annual report 2011-12

भारतीय वन्यजीव संस्थान
Wildlife Institute of India

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Cover Photo Credit: Aditi Nair (O*ctopus cyanea*)

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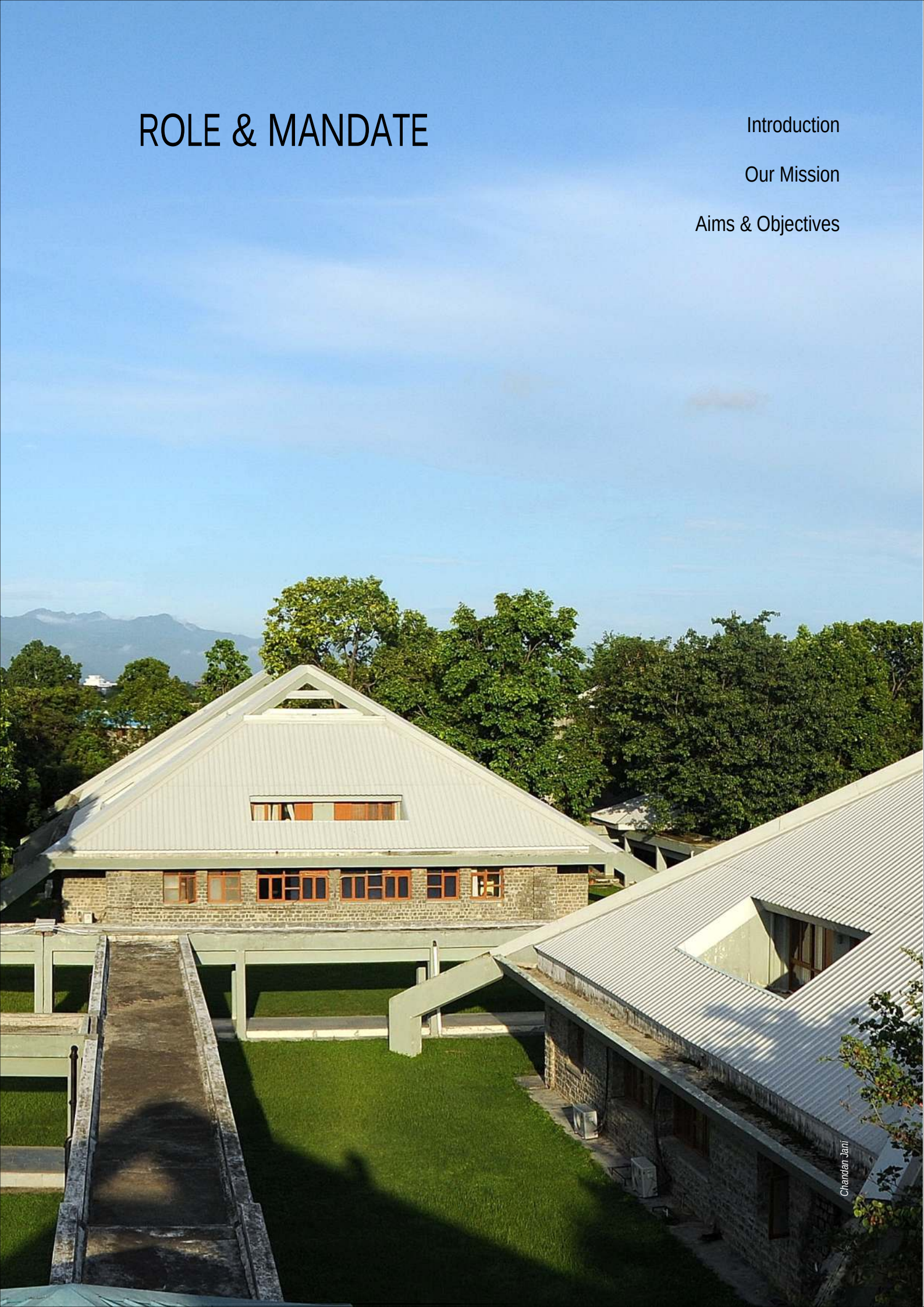
ROLE & MANDATE



INTRODUCTION

The Wildlife Institute of India (WII) is an autonomous organization of Ministry of Environment & Forests. It 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, UNESCO. These collaborations have helped the Institute to 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 provide a more practical and realistic direction to the concept and practice of wildlife conservation by seeking the involvement and cooperation of the 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 to find answers to better address 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 accord with our economic and socio-cultural milieu".

AIMS AND OBJECTIVES

- Build up scientific knowledge on wildlife resources
- Train personnel at various levels for conservation and management of wildlife.
- Carry out research relevant to management including the development of techniques appropriate to Indian conditions.
- Provide information and advice on specific wildlife management problems.
- Collaborate with international organizations on wildlife research, management and training.
- Develop as a regional centre of international importance on wildlife and natural resource conservation.

RESEARCH

Completed

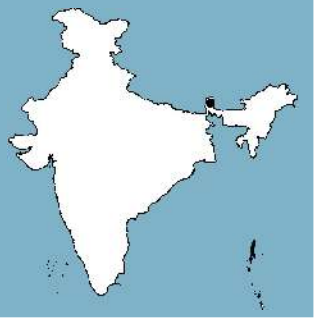
Ongoing

Initiated

Sudip Banerjee

COMPLETED PROJECTS

Developing Spatial Database on the Mammal Distributions and Monitoring Programme for Large Carnivores, Prey Populations and Their Habitats in Khangchendzonga Biosphere Reserve



Funding Source : Grant-in-Aid
Investigator : Dr. S. Sathyakumar
Researchers : Tapajit Bhattacharya, Tawqir Bashir and Kamal Poudyal
Date of Initiation : January, 2008
Date of Completion : December, 2011

Objectives: The objectives were to (i) develop spatial database for the distribution of mammals particularly large carnivores and their prey (ungulates, galliformes) in the different watersheds of Khangchendzonga Biosphere Reserve (BR); (ii) investigate habitat use patterns of ungulates and galliformes and food habits of carnivores in Khangchendzonga BR; and (iii) develop a monitoring programme for the monitoring of large carnivores and their prey (ungulates, galliformes) and their habitats in Khangchendzonga BR.

Progress: Field investigations continued in different parts of the Prek Chu catchment (intensive study area) of Khangchendzonga BR during the reporting period. The study area was divided into 2 × 2 km^2 grids, and camera traps were placed along trails in every grid to obtain data on the presence/absence, relative abundance and populations of carnivores, ungulates and galliformes in the study area. Trail sampling and scanning methods were used for collecting data on carnivores, ungulates and galliformes on the basis of direct and indirect evidence. All field activities were carried out in the form of field expeditions – camping in different areas of the Prek Chu watershed. Field surveys were also carried out in other parts of the reserve.

Outputs and Outcomes: Camera traps were deployed in three different habitats, with an effort of 1,012 (8 sites) trap nights in the temperate habitat, 166 trap nights (3 sites) in the sub-alpine habitat and 1,126 trap nights (12 sites) in the alpine habitat, totaling 2,304 trap nights, in the study period. A minimum of 21 camera locations were , which was adequate for detecting almost all the mammal species present in the three major habitats (temperate, sub-alpine and alpine habitats), with a minimum required effort of 12 sampling occasions (5 days each). A total species richness of 23.33 ± 0.92 and a diversity index of 2.92 ± 0.01 were obtained. Both the species richness and species diversity were highest in the sub-alpine habitat, while both these were

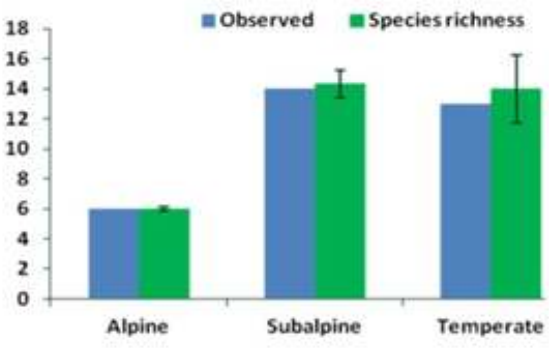
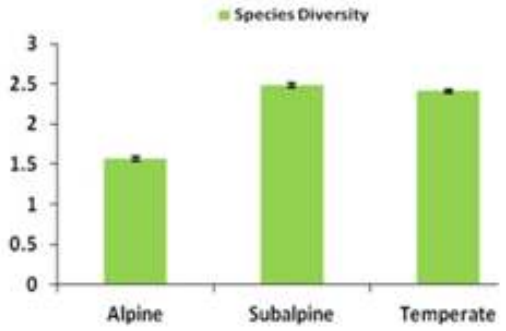


Fig.: Species richness in different habitats of Prek Chu catchment

Fig.: Species diversity in different habitats of Prek Chu catchment



lowest in the alpine habitat. The temperate habitat had intermediate species richness and diversity values.

Estimation of snow leopard (*Panthera uncia*) abundance: The abundance of snow leopard was estimated using photographic capture–recapture of individuals, based on the unique rosette patterns on the body. The abundance of snow leopard was estimated at 4–5 individuals in the sampled area, about 150 km², in 2011. The density was calculated to be around 3 individuals/100 km². The very low capture probability indicates that the species is very rare, shy, cryptic and hence very difficult to sight in the area.

Abundance and density estimation of goral and serow: The Royle/Nichols heterogeneity model can be used to estimate population sizes from spatially replicated presence/absence data or point count data. The goral was found to be more abundant than the serow in the study area. A total abundance of 15.69 ± 4.74 goral and 7.11 ± 3.22 serow was estimated in the sampled area of Prek Chu catchment during the study period. The density of goral was estimated to be 21.44 ± 6.48 individuals/100 km², while that of serow was 8.71 ± 3.94/100 km².

Abundance estimates of galliforms: The blood pheasant was the most frequently sighted galliform, with a maximum detection probability of 0.29, compared with other galliform. It was sighted on 99 occasions, with aggregations of up to 75 individuals. The overall density of the blood pheasant in the study area was estimated at 13.64

MILESTONE: As this was the pioneering study on the mammals of Khangchendzonga BR, the presence of many mammal species in this area was confirmed based on the field work and camera trap pictures. Species-specific field monitoring methods have been identified and standardized.

± 2.78 individuals/km^2. The Himalayan monal was sighted on 21 occasions, and its density was estimated at 1.38 ± 0.45 individuals/km^2. The snow Partridge was sighted on 29 occasions. It was mostly found in groups ranging in size from 1 to 15 individuals. During the study period, the kalij was sighted on 11 occasions. Twenty-one sightings of satyr tragopan were recorded, with an overall density of 1.02 ± .44 individuals/km². The average cluster size was greatest for the blood pheasant (7.66 ± 1.20) and minimum for the monal (1.9 ± 0.27). In the case of the snow partridge and satyr tragopan, the average cluster size was found to be 6.59 ± 0.93 and 2.29 ± 0.52, respectively. The average effective strip width was very similar for all galliform species, with a maximum, with the snow partridge, of 20.16 ± 3.58 and a minimum, with the satyr tragopan, of 16.83 ± 3.47.

Adequacy of monitoring methods for ungulates in different habitats: The adequacy of different monitoring methods, including sign surveys, scan sampling, direct sighting and camera trapping, for detecting ungulates species in different habitats in the study area was compared. Camera trapping was found to be the most suitable method for detecting all the ungulate species in all habitat types, followed by sign surveys and direct sightings. Scan sampling was found to be feasible and adequate for monitoring only the blue sheep. In the alpine and sub-alpine habitats, camera trapping was able to detect more ungulate species than the other two methods could. In the temperate habitat, camera trapping and sign surveys were almost equally adequate in detecting the major ungulate species as the species richness reached saturation after 10 sampling occasion for both methods, in contrast with sighting, for which an asymptote was reached after 80 sampling occasions.

Ecological Assessment of Timberline Ecotone in Western Himalaya with Special Reference to Climate Change and Anthropogenic Pressures

Funding Source	:	Grant-in-Aid
Investigator	:	Dr. B.S. Adhikari and Dr. G.S. Rawat
Researchers	:	I.D. Rai, S. Bhattacharyya and R.R. Bharati
Date of Initiation	:	May, 2007
Date of Completion	:	March, 2012

Objectives: The objectives of the project were to (i) study the status, structural and functional aspects of timberline vegetation along the gradients of anthropogenic pressures; (ii) compare the status of selected indicator species of flora along the timberline within and outside protected areas; (iii) compare the abundance of selected mammals and pheasants in the disturbed and undisturbed timberline ecotones based on direct and indirect evidence; (iv) assess the spatio-temporal changes in the timberline (contiguity, vertical and horizontal extent and interspersion) using remote sensing and GIS; and (v) develop models for predicting future scenarios along sub-alpine–alpine ecotones in the event of climate change and continued anthropogenic pressures.

Progress: The timberline ecotone in the western Himalaya is mainly anthropogenic in nature. *Betula utilis* forms the pioneer community and has the lowest biomass (88.7 t ha^{-1}), and the *Abies spectabilis* (449.8 t ha^{-1}) community had the highest biomass, mainly due to the presence of high girth class trees. The annual litter fall in the timberline communities ranged between 2.79 t ha^{-1} yr^{-1} (B. utilis community) and 7.53 t $ha^{-1}yr^{-1}$ (Q. semecarpifolia community). The net primary productivity was highest in the Abies–Quercus community (21.1 t ha^{-1} yr^{-1}), whereas it was lowest in the *B. utilis* community (15.3 t ha^{-1} yr^{-1}). In the *B. utilis* community, shrubs and ground vegetation contributed more than the tree layer to the total productivity due to the canopy opening and deciduous character of the species, which provided a conducive environment for other species to flourish in. The leaf litter decomposition rates were 0.069, 0.078, 0.059, 0.078 and 0.072% day^{-1} for *B. utilis, Rhododendron campanulatum, R. arboreum, Q. semecarpifolia* and *A. spectabilis,* respectively. The rate of decomposition of leaf litter was very low due to the cold environment and was the lowest determined among all the studies conducted across the Himalayan region for the same genus. The total storage of Nitrogen (N) in the vegetation layer ranged between 377 and 1,466 kg ha^{-1}, that of P between 190 and 926 kg ha^{-1}, that of K between 264 and 834 kg ha^{-1}, that of Ca between 479 and 2,117 kg ha^{-1}, that of Mg between 70 and 303 kg ha^{-1} and that of Na between 26 and 123 kg ha^{-1} in the timberline communities.

The study on the production indicated that up to this elevation zone the productivity is not the limiting factor for the plant growth, which was not far below that in the low elevation forests. Therefore, a favourable climate may lead to advancement of the timberline, unless anthropogenic pressures blur the natural phenomenon.

The study also revealed that various aspects of the ecology of Royle's pika, a small native mammal, were significantly governed by climatic variability. The best fit candidate regression models indicated that the adult pika abundance was significantly governed by the interactive effects of snow cover period and altitude ($\beta = 0.256 \pm 0.03$, $p < 0.001$), whereas the juvenile pika abundance was found to

be governed by food availability (β = 0.045 ± 0.08, CI = -0.02 to -0.12), amount of rock cover (β = 0.040 ± 0.08, CI = 0.03 to 0.14) and spring snow depth (β = 0.07 ± 0.03, CI = -0.006 to 0.148). The study indicated that a short snow cover period during winter and a thin snow layer during spring might result in high adult and juvenile pika mortality due to cold stress. The pikas were found to avoid heat stress by reducing activity during warm midday hours and taking shelter in micro-climatically favourable cooler alpine talus habitats. This study showed that changes in the micro-climatic conditions of the habitats, specifically an increase in temperature, might significantly restrict a small mammal's (Royle's pika) daytime activities, which might have negative impacts on the foraging efficiency of the species. Cutting of wood and lopping for fodder were the major anthropogenic disturbances recorded in the timberline ecotone, being present almost throughout the year to varying extents. The timberline ecotone was found to be actively used by various animals and birds, mainly in summer and during the monsoon, whereas some mammalian species (Himalayan musk deer, Royle's pika and red fox) as well as birds (Himalayan monal) used it almost throughout the year.

Despite all efforts to protect the timberline vegetation of the western Himalaya, the level of disturbance was found to be very high. The spatial extent and pattern of distribution of timberline tree species indicated a transition in species composition from the south-east to the north-west, reflected in a decreasing extent of oak and mixed broadleaved species and an increased extent of conifers. Considering the level of disturbance, the response of the timberline to the changing climate will be minimum on a large scale; however, new areas available as a result of retreating glaciers can be considered as potential sites for species migration. Significant changes in the Valley of Flowers National Park, Pindari, a few sites of Kedarnath Wildlife Sanctuary and several other sites indicated that the response of Rhododendron species to recent changes in climate is clearer than that of any other species. However, the present study found that the maximum change has occurred within the conifer class, but these changes are more related to an increase in density as no evidence was found of good regeneration of conifers, except *Pinus wallichiana*, above the timberline. The overall decrease in timberline ecotone is comparatively low compared to the increase. The decrease at several sites was found to be caused by natural factors. such as a decrease. For example, a decrease in the Rhododendron class in the Great Himalayan National Park was due to disease, and a decrease in the conifer class at several sites was due to mortality. A decrease in vegetation near the timberline at heavily disturbed sites such as Kedarnath and Askot wildlife sanctuaries and Bedni suggested that the timberline might have gone down at these sites, but no such clear pattern was found, possibly due to appropriate scale of the study.

In a nutshell, the ecological understanding gained about the plant responses along the timberline ecotone provided a baseline; however, the small mammals (pikas) emerged as the important taxonomic group in this study. They were sensitive towards climatic variability and can be used as model species for long-term ecological studies to track the effects of environmental changes. The abundance of animals and birds along the timberline also significantly varies with the extent of anthropogenic pressure. Projections of the distributions of timberline species clearly indicate that a small mammal such as Royle's pika has a very high probability of landscape-level range contraction if the temperature rises by 2°C. The distribution ranges of Rhododendron and oak may increase in the future, while the probability that the range of birch will increase in the same scenario is very low.

Diversity and Conservation of Endangered Fish Genetic Resources of Kalakad Mundanthurai Tiger Reserve, Tamil Nadu

Funding Source : Department of Science & Technology, New Delhi
Investigator : Dr. J.A. Johnson
Researchers : K. Kannan
Date of Initiation : December, 2010
Date of Completion : March, 2012

Objectives: The project had the following objectives: (i) Habitat inventory and documenting the existing information on the endangered fish species of Kalakad Mundanthurai Tiger Reserve (KMTR). (ii) Assessing the genetic diversity between the different populations of selected endangered species. (iii) Captive breeding and rearing of young ones of chosen endangered fish species for conservation. (iv) Restoration of endangered populations through species ranching.

Progress: In the reporting year, the habitat utilization patterns of endangered species *Garra kalakadensis, Horalabiosa joshuai, Puntius tambraparniei* and *Tor malabaricus* were evaluated. It was found that *Puntius tambraparniei*, an endangered species, utilized pool and run habitats. Similarly, *Tor malabaricus* was found in pool and run habitats. In addition to the habitat ecology, the genetic diversity of the *Puntius tambraparniei* populations in different environmental gradients was examined. A total 40 DNA samples from *Puntius tambraparniei* (five samples each from eight sites) were isolated, and the gene sequence of cytochrome b (Cyt b) was amplified. The amplified products were sequenced, and the sequences were compared with a reference Cyt b sequence of *Puntius arulius* retrieved from a gene bank. The similarity of the Cyt b gene sequences indicated that the populations from Manimuthar, Thalayanai and Maruthur dam had a distinct haplotypic lineage and that they did not cluster with other populations.

Outputs and Outcomes: A total of 48 species of fishes including 6 threatened and 5 endemic species were recorded. Six threatened species, including 5 endangered species, *Garra kalakadensis, Horalabiosa joshuai, Hypselobarbus curmuca, Puntius tambraparniei* and *Tor malabaricus*, and one vulnerable species, *Puntius arenatus*, were recorded form Kalakad Mundanthurai Tiger Reserve (KMTR). The Malabar mahseer, *Tor malabaricus*, was recorded from the Pampanar, Ingikuliar, Vaalyar, Mysslar and Gowthalyar streams in KMTR. Canonical correspondence analysis showed that the fish abundance was associated with habitat volume, percentage of riparian cover and temperature. The habitat preference and utilization (depth, flow and substrate) of threatened species were documented. Based on the molecular study, it was found that the populations of the endangered *Puntius tambraparniei* from Thalayanai, Manimuthar and Maruthurdam are genetically unique in terms of their distinct haplotype. The gene sequences were deposited in the NCBI Gene bank database.

Significant Findings: Diversity and assemblage structure: A total of 48 species of primary freshwater fish belonging to 27 genera, 11 families and 7 orders were recorded from the study area. Among the species, *Daverio aquipinnatus, Garra mullya* and *Garra kalakadensis* were most dominant locally (72% each). The Malabar mahseer, *Tor*

malabaricus, was recorded from the Myeelar, Pambanar, Gowthalyar and Vaalayar streams and the Ingikuli river.

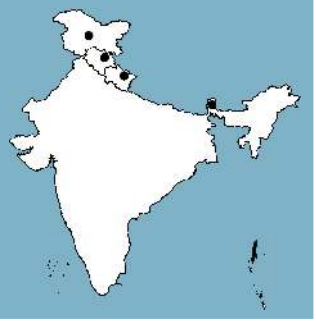
Out of the 48 species recorded, 5 species, namely, *Garra kalakadensis, Horalabiosa joshuai, Puntius kannikattiensis, Puntius tambraparniei* and *Ompok sp. nov.* are strictly endemic to this river basin. Six of the 48 species fall under threatened categories, including 5 endangered species (*Garra kalakadensis, Horalabiosa joshuai, Hypselobarbus curmuca, Puntius tambraparniei* and *Tor malabaricus*) and one vulnerable species (*Puntius arenatus*). The physical habitat (depth, current and substrate) forms the 'structure' within which an organism makes its home. This habitat structure determines the abundance and diversity of the organism. The greatest habitat complexity was recorded in the Aielar, followed by the Ullar and Gadana streams.

Meso- and microhabitat use: Puntius tambraparniei generally utilized pool and run habitats in the Thalayanai and Manimuthar streams. Riffles are less preferred and cascades are not used by *P. tambraparniei*. In pool and run habitats it preferred the following microhabitats: flow, 0.16–0.30 m/sec; depth, 30–100 cm; substrate, boulders, cobbles, gravels and sand. Similarly, for *Tor malabaricus*, found in pool and run habitats in the Myeelar and Pampanar, riffles are a less preferred habitat, and cascades are not used. It preferred the following microhabitats: flow, 0.16–0.30 m/sec; depth, 60–150 cm; substrate, boulders. In the Ullar and Nalumukar, *Horalabiosa joshuai* predominantly utilized run, riffle and pool habitats. It did not use cascades. It preferred the following microhabitats: flow, 0–0.30 m/sec; depth, 0–60 cm; substrate, cobbles and gravels. *Garra kalakadensis* used riffle and run habitats, but it did not use pools and cascades. It preferred the following microhabitats: flow, 0.16–0.30 m/sec; depth, 0–60 cm; substrate, cobbles and gravels. In the Naraikkad stream, *Puntius areinatus* predominantly utilized pool habitats, where it preferred the following microhabitats: flow, 0–0.15 m/sec; depth, 11–30 cm; substrate, sand.

Genetic diversity: The genetic diversity of the *Puntius tambraparniei* populations residing in different environmental gradients was examined. A total of 40 DNA samples (5 samples each from 8 sites) were isolated, and the gene sequence of cytochrome b (Cyt b) was amplified. Then the amplified products were sequenced and aligned. They were compared with a reference Cyt b sequence of *Puntius arulius* retrieved from GenBank. The *P. tambraparniei* populations of the Kallar and Illupaiyar (Gadana river basin) had a variation in the nucleotide sequence at position 511 in the reference Cyt b gene, where the nucleotide 'G' was replaced with 'A'. Similarly, the population from Manimuthar had a variation in the nucleotide sequence at position 957 ('A' was replaced with 'C') and one at position 979 ('A' was replaced with 'G') in the Cyt b gene sequence of *Puntius arulius*. Furthermore, the population from Maruthur dam also had a sequence variation at position 931, where 'A' was replaced with 'C'. Phylogenetic analysis of *P. tambraparniei* from different locations based on the similarity of the Cyt b gene sequence indicates that the populations from Manimuthar, Thalayanai and Maruthur dam had a distinct haplotypic lineage and that they did not cluster with other populations. Further, there are two distinct populations in KMTR, the population from the Karayar and Servalar and the population from the Kallar and Illupaiyar.

Ecology and Conservation of Himalayan Wolf

Funding Source	:	MBZ Species Conservation Fund
Investigator	:	Dr. Bilal Habib and Dr. Y.V. Jhala
Researchers	:	Shivam Shrotriya
Date of Initiation	:	August, 2010
Date of Completion	:	February, 2012



Objectives: The objectives of the project were to (I) collect baseline data on the extent of the distribution; (ii) identify the protected areas occupied in the landscape; and (iii) determine the current status of Himalayan wolf in the wild.

Progress: To determine the distribution of the wolf in the trans-Himalayan landscape of India, questionnaire surveys were administered to collect information about the presence of wolves and livestock predation. Surveys were conducted in three states, Jammu & Kashmir, Himachal Pradesh and Uttarakhand. Villages and nomadic groups in and around the trans-Himalayan protected areas, selected on the basis of their closeness to potential habitats of the wolf, were targeted. In each village or nomadic group, 3 interviews, validating the information from the first respondent, were conducted. A total of 111 people from 40 settlements in Jammu & Kashmir, 133 people from 50 settlements in Himachal Pradesh and 127 people from 47 settlements in Uttarakhand were interviewed.

Outputs and Outcomes: Indices were developed to grade the presence of wolf in different protected areas and the level of wolf–human conflict in these areas. Uttarakhand has relatively little wolf habitat, and therefore the presence index had low values. Almost no conflict was recorded. The wolf–human conflict and wolf presence results from the 3 states are presented in figures.

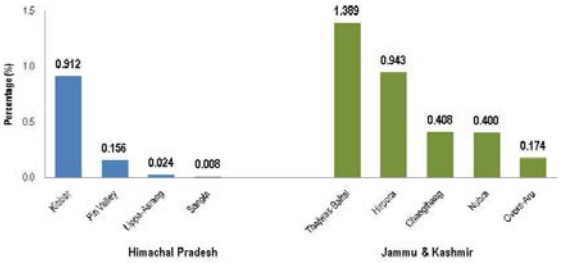


Fig.: Wolf–human conflict (in terms of monetary loss) in different protected areas in the trans-Himalayan landscape.

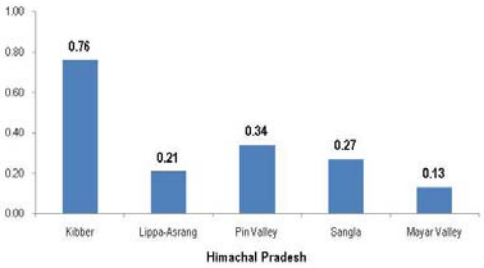


Fig.: Presence index of the wolf for different areas in the trans-Himalayan landscape of Himachal Pradesh.

