaning Ganga", Dehradun, 18 March 2015. At the request of the Director, Forest Research Institute, Dr. S.A. Hussain attended the consultative meeting on "Forestry intervention for cleaning Ganga".

Consultative Meeting on "Denotification of Abubshahar Wildlife Sanctuary", Haryana, 22–24 March 2015. Dr. S.A. Hussain participated in the consultative meeting and provided technical and intellectual inputs.

Meeting of Regional Expert Committees for Management Effectiveness Evaluation of National Parks and Wildlife Sanctuaries, New Delhi, 27 March 2015. A meeting of Regional Expert Committees for Management Effectiveness Evaluation (MEE) of national parks and wildlife sanctuaries was held at MoEFCC, New Delhi under the chairmanship of Shri Vinod Ranjan, ADG (WL). Dr. Mathur gave presentations on "Overview of the MEE process" and "MEE framework and criteria: 2015–2016". It was decided that 40 protected areas in the country would be evaluated under the MEE process.

VISITS

Visit of Experts under Indo-German Expert Exchange Programme, Dehradun, 14 October 2014. Under the Indo-German Expert Exchange Programme (IGEP), Prof. Dr. Stefan Heiland, from the Technical University of Berlin (TUB), along with Dr. Dieter Mutz, IGEP Programme Director and Dr. Kerstin Bark, visited WII. The members of the mission discussed with Dr. V.B. Mathur, Director, WII the potential for exploring further exchange and cooperation between India and German experts and identified landscape planning, biodiversity and the Economics of Ecosystems and Biodiversity (TEEB) as areas of mutual interest. The mission members and WII agreed that a promising starting point could be the exchange of students, for instance in the framework of the international master's course offered by TUB or the internships offered by WII within their bachelor's studies, and professional

exchange of scientists and faculty members, resulting in common publications and resource material on impact assessment and next generation tools such as strategic environmental assessment (SEA).

Indo-German Exchange Programme Dialogue, New Delhi, 16 October 2014. An Indo-German Exchange Programme (IGEP) dialogue on Indian and German experiences with integrated planning instruments such as SEA was organized in New Delhi. The IGEP is implemented by GIZ, which organizes expert meetings on a wide range of topics concerning sustainable development and environmental protection to exchange Indian and German experiences in different fields.

This eighth dialogue, with the title "Is India ready for strategic environmental assessment (SEA)?" was opened by the Programme Director, Dr. Dieter Mutz, GIZ. Dr. Asha Rajvanshi was invited to speak on the Indian experiences with SEA. The title of her talk was "Are we ready in India?" She presented an overview of the potential merits of the tools and highlighted the importance of using SEA in mining, road construction and hydropower. The event was attended by representatives from embassies and international cooperation agencies. Shri Jairam Ramesh, former Minister of Environment, Forest and Climate Change, graced the occasion with his presence.

PROFESSIONAL SUPPORT

Collaborations

International Collaboration with GIZ

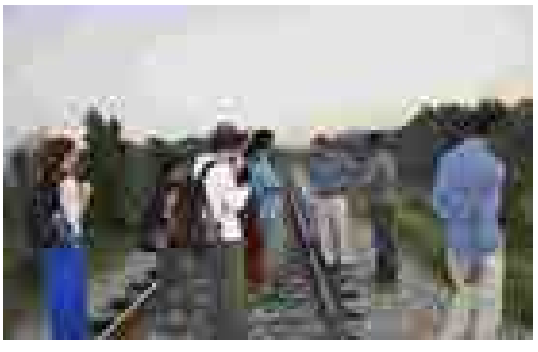
Considering the potential usefulness of strategic environmental assessment (SEA), the Federal Agency for Nature Conservation (BfN) of Germany funded the project "Land Use Planning and Strategic Environmental Assessment" within the framework of the CBD COP 11 Presidency. The objectives of this project were raising awareness and development of human capacities in India for better application of integrated planning instruments, in particular strategic environmental assessment (SEA), to landuse/ spatial and socio-economic development planning to contribute to more environment-/nature-compatible planning, integrating aspects relevant to biodiversity.

Collaboration with the International Centre for Integrated Mountain Development (ICIMOD), Kathmandu, Nepal

As in previous years, WII continued to cooperate/collaborate with ICIMOD while focusing on the conservation and development of Himalayan ecosystems and demonstrating the trans-boundary landscape approach besides being involved in the activities of the Himalayan University Consortium. During the reporting period, WII made a significant contribution towards the development of an implementation plan for the Kailash Sacred Landscape Conservation and Development Initiative. Dr. P.K. Mathur was designated the nodal officer for ICIMOD's activities at WII for coordination of the various activities/programmes undertaken jointly.

International Collaboration with the United Nations University—Institute of Advanced Study (UNU–IAS), Japan

WII entered into an MoU with the United Nations University—Institute of Advanced Study (UNU—IAS), Japan to promote academic exchange, research collaboration and cooperation in biodiversity conservation and sustainable development through training, research, educational activities and dissemination of knowledge.



Under this programme, 11 master's students, accompanied by two faculty members from the UNU–IAS, visited WII during 18–28 May 2014 to undertake short-term field-based studies for their project work. During this period, the students visited Rajaji National Park and were assigned three different components for conducting the study in the national park: (i) well-being of *Van Gujjar* communities after relocation from the park;(ii) organizational changes in the park management in relation to the resettlement of *Van Gujjars;* and (iii) linear infrastructure in the park: mitigation of impacts for conservation of Asian elephants. Members of the WII faculty provided the key inputs in these studies. In addition to this, resources inputs were also provided by the research community at WII and external resource persons. The programme concluded successfully with very positive comments from the visiting faculty members of UNU–IAS about their learning experience and the quality of inputs provided by WII.

Global Biodiversity Information Facility

The Global Biodiversity Information Facility (GBIF) was established in March 2001, as an open ended international coordinating body to promote compilation, linking, standardization, digitization and dissemination of the world's biodiversity data in the form of a distributed open access system, within an appropriate framework for property rights and due attribution. India has signed the third Memorandum of Understanding (MoU) with GBIF for 2012–2017. Realizing the importance of sharing data for improving our understanding of patterns and processes and facilitating informed decision-making, India formulated the National Data Sharing and Access Policy in 2012. The challenge now is to devise efficient access to biodiversity data, share it and add value.

GBIF, MoEFCC and WII jointly organized the 21st meeting of the Governing Board (GB21) of the GBIF and associated events at India Habitat Centre, New Delhi, India from 16 to 18 September 2014. A total of 100 delegates from 32 countries and four international organizations and other GBIF participants attended the meeting. Shri Prakash

Javadekar, Minister of Environment, Forest and Climate Change inaugurated the meeting on 16 September 2014.

The GBIF Public Symposium took place on 17 September. It featured a series of dynamic presenters who highlighted developments in GBIF's infrastructure and community, as well as innovative research uses of GBIF-mediated data, offering a broad overview of recent developments in biodiversity informatics and the benefits they offer society.

WII and University of British Columbia sign Memorandum of Understanding

In a significant step to boost academic, research and training activities involving international partnerships, WII and University of British Columbia (UBC), Canada entered into a Memorandum of Understanding (MoU) on 23 April 2014, marking the beginning of a formal collaboration between these two premier institutions of learning of international repute. Dr. V.B. Mathur, Director, WII and Dr. John Innes, Dean, UBC signed this broad–based, MoU which will facilitate collaborative courses, projects, workshops/seminars and academic exchange visits of faculty members, researchers and students.

The MoU, which has been duly approved by the concerned ministries of the Government of India, is initially for 5 years, with scope for further extension as required.

United Nations Development Programme (UNDP)

Under the High Range Landscape Project of UNDP, GoI and the Kerala Forest Department formulated the research project "Assessment of compatibility of development plans and land use patterns with the objectives of biodiversity conservation and resource planning for Munnar landscape and suggesting measures to enhance project outcomes".

Partnering with Zoological Society of London to Support Gir Lion Conservation in Gujarat

The Wildlife Institute of India has initiated a collaborative project focused on the conservation of Asiatic Lions in Gujarat in close partnership with the Gujarat Forest Department and the Zoological Society of London.

The Zoological Society of London (ZSL), a U.K. based charity founded in 1826, is a world-renowned centre of excellence for conservation science and applied conservation. ZSL's mission is to promote and achieve the worldwide conservation of animals and their habitats. It realizes its mission by carrying out field conservation and scientific research in over 50 countries across the globe and through education and awareness at its two zoos, ZSL London Zoo and ZSL Whipsnade Zoo, inspiring people to take conservation action. ZSL and WII are building on their joint expertise in patrol based monitoring, animal husbandry and welfare, wildlife health and public engagement to further strengthen the Gujarat Forest Department's ongoing Asiatic lion conservation efforts.

ZSL signed a Memorandum of Understanding with the Gujarat Forest Department in February 2015 with a focus on strengthening and supporting biodiversity conservation initiatives in Gujarat. The MoU was signed by Mr. Ralph Armond, Director General on behalf of ZSL and Dr. C.N. Pandey, outgoing P.C.C.F. and CWLW on behalf of GFD in the presence of Mr. Mangubhai Chhaganbhai Patel, the Honourable Minister of Forest and Environment and Tribal Development; and Shri Bachubhai Maganbhai Khabad, Honourable Minister of State Fisheries, Forest and Environment. Senior members from WII present at the signing were Dr. V.B. Mathur, Director, WII, Shri P.C. Tyagi, Dr. P.K. Malik and Dr. Y.V. Jhala. Senior management from ZSL included Prof. David Field, Zoological Director, Mr. James Wren, Development Director and Dr. Gitanjali Bhattacharya, Programme Manager –South and Central Asia Conservation Programmes.

The collaborative conservation project began with reconnaissance visits followed by an inception workshop held at Sasan Gir in August 2015 that was attended by senior management from GFD, WII and ZSL. A series of training workshops have since been jointly delivered by WII and ZSL in Gujarat marking an excellent beginning to a productive partnership.

Year 2015 also marked the renewal of WII's 5 year MoU with our international conservation partner, the Zoological Society of London. At a meeting hosted in Delhi in February 2015, Dr. V.B. Mathur, Director, Wildlife Institute of India showcased WII's strengths and varied field of expertise to a panel from Mr. R. Armond, Director General, Prof. D. Field, Zoological Director, Mr. James Wren, Development Director and Dr. G. Bhattacharya, Programme Manager –South and Central Asia from ZSL. Some key collaborative projects between ZSL and WII were also highlighted and discussed. There was participation from Shri Tyagi and Dr. Malik to discuss further synergies between the two institutions based on joint strengths. WII and ZSL have renewed the MoU for a further 5 years in 2015.

SERVICES

The Indian National Committee of IUCN

The Indian National Committee (INC) is a forum of IUCN members in India. It was granted formal recognition by IUCN Council vide IUCN HQ Letter No. IN/4/NC55 dated 14 November, 2001. The mandate of the Committee is to coordinate activities of IUCN members in India for evolving common approaches on nature conservation. The members of the Committee bring with them expertise and knowledge in various areas of nature conservation. It is thus a forum having collective wisdom on issues related to conservation of nature and natural resources.

Currently, there are 29 members in the Committee drawn from Government of India, Scientific Institutions and National and International NGOs. The expertise represented in the Committee include policy planning, wildlife enforcement and management, scientific research, capacity building of personnel engaged in management of natural resources, disaster management, urban landscape management and livelihood issues.

IUCN India Office provides support to the member organization of the INC-IUCN in taking forward the global agenda of conservation including IUCN programmes. Together we are able to address all the five strategic goals adopted at CBD COP-10 at Nagoya, Japan.

Workshop on National Biodiversity Targets, IIC, New Delhi, June 26-27, 2014.

Twenty six members of the Indian National Committee participated in the two-day workshop. The participants were apprised of India's 5th National Report to the CBD and India's National Biodiversity Targets. The participants worked in a group to prepare a road map for achieving National Biodiversity Targets. During the mapping exercise, certain gaps have been identified. In order to fulfill these gaps, organizations which are not part of the Indian National Committee have also been identified, which could play a role in achieving the 12 National Biodiversity Targets.

An Annual Report of the INC-IUCN is under preparation. The Annual Report has contributions of activities by the member organizations.

Preparation of Wetland Management Plan and Development of Human Resources for Managing Wetlands of Bihar

The Bihar State Forest Department has requested WII to prepare a wetland management plan for two wetland bird sanctuaries of Bihar, namely Baraila and Kushseshwar Asthan. Accordingly, it was proposed to undertake preparation of the management plans for these two sanctuaries. The plan will be prepared on the basis of secondary information, to be provided by the state forest department. Primary field data will also be collected to supplement the existing data. Simultaneously, WII will also train five or six forest officers of the Government of Bihar in developing management plans for wetlands so as to develop their capability for writing the management plans of the remaining wetlands.

Test Flying and Integration of Un-manned Aerial Vehicle (Drone) for Wildlife Research and Management

Application of modern tools and techniques have long been integral part of wildlife research and management, the most popular being the wireless communication used by the forest officials on regular basis and camera trapping and telemetry technologies in several research and conservation projects. Given that wildlife populations move beyond the protected boundaries especially the large animals such as rhino, tiger and elephant and that many of these animals are target of poachers, advanced sophisticated technological solutions are required. In order to offer cost-effective solutions to various problems encountered by the Forest Officials and Researchers, Wildlife Institute of India and National Tiger Conservation Authority, in collaboration with World Wide Fund-International and Conservation Drones implemented pilot activities to integrate advance technologies such as use of Drone or Un-Manned Aerial Vehicles (UAV). With the permission of Ministry of Defence,

Government of India use of UAV has been successfully tested in Panna Tiger Reserve and capacity building at local level has also been established. With this, UAVs are now ready for deployment in our Protected Areas/Tiger Reserves, subject to clearances from concerned agencies.

Management Effectiveness Evaluation (MEE) of Tiger Reserves in India (2014–2015)

The MoEFCC, Government of India assigned the responsibility of technical backstopping of independent MEE of 43 tiger reserves in India to WII.

Management Effectiveness Evaluation (MEE) of Protected Areas in India (2014–2015)

The MoEFCC, Government of India assigned WII the responsibility of technical backstopping of an independent MEE of 40 protected areas in India. The institute prepared a technical manual to guide the MEE process.

Release of Tiger Population Estimation and Management Effectiveness Evaluation (MEE) of Tiger Reserves, New Delhi, 20 January, 2015. The Tiger Population Estimation and MEE Report, prepared by WII and the National Tiger Conservation Authority (NTCA), were released on 20 January 2015 by Shri Prakash Javadekar, Hon'ble Minister of State (Independent Charge), Environment, Forest and Climate Change, Government of India.

MANAGEMENT EFFECTIVENESS EVALUATION OF PROTECTED AREAS OF SIKKIM

- Funding Source
  Department of Forest, Environment & Wildlife Management, Government of Sikkim
- Investigators
  Dr. Anil Bhardwaj, Dr. S. Sathyakumar, Shri Ajay Srivastava and Shri Pratap Singh
- Researcher
  Nasim Ahmad Ansari
- Date of Initiation
  October 2014
- Date of Completion
  December 2015

Objectives

The objectives of the project are to (i) carry out the management effectiveness evaluation (MEE) of the protected areas of Sikkim for updating their management plans; and (ii) build the necessary capacity of identified officers and staff members in management planning.

Progress

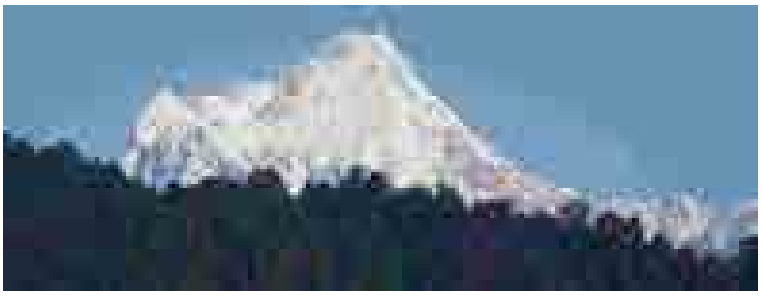
The inception workshop and training programme for protected area managers and staff members was organized in Gangtok in October 2014. The fieldwork for MEE for three protected areas has been completed.

Outputs & Outcomes

The training programme was completed and fieldwork initiated.

Milestone

The fieldwork is to be completed by September 2015, and the final report is to be prepared by December 2015.



Dr. A.K. Bhardwaj

BIODIVERSITY CONSERVATION AND RURAL LIVELIHOOD IMPROVEMENT PROJECT (BCRLIP)

- Funding Source
  International Development Agency and Global Environment Facility through World Bank

- Project Co-ordinator
  Shri Aseem Shrivastava

- Date of Initiation
  July 2011

- Date of Completion
  January 2017

Objectives

The project aims to develop and promote new models of conservation at the landscape scale through enhanced capacity and institution building for mainstreaming biodiversity conservation outcomes. The project has the objective of assisting implementing forest departments with demonstrating the processes and outcomes of the approach. To this effect, building national and regional capacities in landscape-level management is a goal.

The MoEFCC, Government of India is implementing the World Bank-assisted project on BCRLI in India for managing large landscapes having conservation values. It is a multi-sector and multi-theme project, based on the landscape approach to conservation, and emphasizes collaboration between the forest department, local communities and different development agencies for its success. With the role assigned under the project, WII is supporting the project in the following activities: (i) identification of core competencies of the respective FLCs; (ii) assisting with the design of training programmes; (iii) assisting with the preparation of training manuals; (iv) assisting with documenting ecodevelopment learning; and (v) assisting with developing good practice lessons.

Progress

WII is one of the implementing agencies in this project, which is coordinated by the MoEFCC. During the financial year 2014–2015, the following tasks were accomplished.

Biological Indicator and Ecological Mapping Work:

Biological indicator for assessing conservation objectives: The major task is to identify biological indicators for monitoring changes in the landscape over time. The project has earmarked 4 years for this task, and during the first 2 years, WII was able to identify potential indicators related to mammals, fishes, insects and important plants in the landscape. Stand-alone reports on all taxa have been prepared.

Ecological mapping: To understand the biological and socio-economic attributes of the landscape for evolving a methodological framework for landscape planning, WII was assigned the task of profiling the biodiversity and socio-economic characteristics of the Askot landscape, located in Pithoragarh district, Uttarakhand. A scientific study was accordingly designed to collect baseline information on these attributes and prepare an ecological map of the landscape. The major watershed, *i.e.* Gori Valley, was elaborately surveyed, and based on the data obtained from there, an ecological map was prepared. An atlas of maps of the Askot landscape was also published as an outcome of the study.

Completion of model micro-plans: Two model micro-plans for Askot and three for LRK were developed in the process. Both the sites have significantly progressed in terms of micro-planning of the villages under the jurisdiction of the project. According to the information given to WII, 105 micro-plans have been prepared for LRK and 40 have been prepared for Askot. Elaborate discussions were held between WII and the demonstration sites to explain the process of micro-plan approval, which includes finalization of micro-plans in the general bodies of the village institutions concerned before being placed in the landscape-level society for final approval.

Field learning centres (FLCs): Through field visits, consultations and discussion and writing workshops, the FLCs were supported with developing resource material, consisting of training modules, case studies on best practices and curricula. The respective FLCs have begun producing knowledge products in areas of their respective competences.

Orientation for policy makers: Identification of new sites for replication of conservation approaches was completed through an intensive process of consultation. In order to expand the new approach of landscape conservation, WII assisted MoEFCC with identification of new demonstration sites and launching the project through policy-level workshops at the new sites, namely the Agasthyamalai and Satpura landscapes.

Core training programme: A policy-level course was designed and tried at the policy-level workshops at Agasthyamalai on 7 August 2014 and Satpura on 17 November 2014. With project support, a foreign expert has been engaged as a consultant to assisting WII with the design of the course and development of course material. Draft course curricula have been prepared, and it is planned to begin the national courses from 2015–2016 after a national consultation on the design and contents of these courses.

Institutional strengthening of WII: Improving the knowledge repository through the procurement of 52 e-journals was undertaken to provide WII the latest scientific knowledge in landscape conservation. In addition, the GIS lab was upgraded to enable WII to carry out a high-end mapping exercise and a video conferencing facility was established for better and effective communication.

Accounts: The Annual Work Plan for 2014–2015 was approved by the Government of India for an amount of Rs.370.86 lakhs, against which an amount of Rs.148.34 lakhs was released by the Government of India. The total project expenditure for the year was Rs.101.52 lakhs. The Annual Work Plan for 2015–2016 was prepared for Rs.283.06 lakhs and submitted to the MoEFCC on 17 April 2015.

Workshops under the BCRLI project:

The following workshops were organized during the year:

(i) Workshop on new landscape sites at IHC, New Delhi for Secretaries from Kerala, Madhya Pradesh and Maharashtra, forest officials from implementing sites, WII, WB and national experts was held on 3and 4 April 2014.

(ii) A combined consultation with KMTR and PTR on finalization of a training manual for middle- to senior-level officers in Coimbatore was held on 3 and 4 April 2014.

(iii) A policy-level workshop for the Agasthayamalai landscape on "Biodiversity Conservation & Human Well–being" was held on 7 and 8 August 2014.

(iv) A workshop on "Biodiversity Concerns and Human Well-being: Towards Landscape Approach" was held at Pachmarhi, Madhya Pradesh from 17 to 19 November 2014.

Cells

Environmental Impact Assessment

The Environmental Impact Assessment Cell of WII continued to provide professional support in capacity building initiatives at WII, sister organizations, other institutions, professional bodies and government and corporate organizations. Networking and collaborations with international agencies also continued to expand and diversify.

International Collaborations

Collaboration with the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) for the project "Strategic Environmental Assessment—Increasing Planning Efficiency and Reducing Conflicts of Interest—Relevance, Scoping and Needs Assessment of SEA in India"

The project "Land Use Planning and Strategic Environmental Assessment", within the frame of the CBD COP 11 Presidency, which was jointly implemented by collaboration with the GIZ and WII continued to progress and focused on the implementation of capacity development (CD) measures through customized short-term training modules and exploring the potential for cooperation with GIZ and KfW programmes in order to create a basis for implementation of pilot projects and scaling them up. The project has made significant progress on the ground. Learning resources for capacity building initiatives in SEA have already been developed and will be road tested through training programmes.

Collaboration between UN University Institute of Advanced Studies and WII

Under the collaboration between UN University Institute of Advanced Studies and WII, Dr. Asha Rajvanshi provided academic inputs to the short-term project work of the visiting master's students on the study component on "Linear features in Rajaji National Park: Mitigation of the impacts for conservation of Asian elephants".

Professional Support to Other Organizations

Professional support to Quality Council of India's National Registration Board for Personnel and Training

As part of the ongoing initiative of the MoEFCC for revision of the environmental clearance process, the Quality Council of India (QCI) initiated the development of a registration scheme for EIA consultants through the National Registration Board for Personnel and Training (NRBPT). During the reporting year, Dr. Asha Rajvanshi provided professional inputs to the evaluation of applications received for seeking the accreditation of the QCI and continued to provide professional support to the QCI in taking forward the scheme through contributions at several consultative meetings organized during the reporting year.

Professional support to Centre for Green Space and Government of Karnataka at Bangalore, INTACH, Ministry of Urban Development, Government of India

Dr. Asha Rajvanshi was invited to serve on the Advisory Committee, Green Urban Futures and organized a technical session on "Conserving Biodiversity and NaturalHeritage in Urban Landscapes" at the International symposium on Conserving Heritage in Urban Landscapes co-hosted by WII. In this capacity she conceived the session plan and provided professional inputs.

Professional support to IAIA

Dr. Asha Rajvanshi and Dr. V.B. Mathur have been members of International Association for Impact Assessment (IAIA) for over a decade and have actively contributed to the activities of the biodiversity and ecology section. They have been directly involved in the planning of sessions for the annual meeting and in delivering training courses.

IAIA Professional Development Programme (PDP)

Considering her experience, especially in EIA, training and the practical application of impact assessment, the IAIA has invited Dr. Asha Rajvanshi to serve on the committee to guide the PDP. This is a new initiative of IAIA that offers great possibilities for expanding the reach and impact of IAIA and its professional development mission through online training programmes conducted by seasoned IA professionals/trainers. The IAIA Board has endorsed the idea for further development. An initial proposal is being finalized for discussion with potential sponsors. Dr. Asha has contributed to the development of a technical proposal and training module.

Advisory support to MoEFCC, Government of India on matters related to environmental decision making

Dr. Asha Rajvanshi was invited to become a member of the reconstituted Expert Appraisal Committee (EAC) (Non-coal Mining) of the MoEFCC for EIA and evaluation of projects. In this capacity, she has been reviewing the EIA reports of non-coal mining projects and has attended EAC meetings from time to time.