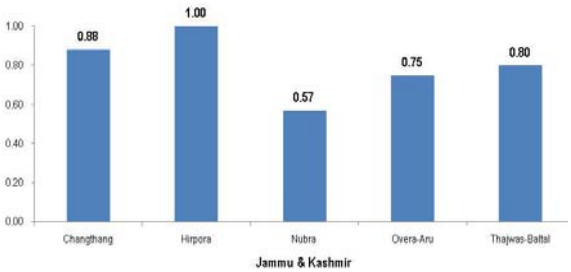


Fig.: Presence index of the wolf for different areas in the trans-Himalayan landscape of Jammu & Kashmir

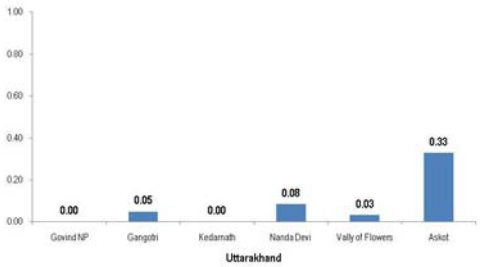
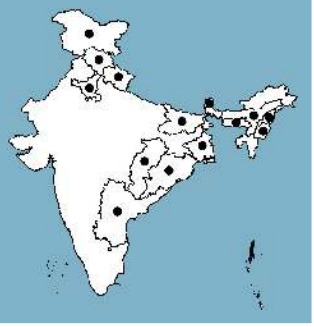


Fig.: Presence index of the wolf for different areas in the trans-Himalayan landscape of Uttarakhand

Conservation of Red Jungle Fowl *Gallus gallus* in India (Phase-II)

Funding Source	:	Grant-in-Aid
Investigators	:	Dr. S. Sathyakumar, Dr. Rahul Kaul (WTI), Dr. Rajiv S. Kalsi (MLNC)
Researchers	:	Merwyn Fernandes and Mukesh
Date of Initiation	:	March 2008
Date of Completion	:	August 2011



Objectives: The objectives of the project were to (I) assess the status and distribution of Red Jungle fowl (RJF) in India; (ii) identify pure RJF populations by molecular genetic studies; (iii) investigate social interactions between wild RJF and domestic fowl; and (iv) propose a conservation action plan for the RJF populations identified.

Progress: During the reporting period, field work on assessment of the spatial patterns in occupancy in the western Shivalik landscape at different scales, abundance estimation and habitat use were completed. Work on observation of trait characters, breeding behaviour and interactions was also completed. Genetic analysis of RJF samples (wild and captive) and domestic chicken samples that were collected from different parts of the country was carried out. Report writing was carried out during the reporting period, and the final project report was submitted.

The Institute carried out a research project from 2006 to 2011 in two phases that dealt with the status, distribution and genetic diversity of the RJF and with interactions between wild RJF and domestic chicken and introgression of domestic genes into wild and captive stocks.

The RJF is listed in the “Least Concern” category of the IUCN, with an extent of occurrence of about 51,00,000 km^2. One of the subspecies, G g murghi, is distributed within India. In order to address the issues of status and distribution, the Institute used presence-only models. A total of 500 geo-rectified data points were used along with predictable variables such as bioclimatic factors, elevation and forest cover. The total predicted probably suitable area in India is approximately 3,54,978 km^2. There are three distinct landscapes within India, the north (12%), central (52%) and north-east (38%) landscapes. The species is still reported from 205 districts out of the 270 districts in 21 range states.

The genetic diversity and population differentiation of the RJF were assessed and phylogenetic analysis of RJF populations was carried out in 19 RJF range states of India. In total, 385 samples (306 RJF and 79 domestic chicken) were collected and genotyped with 26 microsatellite markers. Altogether, 628 alleles were observed across a population of 5 RJF and 1 domestic chicken. The observed and effective numbers of alleles ranged from 9 to 49 and 2.96 to 12.40 with mean (± SE) numbers of alleles 24.15 (± 8.31) and 6.50 (± 2.71), respectively. The effective number of alleles was less than the observed number of alleles for all the loci. The total number of private alleles ranged from 1 to 179 in the south-eastern and northern RJF populations, respectively, while no private alleles were found in the central RJF population. Analysis of molecular variance (AMOVA) revealed a total variation of 6%. The RJF populations in India formed three clusters: (i) a central and south-eastern cluster, (ii) a northern and eastern cluster and (iii) a cluster of the north-eastern population and domestic chicken. Multi-factorial

correspondence analysis also revealed a similar pattern of clustering of RJF populations.

In order to study interactions, observations were recorded from 13 sites with mixed groups. All observations were carried out in the pre-dawn hours. A total of 51 encounters were recorded. The interest was in elucidating whether an interaction between the wild and domestics fowls was mutualistic or agonistic during the breeding and non-breeding seasons. In 10 observations recorded during the breeding season, there were no interactions between the wild and feral populations, suggesting that there might be a spatial segregation between these two populations. Interactions during the non-breeding season suggest that males are intolerant of each other when in close proximity, while the females tolerate each other and mingle freely.

Genetic characterization and maintaining studbooks is the key step towards formulating a management action plan for conservation breeding or a release programme for any captive species. In all, 220 RJF samples (blood/feathers) were collected from 14 captivity centres. The team investigated the population genetic structure and performed an analysis of admixture of the RJF with domestic chicken using 23 highly polymorphic microsatellite markers. Bayesian clustering analysis revealed 3 distinct groups that indicated genetic integrity in the birds of 14 centres.

John Corder

Based on the study, the following recommendations are made:

- As this study could not survey all the areas within the RJF's distribution range, we suggest that there is a need to increase efforts to understand whether the species is prevalent within forested tracts outside the PA network, especially Bihar, Haryana, Punjab, Sikkim and Uttar Pradesh, where the present distribution is highly fragmented, with growing pressures on the existing PAs of these states.
- Similarly, in Andhra Pradesh, Jammu & Kashmir and Maharashtra, extensive field surveys should be carried out to ascertain the presence/absence and exact distribution limits of the RJF as these states hold the limits or edges of the distribution range of this species.
- Specially focussed surveys/studies are required at the overlaps of the ranges of *G. g. murghi* and *G. g. spadiceus* (north-eastern states) and between the ranges of the RJF and grey jungle fowl (central India).
- Admixed birds were identified on the basis of samples collected from zoos/captivity centres. These admixed individuals (hybrids between the RJF and domestic chicken) should be removed from the captive stocks to avoid any further hybridisation. They should not be exchanged with any other zoos/captivity centres and should not be released into the wild. The list of individual birds in zoos/captivity centres that have been identified as 'not admixed' has been provided to these centres.
- Similar genetic analysis should be carried out for RJF individuals in zoos/captivity centres that were not sampled during the study or were born or added after the sampling. Such individuals should not be used /exchanged for any breeding programme.
- As there are chances of silent breeding between the RJF and domestic chicken, the use of domestic hens as foster parents should be avoided.

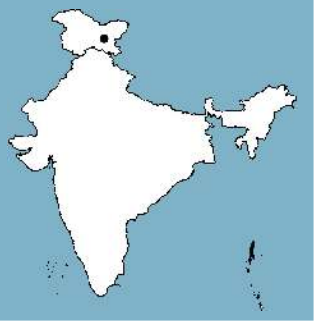
Milestones: In total, 310 RJF and 76 domestic chicken samples were collected. A good quantity of g-DNA was isolated, and the quality was good. The north-eastern RJF population seems to be most admixed with domestic chicken, which may be due to the region being the centre of domestication. The central RJF population seems to be genetically the farthest from domestic chicken.

Outputs and Outcomes: The research project has led to the award of 2 Ph.D. degrees and enabled 2 M.Sc. dissertations. The final report was released during ARS 2012, and copies were submitted to the CWLWs of all the RJF range states, park managers, zoo directors, collaborators and biologists working on galliforms in India. Seven research papers have been published in peer-reviewed international and national journals, as well as 1 chapter in a book. More than 8 gene sequences have been submitted to the NCBI database. The research findings of the project have been presented as papers/posters in 8 international and national conferences/symposia/seminars.

Our understanding of the distribution and status of the RJF and interactions between wild RJF and domestic fowl has improved. Our knowledge of the genetic diversity of wild and captive RJF populations in India has been enhanced. Recommendations and management protocols have been suggested for safeguarding the wild and captive RJF populations in India.

Ecology of Asiatic Black Bear *Ursus thibetanus* at Dachigam National Park, Kashmir

Funding Source	:	Grant-in-Aid
Investigator	:	Dr. S. Sathyakumar
Researchers	:	Lalit Kumar Sharma and Samina Amin Charoo
Date of Initiation	:	March 2007
Date of Completion	:	February 2012



Objectives: The objectives of the project were to (I) assess the bear–human conflicts and threats to the black bear and its habitats at Dachigam and adjacent reserve forests and protected areas in the north-west Himalayan landscape; (ii) evaluate whether the distribution and relative abundance of the Asiatic black bear is influenced by the availability of major food plants found in Dachigam National Park (NP); and (iii) evaluate whether the activity, habitat utilization, and movement and ranging patterns of the Asiatic black bear on a daily, seasonal and annual basis at Dachigam NP are influenced by the availability and distribution of major food plants of Dachigam NP.

Progress: During the reporting period, a few Asiatic black bears were trapped and radio-collared with TELONICS TGW-4780H fourth generation store-onboard GPS subsystems that were programmed to store and send data at fixed intervals. The data can be downloaded to ground receivers. The collared animals were ear-tagged using standard plastic colour-coded ear tags for identification. Three black bears that were rescued from human habitations were ear-tagged and released in the wild to understand their movements and behaviour. The radio-collared bears were tracked regularly from April 2011 to September 2011 to understand their movement patterns. Data analysis and report writing were carried out from October 2011 to March 2012. The report writing is in the final stage, and the final report will be submitted by mid-2012.

Outputs and Outcomes: During the 2-year period in which the collared animals (n = 6) were tracked, from autumn 2009 to autumn 2011, 1,814 locations were obtained, of which 461 were from Argos and

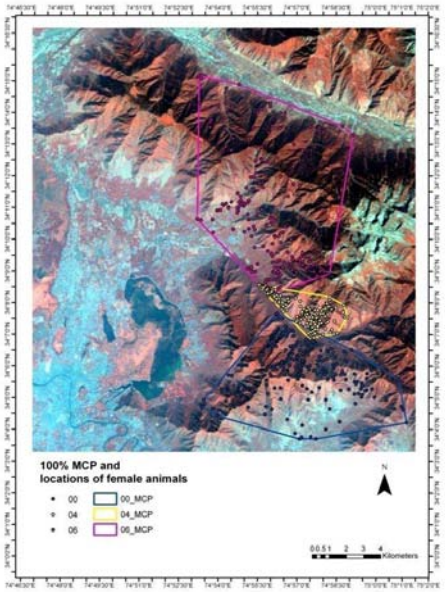
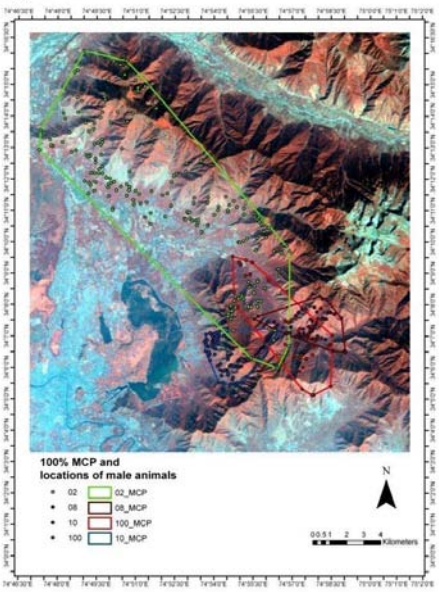


Fig.: The 100% MCP of seven-radio collared black bears in the Dachigam landscape during 2009–11.



1,353 were obtained by VHF tracking the collared animals. The home range size of a female with a cub is smaller than that of a solitary female. The home range was generated using the 100% and 95% kernel method. The 100% minimum convex polygon (MCP) hom range size for the female F04 was 8.44 km^2, for F00 it was 53.84 km^2 and for F06 it was 84.11 km^2. The home range of the male M02 was greatest, 124.67 km^2, that of M08 was 9.6 km^2, that of M10 was 9.8 km^2 and that of M100 was 6.8 km^2. The 95% kernel home range size of the female F04 was 9.6 km^2, that of F00 was 59.2 km^2 and that of F06 was 76.5 km^2. the home range of the male M02 was 151.92 km^2, that of M08 was 11.53 km^2, that of M10 was 8.45 km^2 and that of M100 was 17.9 km^2. The female with a cub (F04) restricted her movements to the natural habitat inside Dachigam NP, whereas the solitary females (F00, F06) and the adult males (M10, M08) used areas outside the boundaries of Dachigam NP substantially. M08 and F04 are still outside Dachigam NP. Using radio–collaring, we were able to collect data on the hibernation period of the black bear in our study area. Hibernation starts in December and ends in late March. The hibernation period of the black bear in Dachigam NP ranges from 40 days to 77 days.

Habitat use by radio-collared black bear in Dachigam landscape: Composition analysis was performed to understand the use of the habitat by black bears in the Dachigam landscape. Seven black bears were radio-collared in the study area for this. The overall 100% MCP home ranges were generated for all the radio-collared bears. The habitats were classed into 6 groups: riverine; mixed forest; pine forest; gras and scrubland; human habitation; and orchard.

The choice of the MCP as home ranges estimator was based on its widespread use. The habitat compositions in the total study area and in each animal's MCP home range, and the proportions of radio locations obtained for each animal within each habitat type were calculated using the HRT tool of ArcGIS 9.1. In the present study, the research team compared the utilization and the availability of habitats at the study area level. Compositional analysis was used to determine the overall use of the habitat by the Asiatic black bear.

The habitat use patterns of 7 Asiatic black bears at the landscape level were studied using compositional analysis. The bears were captured, radio-collared and tracked. The collared animals included 4 males (02 M, 08 M, 10 M and 100 M) and 3 females (00 F, 04 F and 06 F). In total, 967 use locations obtained from 7 back bears were used for the analysis. The overall 100% MCP home

ranges were generated for all the radio-collared animals. The composite home range was generated by combining the MCPs of all 7 animals. The overall habitat use by black bears was not random ($\lambda = 0.0395$, $\chi^2 = 22.62$, df = 5, $P < 0.001$, n = 7). The riverine habitat type ranked highest among the 6 different types of habitat associations, followed by the mixed forest type. It was the lowest for human habitation habitat type. The use of different cover types by black bears was disproportional to the availability within the composite home range or area of analysis. Compositional analysis of second order selection resulted in ranking matrices that ordered the habitats from most used to least used during the study period. The simplified matrix ranked the habitat use in this order: riverine > mixed forest > pine forest > grassland and scrubland > cropland > human habitation.

Milestone: For the first time in India, 8 Asiatic black bears were successfully live-captured, immobilized and radio-collared. They are being monitored through the satellite ARGOS as well as using VHF, which is providing substantial information on the ecology and behaviour of the species. On the basis of the better understanding of bear–human interactions, site-specific conflict mitigatory measures have been proposed and are being implemented by the Department of Wildlife Protection, J&K.

Development and Maintenance of Studbooks of Selected Endangered Faunal Types in Indian Zoos

Funding Source	:	Central Zoo Authority
Investigators	:	Dr. Parag Nigam and Shri P.C. Tyagi
Researchers	:	Anupam Srivastav, Mandakini Nautiyal and Manjari Malviya
Date of Initiation	:	November 2006
Date of Completion	:	January 2012

Objectives: The objectives of the project were to compile and maintain up-to-date studbooks of 14 endangered species, namely the Asiatic lion, Bengal tiger, Indian rhinoceros, lion-tailed macaque, Tibetan wolf, gaur (Indian bison), Nilgiri langur, red/lesser panda, snow leopard, Bhutan grey peacock pheasant, wild dog (dhole), clouded leopard, wild ass and hoolock gibbon, in Indian zoos.

Progress: The studbooks of the Asiatic lion, lion-tailed macaque and Bengal tiger were compiled. Long-term population management recommendations were made on the basis of demographic and genetic analysis. The studbook of the Nilgiri langur was also compiled; however, due to limitations imposed by non-availability of pedigree information, management recommendations could not be provided. The final report was prepared and submitted to the Central Zoo Authority.

Outputs and Outcomes: *Ex-situ* conservation is an important tool in ensuring the long-term survival of threatened species. The objective of *ex-situ* conservation programmes is to maintain genetically viable and demographically stable populations that are able to provide surpluses for reintroduction if required. Pedigree data of animals that can be traced back to founder animals, compiled in studbooks, forms the basis of managing them in captivity. Genetic and demographic analysis of this data is the key to managing these populations.

Milestone: Development of breeding recommendations and population management plans for the identified species.

The project involved compilation of pedigree data of the 14 identified species and subsequent demographic and genetic analyses to suggest

mating recommendations for ensuring the long-term survival of captive populations. The final report of the project was submitted. The major recommendations of the project included the following: (i) Maintenance of complete pedigree records for species included in the conservation breeding programme of India. (ii) Skill enhancement of zoo personnel in record keeping. (iii) Regulation of the exchange of animals for species for which studbooks were compiled according to mating recommendations. (iv) Carrying out molecular genetic analysis of species for which pedigree records are unavailable to establish lineages and relationships in the captive populations.

Diversity of Spiders in Nanda Devi Biosphere Reserve

Funding Source	:	Department of Science and Technology, New Delhi
Investigators	:	Dr. V.P. Uniyal and Dr. K. Sivakumar
Researcher	:	Shazia Quasin
Date of Initiation	:	January 2008
Date of Completion	:	July 2011

Objectives: The objectives of the project were to (I) document the species diversity of spiders in Nanda Devi Biosphere Reserve (NDBR) and (ii) assess the species richness, distribution and abundance of spiders in different vegetation types along altitudinal gradients.

Progress: The patterns of distribution of arthropods along elevational gradients have long been a contentious topic. In the present study, the spider diversity in NDBR was documented. The role of altitude in structuring the community was investigated to validate the observed distribution patterns with contending theories for spider conservation in the western Himalaya along three altitudinal gradients (replicate sites) within NDBR (region). Sampling was carried out over 3 years to obtain data from different seasons covering a substantial altitudinal gradient (1,800–4,100m). Pitfall traps, sweep netting and other semi-quantitative sampling methods were used to capture spiders from all possible niches. The inventory was completed at the regional scale (91%). Comparisons of the different altitudinal zones revealed that the species diversity was higher in the lower altitudinal zones. This study revealed the relative importance of diverse habitat types the diversity and composition of spider assemblages in NDBR. The spider diversity was documented by investigating the function of altitude in structuring communities. The species composition changes along the altitudinal gradients in the 3 sampling sites were also explored using NMS ordination.

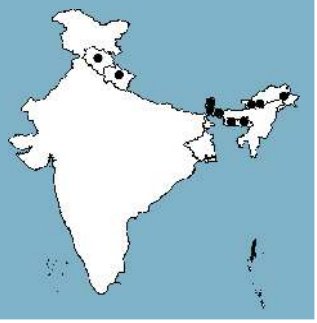
Outputs and Outcomes: A total of 244 species belonging to 108 genera and 33 families were recorded during the entire sampling period. Using the abundance based estimator Chao1, the predicted richness values for the 3 sites were 153.43 ± 0.9 (Lata Kharak), 162.75 ± 1.24 (Malari) and 206.43 ± 0.9 (Bhyundar Valley). The results showed that the species diversity was negatively related to the altitudinal gradient and that altitude influenced the species diversity on a regional scale. It was also observed that the regional species diversity patterns could be explained most prudently and robustly as an interactive effect of site and altitude. As spiders are sensitive to small changes in the environment, especially vegetation,

topography and climatic changes, patterns of linear decline may be related to more severe climatic conditions and the terrain and landscape of NDBR. The species composition was also tested in space through a multi-dimensional scaling based on the average altitude of each site (Lata Kharak, Bhyundar Valley and Malari). It was observed from the results of the ordination that the species compositions of the 3 sites formed separate clusters, indicating that each site had species that were specific to its respective altitudinal zone. Thus, different altitudinal ranges have different species compositions. Furthermore, from the results of guild-wise analysis along the elevation, it was observed that out of the 3 guilds (ground wanderers (GW), plant wanderers (PW), web builders (WB)) the ground dwelling spiders showed a curvilinear decline in all the three sampling sites. The responses of other two guilds, PW and WB, to the altitudinal gradient differed among the 3 sampling sites. Field observations indicated that out of the 3 sites, Bhundyar Valley was the most disturbed by anthropogenic activities, which could be playing an influential role in shaping the spider habitat. The weakening of the relationship between altitude and spider guild diversity in Bhundyar Valley can be attributed to habitat modification by human activities. But as quantification of disturbance was outside the scope of this study, it was difficult to conclude that disturbance is a variable influencing spider diversity.

Milestone: Taxonomy and systematics clarify organization among organisms by analysis of relationships, classification and nomenclature. This study provides the first comprehensive inventory of the spider diversity of the study area. A total of 244 species were recorded. Supplementary information on distributional range, microhabitat, natural history and web structures was collected. Even though the Himalayan region falls in the transition zone of the Palearctic and Oriental realms, earlier studies in this region had primarily reported only genera that belonged to the Oriental realm (ZSI, 1997). This study was able to establish that NDBR is indeed in the transition zone. Several genera that are endemic to India and South-east Asia were recorded from this area. Based on the estimated richness, the inventory was almost complete at the regional scale (91%). However, because of the very limited and fragmented nature of the works (ZSI, 1997), it was not possible to ascertain this claim. Additional sites need to be sampled in future. Thus, this study obtained the first comprehensive representation of the spider fauna in NDBR and will help assess the status of spider diversity in the region, keeping in mind its conservational value.

Study of Bird Species, Numbers and Densities in East and West Himalayas (Phase-I)

Funding Source	:	National Science Foundation, USA through University of Chicago and WII's Grant-in-Aid
Investigators	:	Dr. Dhananjai Mohan and Shri Pratap Singh, WII, and Dr. Trevor Price, University of Chicago
Researchers	:	Mousumi Ghosh and Dr. Dieter Thomas
Date of Initiation	:	January 2007
Date of Completion	:	January 2012



Objectives: The objective of the study was to understand species distributions, densities and habitat associations in the eastern and western parts of the Himalayan range, primarily by comparing the two locations. This included an assessment of the phylogenetic relationships among species.

Progress: Field work was carried out at Pakke Tiger Reserve, Eaglenest Wildlife Sanctuary, Dirang Forest Department, Arunachal Pradesh; and at Ramnagar Rakha Wildlife Sanctuary, Udhampur Forest Divison, Dachigam National Park, Jammu & Kashmir. The field work included ascertaining the altitudinal distributions of birds and their enumeration, vegetation quantification, capture of birds for collection of tail-feather bases and blood samples for DNA sequencing and studying the vocalizations of select species.

Outputs and Outcomes: The eastern Himalaya is probably biologically the second richest place in the world (on a 100 × 100 km^2 scale), after the northern Andes. Preliminary comparisons of DNA sequences suggest that the genetic diversity (age of species) is higher than in the Andes. About twice as many bird species were found in a 100 × 100 km^2 in the eastern Himalayas, compared with the west. This is largely a result of many forest species being found between 1,000 m and 2,000 m elevation in the east not being present in the west. This is associated with the west being drier and having generally sparser vegetation (lower density of trees with less foliage). About 25% of all species are present in both the east and the west. These tend to be species found at high elevations in the east, which experience a climate similar to that of lower elevations in the west. In both the east and the west, the intermediate elevations (1,000–2,500 m) were the most species-rich elevations. However, in the west, the 1,000–2,000 m altitudinal zone, where chir pine dominated the forest, showed a dip in richness. The phylogeny of Himalayan passerines is now complete since the gaps have been filled by molecular work done in the WII lab based on the collections made during the project. A time-dated tree to estimate the relationships among all 449 Himalayan oscines, the 5 Himalayan suboscines and 95% of the 147 non-passerines were constructed on the basis of both mitochondrial and nuclear sequence data. The time-dated tree implies that the Himalayan oscines last shared a common ancestor at ~34 Ma (95% limits in the tree reconstruction 32.3, 35.7). This marks the Eocene/Oligocene boundary, a period of dramatic cooling and by which time the Himalaya had been uplifted to present day altitudes.

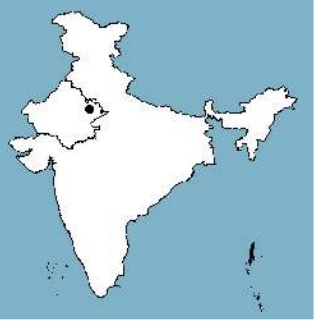
The song variability was investigated in 2 Phylloscopus warblers, namely *Phylloscopus xanthoschistos* and *Phylloscopus reguloides*, both of which occur across almost the entire Himalayan range. South-eastern populations differ from north-western populations in having lower bandwidths and fewer distinct notes in the song (because notes are often sequentially repeated), *i.e.* they are

apparently less complex. It has been suggested that the evolution of greater complexity of songs in the west has occurred largely through the frequent bringing in of introductory notes into the songs. It was possible to observe introductory notes from eastern songs being sung within many western songs.

Milestones: A paper titled 'Determinants of northerly range limits along the Himalayan bird diversity gradient' was published in American Naturalist based on the findings of the ongoing research work under this project. Three papers were presented at the International Conference on Indian Ornithology (ICIO) in November 2011 at Coimbatore, organized by Salim Ali Centre for Ornithology and Natural History. Construction of a time-dated phylogenetic tree of Himalayan birds estimating relationships among all 449 Himalayan oscines, the 5 Himalayan suboscines and 95% of the 147 non-passerines was done on the basis of both mitochondrial and nuclear sequence data.

Global Experiments on Savanna Tree Seedlings in Sariska Tiger Reserve, Rajasthan

Funding Source	:	Wageningen University, The Netherlands
Investigators	:	Dr. K. Sankar and Dr. G.S. Rawat
Researcher	:	Priyanka Bhatt
Date of Initiation	:	April 2009
Date of Completion	:	August 2011



Objectives: The objectives of the project were to (I) study the response of savanna tree seedlings to resources (water, nutrients, light) and (ii) study the competition from grasses for these resources and their ability to tolerate defoliation.

Progress: An experimental plot was laid out, and 120 plots of area 2.5 × 2.5 m^2 with different treatments were laid out. Tree seedlings were planted into sub-plots with treatments consisting of different combinations of water, nutrients, light and grass in a factorial design. The tree species and grass species selected for the experiment were *Acacia leucophloea, Anogeissus pendula, Balanites aegyptiaca, Butea monosperma, Lannaea corromandelica Zizyphus mauritiana, Chloris dolychostachya* and *Heteropogon contortus*. *Hardwickia binata* was included as another target species to understand the response of a humid savanna species in dry savanna vegetation. The seedlings were raised in a greenhouse that was constructed near the site. Once the seedlings were established, 4 seedlings of 7 target species were transferred from the greenhouse to the sub-plots only after the onset of the monsoon (rainy season), and initial measurements such as seedling height, length, basal diameter, number of leaves and condition of cotyledon were recorded for all the seedlings. The seedlings were planted in August 2009. Data on seedling parameters with respect to growth was collected while continuing the specified treatments for a period of 6 months.

After the first year of the experiment, the plots were left undisturbed and the enclosure was prepared for the second year of experimentation. In the second year, 2 new seedlings and 2 seedlings of the previous year of each target species were monitored for obtaining seedling growth data for the 0–1 year and the 1–2 year, respectively. The youngest fully grown leaf of each individual was scanned using a Canolide scanner at the start and end of the experiment. At the end of the experiment all the seedlings were clipped at the ground level,

bagged and oven dried at 70°C for 48 hours and weighed to obtain the dry mass.

Outputs and Outcomes: The experiment helped us to understand the behaviour of seedlings in their first 2 years of growth under various treatments. Each of the 7 target species responded differentially when subjected to these treatments. *Zizyphus mauritiana* seedlings showed strong intra-specific competition, and only 1 out of the 2 planted seedlings survived in 30% of the plots. Another feature that was evident was that 90% of the 1–2 year seedlings survived the treatments, and the deaths (10%) were caused by damage due to rats or common langurs. Both the grass species *Chloris barbata* and *Heteropogon contortus* were unable to survive in the shade plots. Although grass is a tough competitor for resources, it protected the seedlings from the scorching sun in the summer and from biting frost, which were the 2 major contributors to seedling mortality. *Anogesissus pendula* showed the best growth results in shade treatment, followed by even water conditions and defoliation treatment, in the first year. In the second year, however, both the new (0–1 year) and the 1 year old seedlings performed best in even water treatment, followed by shade treatment. This was the species worst hit by defoliation. *Butea monosperma* had better growth with the supplementation of nutrients. Yet it performed the best after defoliation treatment, followed by natural conditions, shade treatment and even water treatment in the first year, but in the second year the best results were obtained for natural treatment and the worst results under defoliated conditions. *Hardwickia binata* also showed the highest growth under defoliated conditions in the first experimental year; however, in the second year, seedlings had better performance under natural conditions, followed by control and shade. The worst performance was in defoliated plots. *Lannea coromandelica* did not show significant differences in the treatments but did slightly better under defoliated conditions in the first year and second year, followed by rainfall and shade. Shade treatment provided the best survival conditions for this species. *Zizyphus mauritiana* performed the best in natural plots, followed by defoliation, even water and shade plots. Under natural conditions, the grass plots showed poorer growth patterns compared with empty plots. *Balanites aegyptiaca* also had the best results under natural conditions, followed by shade and control. The worst results were under defoliated conditions.

- *Acacia leucophloea* and *Zizyphus mauritiana* showed the best growth without any treatment. Removal of grass, however, improves the survival and growth. The seedlings of *Acacia leucophloea, Butea monosperma* and *Zizyphus mauritiana* were found to be drought resistant and hence can be planted in low-moisture areas. But for better survival, the seedlings should be given protection from high-intensity grazing by wild and domestic ungulates and competition from grass competition in the initial stage of growth by thinning.
- *Balanites aegyptiaca* showed 100% germination under nursery conditions after the seeds were washed and sun dried. Although the species had the best survival and growth without any treatment, it tends to succumb to grazing pressure. Hence, protection of juvenile seedlings is recommended, and since water is not a limiting factor for the species, it can be planted in low-moisture areas.
- *Anogeissus pendula* and *Lannea coromandelica* had the best survival and growth in shade treatment, indicating that they are shade lovers. Hence, there will be better growth and survival of the species if it is planted in shady areas. Sowing of seeds in a 3 inch seed bed resulted in germination of *Anogeissus pendula* under nursery conditions.
- *Hardwickia binata* showed 100% germination under nursery conditions, and survival and

growth were best under natural conditions. But since the species is not native to the area, introducing it in the study area is not recommended.

- Awareness amongst local inhabitants should be created by the forest department about practising rotational closure of grasslands for establishment of a 'sanctum sanctorum' for grazing and fodder collection so that the grasslands can cope with the natural grazing pressure with time.
- Weeds such as *Adhatoda vasica* and *Prosopis juliflora* need to be removed on a regular and long-term basis in the savanna habitat as these have been observed to have an antagonistic effect on grass and seedlings by constricting sunlight.

- The weeded areas must be supplemented with seeds of native species of grass such as Chloris barbata, *Heteropogon contortus, Cynodon dactylon* and *Cenchrus ciliaris*.

The target species had 100% survival in the 1–2 year of growth in the absence of herbivores, and hence affording protection to seedlings in the first 2 years will ensure improved rates of survival of the seedlings.

A Study on Sympatric Carnivores (Tiger, Leopard and Dhole) in Mudumalai Tiger Reserve, Tamil Nadu

Funding Source	:	Grant-in-Aid
Investigators	:	Dr. K. Sankar and Shri Qamar Qureshi
Researchers	:	T. Ramesh and Riddhika Kalle
Date of Initiation	:	January 2008
Date of Completion	:	July 2011

Objectives: The objectives of the project were to (i) estimate the density, distribution, group size and composition of prey species of sympatric carnivores (tiger, leopard and dhole); (ii) study the food habits and prey selectivity of sympatric carnivores; (iii) estimate the population of sympatric carnivores; (iv) study the distributions of sympatric carnivores and their prey species with special reference to anthropogenic pressures; and (v) develop a conservation action plan for sympatric carnivores.

Progress: Line transects (n = 33) were laid in the intensive study area (187 km^2) in semi-evergreen, deciduous and dry thorn forests. Each line transect ranged in length from 2 to 3 km, amounting to a total length and sampling effort of 67.05 km and 473.45 km, respectively. Each line transect was walked 4 to 8 times during the study. The prey density was estimated using the program DISTANCE 6.0. Tiger (total 1,100) leopard (506) and dhole (1,438) scats were collected opportunistically along pre-determined forest roads and trails. The scats were washed, sun dried and processed for further analysis. Dietary overlap between predators was estimated using the Pianka overlap index. Estimation of the populations of tiger

and leopard was conducted using a camera-trapping technique. The tiger and leopard populations were estimated using the programs DENSITY 4.4 and SPACECAP in a capture–recapture framework.

Five vehicle transects ranging in length from 15 to 23 km were monitored in the early morning and late afternoon. The total effort amounted to 4,496 km. The density of dhole was estimated using DISTANCE 6.0. The distribution of sympatric carnivores and their prey species with reference to anthropogenic pressures was assessed. The distribution of large carnivore captures and prey encounter rates was delineated into 3 categories: low, medium and high for entire Mudumalai. In addition, anthropogenic data on wood cutting and lopping were collected at every 200 m sampling point around a 10 m radius along each line transect. The average value from these points along each line transect was calculated and incorporated in the Arc GIS 9.2 domain to map the anthropogenic pressure. Information on the livestock and human disturbance in a 1 km radius was collected from villages inside the park through a structured questionnaire survey. The GPS points of all these villages were recorded and mapped along with the livestock and human disturbance using Arc GIS 9.2.

Outputs and Outcomes: The overall prey density was 110.0/km^2 in the semi-evergreen forest. The estimated mean biomass of ungulate prey species was 6,076.9 kg/km^2. Scat analysis revealed the presence of 19 prey species in tiger scats, 20 in leopard scats and 13 in dhole scats, with a high predominance of medium- to large-sized ungulates in the diets of the tiger, leopard and dhole. The dietary overlaps, determined from the percentage of occurrence of prey remains in the diet, were 82% between tiger and leopard, 84% between tiger and dhole and 98% between leopard and dhole.

A total of 9,600 trap nights over a period of 3 years in the study area yielded independent photographic captures of 214 tigers, 307 leopards and 164 dholes. The latest estimates of tiger and leopard densities (± SE)/100 km^2, obtained using the maximum likelihood method, were 9.2 ± 2.4 and 15.1 ± 5.0, respectively. The dhole density was 43.7 ± 21/100 km^2 (excluding pups), with an average group size of 5.6 ± 1.0, from a total of 31 sightings obtained along vehicle transects.

Among the 3 vegetation types, deciduous forest had high and medium capture rates of tiger and leopard, while dhole capture rates were randomly distributed in the reserve. Of the 37 villages in Mudumalai, Moyar, Boothanatham and Chemmanatham villages appeared to have a major impact on the dry thorn forest in terms of livestock grazing and anthropogenic activities. In these villages, the impacts of livestock and human disturbance ranged over distances from 3 to 5 km.

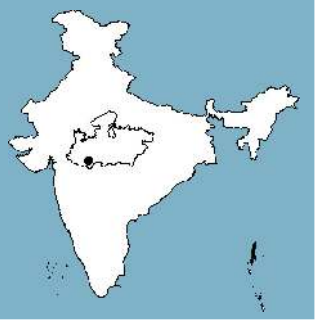
This study indicates that there is a good availability of different sized prey species which facilitates the co-existence of predators through prey choice in Mudumalai Tiger Reserve. This is one of the few areas where the 3 predators co-occur in high densities in the Western Ghats and is a stronghold for major source populations of large carnivores for surrounding areas (reserved forests). Equal importance should be given to the buffer zone of Mudumalai in terms of forest protection and habitat management to maintain the continuity of the forest with adjacent areas. The cessation of agricultural activities will aid in the restoration of the swamp (vayal) habitat in the tiger reserve, which serves as a crucial resource for sambar, gaur and elephant. The minor presence of domestic livestock (nearly 2%) in the diet of predators indicates a low level of human–carnivore conflict in the reserve; however, further investigations into the conflict aspects must be undertaken since the peripheral region of the reserve is under pressure from the increasing

human population. Annual forest fires led to fluctuating herbivore populations during the dry season; hence, effective control-burning prior to the peak dry season, especially along roads, fire lines and tourist spots, can prevent an unwanted spread of fire. A high shrub cover facilitates a predator's hunting strategies, and hence monitoring the spread of weeds (e.g. *Lantana camara*) on an experimental basis should be conducted patch-wise to understand the vegetation dynamics. Over the last 10 years, the vegetation and land cover have transformed considerably into scrubland habitats and fragmented forest patches, especially in the south-eastern region of Mudumalai, primarily under the influence of heavy anthropogenic pressures (lopping, farming and livestock grazing).

In addition to this, local communities should be encouraged to undertake rational land use practices in and around the reserve. The wild ungulate density in Mudumalai is one of the highest in the Indian sub-continent; however, it is prone to cattle-transmitted diseases such as foot-and-mouth disease and rinderpest, which occurred in the 1960s. Hence there is an urgent need to implement regular vaccination programmes for domestic livestock in order to control the spread of diseases to wild ungulate populations. Management recommendations as outlined in this study must be implemented for long-term conservation of large carnivores and their prey in the Mudumalai–Bandipur–Wayanad landscape.

ONGOING PROJECTS

Ecological Effects of Road through Sensitive Habitats: Implications for Wildlife Conservation



Funding Source	:	Grant-in-Aid
Investigators	:	Dr. Asha Rajvanshi and Dr. V.B. Mathur
Researcher	:	A. Pragatheesh
Date of Initiation	:	April 2008
Date of Completion	:	October 2012

Objective: The objectives of the projects are to (I) assess the nature of ecological effects associated with roads based on a study of the existing road sections aligned through or along an ecologically sensitive area; (ii) predict the nature of ecological effects of a proposed road upgradation (4-laning from 2-laning) project with and without mitigation measures; (iii) evaluate the effectiveness of the mitigation proposed based on a study of earlier implemented road project; and (iv) suggest effective measures for preventing road-induced impacts for harmonizing conservation and development.

Progress: Three different road sections across the country were identified for detailed studies under this project. These included a 9 km stretch of NH-7 along Pench Tiger Reserve, National Highway-37 along Kaziranga National Park and the Mumbai–Pune Expressway. During the reporting period, field observations were conducted on National Highway-37. Four different stretches of the road were recognized as corridors (Kanchanjuri, Haldibari, Ghurakati and Panbari corridors) for movement of animals across the national highway. The use of roadside habitats by wild animals and the use of existing corridors were assessed using the pugmark impression pad (PIP) method. Data on road kills were collected based on direct observations in the period between March and June 2011.

To measure the effectiveness of various speed control measures (rumble strip, hump and steel barriers), the speeds of different types of vehicles were monitored at locations before and after the use of the different control structures. The visual impact of the signage boards was assessed by direct

A. Pragatheesh

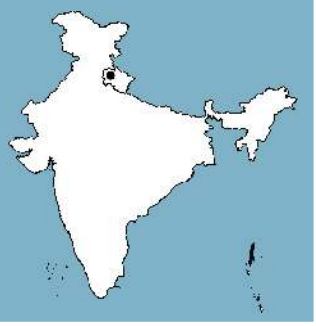
observation of the design features of the signage, the contents and the dimensions of the signage boards and the response of the drivers as reflected in the changes in speed of the vehicles after the sign boards were seen. Additionally, a questionnaire survey (n = 1062) was conducted to identify the signage that was more effective in communicating the message for regulating the speed.

Outputs and Outcomes: The maximum use by herbivores was recorded in the Kanchanjuri and Haldibari corridors. Small carnivore use was high in the Ghurakati and Panbari corridors, located along habitations. Large carnivores frequently used the Haldibari corridor, which offered good habitat connectivity between Kaziranga and the Karbi Anglong hills. The greatest number of road kills recorded was of reptiles (69%), followed by birds (23%) and mammals (8%). The effectiveness of rumble strip, hump and steel barriers in controlling the speeds of different vehicles was different. Steel barriers and rumble strips were effective in reducing the speed of truck and passenger vehicles, respectively. No correlation could be established between the type of signage and the drivers' responses in reducing the speed of the vehicle.

Data on all the 3 sites are being compiled and analysed for preparation of the final project report based on the studies conducted.

Survey and Mapping of Commercially Important Medicinal Plants in the State of Uttarakhand

Funding Source	:	Uttarakhand Forest Department (UKFD)
Investigators	:	Dr. G.S. Rawat and Dr. B.S. Adhikari
Advisor/Collaborator	:	Dr. S. Chandola, PCCF (Wildlife), UKFD
Researchers	:	Umesh Kumar Tiwari and Ninad V. Raut
Date of Initiation	:	January 2008
Date of Completion	:	July 2012



Objectives: The objectives of the project are to (I) quantify the availability of commercially important medicinal plants in various forest ranges of Uttarakhand (Garhwal region); (ii) generate a spatial database on the distribution and abundance of medicinal plants for future monitoring and conservation planning; and (iii) evolve strategies for sustainable harvest of medicinal and aromatic plants (MAPs).

Progress: Data from a rapid mapping exercise (RME) in various forest divisions (FDs) of Garhwal region were analysed, and recommendations were made for conservation, development and harvesting (CDH) of medicinal plants in the region. Of about 95 species of medicinal plant recorded in various transects, 54 species were prioritized for conservation and development.

Outputs and Outcomes: Among all the ranges, Bhilangana in Tehri FD stands out as the most ideal range for conservation, development and harvesting of various MAPs in Garhwal. In this range, Gangi 19 and 20b are recommended for conservation of *Rheum australe*, *Rheum moorcroftianum*, *Aquilegia pubiflora*, *Aconitum heterophyllum*, *Aconitum lethale*, *Angelica archangelica*, *Angelica glauca*, *Polygonatum verticilatum*, *Maharanga emodii*, *Meconopsis aculeata*, *Selinum tenuifolium*, *Tanacetum dolichophyllum*, *Taxus wallichiana*, *Thalictrum foliosusm* and *Trigonella emodi.* The stretch between Kharsholi and Bagi Bugyal has very good numbers of various MAPs and has potential for conservation of many plants in the form of a seed bank. Gangi 33, 34 and 38 are recommended for


B.S. Adhikari

conservation of *Aconitum balfouri*, *Allium stacheyi*, *Lilium polyphyllum*, *Nardostachys grandiflora*, *Picrorhiza kurooa*, *Podophyllum hexandrum*, *Polygonatum multiflorum*, *Rheum moorcroftianum*, *Selinum tenuifolium*, *Swertia chirayita*, *Tanacetum dolichophyllum*, *Trilidium govanianum* and *Valeriena wallichi.* Gangi 16 is recommended for harvesting *Thalictrum foliosusm* sustainably with a rotation of 4–5 years.

In the case of *Adhatoda zeylanica, the* following areas are recommended for harvesting shoots and leaves (upto 50% of the individuals): Lambirao, Nahin, Bhogpur, and Saura blocks (Thano Range, Dehradun FD); Ranipokhari Block of Badkot Range (Dehradun FD); Kalsi (River Range, Chakrata FD); Dwara Block (Raipur Range, Mussoorie FD), Rishikesh area, Singtali Block, Haiwal Block and Khusraila Block (Shivpuri Range, Narendranagar FD). For *Berberis aristata,* civil areas in the Upper Yamuna and Bhilangana valleys between 2,200 and 3,000 m altitude can be considered for harvesting with a rotation of 4–5 years. Given the high demand, pilferage and illicit harvest of several alpine herbs, in which roots and tubers are collected (*e.g. Aconitum heterophyllum, Nardostachys grandiflora, Dactylorhiza hatagirea, Picrorhiza kurooa, Angelica gluaca and Trillidium govanianum*), it would be premature to recommend harvest zones/areas at this stage. In order to develop sustainable harvest plans for such species, a participatory approach involving local community based organizations (*van panchayats*) would be ideal. The Upper Bhilangana Valley has a great potential for implementing CDH plans for alpine medicinal plants. *Rubia cordifolia* is abundant in South Dudhatoli-IV-5 of East Ameli and Ameli-9/31 of West Ameli (Garhwal FD). In these blocks, this species can be extracted with a rotation of 4–5 years, and 10–20% of the population can be harvested. *Valeriana jatamansi* (Samewa) can be harvested (20–30% of the population) from Kunanin-12 of Kanasar Range (Chakrata FD), Kori-2 of Badrigad Range (Mussoorie FD), Pindarpar IV-11 of Pindar East Range (Badrinath FD) and Darmigad-9 of Bawar Range (Chakrata FD). *Thalictrum foliolosum* (Mamira) has harvestable biomass in Gangi Block of Bhilangana Range (Tehri FD) and Patangani Block of Gangotri Range (Uttarkashi FD). This species can be taken up for harvesting (20–30% of the population) with regular reassessments. *Tagetes minuta* can be harvested (20–30% of the population) from Jamak Block of Gangotri Range (Uttarkashi FD) and civil areas of Devta Range (Tons FD).

Impact of Global Change on Species Composition in Western Himalaya – Himachal Pradesh

Funding Source : Department of Space, National Remote Sensing Agency
Investigators : Dr. B.S. Adhikari, Dr. G. Talukdar and Dr. G.S. Rawat
Researcher : Pushkar Sharma
Date of Initiation : May 2010
Date of Completion : May 2013

Objectives: The objective of the project is to study the impacts of global change such as changes in the climate and land use on the floristic diversity of Himachal Pradesh, with emphasis on changes in the species composition.

Progress: Intensive study sites at and around Renuka in the lower region of Sirmour District of Himachal Pradesh were selected for the study. The valley is mainly dominated by 6 different forest communities, *viz. Anogeissus* mixed, *Dalbergia* mixed, *Eucalyptus* mixed, sal, mixed broadleaved and sal mixed forests. The first 4 communities form forests in a few localities, but most of the sites are dominated by mixed broadleaved and sal mixed forests. The density ranged from 190 to 420 trees ha^{-1} and from 330 to 460 trees ha^{-1} and the total basal area ranged from 11 to 61 m^2 ha^{-1} and from 23 to 35 m^2 ha^{-1}, respectively, in mixed broadleaved and sal mixed forests. In *Anogeissus, Dalbergia, Eucalyptus* and sal forests the densities were 660, 780, 380–440 and 390–410 trees ha^{-1} and total basal areas were 43, 46, 25–36 and 24–31 m^2 ha^{-1}, respectively. In the forests in and around Renuka, the shrub density ranged from 420 to 1,000 individuals ha^{-1}, that of herbs ranged from 640 to 1,240 individuals m^{-2}, that of seedlings ranged from 310 to 620 individuals ha^{-1} and that of saplings ranged from 30 to 300 individuals ha^{-1}.

Macro-ecology of Terrestrial Herpetofauna of the Andaman and Nicobar Archipelago

Funding Source : Science Engineering Research Board, Department of Science and Technology
Investigators : Dr. Karthikeyan Vasudevan, Shri B.C. Choudhury, Dr. S.K. Dutta and Dr. Indraneil Das
Researcher : S. Harikrishnan
Date of Initiation : November 2009
Date of Completion : November 2013

Objectives: The objectives of the project are to (I) identify the factors which influence the spatial patterns in species abundance and distribution of reptiles and amphibians in islands; (ii) test null models in the community structure of insular reptiles and amphibians; and (iii) identify the factors that influence the community structure of reptiles and amphibians in islands.

Progress: Eleven islands in the Andaman Islands were sampled for terrestrial herpetofauna. These were South Andaman Island (1,348 km^2), Rutland Island (116 km^2), Neil Island (12.6 km^2), Alexandria Island (3.6 km^2), Grub Island (0.03 km^2), Chester Island (0.09 km^2), Snob Island (0.22 km^2), Hobday Island (3 km^2), Redskin Island (3.3 km^2), Tarmugli

Milestones: A new species of small arboreal toad belonging to the family Bufonidae was discovered in Mt. Harriet National Park. Preliminary morphological examinations reveal that it also belongs to a new genus. Work on the systematics and taxonomy of this species is in progress.

Several individuals of a highly arboreal agamid lizard were found living in the canopy. It is suspected that these belong to the species *Calotes andamanensis* Boulenger, 1891, which has not been recorded since its original description in 1891. Work on the systematics and taxonomy of this species is in progress.

Island (11.5 km^2) and Little Andaman Island (675 km^2). 127 Open quadrats were sampled in these islands. From the open quadrats, 803 reptiles were recorded, with the average density being 6.32/100 m^2; 227 frogs were recorded, with the average density being 1.79/100 m^2. Twenty-two bounded quadrats were sampled in South Andaman Island, Rutland Island, Alexandria Island, Redskin Island, Tarmugli Island and Little Andaman Island. From these bounded quadrats, we recorded 319 reptiles and 280 frogs. The average reptile density in the bounded quadrats was 14.5/100 m^2, and the average frog density was 12.72/100 m^2. The bounded quadrats counts are considered to be total counts, and they show that there is wide a variation in the density of herpetofauna between the various islands. Eight species of frog, 18 species of lizard and 14 species of snake were recorded from 11 islands. These include a new species of lizard and a new species and genus of toad.

Outputs and Outcomes: Data from the bounded quadrats have shown that the rainforests in the Andaman Islands have the highest density of herpetofauna reported from India. The larger islands have a herpetofaunal biomass exceeding 20 kg/ha on the rainforest floor. It is suspected that the chital (*Axis axis*), an invasive herbivore, might have a negative impact on herpetofaunal densities through its impact on the understorey vegetation. The only island without chital, *i.e.* Little Andaman Island, had the highest density of herpetofauna. A targeted study is required to identify the impact of invasive herbivores on the native fauna.

During field work in Mt. Harriet National Park, South Andaman Island, a new species of lizard of the genus *Coryphophylax* Fitzinger in Steindachner, 1867 endemic to the Andaman Islands was identified. The discovery and description of this species were communicated to the international taxonomic journal *Zootaxa*, and the manuscript is under review.

Conservation of the Endangered Asiatic Wild Dog *Cuon alpinus* in Western Arunachal Pradesh: Linking Ecology, Ethnics and Economics to Foster Better Coexistence

Funding Source	:	Department of Science and Technology, Govt. of India
Investigators	:	Dr. G.V. Gopi and Dr. Bilal Habib
Researchers	:	K. Muthamizh Selvan and Salvador Lyngdoh
Date of Initiation	:	March 2009
Date of Completion	:	April 2012

Objectives: The objectives of the project are to: (I) estimate the abundance and population structure of the dhole (wild dog) and its prey species in protected areas of western Arunachal Pradesh; (ii) examine the food habits prey selection and predation patterns of the dhole on different prey species; and (iii) quantify the current people–wild dog conflicts by assessing the livestock depredation by dholes and retaliatory killing by local people.

Progress: Population status and abundance estimates were made through individual

identification using camera trapping with mark–recapture methods. A sign survey was done along roads, streams and trails to identify suitable locations for camera trapping and to derive the encounter rates of carnivore signs in Pakke Tiger Reserve (PTR). A total of 40 cameras were operated in 40 locations. Capture histories (X-Matrix) were developed for each adult tiger and leopard and the population size was estimated by using the program MARK. The densities of tigers and leopards were estimated by dividing the population size (N) by the effective sampled area (A). The photographic encounter rate was used to estimate the dhole abundance. For individually non-identifiable species, the photographic rate seemed to correlate well with the animal abundance.

The prey selection and the feeding habits of the tiger *Panthera tigris*, Asiatic wild dog *Cuon alpinus*, and leopard *Panthera pardus* were studied from June 2009 to April 2011 in PTR, Arunachal Pradesh. Scat analysis was used to estimate the food habits of the dhole, tiger and leopard. Socio-economic status was mainly evaluated through interviews with local people. A total of 809 households were interviewed from 50 villages across the East Kameng, Papum Pare and Lower Subansiri districts.

Outputs and Outcomes: A total of 2,200 trap nights over a period of 2 years resulted in 50 tiger photographs of 7 individual tigers, 41 leopard photographs of 7 individual leopards and 27 photographs of wild dogs, with a maximum pack size of 3 individuals. The estimated tiger population size was 7 to 10.2, and the population size of the leopard was 8 to 14. The estimated population density of the tiger was 2.12 ± 0.04 and that of the leopard was 4.48 ± 0.15. The relative abundance index (RAI) of dhole capture/100 trap night revealed was 0.15/100 trap nights in 2010 and 1.7/100 trap nights in 2011.

Milestones: The status of large carnivores, particularly the dhole, in the Indian part of eastern Himalayas was relatively unknown. This study serves to show for the first time the results of a detailed study on dhole ecology and conservation in the Indian part of the eastern Himalayan biodiversity hotspot. An interesting finding is that the majority of the local people have experienced major problems with dholes and that their general attitude towards dhole conservation is not positive. This is something to address. A mass conservation awareness programme highlighting the ecological and conservation importance of dholes needs to be carried out and misconceptions regarding dholes need to be reduced.

The density, structure and composition of the populations of major prey species were studied in PTR in western Arunachal Pradesh. The estimated mean density of ungulates was 17.5 km^{-2}, with an overall density of 48.7 km^{-2}. The wild pig *Sus scrofa* had the highest density (6.7 ± 1.2 km^{-2}) among all the prey species. The estimated total ungulate biomass density was 2,182.56 kg km^{-2}. This prey biomass can support up to 7.2 tigers per 100 km^{-2}. The estimated minor prey species was 31 km^{-2}. Significantly, 30.6% of the crop damage reported was due to wild pigs (P = 0.01), and 35.4% was due to elephants (P = 0.004).

A total of 422 scats were analysed, of which 109 scats were of tigers, 150 were of leopards and 163

were of dholes. Multinomial Likelihood ratio test was used to estimate the prey selectivity of predators and Ivlev index, Pianka index were used to estimate prey preference and overlap respectively. Large mammalian predators had consumed 1,358.3 kg (tiger, 599.1 kg; leopard, 504.9 kg; dhole, 254.3 kg). The results suggest significant ($P < 0.05$) selection among the prey species. Sambar ($P < 0.05$), barking deer ($P < 0.05$) and wild pig ($P < 0.05$) were preyed on more than their availability by all the predators.

The study also documented the socio-economic factors that drive the decline of wild dog populations in western Arunachal Pradesh. Retaliatory killing, hunting and livestock depredation were the factors that posed a threat to wild dog populations. Two major indigenous tribal groups, the Nyishi and Apatani, were targeted. The most depredation was reported to be caused by the dhole. The livestock preyed most upon was the semi-domesticated mithun (*Bos frontalis*), which is highly valued socio-culturally. Scat analysis showed that livestock constituted nearly 10% of the diet of the dhole, tiger and leopard. The north-eastern (> 35%) and Segalli (> 10%) clusters had high levels of livestock depredation, while the Naumura cluster (< 2%) had negligible livestock depredation. Livestock depredation was correlated with hunting and retaliatory killing. Possible causes of livestock depredation, attitudes and awareness to conservation of wildlife were discussed. A majority of the respondents felt that dhole encounters had declined (67.23%) and that this was a positive thing (56.35%). This emphasizes the point that retaliatory killing of the dhole is a prejudiced response that could lead to serious declines in the dhole populations of Arunachal Pradesh. Social sentiments need to be considered in any further efforts to conserve the dhole through scientific evidence and better enforcement.

Ecological Monitoring of Tiger Population in Panna Landscape, Madhya Pradesh

Funding Source	:	Madhya Pradesh Forest Department and National Tiger Conservation Authority
Investigators	:	Dr. K. Ramesh, Shri S. Sen, Dr. J.A. Johnson and Field Director, Panna Tiger Reserve
Researchers	:	Mriganka Shekhar Sarkar, J. Yogesh and Raja Raj Tilak Dhurbe
Date of Initiation	:	February 2010
Date of Completion	:	January 2014

Objectives: The objectives of the project are to (I) monitor and study the population growth of the translocated/re-established tiger population in Panna Tiger Reserve (TR), including the genetic structure; (ii) understand the dynamics of co-predator and prey populations in relation to the tiger occupancy pattern and other management interventions; and (iii) study the landscape ecology of the tiger, incorporating human interface issues and ecological correlates linked to economics and system services.