Wildlife Forensic and Conservation Genetics

The Wildlife Forensic and Conservation Genetics (WFCG) Cell was formed by merging the Wildlife Forensic and Conservation Genetics Laboratories in 2014. The main functions of the cell include identification of species from wildlife articles, standardization of techniques for identification of species from wildlife parts and products to aid forensic investigation and developing and maintaining a repository of wildlife reference samples of different species, along with genetic material. Besides these, the WFCG Cell plays a role in sensitizing enforcement agencies regarding crime scene examination and proper collection of evidence through regular training and workshops.

During the reporting period, the cell dealt with a total of 192 wildlife offence cases from enforcement agencies across the country, 69% of which were from forest departments, 13% were from the police, 11% were from the honourable courts, 2% each were from the customs and hospitals and the remaining 3% were from the MoEFCC, Government of India. An assortment of biological products were received for species identification, and 57.8% of these cases were tissue samples requiring DNA-based techniques, while 42.2% required morphometric techniques for species identification. The cell provided reports on species identification for 126 cases, and summons were received for a further 65 cases for appearances as expert scientific witnesses during this period.

Field exercises and lectures were conducted on "Crime scene management and evidence collection" for officer trainees of the diploma course and certificate course at Indira Gandhi National Forest Academy. Hands-on training was also conducted on the identification of various body parts and products encountered in the illegal wildlife trade for forest officers and customs probationers. Along with these training programmes, popular lectures were delivered for various visitors/classes at the WFCG Cell.

Genetic research on the sambar *Rusa unicolor* has shown the presence of an ancient lineage in southern India. This lineage has a 40 bp insertion within the mitochondrial control region and is closer to the South-East Asian counterparts compared with sambar populations from central and northern India. In another molecular-level study, Sundarbans tigers *Panthera tigris,* which differ in their morphology from the mainland tigers, were not found to be sufficiently distinct at the genetic level to warrant a separate sub-species status. However, Sundarbans tigers do stand out as an evolutionarily significant unit of *Panthera tigris.* Landscape level-genetic studies on tigers in central India revealed that though the connecting habitat corridors were tenuous and populations fragmented, the animals still managed to disperse and exist in a meta-population framework, providing hope for the conservation of the species in this landscape.

Information Technology, Remote Sensing and Geographic Information System

The Information Technology, Remote Sensing and Geographic Information System (IT, RS & GIS) Facility is a part of almost all wildlife research projects, education and training. The facility is available 24 hours a day to the faculty members, trainees, researchers, students and collaborators working with the institute. A large number of desktop computers configured with Windows, Linux and specialized analytical software for data processing have been made available in a dedicated lab. The computer facility is provided through a wide array of hardware setups connected to a local area network (LAN). There are Intel Xeon servers for Internet, Intranet, database management and library automation services. The computer laboratory has a storage area network (SAN) system, and there are more than 300 nodes on the WII LAN. Wi-Fi connectivity is provided in the hostels, guest house, classrooms, auditorium, board room and Porta Cabin. The institute has 15 Mbps (1:1) Internet leased line connectivity. All the computers of the institute are provided with Internet and mailing services.

The geo-informatics laboratory, Geographic Information System and Remote Sensing Technology, at WII caters to the research and training programmes of the institute. The laboratory is

equipped with software such as ArcGIS, ERDAS Imagine, Idrisi, GRASS and several open source software packages for landscape-level analysis. A dedicated team is available for providing support and training in IT and geo-informatics. The module on remote sensing, GIS and landscape ecology is conducted for the M.Sc., PG Diploma and Certificate Courses at WII, and hands-on training are also provided to other graduate and post-graduate students and interns.

WII has a video conferencing facility consisting of Polycom HDX 8000 VC systems with high definition cameras and displays based on an IP Internet leased line connection. These systems are regularly used for conducting lectures, meetings, classes, interviews and presentations within the country and abroad.

During the reporting year, the following activities were accomplished by the IT, RS & GIS Cell.

BBAMS and Security Surveillance System

The institute implemented the Biometric-Based Attendance Monitoring System (BBAMS) for monitoring the attendance and leave records. The BBAMS records are maintained using Web-based software. IP-based CCTV cameras have been installed at locations near BBAMS devices and in the reception areas of the Guest House and hostels for 24-hour surveillance using Web-based software.

Additional Internet Leased Line (ILL) Connectivity

Additional connectivity through a microwave frequency Internet leased line of 15 Mbps bandwidth (1:1) has been established by the institute through Messrs Reliance Communication, the Internet service provider.

After the establishment of the additional ILL connection, the users of the institute have been ensured of undisrupted 24×7 Internet/mail services and improved Internet speeds.

Online Registration, Examination and Assessment

Online registration, examination and assessment have been implemented for selection of students, researchers and employees of the institute.

Web GIS: A Web-based GIS/RS application has been developed in the ERDAS Apollo 2013 platform for storage and query-based retrieval of spatial and non-spatial information related to the protected area network of India.

New Equipment: The following new hardware and software were obtained:

Desktop computers,14; laptop computers,4; workstationcomputers,1; laser printers,3; plotter-cum-scanners (A0 size),1; proximity-cum-ID card printers,1; network switches,6; access points for Wi-Fi,11; UPS systems,12; biometric-based attendance monitoring system devices,4; CCTV cameras,11; mail and Web server software; ERDAS Imagine 2015 (10 users' license).

Application of Geo-informatics in Research Projects: Geo-informatics technology is being used in most of the research projects of the institute for wildlife research and conservation. Development of a spatial database on the boundaries of all the national parks, wildlife sanctuaries, conservation reserves and community reserves in the country is in progress. Similarly, digitization of the division, range and beat boundaries of the 17 tiger range states in the country is in progress. The country-level data on climate, vegetation, topography and animal distribution is also in progress.

Workshops/Trainings/Meetings Attended: Shri Dinesh Pundir and Shri Harendra Kumar participated in the 21st meeting of the Governing Board (GB-21) of the Global Biodiversity Information Facility in New Delhi from 15 to 18 September 2014. They also participated in the Indo-Norwegian IPBES project workshop in New Delhi on 19 September 2014.

Dr. Manoj Agarwal participated in the seminar on Digital India organized by ISRS-DC in collaboration with the Indian Institute of Remote Sensing (IIRS) on 19 November 2014. He also participated in the workshop on "Role of Land Use/Land Cover Mapping in Participatory Sustainable Resources Management", on 30 January 2015, which was conducted by Uttarakhand Space Application Centre, Dehradun with support from IIRS, Dehradun. Dr. Agarwal participated in the Third IIRS Users Interaction Meet, at IIRS on 26 and 27 February 2015.

Captive Breeding and Zoo Management

The Captive Breeding and Zoo Management Cell was set up in the institute with the following mandate: (i) to provide technical support for *ex-situ* conservation; (ii) to provide inputs on various aspects of zoo management assigned by the Central Zoo Authority; (iii) to carry out research activities for supporting *ex-situ* conservation; (iv) to serve as a nodal centre for preparation and updation of national studbooks of identified species; and (v) to

provide technical advice on the health of captive wild animals.

The following activities were undertaken by the cell during the reporting period: (i) preparation of the "Manual on Enclosure Enrichment of Captive Wild Animals"; (ii) preparation of proceedings of the workshop on conservation breeding; (iii) evaluation of two zoological parks; (iv) appraisal of Kukrail Conservation Breeding Centre; (v) assessment the impacts of the disturbance caused by the toy train at Kanpur Zoological Park; (vi) review of conservation breeding programmes for the lion-tailed macaque and one-horned rhinoceros; (vi) preparation of studbooks (updating 14 species and development of new studbooks for 20 species); (vii) appraisal of mortality of animals at Lucknow Zoo and Kanan Pindari Zoo; and (viii) preparation of a calendar for the Central Zoo Authority.

The Cell completed a project titled "Studies on housing and enclosure enrichment of some species in selected Indian zoos". The cell has an ongoing project titled "Development and maintenance of studbooks for selected endangered species in Indian zoos".

A new studbook was established for four primate species. Existing studbooks for three felid species (the Asiatic lion *Panthera leo persica,* clouded leopard *Neofelis nebulosa* and snow leopard *Panthera uncia*), two primate species (the hoolock gibbon *Hoolock hoolock* and Nilgiri langur *Trachypethecus johnii*) and the red panda *Ailurus fulgens,* Tibetan wolf *Canis lupus chanco* and gaur *Bos gaurus* have been updated. Work is underway on updating the studbook of the lion-tailed macaque *Macaca silenus* and the same will be submitted to the Central Zoo Authority and holding zoos.

National Wildlife Database

The objectives of the computer-based National Wildlife Database are to (i) provide readily accessible and comprehensive information on the conservation status of biogeographic regions, habitat types, individual animal species and the network of protected areas in the country; (ii) establish linkages with researchers, protected area managers and planners and with other data centres; and (iii) facilitate research and training activities in wildlife by providing bibliographic references on protected areas, habitat types and animal species.

During the reporting period, the main thrust of the activities was on updating the databases on protected areas, species and wildlife bibliography on the basis of current information collected from various published/unpublished sources during the above-mentioned period. The protected area database of the country was updated, and presently there are 700 protected areas, including 103 national parks, 528 wildlife sanctuaries, four community reserves and 65 conservation reserves in the country, covering 1,60,096 km2, which is 4.87% of the total geographical area of the country.

The species database was corrected and updated by adding information on the distribution of mammalian species in various protected areas. The bibliographic database was updated by adding current literature published on Indian wildlife in various issues of journals/periodicals during the reporting period. The review of the Wildlife Protected Area Network report was updated by incorporating the latest information. The trainees' database was updated further, and now information on 656 diploma and 538 certificate officer trainees trained in various courses, including 220 foreign nationals, is available. The website of the national wildlife database has been updated further by incorporating the latest information. Nearly 230 queries were received, and output was provided in various desired formats.

Wildlife Extension & Audio Visual

The cell caters to various requirements of academic activities. It maintains 16 mm films, video films, CDs/DVDs, a conference system, a projection system, audio–visual equipment, still cameras and video cameras with accessories and a photo library.

As part of its information dissemination activities, the institute prepared four quarterly issues of the e-newsletter of WII. All the issues were uploaded to the website of the institute during the reporting period.

XII WII–Friends of the Doon (FoD) "Wildlife & Environment Quiz 2014", Dehradun, 1 October 2014

The XII WII–FoD Wildlife & Environment Quiz 2014 — a collaborative activity of WII and Friends of Doon Society was organized on 1 October 2014 at WII to mark the celebrations of Wildlife Week 2014. Twelve schools participated in the preliminary round. Five teams, Ann Mary School, St. Thomas' College, Hilton's School, Carman Residential & Day School and the Heritage School, qualified for the final round. The final quiz had six rounds: Know Your State, Geo Logic, Peeping in the Past, Dekho aur Bujho, Biogeographic Zones, What's Up and Natural World Heritage Sites.

Ann Mary School topped the list and won the WII–FoD Rolling Trophy, Book Prize and Sameer Ghosh Memorial Nature and Wildlife Rolling Trophy. St. Thomas' College won the second prize and Hilton's School won the third prize and received the WII–FoD Book Prize. Dr. Alok Saxena, Additional Director, Indira Gandhi National Forest Academy, Dehradun graced the occasion as the chief guest and distributed the prizes to the winning teams.

Himalayan Day Celebrations, Dehradun, 9 September 2014

Himalayan Day was celebrated at WII on 9 September. Over 50 participants, including scientists, researchers and students, participated. Dr. Ravi Chopra, Director, People's Science Institute, Dehradun was the chief guest, and he delivered a talk on "Sustainable Development in the Himalaya".

In his talk, Dr. Ravi Chopra presented an overview of all the environmental and social problems in the Himalayan region due to the rapid pace of ill-planned development. He stressed the importance of sustainable development through community participation, better risk preparedness and environment-friendly livelihoods.

9 September was chosen as Himalayan Day, in 2010, by individuals who were concerned about the conservation of the Himalayan ecosystems to bring about awareness amongst the common people to save the Himalaya, which are severely threatened due to increasing human activities. Since then, many institutions and organizations in the Himalaya have celebrated this day as Himalayan Day and conducted various discussions and awareness creation activities.

Great Backyard Bird Count, 13–16 February 2015

The Great Backyard Bird Count (GBBC) is a popular citizen science event that collects valuable information pertaining to the distribution and abundance of birds across the globe. Events like these demonstrate the power of engaging citizens in learning about the natural world and monitoring how it is changing.

WII, along with 101 other campuses (including research stations, government institutions, schools, colleges, universities and corporate offices) across India, participated in the count. The birders in WII were grouped into five teams, and they surveyed areas in and around the WII campus. In order to increase the efficiency of coverage, the campus was divided into sub-areas, such as the nature trail, faculty residential colony, area between Admin Block and Old Hostel, sal patch near WII and Block III residential colony. A total of 26 checklists were uploaded to the global listing website (http://ebird.org/), and a total of 96 species, along with three unidentified species, were recorded during the count days. Overall, 1593 individual birds were counted in the WII campus. The rose-ringed parakeet, Himalayan bulbul and large-billed crow were the birds seen most during the count, and birds such as the Indian cormorant, Eurasian hoopoe, black-winged cuckoo shrike and grey-winged blackbird were recorded only once.

More information about the GBBC, Campus Bird Count and other associated events can be found at www.birdcount.in, the website of the Bird Count India partnership. The global GBBC event is organized by Cornell Lab of Ornithology and the National Audubon Society.

Support to MoEFCC, March 2015

The institute provided support to MoEFCC in establishing a photo bank at the ministry for its use in March 2015. More than 200 photographs of animals, plants and landscapes were uploaded to the server.

From time to time, the institute provided relevant photographs during the reporting period to MoEFCC for publications, displays and mementoes.

Library and Documentation Centre

The Library and Documentation Centre (L&DC) plays a vital role in the dissemination of information to target scientists of research and training organizations. Therefore, the L&DC is considered the backbone of any research institution. So is the case with WII's L&DC. It was established in consideration of WII's mission to be multidisciplinary information and learning resource centre of biodiversity conservation and management. The L&DC has the following objectives: (i) serving as a repository of all wildlife-related literature published in India; (ii) acquiring, organizing and disseminating all relevant literature from around the world on biodiversity conservation and related fields; (iii) serving users with normal and special library and information services, such as circulation, reference, photocopying and documentation; (iv) establishing and maintaining links with other national information systems in India and other countries to ensure a free flow of information at the national and international levels; (v) serving as a training centre for information professionals and users; (vi) providing the above services to WII, protected areas all over the country, institutions engaged in nature conservation research

in the country and abroad, universities and colleges, individual scholars working in related areas, NGOs, etc.; and (vii) bringing out periodic publications on the current content of periodicals, research in progress, unpublished research literature, including dissertations and theses, bibliographies and abstracts.

The L&DC now holds approximately 28,000books, 7650 maps/toposheets, 26,000 newspaper clippings and more than 6459 bound volumes of old and rare journals. The library also maintains a good collection (numbering 10,950) of scientific papers. It subscribes to more than 250 print and online journals.

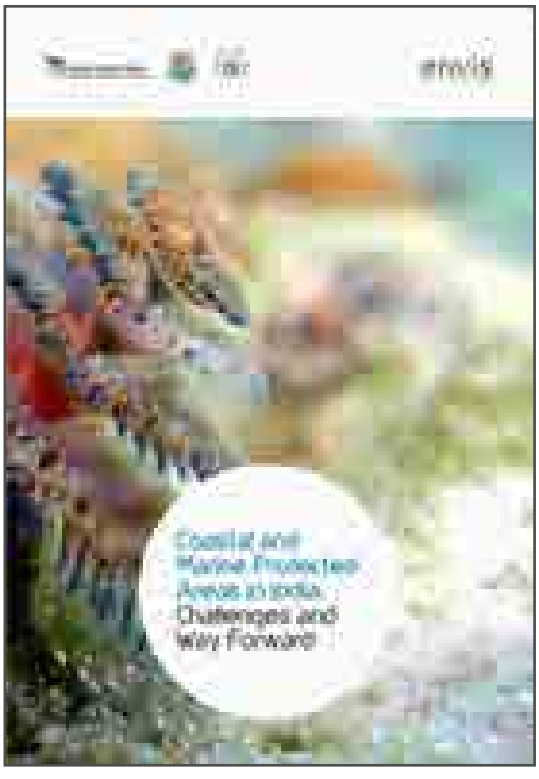
The L&DC is fully computerized, using LIBSYS Library Management Software, UNESCO'S WINISIS software, CD Server, barcoding and related technologies. All library users, including researchers, officer trainees and faculty members, can access online journals and online databases subscribed to by the L&DC through the Intranet. Being connected to the library facility, users have privileges to access all in-house databases such as books, reprints, Indian wildlife abstracts, the map/toposheet collection, press clippings and specialized bibliographic databases on the musk deer, applications of telemetry in wildlife, wildlife and protected area management in Madhya Pradesh, mountain ungulates, rainforest conservation in India, the ungulates of India, Rajaji National Park, the galliforms of India, the freshwater turtles of India, telemetry in wildlife science and the coastal and marine protected areas of India. Users also have access to online databases such as Wildlife and Ecology Studies Worldwide 1935—till date. The L&DC provides a variety of library and information services to its users.

During 2014–15, over 51,525 pages of photocopies were provided to the users. Approximately 48,000 documents were issued and consulted during 2014–15. Value-added services were provided to 3,500 clients and the Ready Reference Service was provided to around 300 clients. Approximately, 450 queries from outside users were attended to, and more than 8,000 bibliographic references were provided to users.

ENVIS Centre on Wildlife and Protected Areas

The MoEFCC, Government of India established the 23rd Centre on Environment Information System (ENVIS) in September 1997 at WII. The thematic area of the WII ENVIS Centre is "Wildlife and Protected Areas". The mission of ENVIS is to support and facilitate the diverse clientele, from policy makers to researchers and industries, and to promote national- and international-level cooperation and exchange of environmental data and information through a nation-wide network. The goals of the WII ENVIS Centre are to (i) build up a repository and act as a dissemination centre for information related to wildlife sciences; (ii) provide information relating to conservation and development for decision-making at the apex level; (iii) establish a database on the protected area network in India; and (iv) promote national and international co-operation through networking and exchange of wildlife-related information.

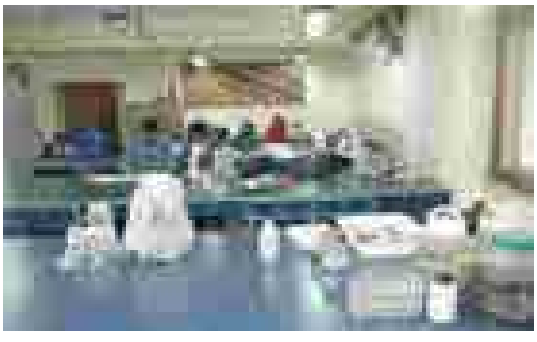
During the reporting period the ENVIS bulletin on "Coastal and Marine Protected Areas in India: Challenges and Way Forward" was released by the Hon'ble Minister Shri Prakash Javadekar, Minister of State (Independent Charge), MoEFCC, Government of India in presence of Dr. S.S. Garbyal, Director General of Forests & Special Secretary to Government of India in WII on 30 August 2014.



Research Laboratory

The Research Laboratory is equipped with the advanced equipment such as anatomic absorption spectrophotometer, high-performance liquid chromatography equipment, a UV–visible spectrophotometer, a microwave reaction system, an automatic nitrogen and Fibre analyser, a Millipore water purification system, a digital pH and conductivity meter, a controlled flame photometer and a digital analytical balance, required for analysis of various physio-chemical parameters of ecological samples. Teaching classes followed by practicals for various ongoing courses of the institute were conducted. These covered analysis of herbivore pellets and carnivore scats, collection and preservation of biological materials, determination of the age and sex of mammals and reptiles, osteology of mammals and photomicrography and analysis of ecological (plant, water and soil) samples for various parameters.

During the reporting period, a total of 1550 samples were analysed. Among these were 310 plant samples and 230 soil samples. In addition, 640 scat samples of tiger, leopard, jackal, wild dog and sloth bear and 370 pellet/dung samples of chital, sambar and nilgai were analysed for food habit studies. Technical inputs to various field training programmes were also provided by the laboratory staff, including demonstration of camera traps, mist netting for birds, radio telemetry and the use of GPS. The laboratory staff provided inputs to short-term training programmes for Forest Guards organized by Corbett National Park, Uttarakhand on "Natural history, behavior and live handling of snakes".



The laboratory staff also collected meteorological data in the WII campus. During the reporting period, the maximum temperature recorded was 38°C, on 30 May 2014, and the minimum temperature was 6°C on 22 January 2015. The total rainfall recorded at the WII campus was 1910 mm.

Herbarium

During the reporting period, the staff of the herbarium provided their inputs to various field activities and surveyed different protected areas. Approximately 300 plant species collected by research scholars, diploma and certificate trainees and faculty members from various parts of the country (Pithoragarh district, Askot landscape, WII campus, high-altitude regions of Uttarakhand, Himachal Pradesh and the Trans-Himalaya (Niti Valley in the Nanda Devi Biosphere Reserve). Apart from specimens, around 75 photographs from various protected areas as well as outside protected areas were also identified.

UNESCO Category 2 Centre on World Natural Heritage Management and Training for the Asia-Pacific Region at WII

The foundation stone of the UNESCO Category 2 Centre (C2C) on World Natural Heritage Management and Training for Asia and the Pacific Region was laid on 30 August 2014 by Shri Prakash Javadekar, Minister (Independent Charge), Environment, Forest and Climate Change, Government of India. The centre is the world's first one dealing with natural heritage and aims to build capacity for the 50 nations of the Asia–Pacific region in natural heritage conservation and management.

While UNESCO has established C2Cs in South Africa, Spain, Italy, China, Bahrain, Brazil, Mexico and Norway, these are only for conservation of cultural heritage. The setting up of UNESCO's first centre in the world for conservation of natural world heritage at WII is an unprecedented step towards protection and conservation of the 59 existing Natural World Heritage sites and identification of potential sites with outstanding universal value across the 50 countries in Asia and the Pacific region to safeguard their future.

The centre is part of WII and is governed by the institute's Governing Body, with the Secretary (Environment, Forest & Climate Change) as its Chairperson and the Director, WII as its Member Secretary. The National CAMPA Advisory Council (NCAC), in its meeting held on 24 November 2014, under the chairmanship of the Hon'ble Minster of

Environment, Forests and Climate Change, granted funds amounting to Rs.18.66 crores for operationalizing the C2C at WII.

The centre's mission is to strengthen the implementation of the World Heritage Convention in Asia and the Pacific Region by building the capacity of all those professionals and bodies involved with inscription, protection, conservation and management of World Natural Heritage sites in Asia and the Pacific region through training, research, dissemination of information and network building. The overall objective is to focus on natural heritage conservation issues with the aim of (i) strengthening capacities in the management of natural world heritage in the region; (ii) achieving a more balanced representation of properties from Asia and the Pacific on the World Heritage List; (iii) raising awareness among the general public and the youth in particular on the importance of natural world heritage and the need to protect it; and (iv) fostering international cooperation for natural world heritage initiatives.

Right to Information

Details about the requests (applications) and appeals received under RTI in the year 2014–2015:

Category	Opening balance as on 1 April 2014	Number of applications received as transfer from other public authorities u/s 6(3)	Received during the year	Number of cases transferred to other public authorities u/s 6(3)	Decisions where request/ appeals were rejected	Decision where request appeals were accepted	Closing balance as on 31 March 2015
Request	0	12	15	0	0	21	6
first appeal	0		3			3	0

Sports

WII participated in the 21st All India Forest Sports Meet, held in Goa during 4–8 November 2014. The institute participated in events such as cricket, tennis, badminton, table tennis and athletics. A contingent of 19 participants was sent by the institute to represent in 13 events. WII, in spite of its small contingent, secured gold medal in the open men's shot-put and the bronze medal in the women's open doubles. This is the first time that WII has secured the gold in shot-put.

Campus Development

During the reporting period, the works relating to renovation/upgrading New Hostel's 32 rooms, including electrical work and air conditioning work, were completed. Some other important tasks, such as work station and office chamber for UNESCO staff and faculty members and upgrading the mezzanine floor of the library block, including making study carrels, laying PVC flooring and carrying out electrical and air conditioning work for students and researchers, were also completed.