Progress: The project continued with regular monitoring of the translocated tigers and other specified activities. Initially, one tigress from Bandhavgarh TR (T1), one from Kanha TR (T2) and one tiger from Pench TR (T3) were introduced. During the interim period, two tigresses (T4 and T5) that were raised in a captive and semi-wild environment in Kanha Tiger Reserve (Gorella enclosure) were captured, radio-collared (T4 with a Telonics VHF-GPS-Argos unit and T5 with a VHF unit) and translocated to Panna TR in March and

November 2011, respectively. Following the expiry/failure of collars, 3 tigers (T1, T2 and T3) were re-collared with VHF–GPS–Argos collars. One male cub each of T1 and T2 were also collared with VHF units, in January and March 2012, respectively. Simultaneously, a total of 80 camera traps (Cuddeback Attack model) were deployed at 120 locations within a 2 km grid framework, covering 480 km^2 of the area, for estimating the populations of the tiger and co-predators. A total of 42 line transects of around 2 km length were surveyed, with 3 pseudo-replicates, in the entire reserve for estimating the prey population size across spatial and temporal scales. Over 140 scat samples of tigers and their cubs were collected for food habit and genetic analyses.

Outputs and Outcomes: T1 and T2 produced their first litters, of 4 cubs each, in 2010. However, 2 of T1's cubs died due to unknown causes in September 2010, and the remaining 6 cubs have grown to the stage of dispersal. In November 2011, a landmark development in which T4 (raised in captive and semi-wild environment) produced a litter of 2 cubs was witnessed. These developments marked the success of the reintroduction efforts. Subsequently, after 2 years of its first litter, T1 produced its second litter of 4 cubs in March 2012, but one of these cubs (a male) was found abandoned by the tigress. The abandoned cub was rescued and is being reared in captivity within Panna Tiger Reserve by the park staff. As of March 2012, there are 5 adults and 5 cubs excluding the abandoned one, thus making the total number of tigers 16.

As indicated above, the 5 animals introduced between 2009 and 2012 have established themselves well in Panna TR and have responded positively, with significant breeding success. Interestingly, the 2 tigresses that were raised in captive and semi-wild conditions in Kanha TR appeared to have adapted gradually to free-ranging conditions, possibly supported by the male (T3). The estimates of the home range of the tigers obtained using the 100% MCP method were 57 km^2 (T1), 26 km^2 (T2), 192 km^2 (T3), 34 km^2 (T4) and 118 km^2 (T5). Except for T5, all the other animals have settled down in the area and thus the true pattern is reflected. T5 is still to establish itself. The reintroduction efforts, including those involving captive-raised animals, continue to provide new insights into tiger biology and have implications for science-based conservation efforts in the country and elsewhere in the distribution range.

An Integrated Approach to Reduce the Vulnerability of the Local Community to Environmental Degradation in the Western Himalaya, India

Funding Source	:	Grant-in-Aid
Investigators	:	Dr. Ruchi Badola and Dr. S.A. Hussain
Researcher	:	Pariva Dobriyal
Date of Initiation	:	January 2008
Date of Completion	:	January 2013

Objectives: This project aims to develop an integrated plan to reduce the vulnerability of local communities to environmental degradation in the western Himalaya. The major objectives of the project are to (a) enumerate the key ecosystem functions of the western Himalayan forested landscape and to estimate its value (carbon sequestration, water retention, nutrient retention, landslide and erosion prevention and recreational value); (b) study the patterns of interaction

between local livelihoods and natural ecosystems; (c) identify the key drivers of land use and resource use changes that have taken place in the region and assess their implications for ecosystem integrity and the vulnerability of the people; (d) identify ecosystem management actions and sustainable livelihood options that may reduce the vulnerability of communities to environmental degradation; and (e) promote the integration of this approach into emerging policy frameworks for sustainable use of natural resources in the region.

Milestones: During the reporting period, 2 papers were published in peer-reviewed journals.

Progress: The socio-economic status and dependency on natural resources for biomass and freshwater were assessed. The socio-economic status was assessed using questionnaire-based interviews; dependency on natural resources for biomass was estimated using the entry point method and participant observation method along with the interviews. The dependency on natural resources for freshwater was estimated using the timed volumetric method. The recreational value of Nanda Devi Biosphere Reserve was estimated using the zonal approach travel cost method.

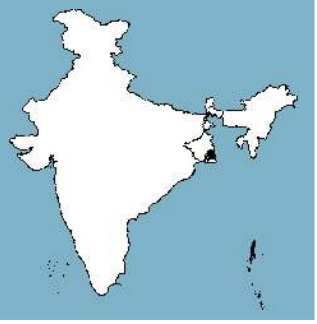
Outputs and Outcomes: The average annual income was found to be higher for households located away from the forest compared with households situated close to the forest because of the access to roads and markets where people can sell their agricultural, woollen and milk products. The average educational levels were more or less similar for households located close to and away from the forest. This may be a result of the national education scheme of the Government of India. In all the sampled villages, most of the people have undergone education up to the 8 standard (middle school), while a few people were graduates.

Access to the basic amenities is better in households located away from the forest, but access to pure drinking water was better in households close to the forest. This is because the water-holding capacity of the soil increases with the presence of leaf litter from a forest. Every forest type contributes differently to the needs of a household. Oak forests provide the highest percentage of households' requirements of fuel wood, fodder and thatching. For other NTFPs such as food and medicinal plants, the contribution of deodar and conifer mixed forests is higher as they are at high altitudes. The same type of dependency has been observed with households situated away from the forest. Oak forests contributed the most to the income, while deodar forests contribute the least. There is no significant difference between households near and away from forests in human well-being. Human well-being showed a positive correlation with educational level, while it was negatively correlated with the degradation of the forests. We found that every household uses 41 m^3 water of every year at a trivial price. The local communities are benefitting from the freshwater services of the forests in their vicinities.

Tourists were interviewed to estimate the recreational value of NDBR. About 50% of the tourists said that their visit was for religious purposes, while 21% said that they had mixed reasons for their visit (recreational–religious–aesthetic). Only 7% of the tourists visit NDBR for nature recreation. A demand curve was generated using linear regression between the total number of tourists and the cost of travel. The estimated recreation value of the study area was calculated at Rs.16.2 million per year, and the consumer surplus per visit was found to be Rs.41.22.

Population Estimation and Ecology of the Tiger in Sundarbans Tiger Reserve, West Bengal

Funding Source	:	National Tiger Conservation Authority, New Delhi
Funding Agency	:	West Bengal Forest Department
Investigators	:	Dr. Y.V. Jhala and Shri Qamar Qureshi
Researchers	:	Dipanjan Naha and Manjari Roy
Date of Initiation	:	October 2009
Date of Completion	:	March 2014



Objectives: The objectives of the 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) assess 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 tiger reserve.

Progress: Though general methods for directly estimating tiger numbers and quantifying the prey base are available, the same cannot be applied to Sundarban mangroves. The mangrove habitat of Sundarbans provides a formidable challenge for conducting a scientific study owing to the ever-present threat from tigers, absence of roads and trails inside the forests and difficulties in employing standard survey methodologies that usually perform well in other habitats. Since access inside the forest was restricted, camera traps were set up using baits and olfactory lures to attract tigers to our camera stations. Optimum locations such as brackish water holes, elevated places, river bends, and regular channel crossing paths frequented by tigers were selected based on the natural history skills and local knowledge of tiger biology of frontline forest staff. Digital cameras with both motion and thermal detection sensors (Moultrie) were used during the exercise. Nylon nets were also used to orient the approaching tigers to get suitable flank photographs for uniquely identifying each individual from its stripe patterns. Traps were operated in 8–9 day sessions during the neap tide, when the tidal fluctuations were minimal and the forest floor was relatively dry, to prevent damage from tidal inundation. Quantification of decay rate was carried out during field surveys. The quantification took into consideration various factors influencing the obliteration of pugmarks, such as the type of tide (high/low tide), lunar phase (spring/neap tide), slope of the bank, proximity to primary or secondary channels and soil type. For estimating the prey density, boat transect surveys were carried out using distance sampling methods. The transects were usually of 10–15 km length. Camera trapping was carried out in an area of about 257 km^2 (effective camera trapped area). Photo-captures of 10 tigers and 2 cubs were obtained in 2010–11 in Netidhopani Beat of West Range. The population estimate obtained using the best fit model (Mh) was 11 (SE 3).

Outputs and Outcomes: The home range radius of 6 km was used for 4 satellite radio-tagged tigers to calculate the buffering strip width around the maximum convex polygon, and the tiger density was computed to be 4.3 (SE 0.3) tigers per 100 km^2. Considering the area occupied by tigers, obtained through occupancy survey of khals, to be 1,645 km^2 within the tiger reserve and extrapolating this density estimate, the population of tigers in Sundarbans Tiger Reserve was computed to be between 64 and 90 adult tigers. Apart from tigers, other wild species such as the fishing cat, leopard cat, water monitor, estuarine crocodiles, wild pig and spotted deer were also photo-captured.

Monitoring Source Population of Tigers in Corbett Tiger Reserve

Funding Source	:	Corbett Tiger Reserve, Uttarakhand Forest Department
Investigators	:	Dr. Y.V. Jhala and Shri Qamar Qureshi
Researchers	:	Shikha Bisht and Sudip Banerjee
Date of Initiation	:	October 2009
Date of Completion	:	October 2012

Objectives: The objectives of the project are to (I) monitor the source population of tigers in Corbett Tiger Reserve and (a) estimate the tiger population within selected areas of the reserve and (b) 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: Ecological studies conducted in this landscape provided snapshots of the status of the tiger population (19 (± 0.54)/100 km^2) in 2006–07. Monitoring the population on an annual/seasonal basis will provide 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 changes. Hence, under Phase IV, the team is concerned with detecting change, establishing its direction and measuring its extent and intensity in Corbett Tiger Reserve (CTR). This will enable us to detect site-specific changes in time to address them through timely intervention for management. Camera trap-based capture–recapture (Pollock's robust design) was conducted each year for a period of 40–48 days to ensure population closure in an area of 481 km^2 (MCP) to estimate the population size, density and survival of tigers. A total of 103 camera locations were sampled in the area. These were identified on the basis of our reconnaissance survey and local knowledge of the forest staff. An effort of 4,326 trap nights yielded 1,224 photographs of 93 individual tigers. Tigers were identified on the basis of stripe patterns using Extract Compare. Closed population estimators selected M (h) as the best-fit model, thereby accounting for heterogeneity. The population (# (S.E.)) computed using the M (h) Jackknife estimator was 108 (9.9). The 1/2 MMDM density estimate (± (S.E.)) per 100 km^2 was 20(2.3). Under the spatial likelihood model, the density was 17 (5.44) tigers.

The Monitoring System for Tigers—Intensive Patrolling and Ecological Status (MSTrIPES) is proposed to be implemented in Corbett Tiger Reserve as a part of this project. The methods have been designed, and data collection has commenced.

Outputs and Outcomes: Estimates of density for a site over multiple years are very useful for understanding and managing populations of large carnivores. Monitoring the abundance and density of tigers in the same area of CTR, which is the source population for the Terai-Shiwalik landscape, or Terai-Arc Landscape (TAL), through intensive camera trapping will highlight trends in the tiger population.

Studies on Housing and Enclosure Enrichment of Some Species in Selected Indian Zoos

Funding Source	:	Central Zoo Authority, New Delhi
Investigators	:	Shri P.C. Tyagi and Dr. Parag Nigam
Researchers	:	Dr. Anupam Srivastav, Sitendu Goswami, T. Ajay Kumar and Malemleima Ningombi
Date of Initiation	:	January 2011
Date of Completion	:	January 2014

Objectives: The project objectives include (I) carrying out a literature review of the existing knowledge relevant to captive management of target species; (ii) assessment of the existing housing facilities and enclosure enrichment for target species in Indian zoos; (iii) developing a critical note for suitable housing and enclosure enrichment for target species; and (iv) developing protocols for enclosure enrichment for the well-being of target captive wild animals.

Progress: The project has been operational since January 2011. During the period January 2011–March 2012, the following activities were carried out by personnel engaged in the project.The review of the literature was completed in respect of 40 animal species,which have been grouped into 13 categories: felids, canids, ursids, small mammals, primates, mega herbivores, ungulates, galliforms, vultures, the Nicobar pigeon, the king cobra, crocodilian species and the painted roof turtle. Information was collected from reputed sites, periodicals, journals, dissertations and theses and submitted to the Central Zoo Authority. For assessment of the housing and enclosure enrichment practices of selected zoos, an enclosure complexity scoring sheet was prepared. This was filled out for the zoos surveyed. Enclosure attributes sheets containing information about enclosures and husbandry practices were developed, and information collected from enclosures was filled in. The project personnel visited 14 zoological parks across the country and conducted behavioural studies in selected enclosures. Behavioural studies were carried out for 17 species.

A pilot study on evaluating housing and enclosure enrichment practices for lion-tailed macaques in zoos of south India has been initiated, and the first draft of the report is ready for peer review.

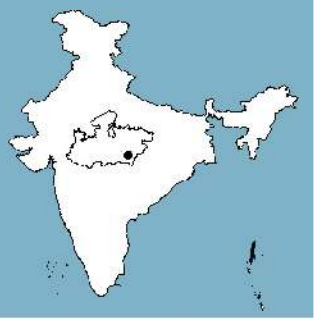
Outputs and Outcomes: Identification of the minimum requirements for housing the identified species in captivity has been completed. An assessment of existing housing and enrichment practices of the identified species in zoos outside India has been undertaken. Enrichment devices relevant to the Indian context have been developed.


Sitendu Goswami

Milestone: Based on the outcomes of the study, minimum standards for suitable housing and enclosure enrichment will be drafted.

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 : June 2014



Objectives: The objectives of the project are to (I) monitor the source population of tigers in Kanha Tiger Reserve and (a) estimate the tiger population within selected areas of the reserve and (b) 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: An effective area of 664 km^2 of Kanha–Kisli–Mukki Block and an area of 150 km^2 in Supkhar Block was camera trapped with an effort of 3,293 and 1,900 camera trap nights. In all, 44 and 13 individual tigers were photo-captured at the 2 sites.

Outputs and Outcomes: The tiger population in Kanha Tiger Reserve was estimated at 61 (SE range 59–64). The tiger density was computed using ½ MMDM to be 7.2 (SE 0.55) in Kanha and 3.2 (SE 0.5) in Supkhar. The tiger population showed an exponential increase with r = 0.21 in Kanha Block and r = 0.11 in Supkhar during 2010–12.

There was a decline in the tiger population and density in 2010. After this the tiger population of Kanha has shown a growth spurt, 21% in Kanha and 11% in the Supkhar area. A total of 12 breeding tigresses having 34 cubs were photo-captured during the sampling. The prey status in Kanha Tiger Reserve was estimated using distance sampling on line transects. A total effort of 900 km was invested in sampling 150 spatial transect replicates and 450 temporal replicates. Amongst the ungulates, the chital had the highest density, 33.2 (SE 4.69) per km^2.

Reintroduction of Cheetah *Acinonyx jubatus* in India

Funding Source : Ministry of Environment & Forests
Investigators : Dr. Y.V. Jhala and Dr. M.K. Ranjitsinh, Chairman, Cheetah Task Force
Researchers : C.M. Bipin, Ridhima Solanki, Anant Pande, Anirudhkumar Vasava and Arti Singh
Date of Initiation : March 2011
Date of Completion : March 2013

Objectives: The project aims to establish free-ranging breeding populations of cheetahs in and around Kuno Wildlife Sanctuary (WLS) and Nauradehi WLS, Madhya Pradesh (MP) and the Shahgarh landscape, Rajasthan. Two or three established populations of cheetah in India are proposed to be managed as a meta-population, with occassional "immigrants" brought in from southern Africa, as and when needed. Within this larger goal, the project will strive to achieve the

following objectives: (i) develop site-specific action plans for reintroduction of the cheetah; (ii) provide adequate security to local flora and fauna and ecosystem processes; (iii) revive and maintain the grassland and scrub forest systems existing in the landscape in the optimal productive state and thereby evolve management techniques and practices for better conservation of these habitats; (iv) build the capacity of the forest departments of MP and Rajasthan in habitat and prey management, especially grasslands, in view of the emerging needs, and in handling cheetahs themselves; (v) build the capacity of the MP and Rajasthan forest departments in mass translocation of herbivores, particularly blackbuck and nilgai, in view of the emerging need for protection of crops and scientific management of wildlife populations; (vi) conserve and enhance the faunal diversity, especially threatened species, such as the chowsingha, the endemic whitebrowed bushchat and the houbara bustard and provide a safe haven in the future for even more endangered species such as the great Indian bustard, lesser florican, gharial and caracal; (vii) generate benefits for the local people through development of wildlife tourism and ancillary activities; and (viii) develop the capacities of local communities to coexist with wild animals, particularly large carnivores.

Progress: Consequent to the decision to start the process of cheetah reintroduction in Kuno WLS and the Shahgarh landscape, a fresh assessment of the status of the prey base, habitat, perception and attitudes of local communities towards wildlife in the proposed areas was carried out. In all, 39 line transects (effort 68 km) and 41 villages (270 interviews) were sampled in and around Kuno WLS (surveyed area 700 km^2). In the Shahgarh landscape (surveyed area 4000 km^2), 40 vehicle transects (effort 648 km) and interviews in 62 settlements were conducted. Additionally, a prey and habitat assessment survey was conducted in Jhalawar Range, Darrah WLS (surveyed area 400 km^2), a potential reintroduction site recommended by the Rajasthan government. In this landscape, 14 vehicle transects (effort 158 km) were sampled.

Outputs and Outcomes: The estimated density of all prey species including livestock in Kuno WLS is 85.91 ± 23/km^2 and that of chital is 35.87 ± 11.7/km^2, whereas in the Shahgarh landscape the estimated density of all prey species including livestock is 40.72 ± 5.26/km^2 and chinkara is 2.71 ± 0.42/km^2. In Jhalawar Range, the estimated density of all prey species including livestock is 26.43 ± 5.81/km^2 and that of wild prey alone is 3.44 ± 1.26/km^2. In Darrah WLS the estimated density of all prey species including livestock is 61.26 ± 11.21/km^2 and that of wild prey is 40.52 ± 7.99/km^2. In the questionnaire regarding interactions with wildlife in Kuno wildlife division, crop depredation was reported by 65% of the respondents, loss of livestock by 9%, trapping/snaring of wildlife by 7% and bush meat consumption by 16%. In the Shahgarh landscape, 51% reported livestock depredation, 14.5% reported trapping of wildlife and 50% reporte bush meat consumption. Jhalawar Range, Darrah WLS was deemed to be unsuitable for a potential reintroduction site due to the lack of an adequate prey base and due to the high level of anthropogenic pressures present. Based on the findings of the survey, action plans for reintroduction of cheetah in Kuno WLS and the Shahgarh landscape were drawn up in collaboration with the state forest department, Cheetah Task Force (CTF), National Tiger Conservation Authority (NTCA), Dr. Laurie Marker of Cheetah Conservation Fund (CCF) and Les Carlisle of &Beyond. The action plans were submitted to the Ministry of Environment & Forests.

Land Use and Land Cover Dynamics and Impact of Human Dimension in Lower Ganga Basin

Funding Source	:	Department of Space, National Remote Sensing Centre
Investigator	:	Dr. Gautam Talukdar
Researcher	:	Indranil Mondal
Date of Initiation	:	March 2010
Date of Completion	:	August 2012

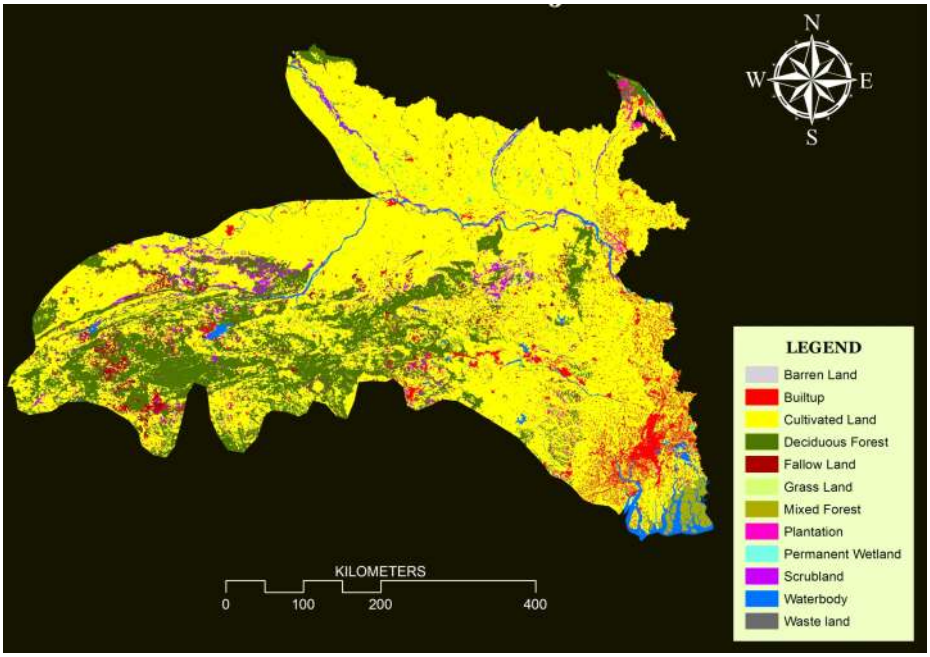
Objectives: The objective of the project are to generate a land use/land cover database with a uniform classification scheme for 1984–85, 1994–95 and 2004–05 using satellite data at a 1:250,000 scale (a) the land use and land cover dynamics; and (b) the impact of the human dimension.

Progress: Satellite data for 1985, 1995 and 2005 were procured from the National Remote Sensing Centre in the form of images. These data were corrected for geometric and radiometric errors. Vector Land-Use Land-Cover (LULC) data were generated and checked for errors for the above years. Data for the drivers of LULC namely climate, soil, elevation and census data, were collected. The analysis has been completed, and report writing is in progress.

Outputs and Outcomes: From 1985 to 2005 the major land transformations were from (a) cultivated land to fallow land and vice versa; (b) cultivated land to water body and vice versa. Other transformations were from (a) cultivated land to built up land, scrubland and permanent wetland; and (b) fallow land to plantation and scrubland.

The socio-economic data show a lot of artefacts that may be an effect of devastating floods that struck every year from 1995 to 2005 in Bihar and parts of Jharkhand. A predictive land use land cover map was drawn up for 2025 using the SAARS model, developed by ISRO. The database compiled in this project can also be used for hydrological, bio-geographical and climate change studies.

Predicted landuse / landcover map for Lower Ganga Basin; Year:2025



Ecology of Lions with Emphasis on the Agro-pastoral Landscapes of Greater Gir Ecosystem

Funding Source	:	Grant-in-Aid
Investigators	:	Dr. Y.V. Jhala and CCF (Wildlife), Junagadh, Gujarat
Researchers	:	Kausik Banerjee and Parabita Basu
Date of Initiation	:	April 2009
Date of Completion	:	March 2014

Objectives: The Asiatic lion is an icon of successful conservation. Its numbers and range have increased from fewer than 50 individuals occupying a few hundred square kilometres to over 400 in more than 9,000 km^2. This research aims to investigate the metapopulation dynamics of lions in the Greater Gir Landscape, with emphasis on lion demography, ranging, food habits and lion–human conflicts.

Progress: Lion abundance was estimated in a closed population mark–recapture framework. In all, 75 individual lions were monitored by radio-telemetry (n = 20) and through whisker profiles (n = 55 adults (91 cubs and 38 litters)) to deduce the vital rates, ranging, habitat use and movement. The food habits of the lion were studied through predations (n = 289), scats (n = 475) and telemetry (5,880 hours of continuous monitoring of radio-collared lions; 23 sessions, range 7–14 days). GIS models (Environmental Niche Factor Analysis and PATHMATRIX) were used to delineate a suitable habitat corridor and identify the optimal pathways used by lions for movement across the human-dominated landscape between the Gir PA and Girnar. Prey abundance in the corridor landscape was studied through distance sampling on systematic line transects (n = 116 km, walk) and vehicle transects (394 km, drive) spread across the landscape. The socio-economy and people's perceptions of lion conservation were studied though a structured questionnaire (n = 222 respondents, 75 villages).

Outputs and Outcomes: Lions increased in numbers with a realized rate of increase (r) of 0.022 (SE 0.001, $\lambda = e^r = 1.0222$) for the past 42 years ($F_{1,7} = 416.3$, $P < 0.001$, $R^2 = 0.98$). The adult (> 2 years) lion density [lions/100km^2, SE] was estimated to be 12 (1.9) in Gir (west), 8 (3) in Gir (central), 15 (0.1) in Gir (east), 6 (0.7) in Girnar and 2 (0.1) in the agro-pastoral eastern landscape. Lions of recruitment age constituted 41%, 43% and 34% of lion sightings in the Gir, Girnar and the eastern landscape, respectively. The average lion group size (including cubs, SE) was 1.98 (0.11) in Gir PA, 3.04 (0.31) in Girnar and 2.85 (0.23) in the eastern landscape. The adult sex ratio (male:female) was 0.63 (0.04 SE), while the cub-to-breeding-lioness ratio was 0.37 (0.1 SE). The average age of first littering by a lioness was 4.39 (SE 0.17) years. The inter-birth interval was 1.37 (0.25 SE) years. The average litter size was 2.39 (0.12 SE). The annual cub survival rate was lower (0.57, SE 0.03) than the juvenile (0.87, SE 0.04) and sub-adult (0.90, SE 0.04) survival rates, the latter being similar. The overall recruitment (survival from young cub to adult stage) was 51% (SE 4%). The overall average annual survival rate of adult lions (> 3 years) was 0.90 (SE 0.12). Human-caused mortality (43%) was significant and is likely to increase in the future as lion densities increase. The demographic parameters of the high-density lion population in Gir are regulated by a high cub mortality and emigration into the sink habitat in the larger landscape. The vital rates of Gir lions did not differ from those of 19 free-ranging African lion populations, and no

evidence was found to suggest that the Asiatic lions' demographic parameters were depressed in comparison with other lion populations.

The Gir–Girnar corridor, identified with the necessary buffer on both sides, cut across 28 villages. Comparison of 1998 Landsat TM classified images with the classification derived from the 2009 Landsat TM data showed that forests have been drastically impacted by conversion to agriculture and settlements in the intervening period. Consequently, the area experienced extensive conversion to urban land cover in the last few decades. The simulated land cover map of 2015 indicated that urban growth might continue to expand further in the future and might have an irreversible impact on land resources unless some conservation policy is enacted.

In the human-dominated corridor landscape, cattle contributed most to the lion prey density and biomass, while wild prey constituted only 3% of the lion prey biomass. A majority (67%) of the respondents opined that lions were rarely a risk to human beings but occasionally killed livestock. Most (72%) of the respondents were in favour of lions continuing to live in their surroundings. The major reason (65%) for the respondents liking lions to live in their surroundings was economic profit (wildlife damage control in the farmlands, tourism, etc.).

Domestic livestock contributed 25–33% of the biomass consumed by lions in the Gir forests. Seventy percent of the lion kills in Girnar were found to be of wild ungulates, while within our study sites of the upper and lower Shetrunji river basins and revenue areas of Amreli and Bhavnagar districts in the human-dominated eastern landscape, domestic livestock were dominant (69%) in the lion kills. However, telemetry data on lion feeding events revealed that despite the lions' use of human-dominated landscapes, their utilization of productive livestock is minimal as the majority of livestock feeding events consisted of scavenging livestock carcasses (63% in Gir, 50% in Girnar and 72% in the human-dominated eastern landscape). This is a mechanism permitting the legendary lion–human coexistence in the Gir landscape.

A broader rural support base has to be generated in the larger human-dominated landscape, where conservation is not a major land-use objective. With the traditional land use pattern in the Gir landscape changing at an alarming rate and with the urban sprawl increasing, the crucial habitats for corridors and refuges for breeding lion nuclei should be delineated and need to be secured. It would not be prudent to declare the Gir–Girnar corridor habitat as a protected area due to the local livelihood dependencies, and the declaration may not be needed since lions are tolerant of traditional land use practices. However, the corridor landscape should be declared as eco-sensitive zone so that there is control and land use changes are managed in a conservation-sensitive manner while resources are invested in restorative management, incentives and mitigation.


Kausik Banerjee

Ecology of Leopard *Panthera pardus* in Relation to Prey Abundance and Land Use Pattern in Kashmir Valley

Funding Source	:	Department of Science and Technology, Govt. of India
Investigators	:	Dr. Bilal Habib and Dr. G.V. Gopi
Researchers	:	Athar Noor and Zaffar Rais Mir
Date of Initiation	:	December 2010
Date of Completion	:	December 2013

Objectives: The objectives of the project are to (I) estimate the density, abundance and distribution of the leopard across different study sites; (ii) estimate the prey density across different sites and develop a relationship between the density of the prey base and leopard abundance; (iii) study variations in food habits across different sites and seasons in Kashmir Valley; and (iv) study the movement patterns, home range size and social organization of leopards across different sites.

Progress: A total of 198 leopard scats were subjected to a preliminary analysis. It was found that 68.7% of the scats contained only a single prey item, while 26.8% contained 2 items. The percent frequency of occurrence of small rodents in the diet of the leopard was the highest (56%), followed by that of the Himalayan grey langur (12.1%). The lowest frequency was that of the hangul (5.2%). The percent relative biomass consumption of the leopard suggests that small rodents contribute the highest (50.66%), followed by the Himalayan grey langur (14.5%) and the hangul (13.8%). The lowest contribution is from domestic sheep (11.8%).

The human-leopard conflict surveys are continuing and out of three wildlife management divisions (north, central and south) of the Kashmir, Central division has been covered. A total of 14 villages, surrounding the Dachigam National Park (NP), have been covered for surveys pertaining to man-animal conflict in the central division. In total 56 known affected families were interviewed for human as well as livestock loss caused by leopard. Only two cases were reported where a four year old girl was killed by leopard and in other a five year old boy was injured. In case of livestock depredation cases (n=54) sheep was attacked the most (32.14%) followed by cattle (19.64%), goat (19.64%), horse (12.5%), dog (10.71%), and donkey (1.78%). Amongst these 54 livestock predation cases leopard attacked the animals in presence of herders in 59.29% occasions and in 40.74% cases herders were not present at the time of attack. Out of 56 conflict cases 80% took place very close to forest patches or within 0-100 m away from forests. Only a small proportion of 16.07% incidents took place 100-500 m away from the forest patches. It was observed that 46.42% conflict cases occurred in afternoon, 26.78% in evening hours, while 14.28% attacks took place during night and only 12.5% occurred in morning hours.

Outputs and Outcomes: The female leopard that was successfully captured and collared with a Vectronics GPS Plus collar is being monitored regularly. The GPS collar is functioning satisfactorily, taking 5–7 GPS fixes each day. The different MCPs (3 to 1) show a gradual increase over 20 day time intervals. MCP 3 is for the first 20 days after the collar was fitted. In the next 20 days the area (MCP 2) increases (total 40 days). MCP 1, which covers a 57 days time period, shows the maximum extent of movement of the collared leopardess. MCP 4 covers the area of most of the activity, encompassing 50% of all the GPS fixes.

Assessment of Banj Oak *Quercus leucotrichophora* Forests in Kedarnath Wildlife Sanctuary, Western Himalaya, with Reference to Invasion by Chir Pine *Pinus roxburghii*

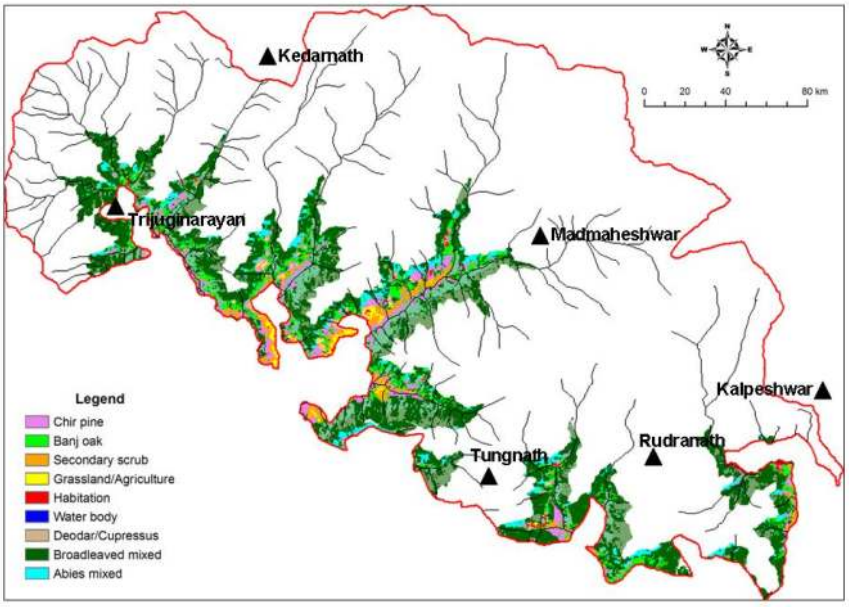
Funding Source	:	Science & Engineering Research Board (SERB), Department of Science & Technology, Gov.t of India
Investigators	:	Dr. Gajendra Singh (SERB, DST Young Scientist)
Date of Initiation	:	October 2010
Date of Completion	:	October 2013

Objectives: The objectives of the project are to (i) assess the spatial extent of banj oak forest and interspersion by bhir pine in Kedarnath Wildlife Sanctuary (WLS); (ii) study the composition of woody vegetation along the oak–pine transition zone; (iii) study the population status of banj oak *Quercus leucotrichophora* along the gradient of human use and altitude; and (iv) analyse possible edaphic and environmental factors that may be responsible for failure of oak regeneration and invasion by the chir pine.

Progress: The intensive study area is spread over ca. 200 km^2 in the southern fringes of Kedarnath WLS between 1,500 and 2,500 m asl. Based on an extensive survey, different banj oak forest patches were selected across various vegetation compositions and anthropogenic pressure gradients. Stratified random transects were laid in each forests patch so as to cover various aspects, slopes and disturbance categories. Features such as being lopped or unlopped and being browsed and grazed by livestock were recorded. Unsupervised classification was performed on the AWIFS data to delineate the final distribution map of banj oak and chir pine forests in the sanctuary.

Outputs and Outcomes: The data analysed so far revealed that banj oak forests in the Kedarnath WLS are found at elevation zones between 1,000 and 2,500 m, where in many places the banj oak is intermixed with the chir pine. The sanctuary has about 1,876 ha under banj oak forests and about 1,824 ha under chir pine forests. Banj oak forests in the sanctuary are mainly distributed in the Mandal-Bandwara, Urgam, Trijuginarayan, Mansoona, Ukhimath and Ransi-Bonsar areas.

The total tree density of banj oak forests in the sanctuary ranged between 74 (Ransi-Bonsar, Gaurikund) and 684 individuals ha^{-1} (Banjani-Gopeshwar). The basal area ranged from 8.96 to 30.18 m^2 ha^{-1}, and the average GBH at all sites ranged from 64 to 85 cm. Banj oak forests close to villages have a high tree density in various areas across the sanctuary. The highest densities of

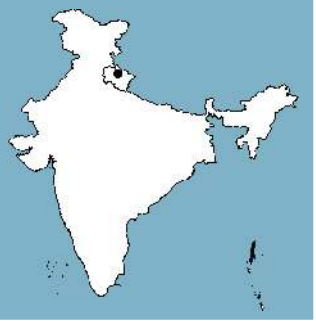


saplings (764 ha^{-1}) were recorded around Urgam areas, and the minimum was around the Rampur-Maikhanda area (159 ha^{-1}). The maximum and minimum seedling densities of banj oak in Kedarnath WLS are recorded in the Ukhimath (1,656 ha^{-1}) and Rampur-Maikhand (63 ha^{-1}) areas, respectively. Owing to excessive biotic disturbances in some areas, stunted banj oak saplings in the form of scrub were also recorded.

The understorey of banj oak forests in Kedarnath WLS is dominated by *Randia tetrasperma, Sinarundinaria falcata, Pyracantha crenulata, Sarcococca saligna* and *Berberis lycium.* The mean shrub density ranges between 101 and 2,229 individuals ha^{-1}, with a high contribution from *Randia tetrasperma,* the maximum shrub richness being recorded in the Mandal-Bandwar (richness 19, diversity 2.25) forests, followed by Urgam (richness 11, diversity 1.89) and Gaurikund (Richness 9, Diversity 1.75). In some moist banj oak forests, *e.g.,* Rampur-Maikhanda (45%) and Mandal-Bandwara (25%), the ground cover is shared by a recent invader, *Eupatorium adenophorum,* along the sides of roads and along fodder-colleting trails.

An Assessment of the Entomofauna for Management and Conservation of Biodiversity in the Gangotri Landscape

Funding Source	:	Grant-in-Aid
Investigator	:	Dr. V.P. Uniyal
Researchers	:	Manish Bhardwaj and Abesh Kumar Sanyal
Date of Initiation	:	January 2008
Date of Completion	:	January 2013



Objectives: The objectives of the project are to: (I) assess the ecological diversity and distribution pattern of beetles (*Coleoptera*) and butterflies (*Lepidoptera*) in the Gangotri Landscape; (ii) determine the status of beetles (*Coleoptera*) as pests in different forest types in the landscape; (iii) determine the impact of anthropogenic pressures on assemblages of butterflies and beetles; and (iv) develop and suggest long-term management strategies for conservation of invertebrate diversity in the landscape.

Progress: Four watersheds, namely Keadarkanta, Istragad, Jakhol and Har-ki-Dun, representing western Himalayan habitats, were sampled for butterflies (*Rhopalocera*), moths (*Heterocera*) and beetles (*Coleoptera*) in Govind National Park and Govind Wildlife Sanctuary during 2011–12. Sampling was conducted at 26 major sites in each 100 m elevation zone from 1,200 to 3,500 m asl, along 2 disturbance gradients. A total of 57 plots for butterflies and 86 plots for moths and beetles were laid and monitored across 3 seasons. Topographic, climatic, vegetation and disturbance parameters were quantified on the same plots to identify the possible environmental correlates of insect diversity in the landscape.

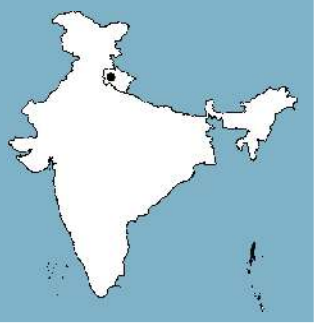

Manish Bhardwaj

Milestone: The study provides the first comprehensive account of *Lepidoptera* and *Coleoptera* from 3 protected areas in the Gangotri Landscape. A total of 34 new species of moth and 12 new species of beetle were documented for the first time from Uttarakhand. A nocturnal insect trapping protocol has been developed for sampling moths in remote and rugged high-altitude terrains, which can be followed for sampling other nocturnal insects in similar areas having poor transportation facilities. A set of forest-specific indicator species has been identified and tested for monitoring forest health quality. Butterflies were effectively tested as indicator taxa for identifying areas important for conservation of insect fauna and for long-term monitoring of insect diversity in the Gangotri Landscape.

Outputs and Outcomes: A total of 912 morpho-species falling in 2 major insect orders were collected from the study area. A total of 315 species were identified up to the species level, including 121 species of butterfly, 174 species of moth and 120 species of beetle. Elevation and temperature were observed to be the most influential factors controlling the species richness of Lepidoptera. The species richness was observed to decrease with elevation, showing bimodal peaks between 1,200–1,800 m and 2,300–2,500 m asl (r = -0.81, $P < 0.01$) for butterflies and between 1,800 and 2,200 m asl, (r = -0.83, $P < 0.01$) for moths. The highest species richness and diversity were recorded in mixed riparian forest and broadleaf forest for all taxa. The plant species richness (r = 0.81, $P < 0.01$) was highly and significantly positively correlated with butterfly species richness (r = 0.87, $P < 0.01$) and moth diversity (r = 0.48, $P < 0.0001$). The study found a significant positive cross-taxon correlation between butterfly, moth and beetle species across sites, suggesting that butterflies can be used as surrogate indicator taxa for monitoring insect diversity. The study highlighted the areas (Istragad and Jakhol) that held the most insect conservation value in the landscape. The findings support the 'water-energy' hypothesis of species richness gradients, which states that temperature limits the number of species at higher elevations and rainfall determines the species richness at warm lower elevations.

Study of Impacts of Biotic Disturbances on Forest Bird Communities in Selected Areas of Uttar Pradesh and Uttarakhand

Funding Source	:	Grant-in-Aid
Investigators	:	Dr. Dhananjai Mohan and Shri Pratap Singh
Researcher	:	Monika Kaushik
Date of Initiation	:	May 2009
Date of Completion	:	July 2012



Objectives: Minor extractive disturbances such as lopping, grazing, firewood collection, fires and biological invasions are the most widespread pressures on forests in developing countries. Although biodiversity is facing serious threats due to such activities in most protected areas in India, little work has been done to understand the impact of such disturbances on the flora and fauna. Considering the need to decipher the role of these small and gradual disturbances on the faunal components of the forest, the present study was formulated with the following objectives: (i) to study the influence of biotic disturbances on the avifauna of the western Himalayan foothills tract; (ii) to identify indicator birds for various disturbance regimes; and (iii) to develop a simple bird habitat monitoring protocol based on the above findings.

Progress: To find out the relationship between habitat disturbance and birds, sampling plots were located and marked across a disturbance gradient in 3 dominant vegetation types, namely dry sal in the southern part of Rajaji National Park (RNP), moist sal in the northern part of RNP and Dehradun Forest Division and *Anogeissus latifolia* tracts on the hilly slopes of RNP. During the reporting period, 12 more new plots were laid, making 4 in each vegetation type. The field data collection was completed in June 2011, and analysis of the data is under way.

Outputs and Outcomes: The species accumulation curves for all 3 forest strata showed that the sampling effort is sufficient as the number of sampling plots versus number of bird species is asymptotic. The results of the Principal Component Analysis (PCA) showed that grazing pressure is a major disturbance factor in all 3 forest strata. In mixed hill forest strata, regression between the habitat variable and PC1 showed a linear relationship. Additionally, the average basal area, canopy cover and average GBH decreased linearly with increase in disturbance level. However, the tree density increased with increase in disturbance level. The response of the vegetation structure to the disturbance gradient in dry and moist deciduous sal forest seems to support the intermediate disturbance hypothesis. The segregation of sites obtained using PCA and cluster analysis corresponds closely with that made *a priori* by the investigators. DISTANCE analysis shows that the density of birds is higher in the dry sal forest.

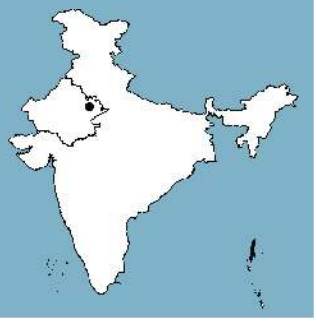
Response of bird community to disturbance variables: In dry forest, bird richness decreased with increasing timber extraction during the breeding season, but during the non-breeding season it was influenced negatively by grazing but influenced positively by firewood collection. Increased lopping and fire presence during the breeding season led to a decrease in bird richness in the hill forest. In moist forest, lopping significantly influenced bird richness positively during both the breeding season and the non-breeding season. During the breeding season, firewood collection and timber extraction significantly reduced the bird richness in moist forest. During both the breeding and non-breeding seasons, bird densities were highest in the hill forest. Across all forest types, bird densities were high during the breeding season compared with the non-breeding season. However, a few plots in dry (Sukh) and hill (Kharasot and Sukh) forests exhibited higher densities during the non-breeding season.

Disturbance and lantana presence and abundance: Timber extraction is the disturbance factor responsible for the presence of lantana in both dry and hill forests. Further generalized linear modeling with a data set after removing data points without lantana found that lantana abundance in dry and hill forest was related to disturbance; however, none of the explanatory variables was found to be significant in moist forest. In dry forest, lantana abundance was found to be influenced negatively by timber extraction and firewood collection but positively influenced by grazing. In hill forest, only lopping pressure was selected in the best fit model, and the relationship was positive.


Monika Kaushik

Ecology of Leopard in Sariska Tiger Reserve, Rajasthan

Funding Source	:	Grant-in-Aid
Investigators	:	Dr. K. Sankar, Shri Qamar Qureshi and Dr. Y.V. Jhala
Researchers	:	Krishnendu Mondal and Pooja Chourasia
Date of Initiation	:	September 2007
Date of Completion	:	March 2013



Objectives: The objectives of the project are to (I) understand the factors influencing the ranging pattern and home range of the leopard; (ii) collect information on prey selection and habitat use by the leopard; (iii) collect information on the population structure, survivorship and dispersal pattern of the leopard; and (iv) develop a conservation action plan for the leopard in semi arid landscapes.

Progress: Two radio-collared leopards were monitored between March 2009 and August 2010. Third order resource selection (resource selection of an individual leopard within its home range) of radio-collared leopards was analysed through the generalized linear mixed effect model (GLMM) during the reporting period. In all, 32 line transects were walked thrice in summer and winter in the study area to estimate the prey availability, prey selection and food habits of leopard. The total length of the transects was 58 km, and the total effort was 195 km walk. To study the food habits, 110 leopard scats were collected, washed and analysed to identify the prey remains. A total of 124 kills of leopards were recorded.

To estimate the population and density of leopards in the study area, photographic capture–recapture techniques were used. Every 2 nights were considered as a single occasion, resulting in 51 occasions and a total effort of 4,080 trap nights in 2011. 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 and Outcomes: The habitat variables (excluding *Boswellia*-dominated forest) and wild prey species (excluding peafowl and sambar) indicated that it was top ranked habitat used by two collard leopards, based on lowest Akaike Information Criterion (AIC). *Zizyphus* mixed forest influenced most positively amongst the habitat variables, explaining the radio-collared leopard's resource, use followed by *Acacia* mixed forest. *Anogeissus* dominated forest and scrubland had negative influences in explaining the leopard's resource use in the study area. These 2 leopards significantly used more habitats with higher encounter rates of nilgai and wild pig and used fewer habitats with higher encounter rates of chital and common langur.

The abundance of prey species was estimated from line transects using the program DISTANCE 5. The selected model for summer was half normal with cosine adjustment 2 (P = 0.17579, chi-square = 3.4769 and degrees of freedom = 2) and for winter it was half normal with cosine adjustment 2, 3 (P = 0.75511, chi-square = 0.0973 and degrees of freedom = 1). The total number of walks was calculated to be 96, with a total effort of 195 km walk in each season in the study period. In summer,

the peafowl was found to be the most abundant (108.34/km^2) prey species in the study area, followed by brahminy cattle (50.29/km^2), common langur (24.55/km^2), nilgai (20.92/km^2) chital (18.98/km^2), sambar (16.79/km^2), wild pig (7.84/km^2) and hare (4.55/km^2). In winter, the peafowl was found to be the most abundant (108.71/ km^2) prey species, followed by the nilgai (40.13/km^2), langur (30.61/km^2), chital (24.76/km^2), goat (20.01/km^2), brahminy cattle cow (13.60/km^2), wild pig (8.7/km^2) and hare (1.08/km^2).

Ten prey species were identified in 110 leopard scats. A total of 42 leopard photos were captured of 14 identified individuals (January 2011 to June 2011). DENSITY 4.4 selected the heterogeneity (Mh) estimator as the appropriate model. The estimated population of leopards was 16.9 with SE 3.4. The estimated density of leopards was 6.0/100 km^2 with SE 0.5 in MCP with the ½ MMDM model, while it was 6.5/100 km^2 with SE 1.8 in the inverse prediction model. In winter (2011–12), 86 leopard photos were captured of 20 identified individuals. The estimated population of leopards in winter (2011–12) in the study area was 21.2 with SE 4.5. The density of leopards was estimated as 8.71/100 km^2 with SE 1.2 using the MCP and ½ MMDM model.

Monitoring of Re-introduced Gaur *Bos 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	:	January 2014

Objectives: The objectives of the project are to (I) understand the ranging pattern and home ranges of the reintroduced gaur in Bandhavgarh; (ii) collect information on the habitat use; and (iii) understand the food habits of the gaur.

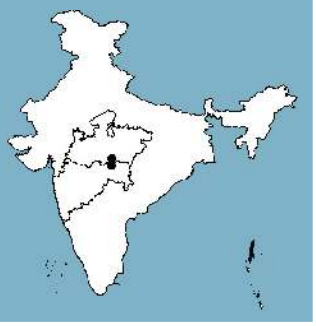
Progress: In January 2011, 19 gaurs (14 females, 5 males) were captured from Kanha Tiger Reserve (KTR) (from 2 different herds) and translocated to Bandhavgarh Tiger Reserve (BTR). Of these, 12 individuals were fitted with radio-collars. The radio-collared gaur were monitored in BTR periodically through ground tracking using the “homing in” and “triangulation” techniques. The minimum convex polygon (MCP) technique was used for home-range calculation. To understand the habitat use, habitat variables such as terrain, broad vegetation type and distance to nearest water body, road and human settlement were recorded at each radio-collared location. Food plants eaten by gaur were recorded based on opportunistic sightings. A total of 220 dung samples were collected during the study period. During March 2012, 31 gaurs (22 females and 9 males) were translocated to BTR from KTR. Of these, 15 were radio-collared.

Outputs and Outcomes: A total of 4,415 locations of gaur were recorded using a hand-held global positioning system (GPS). These positions were later transferred into the Bandhavgarh beat map, which was required for home range estimation. It

B. Navaneethan

was observed that the reintroduced gaur had utilized an area of 268.7 km^2. The annual home ranges of the males and females during the study period were 254.4 km^2 and 200.4 km^2. The summer (April–June 2011) home ranges of males (n = 864) and females (n = 1168) were 231.5 km^2 and 161.2 km^2, respectively. During the monsoon and in the post-Monsoon season (July–October 2011), the estimated home ranges of males (n = 851) and females (n = 834) were 110.6 km^2 and 135.7 km^2, respectively. In winter (November 2011 to February 2012), the estimated home ranges of males (n = 248) and females (n = 450) were 98.5 km^2 and 152.5 km^2, respectively. The observed large home range of gaur in the summer of 2011 was attributed to an initial exploration of areas. A total of 68 plant species were eaten by the gaur.

Ecology of Tigers *Panthera tigris* in Pench Tiger Reserve, Madhya Pradesh and Maharashtra



Funding Source	:	Grant-in-Aid
Investigators	:	Dr. K. Sankar, Dr. Y.V. Jhala and Shri Qamar Qureshi, WII, and Dr. Rajesh Gopal, National Tiger Conservation Authority
Researcher	:	Aniruddha Majumder
Date of Initiation	:	October 2005
Date of Completion	:	March 2013

Objectives: The objectives of the project are to (I) collect information on the ranging, movement and dispersal patterns of tigers; (ii) study habitat use by tigers; (iii) gather information on the food habits of the tiger; (iv) assess the populations of prey species; and (v) prepare a habitat suitability map for the tiger and its prey and suggest recommendations for effective management of the tiger population in Pench Tiger Reserve and adjoining areas.

Progress: Three tigers were radio-collared, 1 adult female (AF), 1 adult male (AM) and 1 sub-adult male (SAM), and monitored between March 2008 and December 2011. The AF was radio-collared on 9 January 2010 and monitored during the reporting year. The 95% minimum convex polygon (MCP) home range of tigers was estimated using Arc GIS 9.3. The AF raised 5 cubs (4 females and 1 male). The ranging patterns and food habits of the AF were studied. To estimate the population and survival rate of tigers in the study area, the photographic capture–recapture (mark–Recapture) technique was used. A total of 81 pairs of camera traps were deployed in a systematic 2 × 2 km^2 sampling grid covering an area of 410 km^2 between April and June 2011. Pollock's robust design was used to estimate the survival rate of tigers. MARK ver. 6 was used for

Aniruddha Majumder

data analysis. Ninety-two line transects were laid between January and March 2012, in the 46 beats of Pench Tiger Reserve, *i.e.* 2 transects in each beat, to assess the availability of prey for tigers.

Outputs and Outcomes: A total of 130 locations of the AF were collected before the radio-collar ceased functioning, in December 2012. The estimated home range of the AF was 23 km² during the reporting period. A total of 39 kills were recorded. Of these, 27 were chital, 7 sambar, 3 wild pig and 2 nilgai. The effort of 45 trap days from 81 traps stations in 3,645 trap nights yielded 84 photographs of 22 individual tigers (7 males and 15 females). The estimated overall tiger population under the best fitted M (h) jackknife model was 22 ± 0.4. The male population was 7 ± 0.3, and the female population was 15 ± 0.7. According to the best fitted model, the estimated overall survival rate of tigers was 0.64 ± 0.06. The survival rate of male tigers was 0.54 ± 0.12 and that of female tigers was 0.67 ± 0.08. The estimated adult sex ratio (female:male) of tigers during this period was 100:47 (n = 22).

Monitoring Reintroduced Tigers in Sariska, Rajasthan

Funding Source	:	National Tiger Conservation Authority
Investigator	:	Dr. K. Sankar
Researcher	:	Subhadeep Bhattacharjee
Date of Initiation	:	February 2009
Date of Completion	:	March 2013

Objectives: The objectives of the project are to (I) collect information on the ranging, movement, home ranges and dispersal patterns of the reintroduced tigers; (ii) collect information on the use of the habitat by the reintroduced tigers; (iii) gather information on the food habits of the reintroduced tigers; (iv) assess the population of the prey species; (v) prepare a habitat suitability map for the tiger and its prey species; (vi) study the effects of anthropogenic pressures on the distribution of the tigers; (vii) evaluate the response of the tigers and their prey species with respect to the removal of anthropogenic influences of the relocated villages; and (viii) suggest management recommendations for effective conservation of tigers in the tiger reserve.

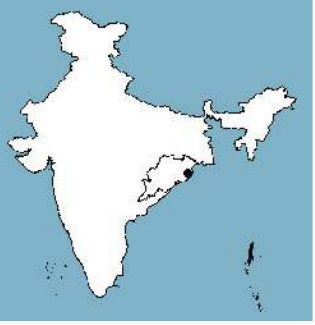
Progress: Five reintroduced tigers (2 males (ST4 and ST6) and 3 females (ST2, ST3 and ST5)) were monitored periodically through ground tracking using the `homing in' and 'triangulation' techniques as well as pugmark tracking during the reporting period. The minimum convex polygon (MCP) technique was used for home range estimation. The prey species abundance in the study area was estimated using the line transect method under the distance sampling technique. A total of 52 line transects, varying in length from 1.6 km to 2 km, were laid over a 500 km² area in tiger-occupied landscapes. Three to 9 replicates were walked on these transects in summer (March–June 2011), during the monsoon (July–October 2011) and in winter (November 2011–February 2012). The total effort on the line transect was 588 km. On each sighting of potential prey species on line transects, the total number of individuals, animal bearing and angular sighting distance were recorded. DISTANCE 6.0 was used to estimate the density of prey species. Tree layer, shrub layer, ground cover, canopy cover, weed abundance, pellet abundance and anthropogenic pressure (wood cutting/lopping) were quantified

along the line transects at every 200 m sampling point. Tiger scats were collected systematically by sampling the forest trails and trek paths and opportunistically from all over Sariska during the study period. A total of 193 tiger scats were collected during the reporting period to study the food habits. Micro-histological structures of hairs were used to identify the prey species in tiger scats. One hundred tiger kills were collected during the reporting period. A total of 1,011, 1,362, 1,238, 1,135 and 1,377 radio locations were recorded respectively for tigers ST2 to ST6 using a hand-held global positioning system (GPS). These positions were later transferred to the Sariska beat map. They are required for home range estimation. Out of the 28 villages situated inside the tiger reserve, 20 villages were surveyed, and 820 plots were laid on 80 radial line transects (4 radial line transects around each village). Vegetation and habitat parameters, along with quantitative assessment of the human disturbance, were recorded from all these plots.