Repair work on the bituminous road of the office and residential premises in blocks I, III and IV was carried out during the reporting period. Other works include replacement and laying of damaged/burnt U.G. electrical cables from the electric sub-station to types IV and V quarters; internal and external finishing work (white washing work) in type IV and V quarters; and renovation and upgrading of the old AC plant for office canteen facilities. Construction of a modular kitchen for the New Hostel block and upgrading the dining hall of the New Hostel block, including electrical work and air conditioning work, were also undertaken and completed during the year. A total of five scooter sheds have been constructed for Type IV quarters in block III. The work for construction of a new building for UNESCO Category 2 Centre is in progress.

VISITORS

- A group of Forest Guards from the office of Divisional Forest Officer, Civil and Jenti, Almora, 24 April 2014.
- Students from College of Veterinary Science & Animal Husbandary, Sardar Krushinagar, Gujarat, 12 May 2014.
- Ranger probationers from Forest Rangers College, Balaghat, M.P., 13 May 2014.
- A group from Madras Naturalists Society, Chennai, 27 May 2014.
- Students from Integral University, Kursi Road, Lucknow, 10 June 2014.
- Students from Department of Zoology, Jai Narain Vyas University, Jodhpur, Rajasthan, 10 June 2014.
- A class under *Sadbhavna* Programme from 161 Brigade, Rampur, 25 June 2014.
- Forest Range Officer Trainees from Central Academy of State Forest Service, Coimbatore, 30 July 2014.
- Forest officials from Forest Department of Dima Hasao Forest, Haflong, Assam, 4 August 2014.
- IFS officers of 2004 to 2008 batches at Indira Gandhi National Forest Academy, Dehradun, 5 August 2014.
- Students from Forest College and Research Institute, Tamilnadu Agricultural University, Mettupalayam, 26 August 2014.
- Officer trainees 12th MCMC, SSB Academy Srinagar, Garhwal, 9 September 2014.
- Forest Range Officer trainees from A.P. Forest Academy, Dulapally, Hyderabad, 16 September 2014.
- Students from M.Sc. Forestry 2nd year student of Forest Research Institute University, Dehradun, 23 September 2014.
- Participants of 120 international training programme on audit in public sector enterprises, 25 September 2014.

- Students from TERI University, New Delhi, 25 September 2014.
- Students from O.P. Jindal Modern School, Hisar, 29 September 2014.
- Students from College of Forestry, Bhubaneswar, 7 October 2014.
- Forest Guard (Trainees) from Forestry Training Academy, Haldwani, 8 October 2014.
- Students from Tamilnadu Agricultural University, Coimbatore, 14 October 2014.
- A group from Forest Department Uttarakhand, Almora, 17 October 2014.
- Students from Tamilnadu Agricultural University, Coimbatore, 20 October 2014.
- Probationers from Dr. G.C. Negi College of Veterinary and Animal Sciences Palampur, H.P., 28 October 2014.
- Students of class XI participating in vigyan Manthan Yatra from Madhya Pradesh Council of Science and Technology, Bhopal, 10 November 2014.

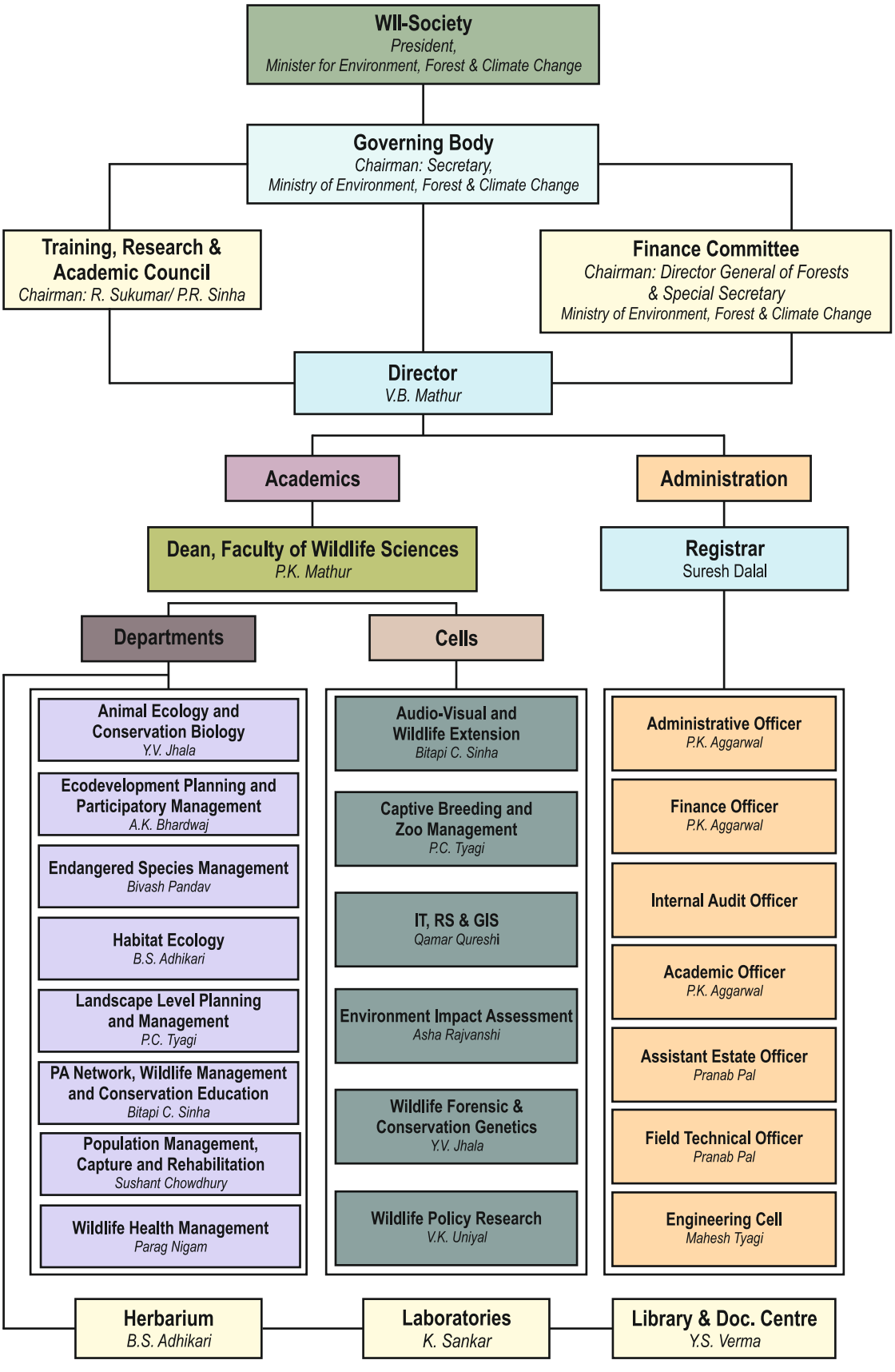
- Students from Uttaranchal (PG) College of Technology & Bio-Medical Sciences, Dehradun, 10 November 2014.
- Students from Institute of Forestry, Hetauda Campus, Hetauda, Nepal, 12 November, 2014.
- Students from NHV University, Jodhpur, 17 November, 2014.
- Forest Range Officers from Telangana Forest Department, Hyderabad, 17 November 2014.
- Partcipants of Higher Judician Training Programme of Indira Gandhi National Forest Academy, Dehradun, 17 November 2014.
- Newly promoted Deputy Rangers from Forest Training Institute & Rangers College, Sundernagar, Mandi, H.P., 20 November, 2014.
- Kashmir Foresters Course Trainees from J&K Forest Department, 26 November 2014.
- Shri S.S. Mohanty, Additional Secretary & Financial Advisor, Ministry of Environment,Forest & Climate Change, Govt. of India, New Delhi, 27 November 2014.

- Shri Ashok Lavasa, Secretary, MoEFCC & Chairman, WII-Governing Body, 28 November 2014.
- Students from Tribhuvan University, Pokhara, Nepal, 28 November 2014.
- Students from Tribhuvan University, Pokhara, Nepal, 2 December 2014.
- Students from Kathmandu Forestry College, Kathmandu, Nepal, 2 December 2014.
- Students from Grace Academy, Dehradun, 2 December 2014.
- Participants of Orientation Module for Indian Railway Traffic Service probationers from Indira Gandhi National Forest Academy, Dehradun, 4 December 2014.
- Students from Selaqui International School, Dehradun, 5 December 2014.
- Students from Institute of Forestry, Hetauda Campus, Hetauda, Nepal, 5 December 2014.
- Students from Indian Institute of Forest Management, Bhopal, 10 December 2014.
- Students from Birsa Agricultural University, Kanke, Ranchi, 15 December 2014.
- Forest Guard Trainees from Forest Guard Training School, Doomi, J&K, 16 December 2014.
- Students from Karnataka Veterinary, Animal & Fisheris Sciences University, Veterinary College, Bidar, 16 December 2014.
- Students from Gurucharan College, Silchar, Assam, 18 December 2014.
- Students from Solapur University, Solapur, 22 December 2014.
- Participants of Foundation Training Programme for scientists and technologists of Science and Technology Department, Govt. of India, New Delhi, 22 December 2014.
- IFS probationers from Indira Gandhi National Forest Academy, Dehradun, 26 December 2014.
- Forest Guard Trainees from Department of Forest and Wildlife Preservation, Government of Punjab, 7 January 2015.
- Students from College of Forestry, Thrissur, Kerala, 9 January 2015.
- Students from Sam Higginbottom Institute of Agriculture, Technology & Sciences, Allahabad, 30 January 2015.
- Forest Range Officers from Uttarakhand Forestry Training Academy, Haldwani, 3 February 2015.
- Students from Govt. Degree College, Nizamabad, 9 February 2015.
- Students from Sam Higginbottom Institute of Agriculture, Technology & Sciences, Allahabad, 12 February 2015.
- Students from ASPEE College of Horticulture & Forestry, Navsari Agriculture University, 23 February 2015.
- Students from KJ Somayia College of Science and Commerce, Mumbai, 27 February 2015.
- Field staff from Himachal Pradesh Forest Department, Rampur, 12 March 2015.
- Students from Jawaharlal Nehru Krishi Vishwa Vidhyalay, Jabalpur, Madhya Pradesh, 13 March 2015.
- Forest Officers from Directorate of Forest Education, Dehradun, 20 March 2015.
- Range Forest Officer Trainees from Central Academy for State Forest Service, Burnihat, Assam, 25 March 2015.

GOVERNANCE

- Organisational Structure of WII
- WII-Society
- Governing Body
- Training, Research & Academic Council (TRAC)
- Finance Committee

Organizational Structure of WII



Wildlife Institute of India - Society

President

1. Minister of State (Independent Charge),
Ministry of Environment,
Forest and Climate Change,
Government of India,
Indira Paryavaran Bhavan,
Jor Bagh Road, Ali Ganj,
New Delhi – 110 003

Members

2. Hon'ble Minister,
Forests & Environment,
Government of Assam,
'Secretariat',
Dispur, Guwahati (Assam)

3. Hon'ble Minister,
Forests & Environment,
Government of Meghalaya,
'Secretariat',
Shillong (Meghalaya)

4. Hon'ble Minister,
Forests & Environment,
Government of Sikkim,
'Secretariat',
Gangtok (Sikkim)

5. Hon'ble Minister
Forests & Environment,
Government of West Bengal,
'Secretariat',
Kolkata (West Bengal)

6. Lt. General (Retd.) Shri A.K. Singh (PVSM, AVSM),
Hon'ble Lt. Governor,
Government of Andaman & Nicobar,
'Secretariat',
Andaman (A&N)

7. Hon'ble Minister,
Forests Department,
Government of Goa,
Swami Vivekanand Road, Panaji,
Goa – 403 001

8. Hon'ble Minister,
Forests & Environment,
Government of Maharashtra,
'Secretariat',
Nagpur (Maharashtra)

9. Hon'ble Minister,
Forests & Environment,
Government of Kerala,
'Secretariat',
Thiruvananthapuram (Kerala)

10. Hon'ble Minister,
Forests & Environment,
Government of Tamil Nadu,
'Secretariat',
Chennai (Tamil Nadu)

11. Hon'ble Minister,
Forests & Environment,
Government of Haryana,
'Secretariat', Panchkula,
Ambala (Haryana)

12. Hon'ble Minister,
Forests & Environment,
Government of Himachal Pradesh,
'Secretariat',
Shimla (Himachal Pradesh)

13. Hon'ble Minister,
Forests & Environment,
Government of Madhya Pradesh,
'Secretariat',
Bhopal (Madhya Pradesh)

14. Hon'ble Minister,
Forests & Environment,
Government of Uttarakhand,
'Secretariat',
Dehradun - 248 001 (Uttarakhand)

15. Shri Brijendra Singh,
28, Sunder Nagar,
New Delhi - 110 003

16. Dr. Ullas Karanth,
Director, Centre for Wildlife Studies,
403, Seebo Apartments,
26-2, Aga Abbas Ali Road,
Bangalore – 560 042 (Karnataka)

17. Dr. Biswajit Mohanty,
Shantijunj,
Link Road,
Cuttack (Orissa)

18. Dr. Erach Bharucha,
Director, Bharti Vidyapeeth
Institute of Environment,
Education and Research,
(Bhartiya Vidyapeeth Deemed University),
Katraj-Dhankawadi,
Pune - 411 043 (Maharashtra)

19. Dr. Reena Mathur,
D-279, Todarmal Marg, Banipark,
Jaipur (Rajasthan)

20. Dr. H.S. Pabla,
Former PCCF (Madhya Pradesh),
E-5, Surendra Garden, Hoshangabad Road,
Bhopal - 462 026

21. Dr. Priya Davidar,
Head, Salim Ali School of Ecology
and Environmental Sciences,
R. Venkataraman Nagar, Kalapet,
Pondicherry

22. Dr. Mewa Singh,
Ramanna Fellow and Professor of Psychology,
University of Mysore,
Mysore - 570 006

23. Dr. A.J.T. Johnsingh,
101, Magnolia, Esteem Gardenia,
Sahkara Nagar,
Bangaluru - 560 092

24. Director,
Bombay Natural History Society,
Hornbil House, Dr. Salim Ali Chowk,
Shaheed Bhagar Singh Road,
Mumbai - 400 023

25. Secretary General & CEO,
World Wide Fund for Nature - India (WWF),
"Secretariat", 172-Lodhi Estate,
New Delhi-110 003

26. Shri Swapan Kumar Banerjee,
President, Wildlife Preservation Society of India,
Heritage Apartment, Flat No.2, First Floor,
18, New Road,
Dehradun-248 001

27. Director,
Centre for Environment Education,
Nehru Foundation for Development,
Thaltej Tekra,
Ahmadabad (Gujarat)

28. A Representative of Friends of Doon,
Jakhan, Dilaram bazaar,
Dehradun

29. Secretary,
Secretary to the Govt. of India,
Ministry of Environment,
Forest and Climate Change,
Government of India,
Indira Paryavaran Bhavan,
Jor Bagh Road, Ali Ganj,
New Delhi - 110 003

30. The Secretary,
Government of India,
Ministry of Finance,
North Block,
New Delhi - 110 001

31. The Secretary,
Government of India,
Department of Science and Technology,
Technology Bhavan,
New Mehrauli Road, New Delhi - 110 001

32. The Secretary,
Government of India,
Department of Education,
Ministry of Human Resource Development,
Shastri Bhavan,
New Delhi - 110 001

33 The Vice Chairman,
Planning Commission,
Yojana Bhavan, Sansad Marg,
New Delhi

34. The Chairman,
University Grant Commission,
Bahadur Shah Zafar Marg,
New Delhi

35. Chief Secretary,
Govt. of Uttarakhand,
"Sachivalaya",
Dehradun

36. Director General of Forests & Special Secretary,
Ministry of Environment,
Forest and Climate Change,
Government of India,
Indira Paryavaran Bhavan,
Jor Bagh Road, Ali Ganj
New Delhi - 110 003

37. Addl. Director General of Forests (WL) &
Director Wildlife Preservation,
Ministry of Environment,
Forest and Climate Change,
Government of India,
Indira Paryavaran Bhavan,
Jor Bagh Road, Ali Ganj,
New Delhi - 110 003

38. Additional Secretary
& Finance Advisor,
Ministry of Environment,
Forest and Climate Change,
Government of India,
Indira Paryavaran Bhavan,
Jor Bagh Road, Ali Ganj,
New Delhi - 110 003

39. Director General,
Indian Council of Forestry
Research & Education,
P.O. New Forest,
Dehra Dun - 248 006

40. Director,
Zoological Survey of India,
M-Block, New Alipore,
Kolkata - 700 053

41. Director,
Botanical Survey of India,
CGO Complex, 3 MSO Building,
Block F, 5th & 6th Floor, DF Block,
Sector-I, Salt Lake City,
Kolkata – 700 064 (West Bengal)

42. Dr. P.K. Mathur,
Dean, Faculty of Wildlife Sciences,
Wildlife Institute of India,
Debradun - 248 001

43. Shri V.K. Uniyal,
Scientist – F,
Wildlife Institute of India,
Dehradun - 248 001
Member-Secretary

44. Dr. V.B. Mathur,
Director,
Wildlife Institute of India,
Dehradun - 248 001

Permanent Invitee:

45. Inspector General of Forests (WL),
Ministry of Environment,
Forests and Climate Change,
Government of India,
Indira Paryavaran Bhawan,
Ali Ganj, Jor Bagh Road,
New Delhi – 110 003

46. Member-Secretary,
National Tiger Conservation Authority,
First Floor, East Tower, NBCC Place,
Bhishma Pitamah Marg,
New Delhi – 110 003

47. Director (Project Elephant),
Ministry of Environment,
Forest and Climate Change,
Government of India,
Indira Paryavaran Bhawan, Ali Ganj,
Jor Bagh Road,
New Delhi – 110 003

Governing Body

1. **Chairman,**
Secretary,
Ministry of Environment,
Forest and Climate Change,
Government of India,
Indira Paryavaran Bhavan,
Jor Bagh Road, Ali Ganj,
New Delhi - 110 003

Members

2. Director General of Forests & Special Secretary,
Ministry of Environment,
Forest and Climate Change,
Government of India,
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3 Dr. A.J.T. Johnsingh,
101, Magnolia,
Esteem Gardenia,
Sahkara Nagar,
Bengaluru- 560 092

4. Shri Brijendra Singh,
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Director, Centre for Wildlife Studies,
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Cuttack (Orissa)

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Bharti Vidyapeeth Institute of Environment,
Education and Research,
(Bhartiya Vidyapeeth Deemed University),
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8. Dr. Reena Mathur,
D-279, Todarmal Marg,
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Jaipur (Rajasthan)

9. Additional Secretary & Financial Advisor,
Ministry of Environment,
Forest and Climate Change,
Government of India,
Indira Paryavaran Bhavan,
Jor Bagh Road, Ali Ganj,
New Delhi - 110 003

10. Chief Secretary,
Government of Uttarakhand,
"Sachivalaya",
Dehradun – 248 001

11. Chief Wildlife Warden,
Govt. of Uttarakhand,
Chandrabani,
Dehra Dun

12. Chief Wildlife Warden,
Government of Mizoram,
Environment & Forest Department,
Tuikhuahtlang,
Aizawal (Mizoram)

13. Chief Wildlife Warden,
Government of West Bengal,
Bikash Bhawan, 3rd Floor, North Block,
Salt Lake City,
Kolkata – 700 091 (West Bengal)

14. Chief Wildlife Warden,
Government of Jammu & Kashmir,
Raj Bagh Forest Complex,
Silk Factory Road,
Srinagar - 190 001 (J&K)

15. Chief Wildlife Warden,
Government of Uttar Pradesh,
17, Rana Pratap Marg,
Lucknow – 226 001 (Uttar Pradesh)

16. Chief Wildlife Warden,
'Vanalakshmi',
Forest Headquarters,
Vazhuthacaud,
Thiruvananthapuram - 695 014 (Kerala)

17. Additional Director General of Forests (WL)
Ministry of Environment,
Forest and Climate Change,
Government of India,
Indira Paryavaran Bhavan,
Jor Bagh Road, Ali Ganj,
New Delhi - 110 003

18. Director General,
Indian Council of Forestry Research &
Education,
P.O. New Forests,
Dehra Dun - 248 006

19. Shri P.R. Sinha,
(Chairman, TRAC),
Country Representative,
India Country Office,
International Union for
Conservation of Nature (IUCN),
C-4/25, Safdarjang Development Area,
Hauz Khas,
New Delhi–110 016

20. Dr. P.K. Mathur,
Dean, Faculty of Wildlife Sciences,
Post Box No. 18, Chandrabani,
Wildlife Institute of India,
Dehradun
Member-Secretary

21. Dr. V.B. Mathur,
Director,
Wildlife Institute of India,
Post Box No. 18, Chandrabani,
Dehradun – 248 001

Permanent Invitees

22. Inspector General of Forests (WL),
Ministry of Environment,
Forest and Climate Change,
Government of India,
Indira Paryavaran Bhavan,
Jor Bagh Road, Ali Ganj,
New Delhi - 110 003

23. Member Secretary,
National Tiger Conservation Authority,
B-1 Wing, 7th Floor,
Paryavaran Bhawan,
CGO Complex, Lodi Road,
New Delhi - 110 003

24. Director (Project Elephant),
Ministry of Environment,
Forest and Climate Change,
Government of India,
Indira Paryavaran Bhavan,
Jor Bagh Road, Ali Ganj,
New Delhi - 110 003

Training, Research & Academic Council (TRAC)(20.03.2015 to 19.03.2018)

Chairman

1. Shri P.R. Sinha,
Country Representative, India Country Office,
IUCN (International Union for
Conservation of Nature),
B-88, Neeti Bagh,
New Delhi – 110 049

Member *(Ex-officio)*

2. Director (Wildlife Preservation)/
Additional Director General (Wildlife),
Ministry of Environment, Forest &
Climate Change, Government of India,
Indira Paryavaran Bhawan,
Ali Ganj, Jor Bagh Road,
New Delhi – 110 003

(3-15) Chief Wildlife Wardens on a regional rotational basis

Northern Region (2 Representatives)
Haryana, Jammu & Kashmir
Eastern Region (2 Representatives)
Orissa, Jharkhand
Central India (1 Representative)
Chhattisgarh
Western Region (2 Representatives)
Daman & Diu, Goa
Southern Region (2 Representatives)
Kerala, Tamil Nadu
North-eastern Region (3 Representatives)
Mizoram, Manipur, Meghalaya
Permanent Invitee
Uttarakhand

16. Director,
Botanical Survey of India,
Ministry of Environment, Forest & Climate Change,
C.G.O. Complex, 3 M.S.O. Building,
Block-F, 5th & 6th Floor, DF Block,
Sector-I, Salt Lake City,
Kolakata – 700 064 (West Bengal)

17. Director,
Zoological Survey of India,
Prani Vigyan Bhawan,
M-Block, New Alipore,
Kolkata – 700 053 (West Bengal)

18. Member Secretary,
Central Zoo Authority,
Bikaner House, Annexe-VI,
Shahjahan Road,
New Delhi – 110 011

Members

(19) & 20. Two representatives from University, who are Members of WII-Society (up to 25.11.2015)

Dr. Priya Davidar, Professor,
Dept. of Ecology & Environmental Sciences,
School of Life Sciences,
Pondicherry University,
R.V. Nagar, Kalapet,
Puducherry – 605 014

Dr. Mewa Singh,
Ramanna Fellow & Professor of Psychology,
University of Mysore,
Mysore – 570 006 (Karnataka)

21. Dr. S. Shivaji,
Research Consultant,
Jhaveri Microbiology Centre,
L. V. Prasad Eye Institute,
L. V. Prasad Marg, Banjara Hills,
Hyderabad – 500 034 (Andhra Pradesh)

22. Sh. T.T.C. Marak, IFS,
Former, Principal Chief Conservator of Forests
& Chief Wildlife Warden, Government of Meghalaya,
Lapalang, Dong Madan,
Shillong – 793 006 (Meghalaya)

23. Dr. Rucha Ghate,
Senior NRM Governance Specialist,
International Centre for Integrated
Mountain Development,
Khumaltar, Lalitpur, G.P.O. Box 3226,
Kathmandu (Nepal)

24. A Representative of the
Indian Council of Forest,
Research & Education (ICFRE)
P.O. New Forest,
Dehra Dun – 248 006 (Uttarakhand)