Outputs and Outcomes: The annual home ranges were estimated respectively as 122.4, 137.4, 218.6, 117.4 and 159.0 km^2 for tigers ST2 to ST6. The present monthly occupied areas of these 5 tigers (ST2 to ST6) were estimated respectively as 40, 75, 110, 60 and 80 km^2. In the summer of 2011 the seasonal home ranges were estimated respectively as 63.7, 106.7, 135.0, 88.2 and 88.7 km^2 for ST2 to ST6. The individual prey densities and mean group size were estimated for all prey species. The half normal key function with cosine adjustment (2, 3) was the best fitted model for estimating the densities of all prey species. This model was selected on the basis of the lowest Akaike information criteria (AIC). The density of peafowl was found to be the highest amongst all the prey species. The estimated encounter rate of peafowl was the highest (1.35 ± 0.001 km^{-1}), followed by those of nilgai (0.44 ± 0.003 km^{-1}), livestock (0.35 ± 0.01 km^{-1}), sambar (0.27 ± 0.01 km^{-1}), chital (0.21 ± 0.02 km^{-1}), common langur (0.11 ± 0.02 km^{-1}) and wild pig (0.09 ± 0.04 km^{-1}). Tiger scat analysis revealed that sambar was the most utilized prey (40.80%) followed by livestock (33.70%), chital (12.90%), nilgai (11.70%) and wild pig (0.80%). The common langur prey remains was least in occurrence in tiger scats. Prey preference by tigers was in the following order: sambar> chital> wild pig> common langur > livestock>nilgai. Livestock was found highest in tiger kills (52%) followed by sambar (29%), chital (11 %), nilgai (6%) and wild pig (2%).

Pooja Chourasia

Determining the Offshore Distribution and Migration Pattern of Olive Ridley Sea Turtles *Lepidochelys olivacea* along the East Coast of India



Funding Source	:	Director General of Hydrocarbons
Investigators	:	Shri B.C. Choudhury, Dr. K. Sivakumar (WII) and Dr. C.S. Kar (Forest Department, Orissa)
Researchers	:	Subrata Kumar Behera, Satya Ranjan Behera and Sajan John
Date of Initiation	:	October 2006
Date of Completion	:	May 2012

Objectives: The objectives of the project are to (i) estimate abundance and spatial distribution of adult and mating turtles off the mass nesting sites in Orissa to determine their critical marine habitat requirements during the breeding season; (ii) study the movement of satellite-tagged turtles in the coastal waters along the east coast of India in the Bay of Bengal and beyond; (iii) track the long-range migratory route of the adult olive Ridley and to determine the non-breeding area of the Ridleys using the east coast of India for nesting; and (iv) determine various other environmental parameters and possible impacts of developmental activities both in the marine and coastal nesting habitats.

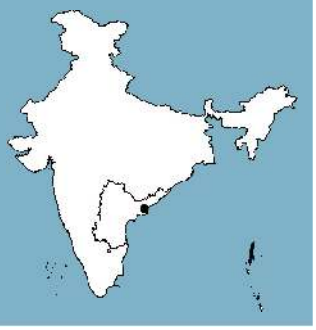
Progress: During this extended period of the project, a stakeholders workshop was conducted on 20 July 2011, and a draft of the final report was formally handed over to the Orissa Forest Department and the DGH. Comments from the DGH and the office of the Chief Wildlife Warden, Orissa, were received, and they were incorporated in the final report.

A consultant with considerable experience in marine turtle research and management has been hired, and the first draft of 'Best Practice Guideline for the Hydrocarbon Exploration Activities Including Mitigation Measures' has been received. It is proposed to organize a consultative meeting of the DGH representatives, oil operators, MoEF officials and other invitees to make a presentation of the guideline *vis-à-vis* some of the existing guidelines of other countries so that a consensus document can originate from this consultation.

Outputs and Outcomes: The researchers of the project continued monitoring the beach profile and the status of erosion and loss of arribada sites. Satellite images of 3 nesting beaches were procured, and a time series physical map of the Aribada sites and the changes that have occurred is being prepared. The researchers also monitored the adjoining seashore to see if the arribada locations are going to change in the future, especially on the Rushikulya nesting beach as the Rushikulya River has changed its course and the river mouth is now flowing through the Rushikulya nesting beach. An area of special attention is the seashore along Chilika lake, north of the mouth of the Rushikulya River up to the new mouth of Chilika.

The benthic biota monitoring study that has been taken up in collaboration with IISER, Kolkata, has progressed satisfactorily, and IISER has provided an interim report. The National Institute of Ocean Technology (NIOT), Chennai, has been contacted to have a feasibility study carried out for creation of an artificial nesting beach and for prevention of erosion. In this regard, several discussions were held. It was found that invasive technology is available to prevent beach erosion. However, the erosion is dependent on anthropogenic, stochastic or other impacts. Two scientists of NIOT participated in the stakeholders' workshop at Bhubaneswar and have planned to visit the Gahirmatha turtle rookery, where the erosion problem is greatest.

Research Strategies for Conservation of Coastal and Marine Biodiversity in the East Godavari River Estuarine Ecosystem, India



Funding Source	:	UNDP–GEF Marine Programme
Investigator	:	Dr. K. Sivakumar
Researcher	:	Gitanjali Katlam
Date of Initiation	:	January 2012
Date of Completion	:	October 2012

Objectives: Identification and prioritisation of research gaps in conservation of coastal and marine biodiversity in the East Godavari River Estuarine Ecosystem (EGREE), India, are the main objectives of the project.

Progress: The East Godavari River Estuarine Ecosystem constitutes the second largest area of mangroves along the east coast of India. It has a rich biodiversity, and a part of the EGREE area is gazetted as Coringa Wildlife Sanctuary (CWLS). It provides significant ecological and economic benefits and livelihood services to its local community. Noticeable, rapid economic changes and an emergence of large-scale production activities have been seen during the last few decades in the EGREE. Moreover, people are dependent on mangroves for their livelihoods. Their activities are resulting in degradation of the overall ecological integrity of the EGREE, particularly the mangrove ecosystems, with associated impacts on the livelihoods of the local people. Therefore, intensive conservation and management strategies are needed to protect the marine ecosystem. In this connection, this study is being conducted to identify and prioritize the research gaps in coastal and marine conservation in the EGREE so that better conservation and management strategies can be prepared.

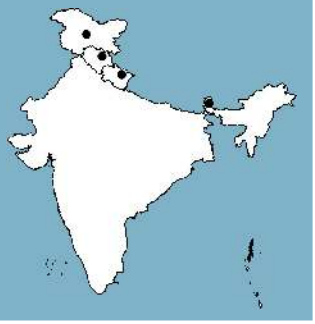
Outputs and Outcomes: An in-depth literature survey of about 700 research publications published between 1871 and 2012 from this region was carried out. Further, Wildlife Institute of India, in collaboration with UNDP-GEF Marine Programme, the Government of Andhra Pradesh and the Ministry of Environment & Forests, Government of India, organized a stakeholders' workshop to discuss the importance of research in conservation of coastal and marine biodiversity in the EGREE and its surrounding regions for their survival as well as for the welfare of the people, who also depend on the ecological services of EGREE for their livelihoods. The stakeholders' workshop identified and prioritized 58 research programmes that are aimed at mainstreaming biodiversity conservation in the production sectors of EGREE through cross-sectoral planning, an enhanced capacity of sector institutions for implementing biodiversity-friendly sector plans, improved community livelihoods and sustainable natural resource use.

K. Sivakumar

INITIATED PROJECTS

Ecology and Conservation of Himalayan Wolf (Phase-II)

Funding Source	:	Grant-in-Aid
Investigators	:	Dr. Bilal Habib and Dr. Y.V. Jhala
Researchers	:	Shivam Shrotriya and Salvador Lyngdoh
Date of Initiation	:	February 2012
Date of Completion	:	February 2017



Objectives: The 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 Himalayan Wolf in different areas and the extent of their dependence on domestic livestock and wild prey populations.; (iii) estimate the home-range/territory sizes of selected Himalayan wolf packs and their relation to major prey biomass; (iv) estimate the critical Himalayan wolf habitat needs especially for denning and rendezvous sites; (v) identify major factors of 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.

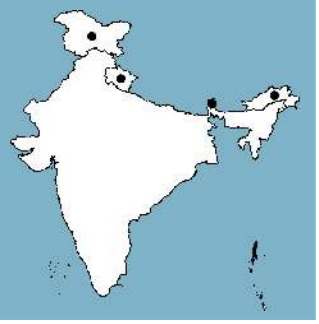
Progress: Phase-II of the project has been initiated. Based on the information obtained in Phase–I, the socio-economic survey of the status and distribution of the Himalayan wolf in the western Himalayan region, potential areas were mapped and identified. Ground surveys were conducted on selected locations for collection of scats and records of indirect signs and identification of existing trails. Kibber Wildlife Sanctuary (WLS) (Himachal Pradesh); Changthang WLS, Nubra-Syok WLS and Thajwas-Baltal WLS (Jammu and Kashmir); Askot WLS and Nanda Devi Biosphere Reserve (Uttarakhand); and Tso Lhamo plateau (Sikkim) are the areas identified for intensive field surveys.

Outputs and outcomes: Kibber WLS sanctuary extensively tracked. An area of approximately 80 km^2 was covered for wildlife signs and encounters. Nearly 140 scats of wolf, snow leopard and red fox were collected, and these are being processed for dietary analysis. Conclusive signs of wolf presence were found in Spiti Valley.

Bilal Habib

Valuation of Rangelands: Livestock Production Function of the Rangelands of the Indian Hindu Kush Himalaya

Funding Source	:	International Centre for Integrated Mountain Development (ICIMOD)
Investigators	:	Dr. Ruchi Badola and Dr. S.A. Hussain
Researcher	:	Shivani Barthwal
Date of Initiation	:	June 2011
Date of Completion	:	July 2012



Objectives: The objectives of the project are to (I) collect data on livestock production and its trends over the years in the Indian Hindu Kush Himalaya (HKH); (ii) analyse the market and non-market (productive and consumptive use) values of livestock production; and (iii) assess the contribution of livestock production to the local revenue and household economy.

Progress: Data on livestock production and its trends over the years were collected from the 10 administrative blocks of the Indian Himalayan states of Jammu & Kashmir, Uttarakhand, Sikkim and Arunachal Pradesh that represent the Indian Hindu Kush Himalaya. The data were analysed, and the final report was prepared.

Outputs and Outcomes: A total of 487 households were interviewed to obtain the livestock production function for the Indian HKH. Changpas, Tibetan Refugees, Ladakhi and Balti were the main ethnic communities in Ladakh, Jammu & Kashmir. The respondents of Joshimath Block, Uttarakhand, were either Garhwali or Tolcha-Bhotia. In Sikkim, the majority of the respondents were Lachenpa, Drokpa-Bhutia, Lepcha Drokpa-Bhutia, Tamang, Nepalis and others. Most of the households interviewed were sedentary/agropastoralists (60.5%), followed by nomadic ones (29.6%) and those indulging in transhumance (9.9%).

In Chungthang Block of Sikkim, 98% of the respondents have open access to the rangelands followed. In Pakke Kesang Block of Arunachal Pradesh the corresponding value is 90%. The per-family ownership was highest for adult goat (27.52), followed by adult sheep. The value of the camel was found to be the highest (US$518.52), followed by the values of the horse, yak, mule and cattle. The value was least for chicken and ducks. The

Table: Representation of the sample population within the study sites

State	District	Blocks	Number of villages	Respondents	
				N	Percentage
Jammu & Kashmir	Leh	Leh	6	21	4.31
		Kharu	3	16	3.28
		Diskit	10	23	4.72
		Durbuk	8	44	9.03
		Nyoma	17	115	23.61
Uttarakhand	Chamoli	Joshimath	2	65	13.35
Sikkim	North Sikkim	Chungthang	3	57	11.70
		Mangan	6	41	8.42
Arunachal	Eastern Kemang	Pakke Kesang	7	49	10.06
Pradesh	Lower Subansiri	Lower Subansiri	6	56	11.49
Total	5	10	68	487	100

livestock holding has undergone changes all across the region, with the per-family holding of livestock showing a decreasing trend.

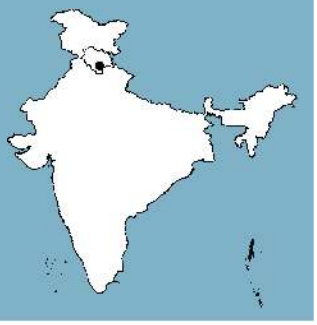
The number of cattle owned by each family has decreased in the last 10 years in all the states of the Indian HKH except Sikkim. The annual average milk production from cows was found to be greatest in Joshimath (1,103 litres) (Uttarakhand). Milk production by yaks was found to be greatest in Chungthang (1,539 litres). The annual average milk production goats in Nyoma from was 1,019 litres, followed by Durbuk, where it was 599 litres. A total of 63 families sold milk, 44 families sold ghee, 49 families sold dried cheese, 29 families sold butter, and only 32 families sold meat. The 63 families across the Indian HKH, on average sold about 745.92 litres of milk in the past 12 months, with the families in Mangan selling the highest, 137 litres per family, followed by Joshimath and Diskit. The price of milk per litre was highest in Joshimath. On average, each family in the 3 blocks of the 9 sample sites sold 7.2 kg of ghee (clarified butter), with the most ghee/family being sold in Chungthang, followed by Mangan and Joshimath. The ghee price was highest in Chungthang of Sikkim. Butter was reported to be sold only in Diskit and Nyoma of Jammu & Kashmir and Chungthang of Sikkim. The average amount of meat sold was highest in Arunachal Pradesh, and the lowest value was reported from Joshimath. The price of meat varied slightly, from US$4.38/kg to US$6.67/kg.

Carpets and shawls were the only value added livestock products reported to be made and sold across Durbuk, Nyoma, Joshimath, Lower Subansiri and Pakke Kesang blocks. In Joshimath, women from the 83% of the households making the carpets are responsible for the sale of carpets, whereas in Lower Subansiri, 80% percent of the males are responsible for the sale of carpets.

The average area of irrigated cropland was 0.54 ha, and that of rain-fed cropland was 0.42 ha. The unit of measurement for land in Ladakh was the *kanal* (1 ha = 19.768 kanals), and it was the *nali* in Joshimath (1 ha = 49.8 nalis). 93.6% of the respondents owned at least 1 house. Fifty-three percent of the respondents owned a television, and 48.3% of the people owned a mobile phone. Crop production across the Indian HKH region varied to a great extent. Potato was found to be grown at all the sample sites. Wheat was found to be grown across the sample sites, except in Arunachal Pradesh, where the staple crop was rice. At higher altitudes, wheat was replaced by barley. All the households (except the nomadic households) were found to be growing some vegetables for subsistence.

The mean area under potato cultivation was the highest, followed by the area under rice cultivation. The mean production and mean sales in kilograms were highest for potato too, followed by wheat and rice in production and sale, respectively. Potato was grown by 175 families, and 101 of them sold the surplus at a mean rate of US$0.86/kg. Highland barley was grown across the Ladakh region and in Joshimath, with 75 families in all cultivating this crop. Barley was reported to be sold only in Joshimath, whereas in the Ladakh region, the crop produce is still used in barter for other goods from fellow villagers or neighbours. Rajma is grown only in Joshimath, with 26 families cultivating it. Large cardamom and ginger are grown in Mangan only, with 14 and 18 families, respectively, cultivating these crops. Chilly is grown on a commercial scale in Arunachal only. Tomato was grown at a commercial level by 13 families in Sikkim and Arunachal Pradesh, of which 7 sold surplus tomatoes at a rate of US$0.31/kg.

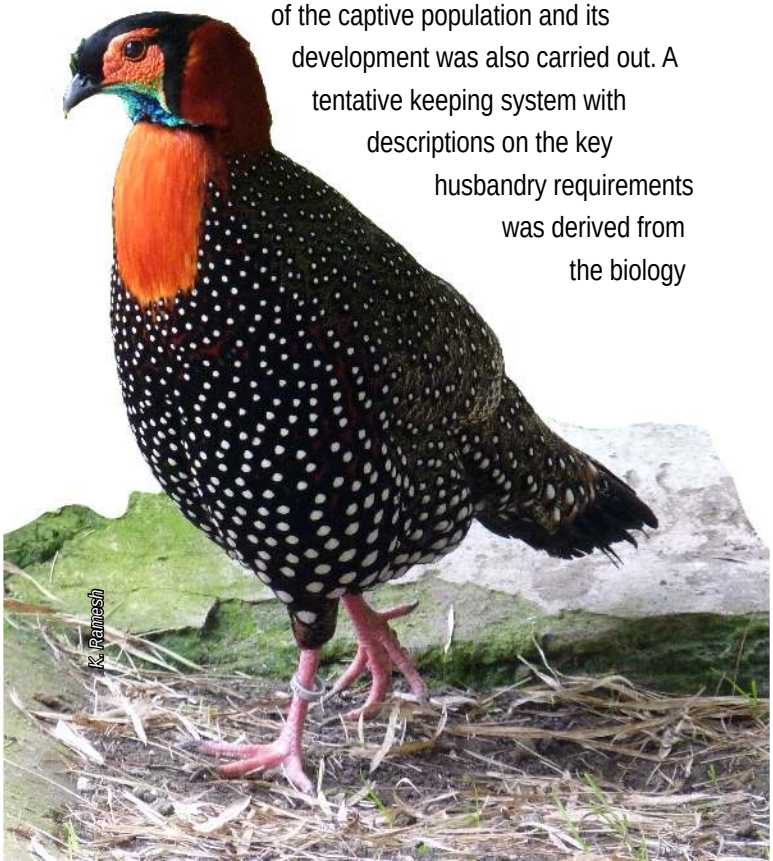
Reproductive Biology and Behaviour of Captive and Wild Populations of Western Tragopan in Himachal Pradesh



Funding Source	:	Himachal Pradesh Forest Department
Investigators	:	Dr. K. Ramesh and Dr. Parag Nigam
Researchers	:	R. Lakshminarasimha and Samhita Bose
Date of Initiation	:	June 2011
Date of Completion	:	May 2014

Objectives: The objectives of the project are to (I) maintain a studbook with information on genetic and demographic parameters; (ii) record breeding chronology and growth pattern; (iii) assess nutrition, body condition and stress factors; (iv) determine activity budget and vocalizations; (v) carry out field surveys to estimate the population status in 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 first step towards the development of a science-based study was to critically evaluate the current living conditions and management regimes at Sarahan Pheasantry, Shimla district. A detailed analysis of the breeding history of the captive population and its development was also carried out. A tentative keeping system with descriptions on the key husbandry requirements was derived from the biology of the western tragopan, following which a key list of actions points was formulated subsequently that served as a basis for future works. The first priority was given to improvements in the living conditions of the animals based on an evaluation report to provide the birds a naturalistic environment and, at the same time, create a platform for the planned scientific studies at the centre.



Regarding the *in-situ* aspect, the primary focus was on capacity building and training of forest guards in the districts of Chamba, Kangra, Kullu, Kinnaur, Shimla and Mandi. Simultaneously, efforts were made for ground truthing of land cover types in and around Sarahan. The GPS locations obtained during the field survey will be used in classifying the vegetation of the study area. Landsat TM satellite images for June (pre-monsoon) and September (post-monsoon) were downloaded from Earth Explorer. Layer stacking, histogram matching and radiometric corrections were applied to each image in ERDAS Imagine. ASTER DEM layers were downloaded, and other necessary GIS layers such as administrative boundaries, forest cover, road network, drainage system and village locations of the state of Himachal Pradesh were procured, and each layer was re-projected using UTM 44N to match the WGS 1984 projection of the Landsat TM and ASTER DEM images.

Outputs and Outcomes: *Enclosures:* For designing a successful enclosure for the western tragopan, the principle of naturalism was adopted. The western tragopans were previously housed in

10 different enclosures. Remodeling involved merging multiple enclosures to increase the space available to the birds. To manage pests inside the enclosures, all possible routes of entry of rodents into the enclosures were blocked. Barriers were installed between enclosures to prevent visual contact and territorial conflicts between contiguously housed birds.

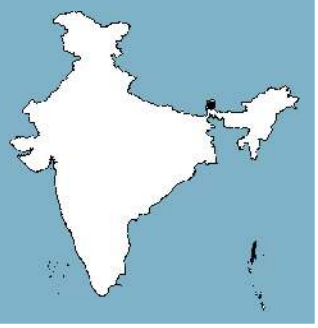
Feeding and nutrition: The feeding regime previously followed at the centre was amended with a new diet specifically designed for the western tragopan, keeping in view the dietary specializations and nutritional requirements of the birds in the wild. The approach for the development of a feeding regime involved 2 aspects: the first is the development of a diet based on information available from the literature concerning the natural feeding habits of the birds, and the second is investigation of selected aspects of foraging behavior with the new diet. This involves the use of experimental approaches to measure aspects such as seasonality, acceptance, preference and nutrient intake.

Reproduction: Provision of undisturbed breeding grounds, as an essential prerequisite for successful breeding, was considered. To achieve this, the nest sites were positioned such that they were located in areas of least disturbance. Multiple nest sites were provided to all the birds within the enclosures.
Behavioural studies: The entire captive population is currently being studied with reference to the new conditions offered to them. Proximate behavioural observations comprising focal animal sampling across different time scales are in progress.

Spatial database: A database has been created, and an updated layer will be used for mapping the habitat suitability of the species and identifying potential sites for reintroduction of the bird in future. A pilot survey was carried out in the Sarahan wildlife range during April and May 2012. Details of the locations that would be required for species–habitat relationship analysis were obtained.

Monitoring Land Use by Wildlife, Livestock and Humans in Khangchendzonga Biosphere Reserve (BR)

Funding Source	:	Ministry of Environment & Forests
Investigators	:	Dr. S. Sathyakumar and Shri Sandeep Kumar Gupta
Researchers	:	Rupak Raj Karki and Nand Kishore Dimri
Date of Initiation	:	June 2011
Date of Completion	:	May 2014



Objectives: The objectives of the project are to (I) assess the distribution and land use patterns of carnivores, ungulates, livestock and humans in Khangchendzonga BR and (ii) develop a monitoring programme for monitoring of land use patterns by carnivores, ungulates, livestock and humans in Khangchendzonga BR.

Progress: The project was initiated in June 2011 with the recruitment of a JRF for molecular genetic work in the WII Research Laboratory. During the reporting period, standardization of techniques was carried out. Work on analysis of samples collected from Khangchendzonga BR was initiated through the ongoing WII-funded research project.

In Khanchendzonga National Park, access to the different watersheds is along the river valleys, and inter-valley connectivity is through alpine passes. Due to the remote, steep and rugged nature of the high-altitude areas, infrastructure is absent in Khanchengzonga BR, and therefore, all field activities have to be carried out in the form of field surveys and involve camping in different areas of the 7 watersheds and other areas in the buffer zones.

Outputs and outcomes: The protocols of DNA standardization and extraction for the wildlife of Khangchendzonga BR have been completed. Wildlife–human conflicts in the buffer zones of Khangchendzonga BR, including the Prek Chu catchment have been completed.

Tawqir Bashir

ACADEMIC & TRAINING

XIII Msc. in Wildlife Science

Status of Doctoral Research

XXXII PG Diploma Course

XXXIII PG Diploma Course

XVII Certificate Course

V.P. Uniyal

ACADEMIC PROGRAMMES

XIII M.Sc. (Wildlife Science) Course

The XIII M.Sc. Wildlife Science course commenced on June 29, 2011. A total of 14 students (12 Indian and 2 foreign students) were selected on a merit basis through the National Entrance Test, held across 6 centers in India, and a personality and aptitude test, held at WII. Eight of the 12 Indian students who joined the course were awarded WII fellowships, and the others were admitted on a self-sponsored basis. One of the foreign students selected did not join the course, while the other foreign student, who joined the course, hails from Guyana, South America.

The current M.Sc. course has been revised to implement the choice-based credit system (CBCS) as per the requirements of Saurashtra University. The new syllabus provides the students more choice and helps develop their area of specialization. Several faculty members and experts from other institutions were invited along with faculty members of WII to deliver lectures in the M.Sc. course. The students were also taken to a number of field tours, starting with Rajaji National Park for the orientation tour and then to Panna National Park for the techniques tour, to Kanha National Park for a tour, to Orissa for a wetland tour and to Kedarnath Wildlife Sanctuary for a high-altitude tour.

M.Sc. Dissertations

Joli Borah, 2011. Occupancy pattern and food -niche partitioning among sympatric kingfishers in Bhitarkanika mangroves, Orissa. Supervisor(s): Dr. Bivash Pandav and Dr. Gopi. G.V.

Shikha Choudhury, 2011. Seasonal habitat use and resource partitioning between two sympatric crocodilian populations (*Gavialis gangeticus & Crocodylus palustris*) in Katerniaghat Wildlife Sanctuary. Supervisor(s): Shri B.C. Choudhury and Dr. Gopi. G.V.

Mijiddorj, T., 2011. Pastoral practice and herders' attitude towards wildlife in south Gobi, Mongolia. Dissertation submitted to Saurashtra University, Rajkot. Supervisor: Dr. Ruchi Badola.

Samuel Vanlalngheta Pachuau, 2011. Response of western hoolock gibbon (*Hoolock hoolock hoolock*) in terms of population abundance and resource utilization across various disturbance regimes in Dampa Tiger Reserve, Mizoram. M.Sc. (Wildlife Science), WII, Saurashtra University, Rajkot. Supervisors: Shri Qamar Qureshi and Dr. Bilal Habib.

Amlendu Pathak, 2011. Winter habitat use of hangul (*Cervus elaphus hanglu,* Wagner) in Dachigam National Park, Srinagar, Kashmir. M.Sc. Forestry, Forest Research Institute University, Dehradun. Supervisor: Dr. Bilal Habib.

Amit Goswami, 2011. Habitat and food resources use in relation to sex, age and group size in sambar (*Rusa unicolor*) during winter in dry tropical deciduous habitat of Ranthambhore Tiger Reserve, India. M.Sc. dissertation submitted to Saurashtra University, Rajkot. 94 pp. Superviors: Dr. S.P. Goyal and Dr. K. Sankar.

J.S. Jiju, 2011. Assessment of pollinator diversity in Navdanya organic farm, Dehradun,

Uttarakhand. Forest Research Institute University, Dehradun. Supervisor: Dr. V.P. Uniyal.

Priyamvada Bagaria, 2011. Land cover change detection in Nanda Devi Biosphere Reserve using remote sensing and geographical information system for biodiversity management. Forest Research Institute University, Dehradun. Supervisor: Dr. V.P. Uniyal.

R. Yadav, 2011. Large carnivore–human interactions in Nanda Devi Biosphere Reserve. M.Sc. (Forestry) dissertation submitted to Forest Research Institute University, Dehradun. 45 pp. Supervisor: Dr. S. Sathyakumar.