25. Dean, Faculty of Wildlife Sciences,
Wildlife Institute of India,
Chandrabani,
Dehra Dun – 248 001 (Uttarakhand)

26 & 27. Two senior most Head of Departments
(in terms of pay-scale)
(to be nominated by Director, WII),
Wildlife Institute of India,
Chandrabani,
Dehra Dun – 248 001 (Uttarakhand)

28. Faculty Member
(In-charge of Research Coordination)
Wildlife Institute of India,
Chandrabani,
Dehra Dun – 248 001 (Uttarakhand)

Member-Secretary

29. Director,
Wildlife Institute of India,
Chandrabani,
Dehra Dun – 248 001 (Uttarakhand)

WII-Finance Committee

Chairman

1. Director General of Forests & Special Secretary,
Ministry of Environment,
Forest and Climate Change,
Government of India, Indira Paryavaran
Bhawan,
Ali Ganj, Jor Bagh Road,
New Delhi – 110 003

Members

2. Additional Director General of Forests &
Director (Wildlife Preservation),
Ministry of Environment,
Forest and Climate Change,
Government of India, Indira Paryavaran
Bhawan,
Ali Ganj, Jor Bagh Road,
New Delhi – 110 003

3. Additional Secretary & Financial Advisor,
Ministry of Environment,
Forest and Climate Change,
Government of India, Indira Paryavaran
Bhawan,
Ali Ganj, Jor Bagh Road,
New Delhi – 110 003

4. Shri P. R. Sinha,
(Chairman, TRAC),
Country Representative, India Country Office,
International Union for Conservation
of Nature (IUCN), C-4/25, Safdarjang
Development Area, Hauz Khas,
New Delhi–110 016

5. Dr. Biswajit Mohanty,
Shantikunj, Link Road,
Cuttack (Odisha)

6. Dr. P.K. Mathur,
Dean, Faculty of Wildlife Sciences,
Wildlife Institute of India,
Dehra Dun

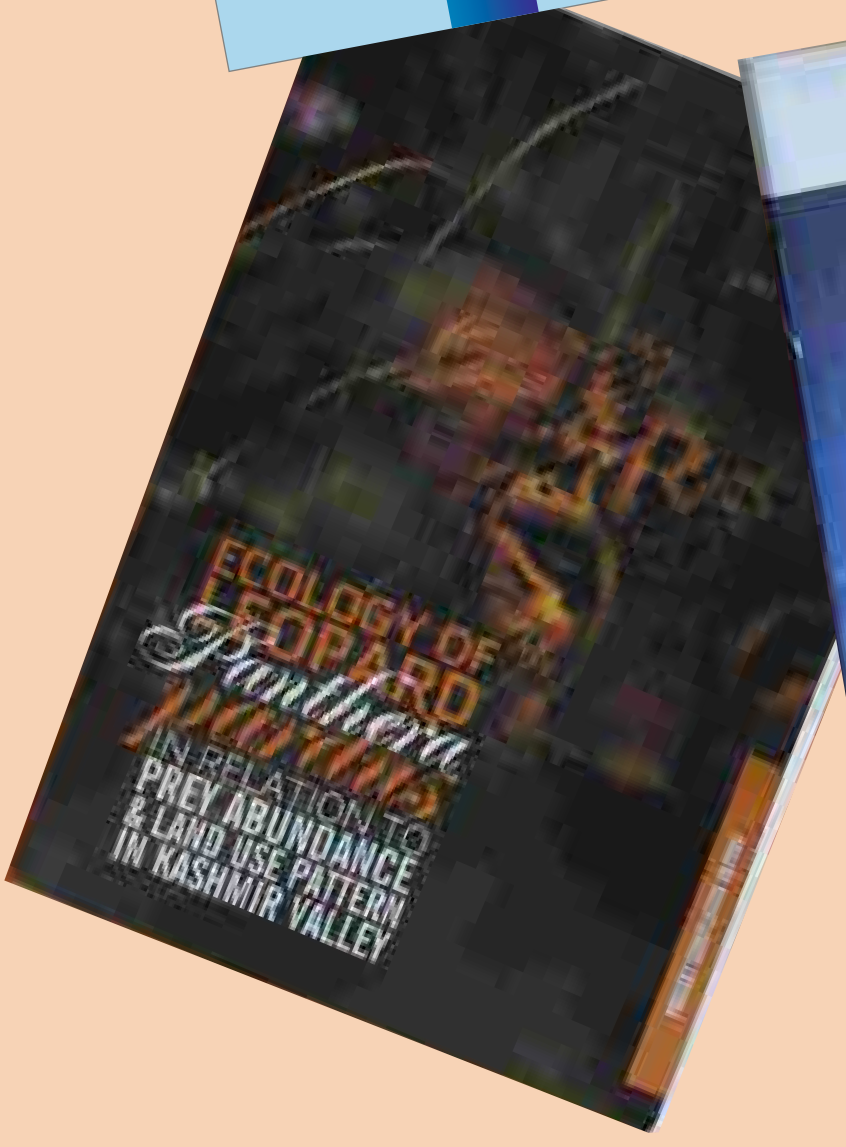
Member- Secretary

7 Dr. V.B Mathur,
Director,
Wildlife Institute of India,
Dehradun

PUBLICATIONS


NATIONAL MISSION FOR SUSTAINING THE HIMALAYAN ECOSYSTEM (NMSHE)
WILDLIFE WATCH
IN THE INDIAN HIMALAYAN REGION
2014-2015
भारतीय वन्यजीव संस्थान
Wildlife Institute of India
SERIES I


भारतीय वन्यजीव संस्थान
Wildlife Institute of India
वार्षिक रिपोर्ट
2013–14


ECOLOGY OF LEOPARD
IN RELATION TO
PREY ABUNDANCE
& LAND USE PATTERN
IN KASHMIR VALLEY


MANAGEMENT
EFFECTIVENESS
EVALUATION
NATIONAL PARKS
AND WILDLIFE
SANCTUARIES
IN INDIA

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- **Rawat GS** (2014) High altitude pastoral production and climate change in the Himalaya: An overview. Lead presentation in a session on Impact of climate change in the Himalayan region. Tropical Ecology Congress – 2014, JNU, New Delhi, December 10-12, 2014.
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- **Laha A, Badola R, Hussain SA, Uniyal VK** (2015) Bridging the gap between conservation and development - A case study of Askot landscape, Pithoragarh, Uttarakhand, India. Paper presented at the XXXVII Indian Social Science Congress, Visakhapatnam, 29 March to 2 April 2015.
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- **Dibyadeep C, Sankar K, Qureshi Q, Malik PK, Nigam P** (2014) Ranging patterns and habitat use of sambar, *Rusa unicolor* in Sariska Tiger Reserve, Rajasthan, Western India. DSG *Newsletter. N026*. Pp 60-71.
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TALKS & MEETINGS

Teaching Inputs Provided to Other Institutions

From WII

- Dr. A.K. Bhardwaj (14 April 2014). **Activities of WII and important issues for the benefit of veteran foresters.** Indira Gandhi National Forest Academy, Dehradun.
- Dr. Asha Rajvanshi (April 17, 2014): **Environment Impact Assessment with procedure and discussion on case studies.** Participants of 115th Induction Training Programme for IAS officers at Lal Bahadur Shastri National Academy of Administration, Mussoorie.
- Dr. Asha Rajvanshi (May 9, 2014): **Relevance of Biodiversity for Human Well-being.** Participants of 2nd National Training Programme on Environment and Auditing at International Centre for Environment Audit and Sustainable Development (iCED), Jaipur.
- Dr. Ruchi Badola (29 May 2014). **Ecodevelopment and participatory resource management.** Indira Gandhi National Forest Academy, Dehradun.
- R. Suresh Kumar (6-9 June 2014). **Wildlife techniques exercise.** Central Academy for State Forest Service, Probationers 2013-14 to Rajaji National Park.
- Dr. V.B. Mathur (11 June, 2014). **Environment, forest and wildlife conservation in India: An Overview.** Lal Bahadur Shastri National Academy of Administration, Mussoorie.
- R. Suresh Kumar (26 June 2014). **Use of remote sensing and GIS in - Tracking turtle migration.** Summer school for students organized by Indian Institute of Remote Sensing, Dehradun.
- Dr. Asha Rajvanshi (July 24, 2014): **Environmental Impact Assessment: Tools, Trends and Best Practice Approaches.** Participants of Mid-career training of Indian Forest Service Officers for Phase-III at Indira Gandhi National Forest Academy, Dehradun.
- Dr. V.B. Mathur (28 July, 2014). **Challenges of biodiversity in India: Challenges, opportunities and way forward.** Indira Gandhi National Forest Academy, Dehradun.
- Dr. Ruchi Badola (4 August 2014). **Valuation and payment of ecosystem services.** Indira Gandhi National Forest Academy, Dehradun.
- Dr. Ruchi Badola (16-17 August 2014). **Involvement of community in prevention of wildlife crimes.** Tiger Trust, Udaipur.
- Dr. A.K. Bhardwaj (23 September 2014). **Panel discussion on community resource management.** Central Academy for State Forest Service, Dehradun.
- Dr. G.S. Rawat (October 2, 2014). **Biodiversity of higher Himalaya.** Lal Bahadur Shastri National Academy of Administration, Mussoorie.
- Dr. S. Sathyakumar (7 October 2014). **Wildlife of the Himalaya: Conservation through science.** Dolphin PG Institute and Department of Forestry, Dehradun.
- Dr. Ruchi Badola (14 October 2014). **Interpersonal relationships.** Central Academy for State Forest Service, Dehradun.
- Dr. V.B. Mathur (20 October, 2014). **Wildlife management issues and challenges.** Indira Gandhi National Forest Academy, Dehradun.
- Dr. V.B. Mathur (12-18 November, 2014). **Participatory climate change adaptation plans for natural world heritage sites in India.** IUCN World Parks Congress 2014 in Sydney, Australia.
- Dr. Ruchi Badola (14 November 2014). **Payment for ecosystem services.** Professional skill up-gradation course at Indira Gandhi National Forest Academy, Dehradun.
- Dr. V.B. Mathur (3 December, 2014). **Environment forest & wildlife conservation in India: Overview.** Orientation Module course for Indian Railway Traffic Service Probationers at Indira Gandhi National Forest Academy, Dehradun.
- Dr. A.K. Bhardwaj (10 December 2014). **Concept of ecodevelopment: Ecodevelopment planning, institutions and institution building process for the ecodevelopment.** Indira Gandhi National Forest Academy, Dehradun.
- Dr. A.K. Bhardwaj (11 December 2014). **Concept of ecodevelopment: Ecodevelopment planning, institutions and institution building process for the ecodevelopment.** Indira Gandhi National Forest Academy, Dehradun.
- G.S. Rawat. (December 11, 2014). **Fascinating**

world of alpine plants and habitats in Himalaya. Ministry of Environment, Forest & Climate Change, Govt. of India, New Delhi on the occasion of International Mountain Day.

- Dr. A.K. Bhardwaj (16 December 2014). **Group discussion on wildlife management.** Indira Gandhi National Forest Academy, Dehradun.
- Dr. Ruchi Badola (18 February 2015). **Integrated approach to reduce the vulnerability of local communities to environmental degradation and climate change impacts in the Western Himalaya.** Central Academy for State Forest Service, Dehradun.
- Dr. S.A. Hussain (18 February, 2015). **Valuation of Bhitarkanika Mangrove Ecosystem for ecological security and sustainable resource use.** Central Academy for State Forest Services, Dehradun.
- Dr. V.B. Mathur (23-24 Feb., 2015). **Conserving world natural heritage: The Indian experience.** Periyar Tiger Reserve, Thekaddy.
- Dr. V.B. Mathur (27 March, 2015). **Overview of the management effectiveness evaluation (MEE) Process.** Meeting of Regional Expert Committees for MEE of National Parks and Wildlife Sanctuaries, Ministry of Environment, Forest & Climate Change, New Delhi.
- Dr. V.B. Mathur (27 March, 2015). **Management effectiveness evaluation framework & criteria: 2015-16.** Meeting of Regional Expert Committees for MEE of National Parks and Wildlife Sanctuaries. Ministry of Environment, Forest & Climate Change, New Delhi.

To WII

- **Dr. Ravi Chopra,** Director, Peoples Science Institute, Dehradun, (9 September 2014). Talk on "Sustainable Development in the Himalaya".
- **Mrs. Vibha Puri Das,** Former Secretary, Ministry of Tribal Affairs, Govt. of India, (28 October, 2014). Guest Lecture on 'Combating Corruption: Challenges and Way Ahead'.
- **Dr. Paul Pearce-Kelly,** Senior Curator, Zoological Society of London & Chair WAZA/CBSG Climate Change Task Force and IUCN Climate Change Specialist Group (28 October, 2014). Guest Lecture on 'Urgent questions concerning climate change threat evaluation and conservation policy'.

Awards

Dr. A.K. Bhardwaj received the first prize under the category of Best Website the prize was given by Chief Minister, Kerala during November, 2014 under Kerala State E-Governance Awards.

ACCOUNTS

Separate Audit Report of Comptroller and Auditor General of India on the Accounts of Wildlife Institute of India, Dehradun for the year 2014-15

1. We have audited the attached Balance Sheet of Wildlife Institute of India, as on 31 March 2015, the Income & Expenditure Account and the Receipts & Payment Account for the year ended on that date under Section 20(1) of the Comptroller & Auditor General's (Duties, Powers & Conditions of Service) Act, 1971 read with Section 38 G of the Wildlife (Protection) Act, 1972. These financial statements are the responsibility of the WII's management. Our responsibility is to express an opinion on these financial statements based on our audit.
2. This Separate Audit Report contains the comments of the Comptroller and Auditor General of India (CAG) on the accounting treatment only with regard to classification, conformity with the best accounting practices, accounting standards and disclosure norms, etc. Audit observations on financial transactions with regard to compliance with the Law, Rules & Regulations (Propriety and Regularity) and efficiency-cum-performance aspects, etc., if any, are reported through Inspection Reports/CAG's Audit Reports separately.
3. We have conducted our audit in accordance with auditing standards generally accepted in India. These standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material mis-statements. An audit includes examining, on a test basis, evidences supporting the amounts and disclosure in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of financial statements. We believe that our audit provides a reasonable basis for our opinion.
4. Based on our audit, we report that:

(i) We have obtained all the information and explanations, which to the best of our knowledge and belief were necessary for the purpose of our audit.

(ii) The Balance Sheet, Income & Expenditure Account and Receipt & Payment Account dealt with by this report have been drawn up in the format approved by the Ministry of Finance.

(iii) In our opinion, proper books of accounts and other relevant records have been maintained by the WII as required under Section 38G of the Wildlife (Protection) Act, 1972 in so far as it appears from our examination of such books.

(iv) We further report that:

A: Balance Sheet:

1. Assets

1.1 Fixed assets (Schedule-8) ₹ 14.72 lakhs

Due to incorrect calculation of depreciation, fixed assets have been understated to the tune of ₹ 14.72 lakh and understatement of capital fund to the same extent. Details are appended to Statement 'A'.

B: Income & Expenditure Account:

As per Schedule 11: Current Assets, Loans, Advances etc. ₹ 1.08 lakh was depicted as Pre-receipted bill issued but not received. It was also depicted in the Annual Accounts for the year 2013-14. Further during the year, the same amount was depicted in the Schedule 14: Fees/Subscriptions as 'Pre-receipted bill issued but not received' and income of ₹ 1.08 lakh was credited in the Income & Expenditure Account. This resulted the overstatement of Income by ₹ 1.08 lakh as well as overstatement of Asset to the same extent.

C. Grants-in-Aid:

During the year 2014-15, WII received grants in aid of ₹ 2,230.00 lakh (₹ 2,099.00 lakh under Plan, ₹ 6.00 under Pench Tiger and ₹ 125.00 lakh under Non-Plan heads) and out of it an amount of ₹ 673.00 lakh (₹ 641.75 lakh under Plan & ₹ 31.25 lakh under Non-Plan) was received during the month of February 2015 and whole of the grants were expended.

D. Management Letter

Deficiencies which have not been included in the Audit Report have been brought to the notice of WII, Dehradun through a Management Letter issued separately for remedial/corrective action.

(v) Subject to our observations in the preceding paragraphs, we report that the Balance Sheet and Income & Expenditure Account and Receipts & Payments Account dealt with by this report are in agreement with the books of accounts.

(vi) In our opinion and to the best of our information and according to the explanations given to us,

Place: New Delhi
Date: 18/11/15

For and on behalf of C&AG of India.

Pr. Director of Audit (SD)

Statement-A

The Institute had inadvertently charged depreciation in the following fixed assets:

Name of the Asset	Value	Amount of Depreciation Charged (₹ in lakh)	Amount of Depreci-ation to be charged (₹ in lakh)	Over charge of depreciation Under-statement of Fixed Asset	Under charge of depreciation Over-statement of Fixed Asset
Campus Development	331.03	25.48	25.68	-	0.20
Building complex	552.85	55.61	55.28	0.33	-
Road and culvert	1.57	0.31	0.16	0.15	-
Staff quarter	22.84	4.57	1.14	3.43	-
Vehicle	32.58	6.52	4.89	1.63	-
Development of forensic laboratory	46.74	8.56	6.42	2.14	-
Training equipment	3.99	0.80	0.60	0.20	-
Camp equipment (project)	0.75	0.19	0.11	0.08	-
DG set	5.48	1.37	0.82	0.55	-
EPABX	0.53	0.13	0.08	0.05	-
Lab equipment	20.82	4.98	2.99	1.99	-
Office equipment	8.01	1.97	1.18	0.79	-
Training equipment (training)	25.41	6.35	3.81	2.54	-
Office equipment (project)	0.04	0.009	0.006	0.003	-
Office equipment (research)	14.91	3.72	2.23	1.49	-
Camp equipment (research)	55.80	12.16	7.29	4.87	-
Furniture & Fixture	47.36	6.91	4.61	2.30	-
Furniture & Fixture (training)	2.90	0.43	0.29	0.14	-
Office equipment (training)	5.56	1.03	0.52	0.51	-
Comp. and peripherals	30.44	6.09	4.57	1.52	-
Journals & periodicals	209.14	20.63	30.95	-	10.32
AC Plant	3.24	0.83	0.30	0.53	-
Total	**1418.75**	**168.649**	**153.926**	**25.243**	**10.52**

Director (EA)

ANNEXURE –"A"

1. As per R&P A/c ₹ 23,26,217.44 was depicted against journals & periodicals in the payment side. However, in the schedule 8 fixed assets it was ₹ 23,26,216.44 (₹ 17,66,748.44 +₹ 5,59,468). The discrepancy of ₹ 1.00 needs rectification.
2. As per schedule 11: Current Assets, Loans and Advances etc. ₹ 91,565.00 was depicted as sundry debtors whereas in the ledger the same was ₹ 91,564.47. Discrepancy needs rectification.
3. As per Uniform Format of Accounts for Central Autonomous Bodies, Interest should be depicted in the Income & Expenditure A/c as Schedule-23. However, the Interest was depicted nil whereas the schedule-23 was entered against the head depreciation. In the schedule-23 the heading was entered as Expenditure on Grants, Subsidies Etc.
4. The schedule nos. 24 & 25 as Significant Accounting Policies and Contingent Liabilities and Notes on Accounts respectively was not depicted in the Balance Sheet and Income & Expenditure A/c. Further, the Significant Accounting Policies (notes on account) was depicted in the schedule 25 instead of schedule 24 & the year 2014 was entered in the schedules forming part of the accounts instead of 2015.
5. Scrutiny of Schedule 5,7 & 11 of the Balance Sheet for the year ended 31st March 2015 Revealed that there was static balance in the following heads:

S. No.	Schedule No. & Name	Heads	Amount (₹)
1.	Sc. 5: Unsecured Loans and borrowings	(8) Others specify Security deposit	3,14,318.00
2.	Sc. 7: Current Assets and Liabilities & Provisions (A)	(2) Sundry creditors (2) Others payments outstanding	2,77,000.00
3.	Sc. 7: Current Assets and Liabilities & Provisions (B)	(6) Others specify Fellowship arrear	65,754.00
4.	Sc. 11: Current Assets, Loans and Advances Etc. (B)	(3) Others specify Loan from MoEF for World Environment Day Loan for WFC workshop	2,80,984.00 30,253.00
		(4) Others specify Training cost accrued but not received	8,38,375.00
	TOTAL		**18,06,684.00**

Security Deposit and others payments outstanding remained static from 2012-13, Fellowship arrear from 2010-11, Loan from MoEF for World Environment Day from 2011-12 (₹ 2,67,298.00) & 2012-13 (₹ 13,686), Loan for WCF workshop from 2012-13 and Training cost accrued but not received remained static from 1996-97 (₹ 1,000.00), 2005-06 (₹ 6,60,000), 2001-02 (₹ 26,500) & 1999-00 (₹ 1,50,875). These balances needs to be review and necessary adjustment may be done.

Director (EA)

RECEIPT & PAYMENT ACCOUNTS FOR THE YEAR 2014-15

RECEIPTS					PAYMENT				
Particulars	**Plan**	**Non Plan**	**Total**	**Previous Year**	**Particulars**	**Plan**	**Non Plan**	**Total**	**Previous Year**
Opening Balance			0		Salaries & Allowances	12,48,19,761.00	1,25,00,000.00	13,73,19,761.00	11,33,78,806.00
Cash in Bank	1,46,58,201.32	0.00	1,46,58,201.32	1,56,88,280.00	Medical	47,17,188.00	0.00	47,17,188.00	73,01,346.00
Cash In Hand	1,08,420.00	0.00	1,08,420.00	1,65,899.00	LTC	17,59,221.00	0.00	17,59,221.00	20,66,179.00
				OTA		2,63,269.00	0.00	2,63,269.00	4,16,251.00
Grant in Aid (Revenue)	19,49,00,000.00	1,25,00,000.00	20,74,00,000.00	21,06,49,000.00	Honorarium	81,300.00	0.00	81,300.00	53,900.00
Grant in Aid (Capital)	1,50,00,000.00	0.00	1,50,00,000.00	25,00,000.00	Fellowship Genetic Lab	9,935.00	0.00	9,935.00	0.00
Grant (other Projects)	6,00,000.00	0.00	6,00,000.00	0.00	Fellowship & Wages (R/Proj)	30,97,152.00	0.00	30,97,152.00	31,56,926.00
MSc Course Fee	0.00	0.00	0.00	12,89,700.00	Stipend of MSc Students	5,43,071.00	0.00	5,43,071.00	4,38,925.00
Bus Charges	2,64,336.00	0.00	2,64,336.00	2,68,250.00	Leave encashment & Gratuity	37,42,658.00	0.00	37,42,658.00	38,47,769.00
Rent	5,91,122.00	0.00	5,91,122.00	6,21,730.00	Bonus	3,90,073.00	0.00	3,90,073.00	4,10,618.00
WII Products	16,662.00	0.00	16,662.00	41,916.00	Leave Salary Pension Con	21,39,850.00	0.00	21,39,850.00	93,95,073.00
Misc Receipts	6,33,377.16	0.00	6,33,377.16	6,74,830.00	Base Camp Expenses (Res Project)	2,94,903.00	0.00	2,94,903.00	1,45,261.00
Elect & Water	3,94,062.00	0.00	3,94,062.00	3,67,173.00	Annual Res Seminar-ARS	12,26,681.00	0.00	12,26,681.00	8,56,965.00
Telephone	7,612.00	0.00	7,612.00	3,836.00	Estate Security	97,23,010.00	0.00	97,23,010.00	1,22,33,271.00
Interest on Saving A/c	15,77,447.00	0.00	15,77,447.00	18,30,936.00	POL, Hiring of Veh (R/Proj)	13,69,350.00	0.00	13,69,350.00	16,91,513.00
Loan & Advance	1,41,984.00	0.00	1,41,984.00	1,56,223.00	Contingencies (Res Proj)	5,67,139.00	0.00	5,67,139.00	13,84,005.00
EMD Security Deposit		0.00	0.00	4,10,500.00	Travel Expenses (Res. Proj)	9,03,766.00	0.00	9,03,766.00	4,71,376.00
Hostel Caution Money	64,600.00	0.00	64,600.00	52,743.00	Lab Expenses-Forc Lab	26,18,229.00	0.00	26,18,229.00	12,72,484.00
Income Tax Refund		0.00	0.00	5,000.00	Harberium	3,360.00	0.00	3,360.00	58,223.00
Travel Advance-GIA	0.00	0.00	0.00	11,609.00	M.Sc Expenditure	20,09,725.00	0.00	20,09,725.00	28,59,256.00
Intt on HBA	1,79,380.00	0.00	1,79,380.00	0.00	Elect and Water Charges	70,99,107.00	0.00	70,99,107.00	75,50,067.00
Travel Advance (R/Proj)	3,000.00	0.00	3,000.00	0.00	Guest House Maint	1,55,425.00	0.00	1,55,425.00	99,872.00
FA (Research Project)	7,482.00	0.00	7,482.00	1,19,566.00	Hospitality/Entertainment	2,21,269.00	0.00	2,21,269.00	2,20,647.00
LTC Adv	1,08,064.00	0.00	1,08,064.00	4,19,150.00	POL of WII Vehicle	17,74,964.00	0.00	17,74,964.00	17,05,609.00
Medical Adv	79,893.00	0.00	79,893.00	90,000.00	Postage & Telegram	2,24,854.00	0.00	2,24,854.00	2,84,850.00