Other Dissertations

Sabic, K., 2011. Human–wildlife conflicts in the Nanda Devi Biosphere Reserve. Uttarakhand, India. Bachelor of Arts with Honors. University of Michigan, USA. 29 pp. Supervisor: Dr. Ruchi Badola.

Niazi, S.G., 2011. Gender based natural resource management in and around Nanda Devi Biosphere Reserve. M.Sc. dissertation on forest management, Forest Research Institute University, Dehradun. 69 pp. Supervisor: Dr. Ruchi Badola.

Phukan, A., 2011. An assessment of socio-economic status of local people, their resource dependency and attitude towards wetland conservation: a case study of Panidihing Wildlife Sanctuary, Assam. M.Sc. dissertation on environment management, Forest Research Institute University, Dehradun. 107 pp. Supervisor: Dr. Ruchi Badola.

Debata, S., 2011. Land sharing pattern of Asian elephant (*Elephas maximus*) with humans in Hadgarh–Kuldiha Elephant Corridor, Orissa, India. M.Sc. (Wildlife and Conservation Biology). North Orissa University. 72 pp. Supervisor: Dr. Ruchi Badola.

Ayan Sadhu, 2011. Diversity, distribution and abundance of meso-carnivores in Pench Tiger Reserve, Madhya Pradesh, India. M.Sc. dissertation submitted to Forest Research Institute University, Dehradun. 75 pp. Supervisors: Shri Qamar Qureshi and Dr. K. Sankar.

Status of Doctoral Research in WII

Awarded

Dr. Gopi. G.V., 2012. Nesting ecology of colonial water birds at Bhitarkanika mangroves, Orissa. Saurashtra University. Supervisor: Dr. Bivash Pandav.

Dr. Shazia Quasin, 2012. Systematics and diversity of spiders (Araneae) in Nanda Devi Biosphere Reserve, Uttarakhand India. Saurashtra University, Rajkot. Supervisor: Dr. V.P. Uniyal.

Dr. T.B. Thapa, 2011. Habitat suitability evaluation for leopard (*Panthera pardus*) using remote sensing and GIS in and around Chitwan National Park, Nepal. Saurashtra University, Rajkot. Supervisor: Dr. V.B. Mathur.

Thesis Submitted

Krishnendu Mondal, 2011. Ecology of leopard (*Panthera pardus*) in Sariska Tiger Reserve, Rajasthan. Ph.D. thesis, Saurashtra University, Rajkot. 200 pp. Supervisors: Dr. K. Sankar and Shri Qamar Qureshi.

Shilpi Gupta, 2011. Ecology of medium and small sized carnivores in Sariska Tiger Reserve, Rajasthan, India. Ph.D. thesis, Saurashtra University, Rajkot. 156 pp.Supervisors: Dr. K. Sankar and Shri Qamar Qureshi.

Sinha, B., 2011. Evaluating effectiveness of interpretive facilities in enhancing conservation awareness in select tiger reserves in India. Bharti Vidhyapeth University, Pune. Supervisor: Dr. V.B. Mathur.

T. Ramesh, 2011. Prey selection and food habits of large carnivores: tiger *Panthera tigris*, leopard *Panthera pardus* and dhole *Cuon alpines* in Mudumalai Tiger Reserve, Tamil Nadu. Ph.D. thesis. Saurashtra University, Rajkot. 173 pp.Supervisors: Dr. K. Sankar and Shri Qamar Qureshi.

V. Deepak, 2011. Ecology and behaviour of Travancore tortoise (*Indotestudo travancorica*) in Anamalai Hills, Western Ghats. Saurashtra University, Rajkot. Supervisor: Dr. K. Vasudevan.

Vyas, P., 2011. Biodiversity conservation in Indian Sundarban in the context of anthropogenic pressures and strategies for impact mitigation. Saurashtra University, Rajkot. Supervisor: Dr. V.B. Mathur.

Registered

Athar Noor, 2012. Status and spatio-temporal ranging behavior of leopard (*Panthera pardus*) in Dachigam National Park, Srinagar, J&K. Saurashtra University, Rajkot. Supervisor(s): Dr. Bilal Habib and Dr. Gopi G. V.

Chandola, S., 2011. An sssessment of human–wildlife interaction in the Indus Valley, Ladakh, Trans-Himalaya. Saurashtra University, Rajkot. Supervisor: Dr. V.B. Mathur.

Maheshwari, A., 2012. Conservation and management of snow leopard and co-predators with special reference of large carnivore–human conflicts in select areas of western Himalayas. Supervisor: Dr. S. Sathyakumar.

Meraj Anwar, 2012. Status of tiger and its associated prey species in selected corridors and key areas of Terai Arc Landscape. Saurashtra University, Rajkot. Supervisor: Dr. Bilal Habib.

Zaffar Rais Mir, 2012. Monitoring prey dynamics and diet fluctuations of leopard (*Panthera pardus*) in Dachigam National Park, Srinagar, J&K. Saurashtra University, Rajkot. Supervisors: Dr. Bilal Habib and Dr. Gopi G.V.

TRAINING ACTIVITIES

XXXII P.G. Diploma Course in Advanced Wildlife Management concluded, *September 1, 2010 to June 30, 2011.*

The 10-month P.G. Diploma course in advanced wildlife management commenced on September 1, 2010 at the Institute with 20 officer trainees of the rank of Deputy Conservator of Forests/Assistant Conservator of Forests and equivalent levels.

During the reporting period, the Management Term Paper Exercise was completed by the officer trainees. After the necessary training, the officer trainees did a bibliographic study to identify research and management gaps in the context of their respective states as the first part of this exercise. In the second part of the study, officer trainees were divided into 5 groups. The field work was conducted from March 30 to April 9, 2011 in Dachigam National Park, J&K; Velavadar National Park, Gujarat; Satpuda Tiger Reserve, Madhya Pradesh; Wayanad Wildlife Sanctuary, Kerala; and Nameri Tiger Reserve, Assam. The management term papers were presented in a seminar by individual officer trainees during April 21-22, 2011. The Management Plan Exercise was conducted at Nagarhole Tiger Reserve in Karnataka during May 1-31, 2011. The officer trainees prepared individual management plans from June 1-20, 2011 and made presentations on June 23, 2011.

All the 20 officer trainees completed the course successfully. They also bagged honours diplomas for securing 75% marks or more. Dr. R.B.S. Rawat, Principal Chief Conservator of Forests, Government of Uttarakhand was the chief guest at the function and presented the award and prizes.

Institute's Gold Medal for the top trainee	Dr. (Ms.) M. Malathi Priya
Silver Medal for the best all round wildlifer	Dr. (Ms.) M. Malathi Priya
A.K. Chatterjee Silver Medal for the best management term paper	Dr. (Ms.) M. Malathi Priya
Wildlife Preservation Society Silver Medal for the second in merit	Dr. Saket Badola
N.R. Nair Memorial Silver Medal for the best management plan	Dr. Saket Badola
Top Trainee in Wildlife Biology book prize	Ms. B. Niveditha

XXXIII Postgraduate Diploma in Advanced Wildlife Management, *September 1, 2011 to June 30, 2012.*

The XXXIII Postgraduate Diploma in Advanced Wildlife Management commenced on September 1, 2011. A total of 9 officer trainees from different states of the country joined the course. Two IFS Probationers joined directly after completing their

training at Indira Gandhi National Forest Academy, Dehradun as 'Hari Singh fellows'.

The orientation tour took place during September 25-30, 2011 at Corbett Tiger Reserve. It familiarized the officer trainees to the terai–bhabar landscape and issues related to corridor management, the people–park interface, relocation and mass tourism. The officer trainees visited Kedarnath Wildlife Sanctuary and Nanda Devi Biosphere Reserve during October 15-21, 2011 as part of their high-altitude tour. During the visit, they learnt about temperate forests, sub-alpine forests and alpine meadows and their ecology, wildlife use and conservation and management issues. They also got an insight into the pioneering work being done for solid waste management in Valley of Flowers National Park. For the techniques tour, the group visited Rajaji National Park from December 3-20, 2011. They did extensive camera-trapping in Chilla and the surrounding areas of Rajaji National Park.

XXVII Certificate Course in Wildlife Management *November 2011 to January 2012.*

The XXVII Certificate Course in Wildlife Management began on November 1, 2011 with 16 officer trainees of the rank of Range Forest Officer and equivalent from different states within the country and abroad.

The course started with a basic grounding in wildlife biology and field techniques and later addressed all major aspects of wildlife management, including the very important human dimensions. The officer trainees undertook the orientation-cum-techniques tour at Rajaji National Park, Uttarakhand, from November 8-19, 2011.

Wildlife Conservation Gold Medal	Shri N. Sanath Kumar
Institute's Silver Medal for the best performance in 'Wildlife Management'	Shri N. Sanath Kumar
Institute's Silver Medal for the `Best All Round Wildlifer'	Shri N. Sanath Kumar
Institute's Silver Medal for the `Best Foreign Trainee'	Md. Amir Hosain Chowdhury

The objective of this tour was to orient and familiarize trainees with different wildlife techniques.

The management tour was conducted during January 2-22, 2012 in parts of Gujarat and Madhya Pradesh. They visited the Gujarat Ecological & Educational Research Foundation, Centre for Environment Education, Science Express, Nalsarovar Bird Sanctuary, Wild Ass Sanctuary, Gulf of Kutch, Narara Marine National Park, Sakkarbagh Zoo, Gir National Park & Sanctuary, Velavadar National Park and Kanha Tiger Reserve. The objectives of this tour were to provide first-hand experience of various management practices related to habitat management, endangered species management, wildlife protection, eco-development, wildlife interface conflicts and tourism. During this tour, the emphasis was on studying the wide range of management practices and problems in India's protected areas.

The final open feedback session was organized on January 25, 2012. All the officer trainees completed the course successfully, and 13 of them obtained honours certificates in this course.


Gautam Talukdar

CAPACITY BUILDING

Workshops, Seminars & Conference

Organized

Participated

Vinod Verma

Workshops, Seminars and Confeferences

ORGANIZED

Course-cum-excursion tour for wildlife professionals from Government of Bhutan, Dehradun, *May 2-9, 2011.*

A course-cum-excursion tour on wildlife management of high-altitude protected areas was organized for 12 wildlife professionals from Sakteng Wildlife Sanctuary of Nature Conservation Division, Government of Bhutan. Lectures were delivered on biodiversity and conservation issues in Bhutan and the eastern Himalaya, monitoring of wildlife and habitats, forest vegetation and alpine rangeland monitoring, recent advances in wildlife management in the Himalaya, Project Snow Leopard, human–wildlife conflicts and evaluation of effectiveness of management in Himalayan protected areas. The trainees visited Kedarnath Wildlife Sanctuary and the buffer zone of Nanda Devi Biosphere Reserve during May 3-8, 2011. Various wildlife techniques and important issues, *viz.,* wildlife habitat evaluation and assessment techniques, wildlife monitoring techniques, natural resource use by local communities, conservation and management issues, community participation in conservation, interaction with managers and community representatives and community-based ecotourism and conservation programmes were discussed. The course ended with a group discussion and a feedback session.

Vinod Verma

Meeting on management effectiveness evaluation (MEE) of tiger reserves in India, New Delhi, *May 9-10, 2011*.

A meeting was organized to discuss the outcomes of the management effectiveness evaluation (MEE) of 39 tiger reserves in India. The chairmen and members of the 5 regional expert evaluation committees attended this meeting along with representatives of the National Tiger Conservation Authority (NTCA) and of tiger reserves.

Course on 'Mainstreaming Biodiversity and Ecosystem Services in Impact Assessment for Responsible Development', Puebla, Mexico, *May 29-30, 2011*.

This course was organized in response to a request from the International Association for Impact Assessment (IAIA) for conducting pre-meeting training courses in conjunction with its annual conference during May 29 - June 4, 2011. The course was the eighth in the series of international courses conducted and coordinated in collaboration with Dr. V.B. Mathur. The 2-day course was targeted at mid-career EA professionals, researchers, business groups, decision-makers, government officials, donor agencies, economists and other professionals committed to more responsible project planning through better integration of biodiversity in impact assessment.

The course has the following objectives: (I) Revisit the link between biodiversity, development and human well-being. (ii) Promote impacts assessment as an effective planning and decision support tool

for assessing impacts of development on biodiversity. (iii) Reiterate the need to invest in managing ecosystems for responsible development. (iv) Stimulate the importance of integrating economic and ecological valuation approaches and their applicability in valuing biodiversity. (v) Explore how to navigate development that reflects a greater convergence of economic security, human well-being and ecological sustainability objectives. (vi) Share a range of ecological and economic approaches for integrating biodiversity in the hierarchy of different mitigation options.

Special training course for officers of Government of Bangladesh, Dehradun, *June 1-25, 2011.* The special training course was organized by the Wildlife Institute of India. It was funded by the Integrated Protected Area Co-Management Project (IPAC) of the Government of Bangladesh. A total of 5 participants from the Forest, Environment and Fisheries departments attended the programme.

The first part of the course was conducted at the institute, during which interactive classroom sessions were held on contemporary wildlife issues. The participants were taken for a visit to Forest Research Institute, Forest Survey of India, Indira Gandhi National Forest Academy and Central Academy for State Forest Service to acquaint them with the activities of the various institutions engaged in training and research. They were also taken to Dhanaulti, Asan Conservation Reserve and Rajaji National Park to be shown good practices of ecotourism and participative wildlife management.

During the second part of the course, the participants visited various protected areas and zoos in Orissa and West Bengal to link theory with the practice of wildlife management. They visited Nandankanan Zoo, Balukhand Konark Sanctuary, the mouth of the Debi River, Rushikulya Rookery, Chilika Lagoon, Alipore Zoo and Sundarbans Tiger Reserve.

Special training course for WWF-Pakistan officers, Dehradun, *June 6-30, 2011*. The course for WWF-Pakistan officers was conducted at Wildlife Institute of India. A total of 7 participants attended the programme. The basic objective of the course was to provide an exposure to the current situation in wildlife and biodiversity conservation in India and to facilitate an understanding of various conservation approaches and good wildlife management practices. The first part of the course was conducted at the institute, during which interactive classroom sessions were held on contemporary wildlife issues. The participants were taken for a visit to Forest Research Institute and Forest Survey of India to acquaint themselves with the activities of these institutions. They were also taken to Asan Conservation Reserve and Rajaji National Park to be shown good practices of participative wildlife management and wetland management.

Vinod Verma

During the second part of the course, the participants visited various protected areas, zoos and rescue centres in Uttarakhand, Delhi and Rajasthan to link theory with the practice of wildlife management. They also visited Corbett Tiger Reserve, National Zoological Park, Ranthambore Tiger Reserve and Jaipur Zoo & Rescue Centre.

First South Asia sub-regional dugong workshop, Tuticorin, *June 7, 2011*. The objective of the workshop was to initiate a memorandum of understanding on the conservation and management of dugongs and their habitats throughout their range in South Asia. It was organized by the UNDP/CMS office, Abu Dhabi, Ministry of Environment & Forests, New Delhi, and Tamil Nadu Forest Department. Dr. Jagdish Kishwan, Additional Director General of Forests (Wildlife), Ministry of Environment & Forests, inaugurated the programme. Resource scientists from UNDP/CMS, Abu Dhabi, South Asian country representatives and Tamil Nadu Forest Department officials participated in the meeting. A comprehensive conservation plan for the dugong and its habitat in the respective countries, salient features of the conservation plan and the present status of implementation were discussed.

Regional workshop on strategies for digitization and mobilization of natural history collections data, Pan Asia Continental, Kolkata, *June 15-17, 2011*. The objectives of the workshop were: (i) digitization of biodiversity data, those of especially natural history collections; (ii) discovery and publishing biodiversity data; and (iii) developing a demand-driven data mobilization strategy and action plan.

It was organized by the Botanical Survey of India, Zoological Survey of India, Wildlife Institute of India, National Biodiversity Authority, Ministry of Environment & Forests and Global Biodiversity Information Facility (GBIF). A total of 41 participants from 11 organizations attended the workshop. In order to sensitize data holders and impart skills to GBIF participants and motivate them to create national level portals in Asia, a regional training workshop on "Strategies for Digitization and Mobilization of Natural History Collections Data" was organized in Kolkata. The sessions included demonstration of best practices and providing hands-on training to participants on digitization and on data publishing.

This workshop provided ample opportunities for interaction among the participants for formulating strategies for digitization and mobilization of natural history collections data within the region. The participants benefited by interacting with the regional partners of GBIF and also had an insight into current standards and the tools and technologies being adopted all around the globe in the field of biodiversity informatics through the inputs provided by the experts from GBIF.

National-level training programme on "Biodiversity Conservation with a Focus on Ecological Monitoring", Dehradun, *September 5-9, 2011*. This national-level training programme for scientists and technologists, sponsored by the Department of Science and Technology, was conducted at the Wildlife Institute of India. The objectives of the course were to: (i) make scientists fully aware of principles/ approaches in ecological monitoring; (ii) make scientists aware of the causes of decline in natural resources/habitats and species; (iii) make them aware of good practices in ecological monitoring; (iv) establish linkages and facilitate sharing of information among scientists; and (v) reiterate their role in creation of baseline information and database management.

In all 22 participants from 16 different organizations participated in the programme. During the course,

the participants were exposed to case studies, field monitoring methods and hands-on training in the lab with analytical tools.

Second Himalayan Day celebrated, Dehradun, *September 9, 2011.* The Institute conducted a consultation meeting on the second Himalayan Day. The faculty members, researchers and M.Sc. students discussed the contribution of the Wildlife Institute of India in establishing a knowledge base specifically on the biodiversity richness, conservation issues and wildlife management-related aspects of the Himalayan landscape. The deliberations focused on strategies for sustaining the Himalayan ecosystem as well as on aspects of better extension of science-based information to authorities in particular and the civil society in general to facilitate environment-friendly decisions enabling conservation of bio-resources without compromising the ecosystem services of the Himalayan landscape.

Workshop on official language Hindi, Dehradun, *September 14, 2012*. The workshop was organized on the occasion of Hindi Day. The objective of the workshop was to encourage employees to use the official language, Hindi, and to discuss policies and regulations pertaining to the use of Hindi in office work. In all, 40 staff and officials of the Institute participated in the workshop. The workshop had a group discussion, and after the group presentations, some suggestions were made to maximize the use of Hindi in office work.

Training course on ecology and biodiversity in EIA, Centre for Environment Planning and Technology, Ahmedabad, *September 22-24, 2011.* In response to a request received communication from Prof. (Dr.) A.K.A. Rathi, Faculty of Planning and Public Policy, Centre for Environment Planning and Technology (CEPT) University, a course was organized by the Wildlife Institute of India. The objective of the course was to build the capacity of EIA consultants in conducting biodiversity inclusive impacts assessments and to guide them to data sources for building ecological baselines of project areas. The course was well received, as was evident from the feedback and from a request by CEPT to conduct such courses on a regular basis. It was organized by Centre for Environment Planning and Technology (CEPT) University, Ahmedabad. In all, 24 participants, including 2 members of the faculty of CEPT, attended the course.

VII Internal Annual Research Seminar (IARS), *October 10, 2011.* The IARS was chaired by Shri Vinod Rishi, Former ADG (WL), MoEF, Government of India, New Delhi. During the IARS, a total of 15 presentations were made in 4 technical sessions *viz.* Vegetation Ecology and Population Estimation; Captive Management and Conservation Breeding; Development and Conservation Interface; and Habitat and Species Assessment. The presentations were based on recently initiated and ongoing research studies of the Institute. The presentations were evaluated by a panel of judges. The following were adjudged as the five best presentations, and the concerned research personnel were awarded book prizes, each worth Rs.1500:

I Krishnendu Mondal Multi-scale resource selection by leopard (*Panthera pardus*) in Sariska Tiger Reserve, Rajasthan.
II Sitendu Goswami Evaluation of housing and enclosure enrichment practices in the sloth bear (*Ursus ursus*) enclosures of 3 zoos
III Aniruddha Majumder Survival rate, habitat use and home range of tiger (*Panthera tigris*) in Pench Tiger Reserve, Madhya Pradesh
IV S.R. Chandramouli Amphibian diversity in the Andaman and Nicobar Islands
V R. Lakshminarasimha Conservation breeding

of western tragopan (*Tragopan melanocephalus*) in Himachal Pradesh: Current status and proposed interventions for scientific management of captive populations

XXV Annual Research Seminar (ARS) of WII, Dehradun, *October 11-12, 2011.* The XXV Annual Research Seminar of the Institute was chaired by Prof. R. Sukumar, Chairman, Training, Research and Academic Council (TRAC). A total of 19 presentations were made in 5 technical sessions, *viz.* Ecology and Conservation of Carnivores; Faunal Diversity; Ecology and Conservation of Birds; Development and Conservation Interface; and Large Mammals: Translocation, Reintroduction and Rescue. The presentations were based on ongoing research studies and were made by research fellows and faculty members of the institute.

About 225 participants 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, conservationists, wildlife experts, faculty members, researchers, M.Sc. students and the postgraduate diploma course officer trainees of WII.

A panel including eminent scientists, academicians, conservationists and wildlife managers examined the relevance and quality of research by the presentations made. The presentations made by the following researchers on the topics cited were adjudged the best five presentations. All 5 researchers were given book awards, each worth Rs.1500.

I Harikrishnan, S. High density and biomass of terrestrial herpetofauna in rainforests of the Andaman Islands

II A. Pragatheesh Impacts of National Highway-37 on wild animal movements between Kaziranga National Park and Karbi-Anglong Hills, Assam

III Shazia Quasin Spider diversity in response to vegetation and microclimate along altitudinal gradient in Nanda Devi Biosphere Reserve

IV Mousumi Ghosh Study of bird species numbers and densities in the east and west Himalaya

V Sutirtha Dutta Effects of environmental stochasticity and human land use changes on the threatened fauna of Kachchh.

Indo-Norwegian joint workshop on capacity building in biodiversity informatics towards IPBES, New Delhi, *October 28, 2011*. This joint workshop was organized to start up the Indo- Norwegian pilot project “Capacity Building in Biodiversity Informatics” in the context of the national needs in

India identified and the UNEP programme "Intergovernmental Platform for Biodiversity and Ecosystem Services (IPBES)". Representatives from Norwegian Institute for Nature Research (NINA); Norwegian Biodiversity Information Centre (NBIC); Norwegian Directorate for Nature Management; Museum for Nature Natural History; University of Oslo (GBIF Norway); Royal Norwegian Embassy; Global Biodiversity Information Facility Secretariat, Copenhagen, Denmark; Ministry of Environment & Forests (MoEF), Government of India; National Tiger Conservation Authority; and Wildlife Trust of India participated in this workshop. In his opening remarks, Shri Hem K. Pande, Joint Secretary, MoEF, gave a brief summary of the Indian strategy on biodiversity management and gave an assurance that the Government of India welcomed the pilot project enthusiastically.

One-week compulsory training course on "Human–Wildlife Conflict: Issues and Mitigation", Dehradun, *December 12-16, 2011*. This course was conducted at the Wildlife Institute of India, Dehradun, as per the instructions from the Ministry of Environment & Forests, Government of India, New Delhi. The course was for in-service IFS officers from various states of the country. The officers were sensitized to their role in human–wildlife conflicts. There was a panel discussion on the topic "Improvement in the Working of Forest Departments: Need for Career Development through Training and Improvement of Skills". The idea of such panel discussions is to have suggestions for upgradation of skills of foresters, adoption of modern techniques and their applications in forestry activities and advancement of individual careers with the ultimate aim of improving the working of the state forest department for efficient delivery of service to the people. A total of 23 participants attended this course.

One-week compulsory training course on "Wildlife Offences: Role of Intelligence Gathering and Wildlife Forensics", Dehradun, *January 16-20, 2012.* The course, conducted for the IFS officers at the Institute, was sponsored by the Ministry of Environment & Forests, Government of India. This course was designed to give an overview of the wildlife offences situation in the country and existing mechanism and strategies to deal with the

problem. There were 20 IFS officers, from 11 states of the country, who participated in the course.

During the training programme, sessions were planned to discuss the wildlife crime situation, understand and interpret the Wildlife Protection Act, Customs Act, CITES and Cr.PC. The role of agencies such as the Wildlife Crime Control Bureau, Customs, ITBP, BSF and army involved in dealing with the illegal trade in wildlife articles and the need for gathering intelligence by the forest department and local police administration were discussed. The Wildlife Crime Control Bureau, New Delhi, provided special inputs for this programme.

A field visit to Rajaji National Park was organized to understand the protection strategies: intelligence gathering, anti-poaching strategies; and the use of wildlife forensics in dealing with wildlife crime in the park. The participants could perceive the complexity of wildlife crime and the role of forensic evidence in enforcement. They interacted with the Park Manager to understand the key factors threatening the rich biodiversity of the park and the form of innovative strategies required to combat wildlife crime.

Attachment of probationers of Indian Revenue Service (Customs & Central Excise) Group A 62nd Batch with Wildlife Institute of India, Dehradun, *January 16-27, 2012* and *January 30 - February 10, 2012.*

The training module was essentially aimed at sensitizing young officers 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 in 2 groups by a large group of 167 officers having various educational backgrounds.

Various inputs were provided. These include an introduction to the importance of biodiversity and its conservation and the status of endangered species including flagship species such as the tiger and monitoring them and special inputs on the illegal trade in wildlife articles including butterflies, shahtoosh, rhino horn, skins and tiger bones. Inputs were also provided on the importance of plant taxonomy and the trade in medicinal plants. Special inputs were given on the role of wildlife forensics in dealing with wildlife cases. Officers were also given basic information on the implementation of the Wildlife Protection Act, 1972, CITES and TRAFFIC.

Apart from being provided indoor inputs, the officers were taken to Corbett National Park, where they had interactions with forest officers. They were sensitized not only to flagship species but also some lesser known species.

Course on 'Biodiversity and Development', Ahmedabad, *February 1-2, 2012*.

A request was received from the Faculty of Sustainable Environment and Climate Change, Centre for Environment Planning and Technology (CEPT) University, Ahmedabad, for inputs of the Wildlife Institute of India (WII) in their course module for M. Tech students. In response to this request, WII provided inputs by planning 20 hour sessions over 2 days. A total of 11 M.Tech. students attended the course.

One-week training workshop on 'Biodiversity Conservation for Women Scientists', Dehradun, *February 6-10, 2012.* The workshop was sponsored by the Department of Science and Technology. In all, there were 23 women participants. They came from a wide variety of subject areas, specializations and regions. The discussions among participants during the sessions were lively and meaningful.

The training workshop broadly appraised the participants about the current conservation situation and the ongoing issues and trends in wildlife conservation. The following topics were discussed during the workshop: (i) Wildlife Conservation—An Overview of National and International Initiatives; Role of Protected Areas in Wildlife Conservation; Ecosystem Services and Climate Change; Wildlife Management in India—Challenges and Conflicts. (ii) Community Participation in Conservation; Stakeholders in Conservation; Biodiversity Conservation and Livelihoods of the Local Communities; Gender Issues in Wildlife Conservation. (iii) Protected Areas to Landscapes—Concept, Approach and Challenges Ahead; and Mainstreaming Wildlife Conservation Issues in Development Process.

The participants were taken on a field visit to Rajaji National Park for understanding recent relocation initiatives and changes in habitats and interaction with Gujjars and forest department personnel.

Workshops, Seminars and Confeferences

PARTICIPATED

Multidisciplinary committee meeting of the Teesta VI HE Project, Gangtok, Sikkim, *April 7, 2011.*

As a member of the multidisciplinary committee constituted by the MoEF for the Teesta VI Hydro-Electric Project, Dr. S. Sathyakumar attended the second meeting and provided inputs during discussions and also during a field visit to the project site.