M.Sc-FA & TA Advance	3,45,000.00	0.00	3,45,000.00	5,32,005.00	Repair & Maint of Vehicle	8,42,265.00	0.00	8,42,265.00	9,54,437.00
Internal Loan	5,19,80,625.00	0.00	5,19,80,625.00	5,000.00	Sport	4,95,863.00		4,95,863.00	1,53,900.00
Camp Equipment	0.00	0.00	0.00	12,000.00	Stationery & Consumables	5,12,500.00	0.00	5,12,500.00	4,43,457.00
Journals & Periodicals	0.00	0.00	0.00	82,152.02	Telephone & Trunk Calls	8,45,057.00	0.00	8,45,057.00	9,39,795.00
TDS	3,978.00	0.00	3,978.00	0.00	Training & Skill upgradation	41,308.00	0.00	41,308.00	26,000.00
CGEGIS	785.00	0.00	785.00	0.00	Legal Expenses	1,95,100.00	0.00	1,95,100.00	2,33,335.00
Expenses for Capitales	1,13,41,845.00	0.00	1,13,41,845.00	3,86,349.00	Operational expenses	7,13,912.00	0.00	7,13,912.00	9,60,641.00
Sundry Debtors	0.00	0.00	0.00	3,563.00	Printing & Binding	5,61,854.00	0.00	5,61,854.00	3,05,086.00
Opening Stock-Library	3,41,547.00	0.00	3,41,547.00	90,377.00	Maint of WII Campus	5,22,033.00	0.00	5,22,033.00	7,90,029.00
Vehicle	47,774.45	0.00	47,774.45	47,774.45	Repair of equipment/furniture	83,717.00	0.00	83,717.00	46,880.00
GPF Recd	60,000.00	0.00	60,000.00	0.00	Computer AMC & Consumabale	15,32,057.00	0.00	15,32,057.00	21,26,409.00
					EMD Released	33,500.00	0.00	33,500.00	0.00
					Lab. Expenses-Research Lab	1,09,835.00	0.00	1,09,835.00	2,84,461.00
					Lab. Expenses-Gen.	31,236.00	0.00	31,236.00	1,54,544.00
					Maint. Of Civil Work	10,14,660.85	0.00	10,14,660.85	8,56,833.00
					Transferred to Trg A/c for expenditure	90,00,000.00	0.00	90,00,000.00	65,00,000.00
					Travel Expenses	27,00,686.00	0.00	27,00,686.00	27,49,468.00
					Plantation & Tree	58,70,989.00	0.00	58,70,989.00	0.00
					Travel expenses Library	6,000.00	0.00	6,000.00	0.00
					Lib expenses	84,147.00	0.00	84,147.00	0.00
					Corpus Funds	0.00	0.00	0.00	41,85,576.00
					Medical Adv	0.00	0.00	0.00	79,893.00
					Travel Advance (GIA)	1,48,150.00	0.00	1,48,150.00	0.00
					Forest advance R/Proj	53,781.00	0.00	53,781.00	7,482.00
					Tour Advance -R/Proj	16,308.00	0.00	16,308.00	3,000.00
					LTC Advance	14,000.00	0.00	14,000.00	1,08,064.00
					M.Sc. TA Advance	68,800.00	0.00	68,800.00	45,000.00
					M.Sc. FA Advance	4,58,535.00	0.00	4,58,535.00	3,00,000.00
					Computer & Accessories	14,32,773.00	0.00	14,32,773.00	1,32,128.00

					By Furniture & Fixture	3,32,608.00	0.00	3,32,608.00	4,01,357.00
					By Journals & Periodicals	23,26,217.44	0.00	23,26,217.44	41,45,644.00
					By Lab Eqpt (For Lab)	8,55,662.00	0.00	8,55,662.00	79,139.00
					By Office Eqpt (Res. Proj)	4,850.00	0.00	4,850.00	3,94,055.00
					By Camp Eqpt (Res. Proj.)	15,18,978.00	0.00	15,18,978.00	11,64,665.00
					By Vehicle	22,02,093.45	0.00	22,02,093.45	47,774.45
					Office equipment	57,300.00	0.00	57,300.00	0.00
					Lab Equipment (Res. Lab.)	54,447.00	0.00	54,447.00	0.00
					Lab Equipment (Harbarium)	57,675.00	0.00	57,675.00	0.00
					Lab Equipment (Genetic Lab.)	70,118.00	0.00	70,118.00	0.00
					TDS	0.00	0.00	0.00	6,134.00
					Income tax	5,000.00	0.00	5,000.00	0.00
					TDS Refund GPF,Pension & Corpus	0.00	0.00	0.00	7,93,010.00
					CGEGIS	0.00	0.00	0.00	1,320.00
					Purch.of Vehicle-Advance	24,96,981.00	0.00	24,96,981.00	21,54,319.00
					Sundry Creditores	39,90,318.00	0.00	39,90,318.00	16,82,377.00
					Previous Year bal. Transf.	19,77,735.00	0.00	19,77,735.00	32,61,000.00
					GPF	0.00	0.00	0.00	60,000.00
					Advance for CPWD	1,25,00,000.00	0.00	1,25,00,000.00	1,32,05,918.00
					Campus development	9,50,117.15	0.00	9,50,117.15	4,66,940.00
					Raj Kishore Mohanti	0.00	0.00	0.00	1,19,301.00
					Sale for Complementry-Library	3,37,461.00	0.00	3,37,461.00	90,377.00
					Incoem from Library		0.00	0.00	0.00
					Income from Res. Project		0.00	0.00	0.00
					Closing Balance			0.00	0.00
					In Bank	6,64,93,479.04	0.00	6,64,93,479.04	1,46,58,201.02
					In Hand	81,830.00	0.00	81,830.00	1,08,420.00
A' Total	**29,34,57,196.93**	**1,25,00,000.00**	**30,59,57,196.93**	**23,65,25,561.47**	**A' Total**	**29,34,57,196.93**	**1,25,00,000.00**	**30,59,57,196.93**	**23,65,25,561.47**

GPF

RECEIPTS					PAYMENT				
Particulars	**Plan**	**Non Plan**	**Total**	**Previous Year**	**Particulars**	**Plan**	**Non Plan**	**Total**	**Previous Year**
To Opening Bal (Bank)	4988913.00		4988913.00	361319	By Final Payment	7,11,360.00		7,11,360.00	37,13,484.00
To GP Fund Contribution	19695641.00		19695641.00	17185743	By Advance/withdrawl	96,94,776.00		96,94,776.00	96,47,496.00
Encashment of FDR's	0.00		0.00	1003702	Auto Sweep FDR	0.00		0.00	49,65,000.00
TDS received from ITO	0.00		0.00	101607	Loan to Deputationists	0.00		0.00	4,00,000.00
Intrest on FDR-TDS	0.00		0.00	385851	Interest on FDR's	0.00		0.00	3,85,851.00
To Int. on saving a/c	193376.00		193376.00	2998	By Investment of FDR	1,28,00,000.00		1,28,00,000.00	0
To Int. on FDRs	0.00		0.00	94524	TDS on Interest on FDRs	0.00		0.00	0
To Refunds of Loan	400000.00		400000.00		By Closing Balance (Cash	0.00		0.00	10,573.00
					By Closing Balance (Bank)	20,71,794.00		20,71,794.00	13,340.00
F' Total	**2,52,77,930.00**	**0.00**	**2,52,77,930.00**	**1,91,35,744.00**	**F' Total**	**2,52,77,930.00**	**0.00**	**2,52,77,930.00**	**1,91,35,744.00**

PENSIONS

RECEIPTS					PAYMENT				
Particulars	**Plan**	**Non Plan**	**Total**	**Previous Year**	**Particulars**	**Plan**	**Non Plan**	**Total**	**Previous Year**
To Opening Balance									
Cash in Bank	829292.00		829292.00	419057	By Investment in FDR	0.00		0.00	0.00
To encashment of FDR	59090549.00		59090549.00	2588479	By Commuted Value of Pension	24,30,579.00		24,30,579.00	11,70,899.00
To Interest (Pension A/c)	94382.00		94382.00	36830	By Pension/ Family Pension	66,93,295.00		66,93,295.00	55,44,124.00
To WII Contribution	3502887.00		3502887.00	3907315	By Transfer of Funds-GIA	5,19,80,625.00		5,19,80,625.00	
To Interest on FDRs	0.00		0.00	1047742	By Interest on FDRs	0.00		0.00	10,47,742.00
To Pension Contribution	759292.00		759292.00	0					
To Interest on FDR (TDS)	0.00		0.00	592634	Cash in Bank	32,03,771.00		32,03,771.00	8,29,292.00
To Cancellation of Ch.	31,868.00		31,868.00						
D' Total	**6,43,08,270.00**	**0.00**	**6,43,08,270.00**	**85,92,057.00**	**D' Total**	**6,43,08,270.00**	**0.00**	**6,43,08,270.00**	**85,92,057.00**

CORPUS FUND

RECEIPTS					PAYMENT				
Particulars	**Plan**	**Non Plan**	**Total**	**Previous Year**	**Particulars**	**Plan**	**Non Plan**	**Total**	**Previous Year**
To Opening Balance	941511.00	0.00	941511.00	16432739					
Misc Receipts	24375391.00	0.00	2,43,75,391.00	70,67,183.00	By Investment	2,50,00,000.00	0.00	2,50,00,000.00	2,00,00,000.00
Interests on Saving A/c	218284.00	0.00	2,18,284.00	3,44,418.00	Interest paid to GIA	0.00	0.00	0.00	3001689.00
To Encashment of FDR	12300000.00	0.00	1,23,00,000.00	0	TDS on Interest on FDRs	0.00		0.00	3,64,789.00
To Interet on FDRs	82905.00	0.00	82,905.00	3,64,789.00			0.00		
TDS received from ITO	0.00	0.00	0.00	98,860.00	On FDRs on pre extension of period	0.00	0	0.00	0.00
					Closing Balance	1,29,18,091.00		1,29,18,091.00	9,41,511.00
F' Total	**3,79,18,091.00**	**0.00**	**3,79,18,091.00**	**2,43,07,989.00**	**F' Total**	**3,79,18,091.00**	**0.00**	**3,79,18,091.00**	**2,43,07,989.00**

TRAINING ACCOUNT

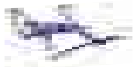
RECEIPTS					PAYMENT				
Particulars	**Plan**	**Non Plan**	**Total**	**Previous Year**	**Particulars**	**Plan**	**Non Plan**	**Total**	**Previous Year**
To Opening in Bank	81,13,371.99		81,13,372.32	24,59,583.21	By Equipment	15925.00		15,925.00	932249.00
Grant Received	90,00,000.00		90,00,000.00	65,00,000.00	By Office Equipment	139039.00		1,39,039.00	243383.00
Interest Received	2,44,610.00		2,44,610.00	2,39,451.00	Training Material	1234886.00		12,34,886.00	0.00
Other Receipts	1,05,64,509.00		1,05,64,509.00	1,37,36,907.00	By Hostel Items	122903.00		1,22,903.00	368270.00
Advance for CPWD-Civil	8,26,939.00		8,26,939.00	0.00	By Cont/Misc	1141456.04		11,41,456.04	730355.46
					By Camping Gear			0.00	145877.00
					By Travelling Expenses	6991638.00		69,91,638.00	4392347.76
					TA/DA & Honorarium (Guest Faculty)	295288.00		2,95,288.00	277972.00
					By Training Allowance	40257.00		40,257.00	395111.00
					POL & Maint of Vehicle	764878.00		7,64,878.00	655568.00
					Boarding & Lodging	5575011.00		55,75,011.00	4486155.00
					Books	263214.00		2,63,214.00	284308.00

					Advance for CPWD-Civil	0.00		0.00	850500.00
					Salary & Wages	500550.00		5,00,550.00	283837.00
					Corpus Funds	1620020.00		16,20,020.00	0.00
					Maint of Vehicle	104019.00		1,04,019.00	631154.00
					Sports Item	9618.00		9,618.00	19058.00
					Advances for expenses	30000.00		30,000.00	0.00
					Maint. Of Civil Work	826939.00		8,26,939.00	0.00
					Repair of Building			0.00	126424.00
					By Closing in Bank	9073788.95		90,73,788.95	8113371.99
C' Total	**2,87,49,429.99**	**0.00**	**2,87,49,429.99**	**2,29,35,941.21**	**C' Total**	**2,87,49,429.99**	**0.00**	**2,87,49,429.99**	**2,29,35,941.21**

CONSULTANCY PROJECTS

RECEIPTS					PAYMENT				
Particulars	Plan	Non Plan	Total	Previous Year	Particulars	Plan	Non Plan	Total	Previous Year
To Opening Balance:	0.00	0	0						
at Bank	1,29,89,946.68		1,29,89,946.68	1,28,94,805.68	By Camp Equipment	0.00		0.00	88,296.00
Grant Received	2,89,50,493.00		2,89,50,493.00	2,66,21,469.00	By Office Equipment	38,93,278.00		38,93,278.00	23,899.00
Interest Saving A/c	6,50,786.00		6,50,786.00	6,49,129.00	By Contingenciges/Misc	46,79,013.96		46,79,013.96	34,39,606.29
Other Receipt	11,56,193.00		11,56,193.00	13,91,770.00	By Fellowship & Wages	14,99,132.00		14,99,132.00	22,64,112.00
Loan from BCRLIP	30,00,000.00		30,00,000.00	11,73,539.00	By Travel Expenses	42,12,843.44		42,12,843.44	42,06,344.71
Advance for CPWD-Civil	15,41,211.00		15,41,211.00	0.00	By POL & Maint. of veh.	3,72,687.00		3,72,687.00	3,25,992.00
					Furniture & Fixture	3,27,498.00		3,27,498.00	0.00
					Stationery items	3,83,321.00		3,83,321.00	1,99,739.00
					By Forests Advance (FA)	2,40,892.00		2,40,892.00	57,000.00
					Other Advance			0.00	2,54,179.00
					By Boarding & Lodging	69,88,942.00		69,88,942.00	56,57,952.00
					By TA /DA & Honorarium	8,08,455.00		8,08,455.00	21,000.00

						Books	2,27,495.00		2,27,495.00	1,22,587.00
						Misc Expenses A/c No 8	14,27,265.05		14,27,265.05	5,18,996.00
						Transf. To Corpus Fund	60,27,196.16		60,27,196.16	1,91,334.00
						Security deposit			0.00	5,000.00
						Consultancy fees	3,70,233.00		3,70,233.00	4,76,023.00
						loan-BCRLIP			0.00	30,00,000.00
						Advance payment to CPWD			0.00	17,96,400.00
						Pre-recd bill for 2012-13			0.00	1,08,253.00
						Service tax	3,12,451.00		3,12,451.00	3,55,556.00
						Report writing	8,725.00		8,725.00	3,82,716.00
						Base camp expenses			0.00	38,048.00
						Field Equipment	15,803.00		15,803.00	59,545.00
						Building renovation	18,78,080.00		18,78,080.00	49,600.00
						Fund transferred			0.00	60,98,588.00
						Publication & Printing	0.00		0.00	0.00
						Misc Receipt-Payment	13,08,400.00		13,08,400.00	0.00
						Loan A/c 51411			0.00	0.00
						By Bank Balance	1,33,06,919.07		1,33,06,919.07	1,29,89,946.68
E' Total	**4,82,88,629.68**	**0.00**	**4,82,88,629.68**	**4,27,30,712.68**		**E' Total**	**4,82,88,629.68**	**0.00**	**4,82,88,629.68**	**4,27,30,712.68**



(P.K. Aggarwal)
Finance Officer

(Dr. V.B. Mathur)
Director

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
BALANCE SHEET AS ON 31 MARCH 2015

(Amt. Rs.)

CORPUS /CAPITAL FUND AND LIABILITIES	Schedule	Current Year	Previous Year
CORPUS /CAPITAL FUND	1	298519167.43	272754892.25
RESERVE AND SURPLUS	2	0.00	0.00
EARMARKED FUND	3	13306919.39	12989947.00
SECURED LOAN AND BORROWINGS	4	0.00	0.00
UNSECURED LOAN AND BORROWINGS	5	52311053.00	330428.00
DEFERRED CREDIT LIABILITIES	6	1577447.00	0.00
CURRENT LIABILITIES AND PROVISION	7	180607490.72	215739835.00
TOTAL (A)		**546322077.54**	**501815102.25**
ASSETS			
FIXED ASSETS	8	140855171.77	140144199.51
INVESTMENTS- FROM EARMARKED / ENDOWMENT FUNDS	9	0.00	0.00
INVESTMENTS- OTHERS	10	261498762.00	264149519.00
CURENT ASSETS, LOANS, ADVANCES ETC.	11	143968143.77	97521383.74
MISCELLANEOUS EXPENDITURE (to the extent not written off or adjusted)			
TOTAL (B)		**546322077.54**	**501815102.25**

(P.K. Aggarwal)
Finance Officer

(Dr. V.B. Mathur)
Director

FORM OF FINANCIAL STATEMENTS(NON-PROFIT ORGANISATIONS)
SHEDULES FORMING PART OF BALANCE SHEET FOR THE YEAR ENDED 31 MARCH 2015

(Amt. Rs.)

SCHEDULE 1: CORPUS/ CAPITAL FUND		Current Year	Previous Year
Balance as at the begninig of the year		198237605.76	192408889.36
Add: Contribution towards Corpus/ Capital fund		18916518.04	5315591.33
Less : Pre receipted Bill of consultancy Project			
Add/(Deduct) : Balance of net income (expenditure) transferred from		-21755178.86	513125.07
TOTAL	**A**	**195398944.94**	**198237605.76**
CORPUS FUND			
Opening Balance		74517286.49	67524376.00
Received during the year		24375391.00	7067183.00
Add Accrued Interest		3926356.00	2666342.00
Add Interest Earned		301189.00	261074.49
Less : Payment made to Grant in Aid		0.00	-3001689.00
Total	**B**	**103120222.49**	**74517286.49**
Total A+B		**298519167.43**	**272754892.25**

FORM OF FINANCIAL STATEMENTS(NON-PROFIT ORGANISATIONS)
SHEDULES FORMING PART OF BALANCE SHEET FOR THE YEAR ENDED 31 MARCH 2015

(Amt. Rs.)

SCHEDULE 3: EARMARKED FUNDS		Current Year	Previous Year
a)	Opeining Balance of the Funds	12989947.00	12894806.00
b)	Addition to the Funds		
	i Grants Received	28950493.00	26621469.00
	ii Interest Received	650786.00	649129.00
	iii Other Receipts	2697404.00	1391770.00
	iv Pre receipted Bill received	0.00	1065286.00
	v Refund of Loan from A/c No. 50650	3000000.00	
	Total	**35298683.00**	**29727654.00**
	TOTAL (A+B)	**48288630.00**	**42622460.00**
	UTILISATION/EXPENDITION TOWARDS OBJECTIVES OF FUNDS		
c)	i Capital Expenditures (Fixed Assets)		
	Camp/Field Equipment	15803.00	147841.00
	Office Equipment	3893278.00	23899.00
	Furniture & Fixture	327498.00	0.00
	Books	227495.00	122587.00
	ii Revenue Expenditure		
	Camp Expenses	0.00	38048.00
	Contigencies/Misc.	4315494.96	4179341.29
	Fellowship & Wages	1499132.00	2264112.00
	Travel Expenses	4212843.44	4206344.71
	POL & Maint. Of Vehicle	372687.00	325992.00
	Advance for Expenses (FA)	240892.00	57000.00
	Boarding & Lodging	6988942.00	5657952.00
	Misc receipt - Payment (Previous Year)	1308400.00	0.00
	Loan D/WII A/c No. 51411	0.00	3000000.00
	Other advances - Firm	0.00	254179.00
	Building Renovation	1878080.00	49600.00
	Fund Transferred	0.00	6098588.00
	Consultancy Fees	370233.00	476023.00
	Service Tax	312451.00	355556.00
	Report Writing	8725.00	382716.00
	Advance payment for CPWD-Civil	0.00	1796400.00
	Corpus fund	6027196.16	191334.00
	Security deposit	0.00	5000.00
	TA/DA & Honorarium	808455.00	0.00
	Stationery items	383321.00	0.00
	Misc Expenses A/c No. 08	1427265.05	0.00
	Sport Expenses	7162.00	0.00
	Training Course Materials	356357.00	0.00
	TOTAL-C	**34981710.61**	**29632513.00**
	NET BALANCE AS AT THE YEAR-END (A+B-C)	**13306919.39**	**12989947.00**

FORM OF FINANCIAL STATEMENTS(NON-PROFIT ORGANISATIONS)
SHEDULES FORMING PART OF BALANCE SHEET FOR THE YEAR ENDED 31 MARCH 2015

(Amt. Rs.)

SCHEDULE 5: UNSECURED LOANS AND BORROWINGS	Current Year	Previous Year
(1) Central Govt.	0.00	0.00
(2) State Govt.(Specify)	0.00	0.00
(3) Financial Instittions	0.00	0.00
(4) Banks		
(i) Term Loans	0.00	0.00
(ii) Others (specify)	0.00	0.00
(5) Other Institutions and Agencies	0.00	0.00
(6) Debentures and Bonds	0.00	0.00
(7) Fixed Deposits	0.00	0.00
(8) Others (Specify)	0.00	0.00
Security Deposit	314318.00	314318.00
Internal Loan	51996735.00	16110.00
TOTAL	**52311053.00**	**330428.00**

FORM OF FINANCIAL STATEMENTS(NON-PROFIT ORGANISATIONS)
SHEDULES FORMING PART OF BALANCE SHEET FOR THE YEAR ENDED 31 MARCH 2015

(Amt. Rs.)

SCHEDULE 6: DEFERRED CREDIT LIABILITIES:		Current Year	Previous Year
(A)	Acceptances secured by hypothecation of capital equipment and other assets	0.00	0.00
(B)	Others	1577447.00	0.00
TOTAL		**1577447.00**	**0.00**

(Amt. Rs.)

SCHEDULE 7: CURRENT LIABILITIES AND PROVISION:			Current Year	Previous Year
(A) CURRENT LIABILITIES				
(1)	**Acceptances**			
(2)	**Sundry Creditors**			
	(1) For Goods			
	(2) For Others	Prev. Year	Current Year	
	Other Payments outstanding (Grant in Aid) (12-13)	277000	2,77,000.00	277000.00
	Other Payments outstanding (Grant in Aid) (13-14)	104012	104012.00	2687135.00
	Other payments outstanding (Res Project) (13-14)	46951	46951.00	1552560.00
	Other Payments outstanding (Grant in Aid) (14-15)	477866	477866.00	0.00
	Other payments outstanding (Res Project) (14-15)	1292205	1292205.00	0.00
(3)	**Advances Received**			
	Hostel Caution Money		368003.00	303403.00
(4)	**Interest accrued but not due on**			
	(1) Secured Loans/Borrowings			
	(2) Unsecured Loans/Borrowings			
(5)	**Statuary Liabilities**			
	(1) Overdue			
	(2) Others (Specify)			
	Pension Fund		88654636.03	139137406.00
	GP Fund		88592755.69	70882315.00
(6)	**Others (Specify)**			
	EMD Received		728308.00	761808.00
	TOTAL (A)		**180541736.72**	**215601627.00**
(B)	Provisions			
(1)	For Taxation			
	TDS		0.00	6134.00
(2)	Gratuity			
(3)	Superannuation/ Pension			
(4)	Accumulated Leave Encashment			
(5)	Trade Warranties/ Claims			
(6)	Others (Specify)			
	TDS refund paid to GPF, Pension & Corpus		0.00	0.00
	CGEGIS		0.00	1320.00
	GPF		0.00	60000.00
	Payment to Income Tax		0.00	5000.00
	Payment made to Sh Rajkishore Mohanto (Res. Projecdt)		0.00	0.00
	Fellowship (Arrear)		65754.00	65754.00
	TOTAL (B)		**65754.00**	**138208.00**
	TOTAL (A+ B)		**180607490.72**	**215739835.00**

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
SCHEDULES FORMING PART OF BALANCE SHEET FOR THE YEAR ENDED 2014-15

SCHEDULE 8 : FIXED ASSETS

Pariculars	Gross Block					DEPRECIATION				NET BLOCK	
	Cost as at the begining of the year	Addition during the year		Deduction during the year	Cost as at the end of the year	As at the beginning of the year	For the year	Deduction during the year	At the end of the year	As at the current year -end	As at the Previous year-end
		Upto 30-Sep	After 30-Sep								
BLOCK: 0%											
Avenue Plantations	3438280.00	-3438280.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3438280
Land	6607214.58	0.00	0.00	0.00	6607214.58	0.00	0.00	0.00	0.00	6607214.58	6607214.58
Trees	2432709.00	-2432709.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2432709
TOTAL	**12478203.58**	**-5870989.00**	**0.00**	**0.00**	**6607214.58**	**0.00**	**0.00**	**0.00**	**0.00**	**6607214.58**	**12478203.58**
BUILDINGS											
BLOCK: 10%											
Arch. & Sprvson Fee	2531409.34	0.00	0.00	0.00	2531409.34	281267.70	253140.93	0.00	253140.93	2278268.41	2531409.34
Auditorium	3790709.41	0.00	0.00	0.00	3790709.41	421189.93	379070.94	0.00	379070.94	3411638.47	3790709.41
Boundary Fencing	231009.14	0.00	0.00	0.00	231009.14	25667.68	23100.91	0.00	23100.91	207908.23	231009.14
Boundary Wall	408449.77	0.00	0.00	0.00	408449.77	45383.31	40844.98	0.00	40844.98	367604.79	408449.77
Building Complex	54661564.92	950117.15	0.00	0.00	55611682.07	6073507.21	5561168.21	0.00	5561168.21	50050513.86	54661564.92
Campus Develop Corr. During the year for	18052547.42	0.00	14852362.00	0.00	32904909.42	2242422.37	2547872.84	0.00	2547872.84	30357036.58	18052547.42
Tennis Court	166587.06	0.00	0.00	0.00	166587.06	18509.67	16658.71	0.00	16658.71	149928.35	166587.06
Sports Complex	95001.62	0.00	0.00	0.00	95001.62	10555.74	9500.16	0.00	9500.16	85501.46	95001.62
BLOCK: 20%											
Road & Culvert	157155.88	0.00	0.00	0.00	157155.88	39288.97	31431.18	0.00	31431.18	125724.70	157155.88
Staff Quarters	2284153.63	0.00	0.00	0.00	2284153.63	571038.41	456830.73	0.00	456830.73	1827322.90	2284153.63
TOTAL	**82378588.18**	**950117.15**	**14852362.00**	**0.00**	**98181067.34**	**9728831.00**	**9319619.59**	**0.00**	**9319619.59**	**88861447.76**	**82378588.18**

Pariculars	Gross Block					DEPRECIATION				NET BLOCK	
	Cost as at the begining of the year	Addition during the year		Deduction during the year	Cost as at the end of the year	As at the beginning of the year	For the year	Deduction during the year	At the end of the year	As at the current year -end	As at the Previous year-end
		Upto 30-Sep	After 30-Sep								
PLANT MACHINERY & EQPT											
BLOCK: 20%											
Vehicle	1055969.88	2202093.45	0.00	0.00	3258063.33	275936.08	651612.67	0.00	651612.67	2606450.66	1055969.88
Development of Foerensic Laboratory	3818677.09	68200.00	787462.00	0.00	4674339.09	947685.40	856121.62	0.00	856121.62	3818217.47	3818677.09
Training Equipment	399480.33	0.00	0.00	0.00	399480.33	99870.08	79896.07	0.00	79896.07	319584.26	399480.33
BLOCK: 25%											
AC Plant	276909.53	0.00	0.00	0.00	276909.53	92303.18	69227.38	0.00	69227.38	207682.15	276909.53
Camp Equipment (project)	75280.87	0.00	0.00	0.00	75280.87	25093.62	18820.22	0.00	18820.22	56460.65	75280.87
DG Set	547983.46	0.00	0.00	0.00	547983.46	182661.15	136995.87	0.00	136995.87	410987.60	547983.46
EPABX	53148.23	0.00	0.00	0.00	53148.23	17716.08	13287.06	0.00	13287.06	39861.17	53148.23
Lab Equipment	1900125.24	0.00	182240.00	0.00	2082365.24	633375.08	497811.31	0.00	497811.31	1584553.93	1900125.24
Office Equipment	743244.51	36150.00	21150.00	0.00	800544.51	247748.17	197492.38	0.00	197492.38	603052.13	743244.51
Training Equipment (Training A/c)	2525000.40	15925.00	0.00	0.00	2540925.40	686291.97	635231.35	0.00	635231.35	1905694.05	2525000.4
Office Equipment (Project)	3676.15	0.00	0.00	0.00	3676.15	1225.38	919.04	0.00	919.04	2757.11	3676.15
Office Equipment (Research Project)	1486104.89	0.00	4850.00	0.00	1490954.89	473207.13	372132.47	0.00	372132.47	1118822.42	1486104.89
Camp Equipment) (Research Project	4144099.07	3165.00	1433156.00	0.00	5580420.07	1319940.54	1215960.52	0.00	1215960.52	4364459.55	4144099.07
TOTAL	**17029699.63**	**2325533.45**	**2428858.00**	**0.00**	**21784091.10**	**5003053.86**	**4745507.94**	**0.00**	**4745507.94**	**17038583.16**	**17029699.63**

Pariculars	Gross Block					DEPRECIATION				NET BLOCK	
	Cost as at the begining of the year	Addition during the year		Deduction during the year	Cost as at the end of the year	As at the beginning of the year	For the year	Deduction during the year	At the end of the year	As at the current year -end	As at the Previous year-end
		Upto 30-Sep	After 30-Sep								
FURNITURE, FIXTURES											
BLOCK : 15%											
Furinitures & Fixtures	4403117.99	78002.00	254606.00	0.00	4735725.99	746244.70	691263.45	0.00	691263.45	4044462.54	4403117.99
Furniture & Fixture (Training)	289687.45	0.00	0.00	0.00	289687.45	51121.32	43453.12	0.00	43453.12	246234.33	289687.45
TOTAL	4692805.44	78002.00	254606.00	0.00	5025413.44	797366.02	734716.57	0.00	734716.57	4290696.87	4692805.44
OFFICE EQUIPMENT											
BLOCK : 20%											
Office Equipment (Training A/c)	416511.88	58170.00	80869.00	0.00	555550.88	73705.09	103023.28	0.00	103023.28	452527.60	416511.88
TOTAL	**416511.88**	**58170.00**	**80869.00**	**0.00**	**555550.88**	**73705.09**	**103023.28**	**0.00**	**103023.28**	**452527.60**	**416511.88**
COMPUTER/PERIPHERALS											
BLOCK : 20%											
Comp. and Periphrals	3043967.16	0.00	0.00	0.00	3043967.16	750388.04	608793.43	0.00	608793.43	2435173.73	3043967.16
BLOCK : 60%											
Comp. & Accessories	87646.78	-23663.00	1456436.00	0.00	1520419.78	113923.92	475321.07	0.00	475321.07	1045098.71	87646.78
E Governance	24476.04	0.00	0.00	0.00	24476.04	36714.05	14685.62	0.00	14685.62	9790.42	24476.04
TOTAL	**3156089.98**	**-23663.00**	**1456436.00**	**0.00**	**4588862.98**	**901026.01**	**1098800.12**	**0.00**	**1098800.12**	**3490062.86**	**3156089.98**
BOOKS											
BLOCK : 10%											
Journals & Periodicals	18587829.09	1766748.44	559468.00	0.00	20914045.53	1872999.67	2063431.15	0.00	2063431.15	18850614.38	18587829.09
Library Books	1404471.74	0.00	0.00	0.00	1404471.74	156052.42	140447.17	0.00	140447.17	1264024.57	1404471.74
TOTAL	**19992300.83**	**1766748.44**	**559468.00**	**0.00**	**22318517.27**	**2029052.09**	**2203878.33**	**0.00**	**2203878.33**	**20114638.94**	**19992300.83**
GRAND TOTAL	**140144199.52**	**-716080.96**	**19632599.00**	**0.00**	**159060717.59**	**18533034.07**	**18205545.82**	**0.00**	**18205545.82**	**140855171.77**	**140144199.52**

FORM OF FINANCIAL STATEMENTS(NON-PROFIT ORGANISATIONS)
SHEDULES FORMING PART OF BALANCE SHEET FOR THE YEAR ENDED 31 MARCH 2015

(Amt. Rs.)

SCHEDULE 10: INVESTMENTS OTHERS	Current Year	Previous Year
(1) In the Govt. Securities		
(2) Other approved Securities		
(3) Shares		
(4) Debentures and Bonds		
Investment in RBI Bond (GPF)	20000000.00	20000000.00
Investment in RBI Bond (Pension)	16500000.00	16500000.00
Investment in RBI Bond (Corpus Fund)	29800000.00	29800000.00
(5) Subsidaries and Joint Ventures		
(6) Others (Specify)		
Investment in FDR (GPF)	61389039.00	41847170.00
Autosweep FDR-GPF	2015000.00	4965000.00
Investment in FDR (Pension Fund)	60624353.00	109115216.00
FDR Corpus Fund	56020370.00	41107133.00
Autosweep FDR Corpus fund	12000000.00	0.00
Autosweep FDR-Pension Fund	3150000.00	815000.00
TOTAL	**261498762.00**	**264149519.00**

(P.K. Aggarwal)
Finance Officer

(Dr. V.B. Mathur)
Director

FORM OF FINANCIAL STATEMENTS(NON-PROFIT ORGANISATIONS)
SHEDULES FORMING PART OF BALANCE SHEET FOR THE YEAR ENDED 31 MARCH 2015

(Amt. Rs.)

SCHEDULE 11: CURRENT ASSETS, LOANS, ADVANCES ETC.	Current Year	Previous Year
(A) CURRENT ASSETS		
(1) Inventories		
Closing Stock of Steel & Cement	0.00	0.00
Advance paid for Journals (Grant in Aid)	0.00	0.00
Closing Balance of WII Publication	352396.00	689857.00
(2) Sundry Debtors		
(1) Debts Outstanding for a period exceeding six months	91565.00	95650.00
(2) Others (Specify)		
(3) Cash balances in hand (including cheques/drafts and imprest)		
Grant-in-Aid A/c	81830.00	108420.00
Training A/c	0.00	0.00
Pension Fund A/c	0.00	0.00
GPF A/c	0.00	10573.00
Corpus Fund	0.00	0.00
(4) Bank Balances		
(1) With Scheduled Banks		
Grant-in-Aid A/c	6,64,93,479.04	14658201.32
Training A/c	9073788.95	8113372.00
Pension Fund A/c	53771.03	14292.00
GPF A/c	56794.69	13340.00
Corpus fund No 4032	918091.67	941511.42
Endowment Funds	13306919.39	12989947.00
TOTAL (A)	**90428635.77**	**37635163.74**
(B) LOANS, ADVANCES AND OTHER ASSETS		
(1) Loans		
(1) Staff		
Loan & Advances to Staff TA(MSc) FA(MSc) LTC TA(GIA)	212193.00	354177.00
Advance for expenses (Staff) (68800+458535+14000+148150)	689485.00	532957.00
Advance for expenses (Research Projects) (53781+16308)	70089.00	10482.00
Land Acquisition Charges (Deposited in Hon'ble High Court)	18000000.00	18000000.00
Advance for expenses (Training Account)	30000.00	0.00
(2) Other entities engaged in activities /objectives similar to	0.00	
(3) Others (Specify) GIA Training	0	0.00
Adv for civil work to CPWD 11137762 23561	11161323.00	14340624.00
Loan for World Environment Day (MoEF)	280984.00	280984.00
Loan for WCF workshop	30253.00	30253.00
Advance Payment-GIA	2496981.00	2621259.00

FORM OF FINANCIAL STATEMENTS(NON-PROFIT ORGANISATIONS)
SHEDULES FORMING PART OF BALANCE SHEET FOR THE YEAR ENDED 31 MARCH 2015

(Amt. Rs.)

			Current Year	Previous Year
(2)	**Advances and other amounts recoverable in cash or in kind or**			
	(1) On Capital Accounts			
	(2) Prepayments			
	(3) Others (Specify)			
	Security Deposit for Electricity Connection		412283.00	412283.00
	Advance payment to firm (Training-Firm)		0.00	0.00
	TDS to be refunded by the ITO (Pension Fund)		3055298.00	2093212.00
	TDS to be refunded by the ITO (GPF)		859691.00	572892.00
	TDS to be refunded by the ITO (Corpus fund)		842669.00	453105.00
(3)	**Income Accrued**			
	(1) On Investments from Earmarked / Endowment Funds			
	(2) On Invesments -Others			
	Interest Accrued in FDR (GPF)	4272231.00	3473340.00	
	Interest Accrued in FDR (Pension Fund)		5271214.00	10599686.00
	Interest Accrued in FDR (Corpus Fund)		3539092.00	2213237.00
	(3) On Loans and Advances			
	(4) Others (Specify)			
	Training Cost Accrued But not Received		838375.00	838375.00
	Pre-receipted bill issued but not received		108253.00	108253.00
(4)	**Expenses payable towards capital/fixed Assets**			
	(1) Grant in Aid (2013-14)	(1580661-1526108)	54553.00	1580661.00
	(2) Research Project (2013-14)	(1370440-1232435)	46951.00	1370440.00
	(3) Grant in Aid (2014-15.)	(2687135-1106474)	75751.00	0.00
	(4) Research Project (2014-15)	(1552560-182120)	1191839.00	0.00
	TOTAL (B)		**53539508.00**	**59886220.00**
	TOTAL (A+B)		**143968143.77**	**97521383.74**

(P.K. Aggarwal)
Finance Officer

(Dr. V.B. Mathur)
Director

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2014-15

(Amt. Rs.)

	Schedule	Current Year	Previous Year
INCOME			
Income from Sales/Services	12	0.00	0.00
Grants/Subsidies	13	204083481.96	205656380.27
Fees/Subscriptions	14	19672762.00	21634860.00
Income from Investments (from earmarked/endowment Funds Transferred to funds)	15	0.00	0.00
Income from Royalty, Publication etc	16	2134325.61	2071887.02
Interest Earned	17	244610.00	2070387.00
Other Income	18	0.00	0.00
Increase/decrease) in stock of Finished goods and works-in-progress	19	0.00	0.00
TOTAL (A)		**226135179.57**	**231433514.29**
EXPENDITRUE			
Establishment Expenses			
(Plan & Non Plan)	20	154858931.00	140894891.00
Other Administrative Expenses (Plan & Non Plan)	21	74825881.61	71492464.14
Expenditure on Grants, Subsidies etc.	22	0.00	0.00
Interest	0.00	0.00	
Depreciation (Net Total at the year end - corresponding to Schedule 8)	23	18205545.82	18533034.00
Total (B)		**247890358.43**	**230920389.14**
Balance being excess of Income over Expenditure (A-B)		**-21755178.86**	**513125.15**
BALANCE BEING SURPLUS (DEFICIT) CARRIED TO CORPUS/CAPITAL FUND		**-21755178.86**	**513125.15**

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2014-15

(Amt. Rs.)

SCHEDULE :13 GRANTS/SUBSIDIES		Current Year	Previous Year
(1) Central Government			
Grant -in- Aid from MoEF		223000000.00	213149000.00
Amt capitalized	(-)	18916518.04	-7492619.73
Total		**204083481.96**	**205656380.27**
(2) State Governments (s)			
(3) Government Agencies		0.00	0.00
(4) Institutions/Welfare Bodies		0.00	0.00
(5) International Organisations		0.00	0.00
(6) Others (Specify)			
WII Contribution (Pension A/c)		0.00	0.00
TOTAL		**204083481.96**	**205656380.27**

(Amt. Rs.)

SCHEDULE :14 FEES/ SUBSCRIPTIONS	Current Year	Previous Year
(1) Entrance Fees		
M.Sc.Course Fee	0.00	1289700.00
(2) Annual Fees/ Subscriptions	0.00	0.00
(3) Seminar/ Program Fees		
Seminar/ Workshop Fees	0.00	0.00
(4) Consultancy Fees		
Consultancy refund		
(5) Others (Specify)		
Other Receipt (Training)	10564509.00	13736907.00
Receipt for Training courses	9000000.00	6500000.00
Misc. Receipt (Corpus Fund)		
Pre-receipted bill issued but not received	108253.00	108253.00
Receipt for Training Cost		
TOTAL	**19672762.00**	**21634860.00**

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2014-15

(Amt. Rs.)

SCHEDULE :16 INCOME FROM ROYALTY, PUBLICATION ETC.	Current Year	Previous Year
(1) Income from Royalty		
(2) Income from Publications		
(3) Others (Specify)		
Income from Research Project		12000.00
Income from Library	0.00	82152.02
Vehicle Advance	47774.45	0.00
Misc. Receipts	812757.16	674830.00
WII Products	16662.00	41916.00
House Licence Fee	591122.00	621730.00
Bus Charges	264336.00	268250.00
Electricity & Water Charges	394062.00	367173.00
Telephone	7612.00	3836.00
TOTAL	**2134325.61**	**2071887.02**

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2014-15

(Amt. Rs.)

SCHEDULE :17 INTEREST EARNED	Current Year	Previous Year
(1) On Term Deposits		
(1) With Scheduled Banks		
Int. on Bank Deposit	0.00	0.00
Interest on FDR	0.00	
Interest on Investment	0.00	0.00
(2) With Non-Scheduled Banks	0.00	0.00
(3) With Institutions	0.00	0.00
(4) Others (Specify)		
Int. on Investment(Training)	0.00	0.00
Interest (Training)	0.00	0.00
(2) On Savings Account		
(1) With Scheduled Banks		
Int. on Savings Account	0.00	1830936.00
Interest on Saving A/c (Training A/c)	244610.00	239451.00
Interest Received		
(2) With Non-Scheduled Banks		
(3) Post Office Savings Account		
(4) Others (Specify)		
(3) On Loans		
(1) Interest on Loan & Advance		
(2) Others	0.00	0.00
(4) Interest on Debtors and Other Receivables		
TOTAL	**244610.00**	**2070387.00**

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2014-15

(Amt. Rs.)

SCHEDULE :20 ESTABLISHMENT EXPENSES		Current Year		Previous Year	
		Plan	Non Plan	Plan	Non Plan
(1)	Salaries and Wages				
	Salary & Wages (Training A/c)	500550.00		283837.00	
	Honorarium	81300.00		53900.00	
	Medical	4717188.00		7301346.00	
	Salaries & Allowances	124829696.00	12500000.00	103029806.00	10349000.00
	Stipend	543071.00		438925.00	
	Wages	0.00		0.00	
	Fellowship & Wages (Research Project)	3097152.00		3156926.00	
(2)	Allowances and Bonus				
	Bonus	390073.00		410618.00	
	OTA	263269.00		416251.00	
	LTC	1759221.00		2066179.00	
	Corps Fund (Training)	0.00		0.00	
	Transferred to Corpus Fund	0.00		0.00	
	Honorarium (Training A/c)	0.00		0.00	
(3)	Others (Specify)				
(4)	Contribution to Other Fund (Specify)				
	Leave Salary and Pension Contr.	2139850.00		9395073.00	
(5)	Staff Welfare Expenses				
	Uniforms	0.00		0.00	
(6)	Expenses on Employees Retirement and Terminal Benefits				
	Final Payment				
	Leave Encashment & Gratuity	3742658.00		3847769.00	
(7)	Others (Specify)				
	Camp Expenses (Research Project)	294903.00		145261.00	
	TOTAL	**142358931.00**	**12500000.00**	**130545891.00**	**10349000.00**

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2014-15

(Amt. Rs.)

SCHEDULE :21 OTHER ADMINISTRATIVE EXPENSES	Current Year		Previous Year	
	Plan	Non Plan	Plan	Non Plan
AMC of Computers	1532057.00	0.00	1899252.00	0.00
Annual Research Seminar	1226681.00	0.00	856965.00	0.00
Contingencies/Misc. (Research Project)	601240.72	0.00	1511742.00	0.00
Cont./Misc. (Training Account)	3057747.04	0.00	1806782.46	0.00
Expenses for Library	90147.00	0.00	0.00	0.00
Electricity and Water Charges	7099107.00	0.00	7550067.00	0.00
Estate Maintenance	522033.00	0.00	790029.00	0.00
Estate Security	9723010.00	0.00	12233271.00	0.00
Lab Expenses (Research lab)	197484.00	0.00	426976.00	0.00
Lab Expenses (Forensic Lab)	2809744.00	0.00	1840941.00	0.00
Lab Expenses (Genetic Lab)	104010.00	0.00	190730.00	0.00
Legal Expenses	195100.00	0.00	233335.00	0.00
M.Sc. Course Expenditure	2009725.00	0.00	2859256.00	0.00
Operational Expenses	1090606.00	0.00	1281160.47	0.00
Corpur Fund Transfer (Training Account)	1620020.00	0.00	0.00	0.00
POL & Maintenance of Vehicle (Research Project)	1409350.00	0.00	1691513.00	0.00
POL & Maintenance of Vehicle (Training A/c)	764878.00	0.00	655568.00	0.00
POL for Vehicles	1774964.00	0.00	1705609.00	0.00
Postage & Telegrams	224854.00	0.00	284850.00	0.00
Printing & Binding	561854.00	0.00	305086.00	0.00
Borading & Lodging (Training Account)	5575011.00	0.00	4586155.00	0.00
Repair & Maintenance of Vehicles	842265.00	0.00	954437.00	0.00
Repair of Vehicle (Training Account)	104019.00	0.00	631154.00	0.00
Repair & Maintenance furniture & Fixture	83717.00	0.00	245164.00	0.00
Sports	495863.00	0.00	217301.00	0.00
Sport Goods (Training Account)	9618.00	0.00	19058.00	0.00
Stationery	546920.00	0.00	534482.00	0.00
Training Allowance	40257.00	0.00	395111.00	0.00
Telephone & TC	845057.00	0.00	939795.00	0.00
Training & Skill Upgradation of Staff	41308.00	0.00	26000.00	0.00
Training Cost Expenditure	9000000.00	0.00	6500000.00	0.00
Travel Exp. (Grant in Aid)	2700686.00	0.00	2749468.00	0.00
Travel Exp. (Research Project)	903766.00	0.00	471376.00	0.00
Travelling Expenses (Training A/c)	6991638.00	0.00	4392347.76	0.00
Corpus fund transfer (Training Account)	0.00	0.00	4185576.00	0.00
Maintinancae of civil work	1014660.85	0.00	856833.00	0.00
Add : Expenditure Plant & Treee (As pointed out by Audit)	5870989.00	0.00	2129253.95	0.00
Harberium	3360.00	0.00	58018.50	0.00
Sales for Complementary-Lib.	337461.00	0.00	90377.00	0.00
Repair of Building (Training Account)	826939.00	0.00	126424.00	0.00
Fund Transfer to GIA-(Intt. For Corpus)	1977735.00	0.00	3261000.00	0.00
TOTAL	**74825881.61**	**0.00**	**71492464.14**	**0.00**

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2014-15

(Amt. Rs.)

SCHEDULE :23 EXPENDITURE ON GRANTS, SUBSIDIES ETC.	Current Year		Previous Year	
	Plan	Non Plan	Plan	Non Plan
(a) On Fixed Loans	0.00	0.00	0.00	0.00
(b) On other Loans (including Bank Chargs)	0.00	0.00	0.00	0.00
(c) Other (Specify)	18205545.82	0.00	18533034.00	0.00
TOTAL	**18205545.82**	**0.00**	**18533034.00**	**0.00**

ANNEXURE - 1

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
FIXED ASSETS PURCHASED FORM FUNDS REFLECTED IN SCHEDULE - 3

Particulars	Gross Block				
	Cost as the beginning of the year	Addition during the year	Deducation during the year	Costs as at the end of the year	Cost as the previous year end
Equipment					
Camp equipment	10279131.29	15803.00	0.00	10294934.29	10279131.29
Office Equipment	1971589.38	3893278.00	0.00	5864867.38	1971589.38
Books	762473.00	227495.00	0.00	989968.00	762473.00
Furniture & Fixture	0.00	327498.00	0.00	327498.00	0.00
Total	**13013193.67**	**4464074.00**	**0.00**	**17477267.67**	**13013193.67**

(P.K. Aggarwal)
Finance Officer

(Dr. V.B. Mathur)
Director

FORM OF FINANCIAL STATEMENTS (NON PROFIT ORGANIZATIONS)
SCHEDULES FORMING PART OF THE ACCOUNTS FOR THE PERIOD ENDED ON 31ST MARCH 2015

SCHEDULE – 25 SIGNIFICANT ACCOUNTING POLICES (Notes on Accounts)

1. Accounts of the institute have been prepared on accrual basis and accrued interest has been accounted for the Accounts.
2. Depreciation has been allowed on Assets at the rate prescribed by the Income Tax Department, Govt. of India and being charged on pro-rata basis. For equipments which are being used in field, higher rate of depreciation is being charged than those at office.
3. The funds received for expenditure on consultancy projects (Externally Funded) have now been shown under Liabilities as per direction of Audit (C&AG). The balance available and expenditure incurred on these projects in reflected in Schedule-3 of Balance Sheet. The Fixed Assets created from these funds are mentioned Annexure-I
4. The institute has created a Corpus Fund as per decision of XLVII Governing Body meeting. The receipts on account of unspent balance of externally funded projects which are not required to be refunded back, interest credited by Bank, saving from the Consultancy project and other petty misc. receipts etc are being deposited in Corpus Fund. Separate Receipt & Payment Account for transactions relating to Corpus Fund has been maintained as per direction of Audit (C&AG)
5. Being a Research Institute of Govt. of India, it is exempted from Custom Duty on imported scientific items.
6. Institute has been directed by Finance Committee to keep its investments only in FDR with Nationalized Bank/RBI Bonds.

(P.K. Aggarwal)
Finance Officer

(Dr. V.B. Mathur)
Director

GENERAL PROVIDENT FUND ACCOUNT NO. 518502010001297
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2014-15

GPF			
Income		**Expenditure**	
Particulars	**Amount**	**Particulars**	**Amount**
Opening Balance	4988913.00	Final payment of GPF	711360.00
Interest Received on Saving Account	193376.00	Investment	12800000.00
Interest Earned on FDR	286799.00	Advance/Withdrawal paid	9694776.00
GPF Contribution	19695641.00	Interest Accrued and invested	4272231.00
Interest Accrued on FDR	4272231.00	TDS on Interest if FDR	286799.00
Refunded of Loan	400000	Bank Balance	2071794.00
Total	**29836960.00**	**Total**	**29836960.00**

PENSION FUND ACCOUNT NO. 518502010000018
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2014-15

GPF			
Income		**Expenditure**	
Particulars	**Amount**	**Particulars**	**Amount**
Opening Balance	829292.00	Investment in FDR	0.00
Interest Received on Saving Account	94382.00	Commuted Value of Pension	2430579.00
Interest Earned on FDR	0.00	Family Pension/ Pension	6693295.00
WII Contribution	3502887.00	Interest Accrued and invested	3539092.00
Encashment of FDR	59090549.00	TDS on Interest on FDR	0.00
Pension Contribution (759292+31868)	791160.00	Transfer of Fund	51980625.00
Interest Accrued	3539092.00	Bank Balance	3203771.00
Total	**67847362.00**	**Total**	**67847362.00**

WII MANAGEMENT EFFECTIVENESS EVALUATION (MEE) OF PROTECTED AREAS
RECEIPT & PAYMENTS FOR THE PERIOD OF 01.04.2014 TO 31.03.2015

Receipt	Amount	Payment	Amount
Opening Balance	3332832.00	Travel Expenses	244774.00
Interest received 2014-15	105001.00	MEE Workshop expenditure	179729.00
Grant received for MEE Workshop	200000.00	Per diem to evaluation team	201054.00
		Report Writing Cost	9608.00
		Project Management Cost	963863.00
		Miscellaneous & unforeseen Expenses/Overheads	212807.00
		MEE Tiger Reserve	**368455.00**
		Balance as on 31.03.2015 A/C No - 62	**1457543.00**
Grant Total	**3637833.00**	**Grant total**	**3637833.00**

WII SURVEY & MAPPING OF MEDICINAL PLANTS IN UTTRAKHAND
RECEIPT & PAYMENTS FOR THE PERIOD OF 01.04.2014 TO 31.03.2015

Receipt	Amount	Payment	Amount
Opening Balance	824099.00	Fellowships	0.00
Interest received 2014-15	33292.00	Expenditure of Sand Mining Project	0.00
		Balance as on 31.03.2015 A/C No - 50188	**857391.00**
Grant Total	**857391.00**	**Grant total**	**857391.00**

PROJECT TIGER CO-PREDATOR, PREY & HABITAT PHASE IV
RECEIPT & PAYMENTS FOR THE PERIOD OF 01.04.2014 TO 31.03.2015

Receipt	Amount	Payment	Amount
Opening Balance	150087.00	Fellowships & wages for field persons	391074.00
Grant received for Bihar Wetland Project	1900000.00	Consumeable	157522.00
Interest received 2014-15	39008.00	Travel	550133.00
Grant received for Corbett Tiger Project	300000.00	Miscellaneous and unforeseen	30396.00
		Equipment for water and soil analysis	200000.00
		Corpus Fund	150087.00
		Balance as on 31.03.2015 A/C No - 50673	**909883.00**
Grant Total	**2389095.00**	**Grant total**	**2389095.00**

HOUSING & ENCLOSURE ENRICHMENT OF SOME SPECIES IN SELECTED INDIAN ZOOS
RECEIPT & PAYMENTS FOR THE PERIOD OF 01.04.2014 TO 31.03.2015

Receipt	Amount	Payment	Amount
Opening Balance	183931.00	Fellowships	96000.00
Gerant Received from Central Zoo Authority, New Delhi	517000.00	Stationery	23012.00
Interest received 2014-15	18479.00	Travel	108609.00
		Miscellaneous & Contingencies	59018.00
		Equipment	8000.00
		Development of Enrichment	0.00
		Balance as on 31.03.2015 A/C No - 50912	**424771.00**
Grant Total	**719410.00**	**Grant total**	**719410.00**

MACROECOLOGY OF THE TERRESTRIAL HERPETOFAUNA IN ANDAMAN & NICOBAR ARCHIPELAGO
RECEIPT & PAYMENTS FOR THE PERIOD OF 01.04.2014 TO 31.03.2015

Receipt	Amount	Payment	Amount
Opening Balance	386866.00	Fellowships	32667.00
Interest received 2014-15	14400.00	Consumeable	17850.00
		Travel	14156.00
		Balance as on 31.03.2015 A/C No - 51031	**336593.00**
Grant Total	**401266.00**	**Grant total**	**401266.00**

ECOLOGY OF LEOPARD PANTHERA PARDUS IN RELATION TO PREY ABUNDANCE & LAND USE PATTERN IN KASHMIR VALLEY
RECEIPT & PAYMENTS FOR THE PERIOD OF 01.04.2014 TO 31.03.2015

Receipt	Amount	Payment	Amount
Opening balance	64459.57	Fellowships	9290.00
Interest received 2014-15	2982.00	Consumeable	0.00
Grant received	56464.00	Travel	0.00
		Contingencies	0.00
		Balance as on 31.03.2015 A/C No - 51480	**114615.57**
Grant Total	**123905.57**	**Grant total**	**123905.57**

ECOLOGICAL ASSESSMENT OF BANJ OAK FORESTS IN KEDARNATH WILDLIFE SANCTUARY, WESTERN HIMALAYA WITH REFERENCE TO INVASION BY PINE
RECEIPT & PAYMENTS FOR THE PERIOD OF 01.04.2014 TO 31.03.2015

Receipt	Amount	Payment	Amount
Opening balance	262117.00	Fellowships	0.00
Interest received 2014-15	10589.00	Consumeable	0.00
Grant received	0.00	Travel	0.00
		Contingencies	0.00
		Balance as on 31.03.2015 A/C No - 51671	**272706.00**
Grant Total	**272706.00**	**Grant total**	**272706.00**

DIVERSITY OF MOTHS ASSEMBLAGE AND THEIR POTENTIAL ROLE AS CONSERVATION TOOL IN DIFFERENT PROTECTED AREAS OF UTTRAKHAND
RECEIPT & PAYMENTS FOR THE PERIOD OF 01.04.2014 TO 31.03.2015

Receipt	Amount	Payment	Amount
Opening Balance	83399.00	Fellowships	213333.00
Grant received	500000.00	Consumeable	90680.00
Interest received 2014-15	9484.00	Travel	45886
		Contingencies	36234
		Overhead incl maint of Equipment	0.00
		Balance as on 31.03.2015 A/C No - 53258	**206750.00**
Grant Total	**592883.00**	**Grant total**	**592883.00**

PREPARING AND UPDATING STUD BOOKS OF 34 ENDANGERED SPECIES (14 OLD AND 20 NEW)
RECEIPT & PAYMENTS FOR THE PERIOD OF 01.04.2014 TO 31.03.2015

Receipt	Amount	Payment	Amount
Opening Balance	400737.08	Salaries	584500.00
Interest received 2014-15	17245.00	Travel (Data colletion from Zoos)	89110.00
Grant received	1063000.00	Stationery	0.00
		Miscellaneous & contingencies	42380.00
		Balance as on 31.03.2015 A/C No - 53274	**764992.08**
Grant Total	**1480982.08**	**Grant total**	**1480982.08**

PATTERN OF BIOMASS PRODUCTION BY WETLANDS & ITS USE BY WILD UNGULATES IN KAZIRANGA LANDSCAPE
RECEIPT & PAYMENTS FOR THE PERIOD OF 01.04.2014 TO 31.03.2015

Receipt	Amount	Payment	Amount
Receipt	**Amount**	**Payment**	**Amount**
Opening Balance	43930.00	Equipment	0.00
Interest received 2014-15	22477.00	Manpower	526954.00
Grant received	1500000.00	Consumables	463697.00
Loan from Bihar Wetland Project	200000.00	Travel	339876.00
		Contingencies	182156.00
		Balance as on 31.03.2015 A/C No - 53439	**253724.00**
Grant Total	**1766407.00**	**Grant total**	**1766407.00**

"CAUSES OF AVIAN DIVERSITY GRADIENTS ALONG THE HIMALAYAS"
RECEIPT & PAYMENT FROM 01.04.2014 TO 31.03.2015

Receipt	Amount	Payment	Amount
Opening Balance	791887.23	Equipment	283755.00
II nd year Grant Received from SERB	900000.00	Manpower	395531.00
Interest during Financial Year 2014-15	20836.00	Consumables	285558.00
		Travel	161091.00
		Contingencies	26674.00
		Balance as on 31.03.2015 A/c No. 53582	**560114.23**
Grant Total	**1712723.23**	**Grant Total**	**1712723.23**

"EFFECT OF CLIMATE CHANGE ON RIVERINE FORESTS AND INDICATOR SPECIES ALONG ALONG RIVER GANGA IN UTTARAKHAND"RECEIPT & PAYMENT FROM 01.04.2014 TO 31.03.2015

Receipt	Amount	Payment	Amount
Opening Balance	455690.00	Equipment	2500.00
Bank Interest	12712.00	Manpower	176000.00
II nd Grant Received from SERB	700000.00	Consumables	10008.00
		Travel	167100.00
		Contingencies	37945.00
		Balance as on 31.03.2015, A/c no 53319	**774849.00**
Grant Total	**1168402.00**	**Grant Total**	**1168402.00**

DISTRIBUTION, POPULATION STATUS & CONSERVATION GENETICS OF CHEER PHASANT (CATERUS WALLICHI) IN HIMACHAL PRADESHRECEIPT & PAYMENTS FROM 01.04.2014 TO 31.03.2015

Receipt	Amount	Payment	Amount
Opening Balance	173532.00	Manpower	550730.00
IInd year grant received from SERB	700000.00	Consumables	137584.00
Bank Interest	10250.00	Contingencies	26309.00
		Travel	21565.00
		Balance as on 31.03.2015 A/C No - 53669	**147594.00**
Grant Total	**883782.00**	**Grant total**	**883782.00**

"DIVERSITY OF SPIDER (ARACHNIDA: ARANEAE) ASSEMBLAGES IN ASKOT WILDLIFE SANCTUARY" UTTARAKHAND, WESTERN HIMALAYARECEIPT & PAYMENTS FROM 01.04.2014 TO 31.03.2015

Receipt	Amount	Payment	Amount
Opening Balance	630319.00	Equipments	24200.00
IInd Yrs grant received from SERB	500000.00	Manpower	577330.00
Interest received during 2014-15	27629.00	Consumables	66620.00
		Travel	82678.00
		Contingencies	2800.00
		Balance as on 31.03.2015 A/c No - 53752	**404320.00**
Grant Total	**1157948.00**	**Grant total**	**1157948.00**

"ECOLOGY OF SLOTH BEAR IN AND AROUND RATAN MAHAL, JAMBUGHODA SANCTUARIES" RECEIPT & PAYMENTS FROM 01.04.2014 TO 31.03.2015

Receipt	Amount	Payment	Amount
Opening Balance	187881.00	Equipments	35480.00
II nd year Grant received for 2014-15	550000.00	Manpower	495250.00
Interest received F.Y. 2014-15	8470.00	Consumables	0.00
		Contingencies	666.00
		Travel	92260.00
		Balance as on 31.03.2015, A/c No - 53632	**122695.00**
Grant Total	**746351.00**	**Grant total**	**746351.00**

ECOLOGY OF THE ENDANGERED ASIATIC LIONS USINGH SATELLITE AND GPS TELEMETRY RECEIPT & PAYMENTS FROM 01.04.2014 TO 31.03.2015

Receipt	Amount	Payment	Amount
Opening Balance	1166133.00	Equipment	92809.00
II nd year Grant received for 2014-15	800000.00	Manpower	618534.00
Interest received 2014-15	27625.00	Travel	444209.00
		Contingencies	28420.00
		Consumables	242858.00
		Balance on 31.03.15, A/c No - 53583	**566928.00**
Grant Total	**1993758.00**	**Grant total**	**1993758.00**

"ECOLOGY TAXONOMY AND CONSERVATION OF FISH DIVERSITY IN SUBANSIRI RIVER BASIN OF ARUNANCHAL PRADESH"RECEIPT & PAYMENTS FROM 01.04.2014 TO 31.03.2015

Receipt	Amount	Payment	Amount
Opening Balance	706056.00	Equipments	196860.00
II nd Year Grant Received	400000.00	Manpower	210000.00
Interest received during F.Y. 2014-15	27330.00	Consumables	73234.00
Received from bank	1.00	Contingencies	41866.00
		Travel	230026.00
		Overhead Charges	38069.00
		Balance as on 31.03.2015, A/c No - 53803	**343332.00**
Grant Total	**1133387.00**	**Grant total**	**1133387.00**

"PLANT PHENOLOGICAL RESPONSES TO CLIMATIC VARIATIONS ALONG TIMBERLINE ECOTONE IN OUTER FRINGES OF ASKOT WILDLIFE SANCTUARY"RECEIPT & PAYMENTS FROM 01.04.2014 TO 31.03.2015

Receipt	Amount	Payment	Amount
Opening Balance	305359.00	Equipments	100926.00
II nd year Grant received	550000.00	Manpower	551500.00
Interest received during F.Y. 2014-15	14066.00	Consumables	11907.00
		Contingencies	29185.00
		Travel	99872.00
		Balance as on 31.03.2015, A/c No - 53605	**76035.00**
Grant Total	**869425.00**	**Grant total**	**869425.00**

"KAILASH SACRED LANDSCAPE CONSERVATION AND DEVELOPMENT INITIATIVE (KSLCDI)" RECEIPT & PAYMENT FROM 01.04.2014 TO 31.03.2015

Receipt	Amount	Payment	Amount
Opening Balance	4997815.56	Equipment	1161105.94
4th Grant received during 2014-15	3229272.88	Manpower	2298544.00
Interest received during F.Y. 2014-15	109643.00	Workshop	1134905.00
		Travel	1123515.00
		Miscellaneous Expenses	96953.00
		Material Supply	111874.00
		IT Communication/ Stationary	124153.00
		Overhead/ Institutional Charges	1122715.00
		Infrastructural Support for Project Implementation	216331.00
		Field work and field base rental	438096.00
		Balance as on 31.03.2015, A/c No. 53475	**508539.50**
Grant Total	**8336731.44**	**Grant Total**	**8336731.44**

PATTERN OF SPATIAL AND TEMPORAL HABITAT OCCUPANCY IN RELATION TO CROP RAIDING BEHAVIOUR AND GENETIC VARIATION OF FREE-RANGING ASIAN ELEPHANT (ELEPHAS MAXIMUS)RECEIPT & PAYMENT FROM 01.04.2014 TO 31.03.2015

Receipt	Amount	Payment	Amount
Opening Balance	142496.00	Wages & Salary	15000.00
II nd Year Grant Receive	400000.00	Consumable	231594.00
Bank Interest receive during F.Y. 2014-15	5928.00	Contingency	50291.00
		Balance as on 31/03/2015, A/c No. 53957	**251539.00**
Grant Total	**548424.00**	**Grant Total**	**548424.00**

5TH NATIONAL REPORT TO CONVENTION ON BIOLOGICAL DIVERSITY (CBD) UNDER GEF DIRECTOR ACCESS PROJECT & REVISION OF NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN (NBSAP) UNDER GEF DIRECT REVISION OF NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN (NBSAP) UNDER GEF DIRECT ACCESS PROJECT TITLED "STRENGTHENING THE ENABLING ENVIRONMENT AND MANAGEMENT IN INDIA"RECEIPT & PAYMENTS FOR THE FINANCIAL YEAR 2014-15

Receipt	Amount	Payment	Amount
Opening Balance	3828500.00	Travel Cost of WII faculty/ Consultant/ Project Associates & Misc. Costs	1441709.00
IIIrd grant received during 2014-15	2200000.00	Activity Costs	2383136.00
Bank Interest receive during F.Y. 2014-15	81780.00	Overhead/ Institutional Charges	1180352.00
		Balance as on 31.03.2015, A/c No - 53203	**1105083.00**
Grant Total	**6110280.00**	**Grant total**	**6110280.00**

POPULATION GENETIC STRUCTURE AND GENE FLOW IN BROWN BEAR POPULATION IN INDIA AND ASSESS EXTENT OF GENE FLOW BETWEEN POPULATION OF INDIA & PAKISTANRECEIPT & PAYMENT FROM 24.11.2014 TO 31.03.2015

Receipt	Amount	Payment	Amount
Ist Year grant received	1626000.00	Equipment	0.00
Bank Interest for F.Y. 2014-15	1604.00	Manpower	25371.00
		Consumables	27231.00
		Travel	0.00
		Contingencies	0.00
		Balance as on 31.03.2015 A/c No. 55018	**1575002.00**
Grant Total	**1627604.00**	**Grant Total**	**1627604.00**

GENETIC ASSESSMENT OF SAMBER RUSA UNICOLOR POPULATION IN NORTH-EAST INDIA RECEIPT & PAYMENT FROM 17.10.2014 TO 31.03.2015

Receipt	Amount	Payment	Amount
Ist Year grant received	1620000.00	Equipment	232796.00
Bank Interest for F.Y. 2014-15	15879.00	Manpower	69629.00
		Consumables	38000.00
		Travel	77718.00
		Contingencies	22286.00
		Balance as on 31.03.2015 A/c No. 54947	**1195450.00**
Grant Total	**1635879.00**	**Grant Total**	**1635879.00**

DST- INSPIRED FACULTY FELLOW RECEIPT & PAYMENT FROM 05.08.2014 TO 31.03.2015

Receipt	Amount	Payment	Amount
Grant Received	1563611.00	Manpower	650045.00
Bank Interest for F.Y. 2014-15	25139.00	Contingencies/ Miscellaneous	217002.00
		Consumables	2500.00
		Balance as on 31.03.2015 A/c No. 54269	**719203.00**
Grant Total	**1588750.00**	**Grant Total**	**1588750.00**

EVALUATION OF PREY AVAILABILITY AND HABITAT SUITABILITY FOR TIGER AND ITS RANGING PATTERN IN SANJAY TIGER RESERVE (M.P.)RECEIPT & PAYMENT FROM 12.06.2014 TO 31.03.2015

Receipt	Amount	Payment	Amount
Grant Received	2782000.00	Manpower	330313.00
Bank Interest for F.Y. 2014-15	64776.00	Hiring of Vehicle and POL	286564.00
		Contingency	1770.00
		Miscellaneous	25569.00
		Equipments	62360.00
		Base Camp Expenditure	12173.00
		Travels	31633.00
		Balance as on 31.03.2015 A/c No. 54159	**2096394.00**
Grant Total	**2846776.00**	**Grant Total**	**2846776.00**

ASSESSMENT OF THE CONSERVATION VALUE OF MANGROVES OF GUJARAT (PROJECT 1) & MAPPING OF MARINE PROTECTED AREAS OF INDIA COAST INCLUDING ISLANDS (PROJECT 2) & MARINE TURTLE PROJECT ALONG THE COAST OF PUDUCHERRY & KARAIKAL REGION (PROJECT 3) RECEIPT & PAYMENT FROM 07.10.2014 TO 31.03.2015

Receipt	Amount	Payment	Amount
Ist Grant Received from NCSCM, Chennai (Project 1)	690000.00	Data Generation in GIS & RS Lab	526518.00
Grant Received from NCSCM, Chennai (Project 2)	717600.00	Project Staff/Fellowship	79732.00
Grant Received from Dir. Of Forest & Wildlife Puducherry (Project 3)	454250.00	Research Contingency including Inst. Charges	18434.00
IInd Grant Received from NCSCM, Chennai (Project 1)	230000.00	Travels	245872.00
Bank Interest for F.Y. 2014-15	11226.00	Field Equip., Contin., Baot Hiring/ Vehicle Hiring	355269.00
		Research Biologist & Field Assistants	379821.00
		Balance as on 31.03.2015 A/c No. 54919	**497430.00**
Grant Total	**2103076.00**	**Grant Total**	**2103076.00**

HYDRO ELECTRICAL PROJECT & BELLARY MACRO LEVEL STUDY RECEIPT & PAYMENT FROM 01.04.2014 TO 31.03.2015

Receipt	Amount	Payment	Amount
Opening Balance	549830.00	Misc (HEP)	21100.00
Interest	21970.00	Travels	46761.00
		Balance as on 31.03.2015 A/C No. - 52127	**503939.00**
Grant Total	**571800.00**	**Grant Total**	**571800.00**

EVALUATING ECOLOGICAL STATUS OF LEOPARDS IN KALESAR NATIONAL PARK, H.R. & RECONNAISSANCE SURVEY FOR BLACKBUCK AND ITS HABITAT IN AND ADJOINING LANDSCAPE OR NPCIL COLONY SITE (H.R.)RECEIPT & PAYMENT FROM 19.07.2014 TO 31.03.2015

Receipt	Amount	Payment	Amount
Grant Received from Forest Deptt. Haryana	1989500.00	Base Camp Estiblishment & Other Costs	42550.00
Grant Received from NPCIL Colony Site	455400.00	Contingency Cost	4215.00
Bank Interest for F.Y. 2014-15	31653.00	Engagement of Technical Manpower	180000.00
		Incidential Expenses	1400.00
		Travel & Vehicle Hiring for field visit	167677.00
		Camera Trap Running Costs	61653.00
		Camera Trap, Camera and Bionx	1054848.00
		Manpower	121057.00
		Balance as on 31.03.2015 A/c No. 54196	**843153.00**
Grant Total	**2476553.00**	**Grant Total**	**2476553.00**

UNDERSTANDING METAPOPULAION DYNAMIC OF TIGERS IN TERAI ARC LANDSCAPE, INDIA PROJECT RECEIPT & PAYMENT FROM 22.12.2014 TO 31.03.2015

Receipt	Amount	Payment	Amount
Ist Grant received from Panthera WL Conservation	3200000.00	Non-recurring Component	205257.45
Interest	14375.00	Recurring Component	80208.00
		Bank Balance A/c No. - 54992	**2928909.55**
Grant Total	**3214375.00**	**Grant Total**	**3214375.00**

WII-UNESCO PROJECT RECEIPT & PAYMENT FOR THE PERIOD OF 01-04-2014 TO 31-03-2015

Receipt	Amount	Payment	Amount
Opening Balance	36,06,153.25	Contigencies	3,67,498.08
Intt.Received	1,28,887.00	Regitration Fees	92,167.68
		Advance for Expenses	3,42,000.00
		Expenditure Total	8,01,665.76
		Balance as on 31.03.2015 A/c No. 44	**29,33,374.49**
Grant Total	**37,35,040.25**	**Grant Total**	**37,35,040.25**

WII-BUILDING PARTNERSHIP TO SUPPORT UNESCO WORLD HERITAGE PROGRAMME RECEIPT & PAYMENT FOR THE PERIOD OF 01-04-2014 TO 31-03-2015

Receipt	Amount	Payment	Amount
Opening Bal.	28,47,328.62	Fellowship and Wages	7,70,232.00
Grant Received	1,43,923.71	Travelling Expenses	1,45,719.00
Intt. Received	94,665.00	Training & Workshop	97,372.00
		Office Equipment	20,475.00
		Misc. & Contigencies	2,47,682.00
		Advance for Expenses	3,01,050.00
		Expenditure Total	15,82,530.00
		Balance as on 31.03.2015 A/c No. 50246	**15,03,387.33**
Grant Total	**30,85,917.33**	**Grant Total**	**30,85,917.33**

WII-ENVIS PROJECT RECEIPT & PAYMENT FOR THE PERIOD OF 01-04-2014 TO 31-03-2015

Receipt	Amount	Payment	Amount
Opening Balance	14,66,162.75	Fellowship and Wages	8,36,323.00
Intt. Received	71,271.00	Travelling Expenditure	49,900.00
Grant Received	14,75,118.00	Contigency	1,55,607.00
Misc. Income (Entry Fee of QuiZ-2013)	12,000.00	Report Writing	5,31,392.00
Payable Salary	84,000.00	Office Equipment	1,84,372.00
M/s Xpression Print & Graphices, Ddun	4,10,822.00	Doon Wildlife Environment Quiz-2014	15,524.00
Misc. Income (Appication Fees)	6,000.00	M/s Strategic Marketing	71,228.00
		Expenditure Total	18,44,346.00
		Balance as on 31.03.2015 A/c No. 32	**16,81,027.75**
Grant Total	**35,25,373.75**	**Grant Total**	**35,25,373.75**

WII-DGH SEATURTLE TELEMETRY PROJECT RECEIPT & PAYMENT FOR THE PERIOD OF 01-04-2014 TO 31-03-2015

Receipt	Amount	Payment	Amount
Opening Balance	87,51,203.28	Corpus Funds	80,51,203.00
Intt. Received	2,01,789.00		
		Expenditure Total	80,51,203.00
		Balance as on 31.03.2015 A/c No. 59	**9,01,789.28**
Grant Total	**89,52,992.28**	**Grant Total**	**89,52,992.28**

AVIAN MALARIA PROJECT
RECEIPT & PAYMENT FOR THE PERIOD OF 01-04-2014 TO 31-03-2015

Receipt	Amount	Payment	Amount
Opening Balance	8,367.00	Corpus Funds	8,743.00
Intt. Received	376.00		
		Expenditure Total	8,743.00
		Balance as on 31.03.2015 A/c No. 50650	**0.00**
Grant Total	**8,743.00**	**Grant Total**	**8,743.00**

TIGER RESPONSE TO PRAY HUMAN DISTURBANCE
RECEIPT & PAYMENT FOR THE PERIOD OF 01-04-2014 TO 31-03-2015

Receipt	Amount	Payment	Amount
Opening Balance	13,81,887.30		
Interest Received	55,822.00		
		Expenditure Total	0.00
		Balance as on 31.03.2015 A/c No. 60	**14,37,709.30**
Grant Total	**14,37,709.30**	**Grant Total**	**14,37,709.30**

ISRO-GBP PROJECT ON LULC DYNAMICS
RECEIPT & PAYMENT FOR THE PERIOD OF 01-04-2014 TO 31-03-2015

Receipt	Amount	Payment	Amount
Opening Balance	1,31,035.00	Office Equipment	41617.00
Intt. Received	9,952.00	Report Writing	25280.00
		Expenditure Total	66,897.00
		Balance as on 31.03.2015 A/c No. 51241	**74,090.00**
Grant Total	**1,40,987.00**	**Grant Total**	**1,40,987.00**

INTERRATED DEVELOPMENT OF WILDLIFE HABITATS
RECEIPT & PAYMENT FOR THE PERIOD OF 01-04-2014 TO 31-03-2015

Receipt	Amount	Payment	Amount
Opening Balance	1,24,208.00	Travel Expenditure	4514.00
Intt. Received	4,400.00		
		Expenditure Total	4,514.00
		Balance as on 31.03.2015 A/c No. 51240	**1,24,094.00**
Grant Total	**1,28,608.00**	**Grant Total**	**1,28,608.00**

WII-MONITORING LAND-USE BY WILDLIFE. LIVESTOCK AND HUMAN IN KHANGCHENDZONGA BIOSPHERES RESERVE RECEIPT & PAYMENT FOR THE PERIOD OF 01-04-2014 TO 31-03-2015

Receipt	Amount	Payment	Amount
Opening Balance	1,34,020.10	Fellowship & Wages	61586.00
Intt. Received	4,797.00	Travel Expenses	6943.00
		Base Camp Expenses	6575.00
		Contigencies	2751.00
		Expenditure Total	77,855.00
		Balance as on 31.03.2015 A/c No. 51411	**60,962.10**
Grant Total	**1,38,817.10**	**Grant Total**	**1,38,817.10**

I U C N CELL
RECEIPT & PAYMENT
FOR THE PERIOD OF 01-04-2014 TO 31-03-2015

Receipt	Amount	Payment	Amount
Opening Balance	4,38,022.89		
Intt. Received	14,228.00		
Member Ship Fees	1,26,000.00		
Misc. Receipts	18,200.00		
		Expenditure Total	0.00
		Balance as on 31.03.2015 A/c No. 41	**5,96,450.89**
Grant Total	**5,96,450.89**	**Grant Total**	**5,96,450.89**

WESTERN TRAGOPAN PROJECT
RECEIPT & PAYMENT FOR THE PERIOD OF 01-04-2014 TO 31-03-2015

Receipt	Amount	Payment	Amount
Opening Balance	16,67,277.00	Fellowship & Wages	178000.00
Intt. Received	55,549.00	Travel Expenses	52166.00
		Contigencies	12335.00
		Base Camp Expenses	12960.00
		Expenditure Total	2,55,461.00
		Balance as on 31.03.2015 A/c No. 52465	**14,67,365.00**
Grant Total	**17,22,826.00**	**Grant Total**	**17,22,826.00**

STRUCTURAL AND FUNCTIONAL ATTRUBUTES OF PLANT COMMUNITIES IN COLD ARID REGION OF NANDA DEVI BIOSPHERES RESERVE, UTTARAKHANDRECEIPT & PAYMENT FOR THE PERIOD OF 01-04-2014 TO 31-03-2015

Receipt	Amount	Payment	Amount
Opening Balance	9,423.00		
Intt. Received	381.00		
		Expenditure Total	**0.00**
		Balance as on 31.03.2015 A/c No. 52529	**9,804.00**
Grant Total	**9,804.00**	**Grant Total**	**9,804.00**

ASSESSMENT OF DUGONG DISTRIBUTION, HABITAT AND RISKS DUE TO FISHERIES AND OTHER ANTHROPOGENIC RELATED ACTIVITIES IN INDIARECEIPT & PAYMENT FOR THE PERIOD OF 01-04-2014 TO 31-03-2015

Receipt	Amount	Payment	Amount
Opening Balance	2,76,954.00	Hand Ship Allowance	146931.00
Intt. Received	8,157.00		
		Expenditure Total	1,46,931.00
		Balance as on 31.03.2015 A/c No. 53244	**1,38,180.00**
Grant Total	**2,85,111.00**	**Grant Total**	**2,85,111.00**

ASSESSMENT OF ECOLOGICAL SETTING AND BIODIVERSITY VALUES OF PAPIKONDA NATIONAL PARK AND INDIRA SAGAR (POLAVARAM) MULT. PROJECTRECEIPT & PAYMENT FOR THE PERIOD OF 01-04-2014 TO 31-03-2015

Receipt	Amount	Payment	Amount
Opening Balance	6,97,825.00	Fellowship & Wages	26000.00
Intt. Received	25,014.00	Travel Expenses	69218.00
		Office Equipment	23786.00
		Report Writing	19300.00
		Contigencies	60.00
		Expenditure Total	1,38,364.00
		Balance as on 31.03.2015 A/c No. 53223	**5,84,475.00**
Grant Total	**7,22,839.00**	**Grant Total**	**7,22,839.00**

ECOLOGY AND CONSERVATION OF SEA TURTLE OFF COAST OF THE SINDHUDURY USING SATELLITE TRACKING TECHNIQUESRECEIPT & PAYMENT FOR THE PERIOD OF 01-04-2014 TO 31-03-2015

Receipt	Amount	Payment	Amount
Grant	21,24,000.00	Fellowship & Wages	5760.00
Intt. Received	41,180.00	Travel Expenses	54795.00
		Contigencies	11052.00
		Expenditure Total	71,607.00
		Balance as on 31.03.2015 A/c No. 54273	**20,93,573.00**
Grant Total	**21,65,180.00**	**Grant Total**	**21,65,180.00**

WII-BCRLI PROJECT
RECEIPT & PAYMENT FOR THE PERIOD OF 01-04-2014 TO 31-03-2015

Receipt	Amount	Payment	Amount
Opening Balance	1,97,932.08	Salary /Fellowship	613367.00
Grant Received	1,48,34,400.00	Work shop for Policy and Dicision Markers	532570.00
Advance for FA & TA	1,35,944.00	Biological Indicator	1050405.00
		Consumables	149350.00
		Developing Learing Material	64444.00
		Ecological Mapping	863838.00
		Institutional Strengthening of WII	850379.00
		Review Meeting	61325.00
		Audit (interest to WII)	239321.00
		Consultation With Key Line Departments	18576.00
		Course for Mid Forest Officers	26292.00
		Lesson Learnt Visit	54138.00
		Regional Workshop	11229.00
		Vehicle Hiring	49384.00
		WII Input/Support	36405.00
		Online Scientific Journal	2861774.77
		Furniture	3366.00
		Advance for FA & TA	283630.00
		Refund of Loan	3000000.00
		Expenditure Total	1,07,69,793.77
		Balance as on 31.03.2015 A/c No. 33049	**43,98,482.31**
Grant Total	**1,51,68,276.08**	**Grant Total**	**1,51,68,276.08**

WII-UNESCO C 2 C PROJECT
RECEIPT & PAYMENT FOR THE PERIOD OF 01-04-2014 TO 31-03-2015

Receipt	Amount	Payment	Amount
Grant	1,00,00,000.00	Salaries	1290877.00
Intt. Received	2,11,193.00	Travel Expenditure	335884.00
Misc. Received	77,000.00	Printing & Stationery	30848.00
		Purch. Of Book	13558.00
		Telephone Expenses	652.00
		Advertising Expenses	122770.00
		Boarding & Lodging Expenses	162597.00
		Printing	48300.00
		UNESCO C2C Innogration Expenses	135183.00
		Re-Furnishing of Office Space	1493650.00
		Contigencies/Misc. Expenses	136429.00
		Office Equipment	1226078.00
		Ex Eng. CED-II. CCU, New Delhi	5000000.00
		Expenditure Total	99,96,826.00
		Balance as on 31.03.2015 A/c No. 54034	**2,91,367.00**
Grant Total	**1,02,88,193.00**	**Grant Total**	**1,02,88,193.00**

IMPACT OF GLOBAL CHANGES ON SPECIES COMPOSITION IN WESTERN HIMALAYAS:HP [A/c 51164]
RECEIPT & PAYMENT FOR THE YEAR 2014-15

Particulras	Amount	Particulras	Amount
Opening Balance	36169		
Interest credited by Bank	1461	**Balance as on 31.03.2015 A/c No. 51164**	**37630**
Grant Total	**37630**	**Grant Total**	**37630**

REVOLVING FUND FOR GUEST HOUSE MAINTENANCE A/C NO. 54189
RECEIPT & PAYMENT FOR THE YEAR 2014-15

Particulras	Amount	Particulras	Amount
Rent Charges received	829480	Operational Expenses	335130
Sale of Souvenier	90900	Equipment	33839
Interest credited by UBI	7663		
		Balance as on 31.03.2015 A/c No. 54189	**559074**
Grant Total	**928043**	**Grant Total**	**928043**

DST-NMSHE PROGRAMME PROJECT-MICRO FLORA AND FAUNA & WILDLIFE ANIMAL POPULATION RECEIPTS & PAYMENT FOR THE FINANCIAL YEAR 2014-15

Receipt	Amount	Payment	Amount
Grant Received	33016120.00	Fellowship & Wages	587020.00
Interest Received	511144.00	Travel Expenditure	49937.00
		Visualization Lab & Databases Development	15000000.00
		Contigencies	120677.00
		Advance for expenses	60000.00
		Total Expenditure	15817634.00
		Balance as on 31.03.2015 A/c No. 54272	**17709630.00**
Grant Total	**33527264.00**	**Grant Total**	**33527264.00**

GIZ- STRENGTHENING CAPACITY FOR SUSTAINABLE AND PARTICIPATORY MANAGEMEMENT FOR COSTAL & MARINE PROTECTED AREAS IN INDIARECEIPTS & PAYMENT FOR THE FINANCIAL YEAR 2014-15

Receipt	Amount	Payment	Amount
Grant Received	3798987.00	Project Coordination	1269644.00
Interest Received	15387.00	Consumables & Training	65236.00
		Worshop & Trainings	1926092.00
		Institutional Charges	345362.00
		Mis Expenses	1101.81
		Total Expenditure	3607435.81
		Balance as on 31.03.2015 A/c No. 54145	**206938.19**
Grant Total	**3814374.00**	**Grant Total**	**3814374.00**

SARANDA FORESTS
RECEIPTS & PAYMENT FOR THE FINANCIAL YEAR 2014-15

Receipt	Amount	Payment	Amount
Grant Received	2500000.00	Expenses	0.00
Interest Received	0.00		
		Balance as on 31.03.2015 A/c No. 55074	**2500000.00**
Grant Total	**2500000.00**	**Grant Total**	**2500000.00**

GEF-UNDP-GOI MUNNAR LANDSCAPE PROJECT
RECEIPTS & PAYMENT FOR THE FINANCIAL YEAR 2014-15

Receipt	Amount	Payment	Amount
Grant Received	1806695.00	Expenses	0.00
Interest Received	0.00		
		Balance as on 31.03.2015 A/c No. 55075	**1806695.00**
Grant Total	**1806695.00**	**Grant Total**	**1806695.00**

MONITORING OF SOURCE POPULATION OF TIGERS IN RANTHAMBORE TIGER RESERVE
RECEIPT & PAYMENT FOR THE PERIOD WEF 01 APRIL 2014 TO 31 MARCH 2015

Receipt	Amount	Payment	Amount
Opening Balance	2577394.84	Grants Sunderbans	100000
Interest	76892	Grants Kanha TR	100000
		Equipment	329640
		Contingencies	448652
		Fellowship & Wages	292407
		Travel	3968
		Vehicle Hiring	82259
		Total Expenditure	1356926
		Balance as on 31.03.2015 UBI-64	**1297360.84**
Grant Total	**2654286.84**	**Grand total**	**2654286.84**

RADIO COLLARING OF TIGERS IN SUNDERBANS TIGER RESERVE
RECEIPT & PAYMENT FOR THE PERIOD WEF 01 APRIL 2014 TO 31 MARCH 2015

Receipt	Amount	Payment	Amount
Opening Balance	381196.13	Fellowship & Wages	367770.00
Grants	1252000.00	Veh & Boat hiring	10984.00
Interest	10921.00	Travel	39449.00
		Contingencies	2500.00
		Total Expenditure	**420703.00**
		Balance as on 31.03.2015 UBI A/c No. 50546	**1223414.13**
Grant Total	**1644117.13**	**Grant Total**	**1644117.13**

MONITORING RE-INTRODUCED GAUR IN BANDHAVGARH TIGER RESERVE (MP)
RECEIPT & PAYMENT FOR THE PERIOD WEF 01 APRIL 2014 TO 31 MARCH 2015

Receipt	Amount	Payment	Amount
Opening Balance	248616.15	Purchase of radio collars,receivers anntennas & payment for satellite data acquisition charges from ARGOS	85431.77
Grants	2090500.00	Fellowship & wages	515797.00
Interest	10947.00	TA/DA for the researcher/Investigators	67982.00
		Vehicle POL and maintenance	126829.00
		Misc/Contingency	56275.00
		Total Expenditure	**852314.77**
		Balance as on 31.03.2015 UBI - 50629	**1497748.38**
Grand Total	**2350063.15**	**Grand Total**	**2350063.15**

RADIO TELEMETRY MONITORING SOURCE POPULATION OF TIGERS IN KANHA TR
RECEIPT & PAYMENT FOR THE PERIOD WEF 01 APRIL 2014 TO 31 MARCH 2015

Receipt	Amount	Payment	Amount
Opening Balance	5367438.18	Travel	16758.00
Grants	100000.00	Camera Traps	3979800.00
Interest	103245.00	POL	2500.00
		Fellowship/Wages	389770.00
		Contingencies	35398.00
		Total Expenditure	4424226.00
		Balance as on 31.03.2015 UBI-50685	**1146457.18**
Grand Total	**5570683.18**	**Grand Total**	**5570683.18**

ECOLOGICAL MONITORING OF TIGER POPULATION IN PANNA LANDSCAPE (MP)
RECEIPT & PAYMENT FOR THE PERID WEF 01 APRIL 2014 TO 31 MARCH 2015

Receipt	Amount	Payment	Amount
Opening Balance	2266562.38	Fellowship	120000.00
Grants	5421000.00	Wages	132509.00
Interest	60150.00	Vehicle hiring	414554.00
		Contingency	306301.00
		GPS Collars	23659.90
		Equipment	313816.00
		Total Expenditure	1310839.90
		Balance as on 31.03.2015 UBI-50908	**6436872.48**
Grand Total	**7747712.38**	**Grand Total**	**7747712.38**

DEVELOPMENT OF APPROPRIATE TECHNIQUES FOR MINIMIZING MAN ANIMAL CONFLICT
RECEIPT & PAYMENT FOR THE PERIOD WEF 01 APRIL 2014 TO 31 MARCH 2015

Receipt	Amount	Payment	Amount
Opening Balance	264221.00	Expenditure	0.00
Interest	10674.00		
Grand Total	**274895.00**	**Balance as on 31.03.2015 UBI - 50710**	**274895.00**

OKHALA BIRD SANCTUARY MANAGEMENT PLAN
RECEIPT & PAYMENT FOR THE PERIOD WEF 01 APRIL 2014 TO 31 MARCH 2015

Receipt	Amount	Payment	Amount
Opening Balance	263822.00	Travel cost for the project personnel including DA	19610.00
Interest	10019.00	Remote sensing and mapping component	90379.00
		Total Expenditure	109989.00
		Balance as on 31.03.2015 UBI - 50885	**163852.00**
Grand Total	**273841.00**	**Grand Total**	**273841.00**

PROCUREMENT OF SATELLITE AND VHF COLLARS FOR STUDY OF TIGER BEHAVIOUR
RECEIPT & PAYMENT FOR THE PERIOD WEF 01 APRIL 2014 TO 31 MARCH 2015

Receipt	Amount	Payment	Amount
Opening Balance	597775.00	Field Director Bandhavgarh (MP)	500000.00
Interest	21793.00		
		Total Expenditure	500000.00
		Balance as on 31.03.2015 UBI - 50709	**119568.00**
Grand Total	**619568.00**	**Grand Total**	**619568.00**

MONITORING OF RE-INTRODUCED TIGERS IN SARISKA TIGER RESERVE
RECEIPT & PAYMENT FOR THE PERIOD WEF 01 APRIL 2014 TO 31 MARCH 2015

Receipt	Amount	Payment	Amount
Opening Balance	358422.74	Fellowship	192000.00
Grants	1200000.00	Field Asstt	639773.00
Interest	13189.00	Vehicle Hiring	441078.00
		Satellite Data acquiring Charge	244120.19
		Misc/Contingency	41357.00
		Total Expenditure	1558328.19
		Balance as on 31.03.2015 UBI - 50545	**13283.55**
Grand Total	**1571611.74**	**Grand Total**	**1571611.74**

AITEP 2013-15/MSTRIPS/EVA PHY STREES & REPRODUCTIVE POTENTIAL IN REINTRODUCED TIGER PROJECT RECEIPT & PAYMENT FOR THE PERIOD WEF 01 APRIL 2014 TO 31 MAR 2015

Particulars	Amount	Particulars	Amount
Brought forwarded	1,11,79,374.00	Equipment (Camera Trap, Compass, Range Finder, Binoculars, GPS, Computers, Software etc.)	1,32,75,561.98
Grant for AITEP	1,00,00,000.00	Contractual tech for data collection	99,19,377.00
Grant for AITEP	40,00,000.00	Vehicle hiring for data collection	65,55,602.00
Grant for AITEP	1,00,00,000.00	Wages for field assistant	23,57,378.00
Grant for AITEP	41,00,000.00	Travel exp(including International for Conferences)	17,60,919.00
Grant for AITEP	75,00,000.00	GIS Staff (Contructual for Data Analysis)	10,36,516.00
Grant for DIBANG	9,00,000.00	Contingencies	57,80,039.00
Recd from TATR	10,00,000.00	Pub & Trg material	1,98,849.00
Grant for TATR	29,00,240.00	Grant for Sariska	12,00,000.00
Grant for Sariska	12,00,000.00	Grant for Long Term TATR	29,00,240.00
Intrest recd	3,39,060.00	Total expenses	4,49,84,481.98
		Balance as on 31.03.2015 UBI-50968	**81,34,192.02**
Grand Total	**5,31,18,674.00**	**Grand Total**	**5,31,18,674.00**

WII - LONG TERM MONITORING OF TIGER AT TATR
RECEIPT & PAYMENT FOR THE PERIOD WEF 01 APRIL 2014 TO 31 MAR 2015

Receipt	Amount	Payment	Amount
Brought forwarded	30,70,641.25	Salaries & Wages	10,61,947.00
Grant Received	8,96,360.00	Consumables	98,995.00
Grant recd	29,00,240.00	Travel	12,82,750.00
Intrest	74,764.00	contingences	3,04,035.00
		Equipment	25,72,895.00
		A/c No 50968	10,00,000.00
		Total expenses	63,20,622.00
		Balance as on 31.03.2015 UBI- 53431	**6,21,383.25**
Grand Total	**69,42,005.25**	**Grand Total**	**69,42,005.25**

WII - RE-INTRODUCTION OF CHEETAH PROJECT
RECEIPT & PAYMENT FOR THE PERIOD WEF 01 APRIL 2014 TO 31 MAR 2015

Receipt	Amount	Payment	Amount
Brought forwarded	3,28,017.00	Biologists / sociologist	1,48,885.00
intrest	10,398.00	Travel Exp	1,227.00
		Contingences	2,500.00
		Total expenses	1,52,612.00
		Balance as on 31.03.2015 UBI-52366	**1,85,803.00**
Grand Total	**3,38,415.00**	**Grand Total**	**3,38,415.00**

WILD LIFE INSTITUTE OF INDIA FOREIGN CONTRIBUTION ACCOUNT
RECEIPT & PAYMENT ACCOUNT FOR THE PERIOD ENDING 31ST MARCH, 2015

Receipt	Amount	Payment	Amount
Balance as on April,1 2014		Fellowship & Wages	2607391.00
UBI A/c No 518502010000010	16104407.92	Travel Expenditure	2069805.00
Interest Received	681281.00	POL & Vehicle of Maint.	174160.00
Misc. Received	40799.00	Contigencies	1332266.90
Fund Received		Office Equipment	1840336.00
IPBES-Indo Nowgian Pilot Project-Phase-2	4306967.00	Field Equipemt	16550.00
GBIF-Govt. Bocy 21 Meeting in India	809516.00	Base Camp Expenses	202216.00
Study Tour for Bangladesh	630658.00	Boarding & Lodging	1308234.00
Study Tour for Sri Lankan Officers	3103441.00	Corpus Funds	2284736.00
United National University	541716.43	Advance for Payment	179784.00
Great India Busted-NGS	1164994.00		
ZSL-GFD Lion Conservation Project	5570581.00		
Advance for Payment	439417.00	Total Expenditure	12015478.90
		Balance as on 31.03.2015	
		UBI A/c No 518502010000010	**21378299.45**
Grand Total	**33393778.35**	**Grand Total**	**33393778.35**

(P.K. Aggarwal)
Finance Officer

(Dr. V.B. Mathur)
Director

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