Workshop on 'Surveillance Assessment', Dehradun, *April 7-9, 2011.*

The National Accreditation Board for Education and Training (NABET), Quality Council of India, organized the workshop. The objective of the workshop was to develop guidance that can direct the process of surveillance cycle of the EIA consultant accreditation process. The Wildlife Institute of India helped not only in coordinating the workshop but also assisted with the technical deliberations. Dr. Asha Rajvanshi attended this workshop as a member of the technical committee of the NABET and provided technical inputs in the review of the scheme for surveillance assessment of the EIA consulting organization.

Brainstorming conference towards a consortium on 'Biodiversity Research in Eastern Himalaya and Eastern Ghats', Chemchi, Sikkim, *April 9-12, 2011.*

Dr. S. Sathyakumar participated in the brainstorming conference, which was organized by the University of Calcutta, UNESCO—Asia, DBT and WWF-India. He made 1 oral and 3 poster presentations that were based on results from WII's ongoing research projects in the eastern Himalaya and participated in the panel discussions.

Biodiversity Data Publishing Workshop, Pretoria, South Africa, *April 19-20, 2011*.

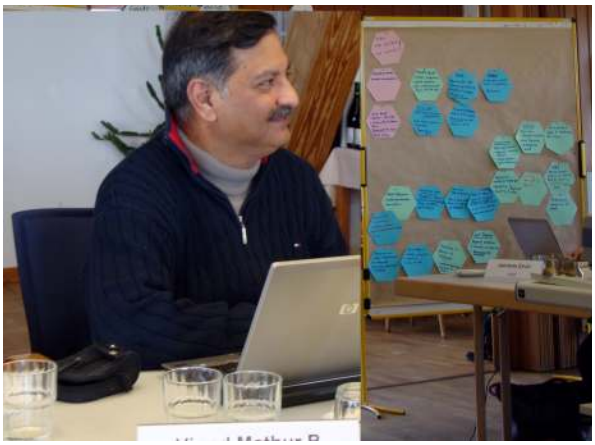
The workshop was organized and supported by the Global Biodiversity Information Facility (GBIF), Copenhagen, Denmark. In all, 26 participants attended the workshop. The joint workshop was organized to discuss the various milestones and take stock of the progress made by India and South Africa with pilot projects that were aimed at the development of a web-based EIA Biodiversity Data Publishing portal in the 2 countries under the GBIF–MoEF project. The workshop aimed to review complementarities between the 2 pilot projects, share experiences about project implementation and chart out the future course of action. The workshop had the following objectives: (i) demonstrate the EIA Biodiversity Data Publishing toolkit as developed so far and obtain inputs and feedback on the system; (ii) explore ways to ensure seamless implementation in South Africa; (iii) explore how the publication toolkit can be adapted for publishing EIA biodiversity data from EIA reports prepared to meet the regulatory requirements for environmental decision- making in India; (iv) explore a knowledge exchange between South

Africa and India; and (v) share lessons through the development of best practice guidelines for this project.

Dr. Vinod Mathur and Dr. Asha Rajvanshi from the Wildlife Institute of India participated in the workshop as members of the GBIF delegation from India, which was headed by Mr. Hem Pande, the Joint Secretary of the Minister of State for Environment & Forests, Government of India. Also, as members of the partner institutions of the project under the collaborative agreement with South Africa, the Wildlife Institute of India and the GBIF, Dr. Asha Rajvanshi, who is coordinating the pilot project in India, made a presentation and shared the progress made with respect to implementation of the project and highlighted the key recommendations of the consultative workshop, which was earlier held in Dehradun, during June 23–25, 2010. Dr. Vinod B. Mathur made a presentation on the policy and governance issues associated with the implementation of the project. Other contributions of the WII faculty included deliberations on the products of the pilot project of South Africa and the future action plan for dissemination of products of the pilot projects of GBIF.

The workshop participants agreed that the EIA biodiversity publishing toolkit could be a valuable component of the drive to improve the availability and quality of the biodiversity data within the EIA sector.

Planning workshop to sustain capacity building for the CBD programme of work on protected areas, Isle of Vilm, Germany, *May 1-5, 2011*. The Executive Director, Secretariat of the Convention of Biological Diversity, Canada, invited Dr. Vinod B. Mathur, Dean, Faculty of Wildlife Sciences, to participate in the planning workshop. The objectives of this planning workshop were (i) to develop the *modus operandi* of the 2011–12 series of subregional



workshops and (ii) to discuss the feasibility of conducting these workshops as part of a subregional support strategy of capacity building.

National conference on "Biodiversity *Vis-à-vis* Environmental Degradation in Hilly Terrain", Dehradun, *May 15-16, 2011.* Dr. V.P. Uniyal and Ms. Shazia Quasin participated in the national conference, which was organized by the Department of Zoology, DBS (PG) College, Dehradun and sponsored by the University Grant Commission, Council for Scientific and Industrial Research, Indian Council of Medical Research and Uttarakhand State Council for Science and Technology. Dr. V.P. Uniyal presented a paper and chaired the session. Ms. Shazia presented a paper titled "Altitudinal Gradient Structuring Spider Assemblages: A Study in Nanda Devi Biosphere Reserve (Western Himalayas), Uttarakhand, India".

Ministerial meet of elephant-8 countries, New Delhi, *May 24, 2011.* The Ministry of Environment & Forests, in collaboration with the Wildlife Institute of India, National Tiger Conservation Authority and Wildlife Trust of India, organized an 8-country ministerial meet at Ashok Hotel, New Delhi. Holding such an event was one of the recommendations put forward by the Elephant Task Force constituted by the Government of India for safeguarding the future of elephants in wild and captivity. The meet was a first small initiative to bring together 8 major elephant nations of Asia and

Africa, *viz.* Botswana, Kenya, Tanzania, Congo Brazzaville, India, Thailand, Indonesia and Sri Lanka, for setting a bigger international platform for all 50 range countries across the globe to chart visions for elephant conservation and management. Shri Jairam Ramesh, Ex-Hon'ble Minister for Environment & Forests, inaugurated the logo and released the mascot *Haathi mere saathi* for creating public awareness and eliciting support for the elephant conservation campaign amidst the development aspirations of people. The hon'ble ministers and delegates of all 8 participating nations also presented their country statements, which finally adopted a declaration to take forward elephant conservation and management in all range countries through mutual cooperation and knowledge sharing. The other participants included delegates from 8 countries, officials from the respective embassies, scientists, administrators, forest managers, national and international NGOs, media persons, corporate houses, etc.

The meet also had a technical session on 3 broader issues: elephant science and conservation; elephant conservation and management; and cultural and ethical perspectives. Dr. Sushant Chowdhury, from the WII, convened the technical session on 'Elephant Conservation and Management' by flagging the issues on habitat management, population management, conflict management, captive management, health management and participatory management. As a technical committee member he also assisted with organizing this important meet.

Consultative workshop, Bangalore, *May 30-31, 2011.* Dr. Ruchi Badola was invited by the South Asian Network for Environmental Economics to participate in a consultative workshop to explore a coherent theme for a coordinated set of studies for research applications by the South Asian Network for Environmental Economics.

Annual conference of International Association for Impact Assessment (IAIA'11) on "Impact Assessment and Responsible Development for Infrastructure, Business and Industry" Puebla, Mexico, *May 31 - June 4, 2011*. Dr. Asha Rajvanshi and Dr. V.B. Mathur were invited the by International Association for Impact Assessment (IAIA) to attend the IAIA's international conference on Impact Assessment and Responsible Development for Infrastructure, Business and Industry to provide professional inputs in the technical sessions of the conference and to chair technical sessions. Funding support for participation in the above conference was provided by the IAIA and GBIF.

The conference was organized by the IAIA. Dr. Rajvanshi presented the paper 'Impact Assessment of Madhya Ganga Canal Project: Decision Review for Development of an EIA Biodiversity Data Publishing Framework: India Pilot Project' during the conference sessions. She also chaired two sessions: (i) Biodiversity: Bringing Business on Board; and (ii) Biodiversity and Global Access to Biodiversity Information for IA.

Dr. Mathur presented the following papers during the conference sessions: (i) Conservation-Induced Displacement of Human Communities from Protected Areas: The Indian Experience; and

(ii) EIA Biodiversity Publishing Framework: Policy and Governance Issues.

South Asian conference on "2011 International Symposium on Environmental Science and Technology", Beijing, China, *June 1-4, 2011.* Dr. Pranab Pal, Field Technical Officer, participated in the conference, which was organized by the Chinese Society for Environmental Sciences, Beijing Institute of Technology, China. The objective of the conference was to discuss the environment as one of the most burning issues in the present global scenario. Dr. Pal presented a paper on the "Role of Protected Area in Conserving Biodiversity". The paper was published in the book *Progress in Environmental Science and Technology*, published by Science Press, USA.

First South Asia regional workshop on "Conservation and Management of Dugongs', Tuticorin, *June 6-7, 2011*. In a major step towards enhanced regional cooperation for the conservation of dugongs (sea cows), India hosted the workshop. The Ministry of Environment & Forests, UNEP/CMS Dugong, MoU Secretariat and the Wildlife Institute of India jointly organized the workshop. Policy and conservation management experts from India, Pakistan, Sri Lanka and Bangladesh, experts from UNEP/CMS Dugong MoU Secretariat, the Environment Agency, Abu Dhabi, officers of the state forest departments of Tamil Nadu, Gujarat and the Andaman & Nicobar Islands, field officers of the Gulf of Mannar Biosphere Reserve, representatives of the State Fisheries Department, Central Marine Fisheries Research Institute, Wildlife Trust of India, Reefwatch Marine Organization, Wildlife SOS, GEER Foundation and various other stakeholders attended the workshop. Dr. K. Sivakumar represented the Institute at the workshop.

Workshop on the World Bank and global best practices in environmental management and role of training and knowledge networks, New Delhi**,** *June 13-14, 2011.* The World Bank invited Dr. Asha Rajvanshi and Dr. V.B. Mathur to provide professional inputs at the 2-day interactive workshop of environmental assessment practitioners. The objective of the workshop was to contribute to reduction of the unevenness of quality in environmental assessment for various complex developmental projects through the engagement of a variety of stakeholders. The focus of the workshop was to invite interest and review the capacity of several academic institutions to develop and deliver high-quality training related to environmental assessment processes, plans and techniques, in line with the expectations of the World Bank and global best practices. The workshop also aimed to serve as a platform for identifying social and environmental sustainability issues in some projects financed by the bank.

The workshop was organized and supported by the World Bank. Drs.Vinod Mathur and Asha Rajvanshi made a presentation on the profile of the Wildlife Institute of India in the context of its national, regional and global role in building capacity in the field of impact assessment and provided professional inputs in the development of a training curriculum and learning resources.

Workshop on "Conservation of Asian Elephants in Fragmented Habitats: Issues and Challenges', Noida, *June 15-17, 2011.* Amity School of Natural Resources and Sustainable Development, in collaboration with Amity Institute of Global Warming & Ecological Studies (AIGWES), organized a workshop to brainstorm and discuss the critical issues of elephant conservation. The focus of the workshop was on the policy issues of effective corridors,

conflict resolution, community involvement in conservation and finding alternative ways for coexistence with elephants. The nearly-30 audience targeted were officials from the forest department, wildlife NGOs, representatives from the eco-tourism and hospitality industries and some village representatives. Dr. Sushant Chowdhury, from the WII, was invited to present a talk on June 16, 2011 on “Landscape/land use planning for the conservation and management of elephants”. The talk highlighted the point that interspersion of forest and agriculture is the major problem area of managing elephants, with resultant conflicts.

Kishenganga Hydro-electric Project (HEP) arbitration meetings and field visit to downstream areas in Pak-occupied Kashmir (POK) and the project site in Jammu & Kaskmir, India, Islamabad, Pakistan, and Srinagar, J&K, India, *June 15-20, 2011.* Based on a request from the Ministry of Water Resources (Indus Wing), the Wildlife Institute of India (WII) provided technical inputs on environmental aspects of Kishenganga HEP and participated in the meetings, field visits and report preparation. Dr. S. Sathyakumar represented the WII in the meetings and field visit to downstream areas of Kishenganga HEP in POK. Dr. K. Sivakumar and Dr. J.A. Johnson participated in meetings held during September and October at New Delhi and provided inputs on environmental aspects of Kishenganga HEP and report preparation.

35th Session of the World Heritage Committee, Paris, France, *June 19-29, 2011*. Dr. V.B. Mathur, Dean, was designated as the member of the official Indian delegation. Dr. Mathur provided technical inputs in the agenda items pertaining to (a) State of Conservation Report of Keoladeo National Park, Rajasthan, and Kaziranga National Park, Assam; (b) the decision

on the removal of Manas WHS from the 'List of World Heritage Sites in Danger'; (c) nomination of the Western Ghats on the World Heritage List; (d) establishing a UNESCO Category II Centre at the Wildlife Institute of India, Dehradun; (e) discussion on Retrospective Inventory and Outstanding Universal Values and the Second Cycle of the Periodic Reporting. The highlight of this visit was the removal of Manas WHS from the 'List of World Heritage Sites in Danger' and referral of the dossier of the Western Ghats for nomination on the UNESCO World Heritage List.

Seminar on “Eco-sensitive zone and sarus wetland conservation”, Lucknow, *July 11, 2011.* The Uttar Pradesh Forest Department organized the workshop for sensitization regarding the legal provisions of declaring eco-sensitive zones under the Environment (Protection) Act, 1986 for the conservation of sarus cranes and other wetland species in non-forest areas. Shri Fateh Bahadur Singh, the Hon'ble Minister of Van Evam Van Jantu Udhyan, Uttar Pradesh, inaugurated the seminar. This sensitization seminar was participated in by all levels of officers from the Forest Department of Uttar Pradesh, administrators and NGOs from the state. One of the 4 key speakers, Dr. Sushant Chowdhury, presented a talk on “Environmentally/ecologically sensitive areas: a powerful legal tool for landscape conservation”, which highlighted the scope of this legal tool for

bringing a regulatory regime through informed knowledge on the species and habitats.

20th international conference on bear research and management, Ottawa, Canada, *July 17-24 2011.* Dr. S. Sathyakumar participated in the international conference. He made 2 oral and 3 poster presentations that were based on results from WII's ongoing research projects on bears.

The policy dialogue on *Hilsa* conservation, Kolkata, *July 24–26, 2012*. The objective of the meeting was to discuss the research findings and recommendations and to develop a consensus on a collective trans-boundary effort for *Hilsa* conservation. It was organized by the IUCN country offices of India and Bangladesh and the IUCN Asia regional office, Bangkok, to enhance the regional cooperation in conservation of *Hilsa* in the Sundarbans. The meeting was inaugurated by the Honorable Fisheries Minster, West Bengal. The IUCN country representatives from India and Bangladesh, scientists, academicians and fisheries stakeholders participated in the discussion. The 2 country representatives presented the joint research findings on critical issues related to *Hilsa* conservation. A 2-day field visit to the Sundarbans was arranged for the participants. At the end, a detailed discussion on the research findings was held and different policies were formulated for conservation of *Hilsa*. Dr. J.A. Johnson represented the Institute in the policy dialogue.

Programme on 'Ecosystem Services for Poverty Alleviation (ESPA)', London, *July 25-27, 2011*. Dr. Ruchi Badola was invited as an expert by the Programme Executive Board (PEB) of the ESPA programme, UK, in the moderating panel for finalization of projects for funding support of this programme.

Meetings of the 'Thematic group on wildlife conservation and management', New Delhi, 7th meeting on *August 1, 2011* and 8th meeting on *December 28, 2011.* The meetings were convened by the Inspector General of Forests (Wildlife). The Ministry of Environment & Forests (MoEF) aimed to evaluate and approve research proposals and technical reports of completed projects funded by the ministry.

Two meetings held at the MoEF primarily deliberated on the comments received on new research proposals seeking funding from the MoEF so as to take a final decision on their approval and funding. Likewise, research reports of completed projects were approved based on presentations made by the principal investigators of the projects. Dr. P.K. Mathur represented the WII in the meeting.

National workshop on 'Water, Energy and Biodiversity with Special Reference to North-East Region', Agartala, Tripura, *August 20-22, 2011*. Dr. V.B. Mathur, Dean, attended the national workshop on 'Water, Energy and Biodiversity with Special Reference to North-East Region' organized by the Tripura Biodiversity Board and presented a paper on 'Role of Protected Area (PA) Systems in Biodiversity Conservation: A National Perspective with a Focus on North-eastern Region (NER)'.

International conference on 'Ecology and Transportation', Seattle, Washington, USA, *August 21-25, 2011*. Shri Pragatheesh, Senior Research Fellow, attended the 2011 International Conference on Ecology and Transportation, Seattle, Washington, USA, and presented the poster paper 'Spatial Patterns and Factors Influencing the Mortality of

Avifauna on National Highway-7 Passing through Pench Tiger Reserve, Madhya Pradesh, India'.

Training-cum-workshop on 'Wildlife management', Dehradun, *September 5-10, 2011.* It was organized for in-service SFS officers by the Central Academy for State Forest Service, Dehradun. Dr. Parag Nigam provided inputs on 'Management of wild animals in distress' on September 6, 2011.

Student Conference on Conservation Sciences (SCCS), Bangalore, *September 14-16, 2011*. The National Centre for Biological Sciences (NCBS), Bangalore, organized the conference. Dr. V.B. Mathur, Dean, was invited to chair a plenary session and to present 'Reflections on the State of Wildlife Management in South and Southeast Asia'.

Workshop on "Challenges in climate change resilience and adaptation: Potential for ICIMOD-India collaboration", New Delhi, *September 30, 2011*. Dr. Ruchi Badola participated and provided technical and intellectual inputs in this workshop, held at India Habitat Centre, New Delhi.

Nodes training workshop on 'Biodiversity data publishing and fitness-for-use', Argentine Museum of Natural Sciences', Bernardino Rivadavia, *September 28–30, 2011*. The specific objectives of this course were to provide Global Biodiversity Information Facility (GBIF) node managers with up-to-date information about (i) the new biodiversity data publishing options based in Darwin Core Archives, spreadsheets and others; (ii) how to build data discovery and publishing strategies and action plans; and (iii) data quality and fitness-for-use.

The workshop was organized by the GBIF. As part of the GBIF's strategy to make biodiversity data publishing mainstream, the technological barriers faced by those willing to share their data have to be significantly lowered and the incentives for publishers multiplied. In parallel, assessing and improving the quality of the data published through the GBIF have been permanent concerns for the GBIF nodes, the Secretariat and anyone using the data. The course provided the GBIF nodes with an update on how those challenges and opportunities are being addressed and about the evolution of the process of data publishing: standards, methods, data flows, etc. This training was organized for GBIF node managers and staff members of GBIF nodes. Forty-four people from 38 countries participated. Dr. Gautam Talukdar participated in the workshop.

GBIF nodes global meeting, Argentine Museum of Natural Sciences, Bernardino Rivadavia, *October 1-2, 2011*. This was a meeting of the GBIF node managers voicing their requirements and concerns and identifying the way forward. This also provided the node managers a platform for interaction/learning among themselves and for getting first-hand information on how other nodes are operating.

It was organized by the GBIF. Participant nodes play the key role in implementing the GBIF as a truly decentralised global network. However, the majority of the participant nodes currently lack the vision, staff and budget necessary to operate. Resource barriers (insufficient funds, insufficient staff) are the most commonly identified barriers to furthering the development of national nodes. This underlines the importance of a formal level of endorsement of national nodes about their ability to function as sustainable biodiversity information facilities at the national level and as a part of the GBIF global network. Dr. Gautam Talukdar participated in the workshop.

18th meeting of the Governing Board (GB18) of GBIF, Buenos Aires, Argentina, *October 4-6, 2011.* The meeting was organized by the GBIF. The 18th meeting of the GBIF Governing Board (GB18) took place in Hotel Panamericano, Buenos Aires, Argentina. In all, 105 participants from 30 countries and 12 international organizations as well as observers participated in the meeting. Dr. Gautam Talukdar participated in the meeting.

GBIF Science Symposium, Cancilleria, Argentina, *October 5, 2011*. The objective was to commemorate 10 years of the GBIF, reaping benefits for science and society. It was organized by the GBIF. Once a year, the GBIF sponsors a science symposium in association with its Governing Board meeting and associated committees. The 2011 symposium focused on the experience gained during the GBIF's first decade of work and the future of biodiversity informatics. Topics addressed during the symposium included insights from eco-informatics studies on the climate and earth's biodiversity. Presentations were on lessons learned and experiences in building and managing biodiversity information networks in different countries across the globe. More than 100 participants, from academia, museum collections, governments and biodiversity networks, took part in the science symposium. Dr. Gautam Talukdar participated in the symposium.

National conference on "Recent advances in wildlife conservation", Gir National Park and Wildlife Sanctuary, Sasan Gir, Junagadh, *October 7-8, 2011*. The conference aimed to discuss the current status of wildlife conservation in the context of Gujarat State and deliberate on potential strategies and approaches. The conference was jointly sponsored by Saurashtra University and Gujarat Forest Department. The PCCF and Head of the Forest Force, Government of Gujarat, chaired the conference. The Pro-Vice Chancellor; Dean, Faculty of Sciences; and Prof. V.C. Soni, Department of Biosciences represented the university. Senior professional foresters, scientists and protected area managers attended the workshop. The Director, Wildlife Institute of India, and the Director, Indian Institute of Forest Management, Bhopal, also attended the workshop and provided resource inputs. A presentation entitled 'Landscape approach to conservation in the context of Gujarat State' was made by Dr. P.K. Mathur, and Dr. N.P.S. Chauhan made a presentation on human–wildlife conflict and mitigation strategies. The conference also had an integral component of a field visit to Gir Protected Area.

National symposium-cum-workshop 'Arachnology with reference to spiders: Ecology, biology and taxonomy', Solapur, *October 13-15, 2011.* This symposium-cum-workshop was organized by the Department of Zoology, Walchand College of Arts & Science, Solapur. Ms. Shazia Quasin participated as a resource person. With her expertise on spider taxonomy, she explained spider morphology and techniques of dissecting to the participants. She also gave a presentation on her work conducted in the Nanda Devi Biosphere Reserve on high-altitude spiders.

18th UNESCO General Assembly meeting of States Parties to the Convention concerning the Protection of the World Cultural and Natural Heritage, Paris, France, *November 7-9, 2011*. Dr. V.B. Mathur, Dean, was designated as a member of the official Indian delegation for the 18th UNESCO General Assembly of States Party to the Convention concerning the Protection of World Cultural and

Natural Heritage. The high point of this visit was the election of India as a member of the UNESCO World Heritage Committee.

UGC sponsored national symposium and workshop on 'Global warming and its impacts on biodiversity', Ambala Cantt., *November 8-9, 2011.* Dr. V.P. Uniyal, Shri Manish Bhardwaj and Ms. Shazia Quasin attended the symposium. Dr. V.P. Uniyal participated as a resource person and chaired the session. Mr. Bhardwaj presented a paper titled 'Species richness, diversity and rarity of butterflies along an elevation gradient in the Gangotri landscape, Uttarakhand'. Ms. Shazia Quasin presented a paper titled 'Spider (Araneae) diversity patterns along an altitudinal gradient in Nanda Devi Biosphere Reserve, the World Heritage Site, Uttarakhand'. The symposium was organized by Gandhi Memorial National College, Ambala.

6th Uttarakhand state science and technology congress, Almora, Uttarakhand, *November 13-17, 2011.* Dr. V.P. Uniyal, Shri Manish Bhardwaj, Shri Abesh Sanyal and Ms. Shazia Quasin attended this congress, organized by UCOST, Uttarakhand. Dr. Uniyal participated as a resource person. Three presentations were made on the conservation status of the Lepidoptera in the Gangotri landscape that were based on results from WII's ongoing research project in the Gangotri landscape and Nanda Devi Biosphere Reserve.

Workshop on 'Capacity building for research and information exchange on socio-economic impacts of living modified organisms under the Cartagena Protocol on Biosafety', New Delhi,*November 14-16, 2011*. The Executive Secretary, Secretariat of the Convention on Biological Diversity (CBD), invited Dr. Asha Rajvanshi as one of the resource persons to attend the workshop on capacity building for research and information exchange on socio-economic impacts of living modified organisms under the Cartagena Protocol on Biosafety, New Delhi. The objectives of the workshop were (i) analysis of the capacity building activities, needs and priorities regarding the socio-economic considerations submitted to the Biosafety Clearing House by the parties and other governments and identification of options for co-operation in addressing those needs; and (ii) exchange and analysis of information on the use of socio-economic considerations in the context of Article 26 of the protocol.

Dr. Asha Rajvanshi provided an insight into participatory approaches adopted in India for environmental decision making through her presentation on socio-economic considerations in environmental decision-making in India. The

workshop was organized by the CBD secretariat, and the fund support for the participation of WII faculty members was also provided by the CBD.

17th meeting of scientific council of convention on migratory species, Bergen, *November 16-19, 2011*. The 10th meeting of the Conference of the Parties (COP 10) to the Convention on the Conservation of Migratory Species of Wild Animals (CMS), with the theme of 'Networking for Migratory Species', was held in Bergen, Norway. CMS, also called the Bonn Convention, is an international treaty concluded under the aegis of the United Nations Environment Programme (UNEP) dedicated to the conservation of migratory animals such as birds, whales and dolphins, sharks, gorillas, marine turtles and elephants. CMS has committed itself to protecting migratory animals and preserving their habitats.

Prior to COP 10, the 17th meeting of the CMS Scientific Council was held to finalize advice on scientific issues and priorities for research and conservation for discussion and approval. Two members of the Indian delegation, *i.e.* Smt. Prakriti Srivastava, Dy. Inspector General of Forests (Wildlife), MoEF, and Dr. K. Sivakumar, Wildlife Institute of India, attended the meeting. The 17th meeting of the CMS Scientific Council also discussed and considered listing new species on the convention's two appendices.

Ist Indian Forestry Congress, New Delhi, *November 22-25, 2011*. The Indian Council for Forestry Research and Education (ICFRE), Dehradun organized the Ist Indian Forestry Congress on the theme “Forests in the Changing World” in the PUSA Campus, New Delhi. Dr. V.B. Mathur, Dean was invited to chair a technical session and to present a lead paper on “Protected Area Management: New Paradigm for Conservation”.

Workshop on 'Management of grasslands in Kanha Tiger Reserve', Kanha TR, *November 23-24, 2011*. A field-level workshop on the Kanha grasslands was organized, focusing on the use of prescribed fire for their management, to formulate appropriate strategies for their long-term management and conservation. Thus, the workshop aimed to assess the ecological status and necessity for prescribed burning in the grassland and forest communities forming the rangelands supporting the wild ungulate populations.

The workshop was sponsored by the Wildlife Wing of the State Forest Department, Government of Madhya Pradesh, and organized by the Field Director, Kanha Tiger Reserve, Mandla. Experts from South Africa who have been involved in prescribing fire for management of vegetation were specifically invited. The workshop was attended by protected area managers and scientists involved in the management of grasslands. Dr. P.K. Mathur was invited as a resource person. The workshop was chaired by the PCCF (WL) and CWLW, Madhya Pradesh. The workshop included presentations by members working on the 'Fire International' team on techniques for ecological assessment of vegetation for wildlife management and focused on the role of fire in grassland and forest communities. Techniques for assessing the condition of the vegetation were also demonstrated in the field. The workshop concluded that the grasslands are in a highly moribund and unpalatable condition, urgently requiring burning to provide young nutritious re-growth for grazing ungulate species such as gaur, barasinga and chital. Thus, prescribed burning was recommended.

National workshop on 'Bio-Informatics: Development of Web Portal for the Western Ghats', Bangalore, *November 24, 2011*. This national workshop was

organized by the Ashoka Trust for Research in Ecology and the Environment (ATREE). Dr. V.B. Mathur, Dean, was invited to present a paper on 'Developing Biodiversity Information Facility: The Indian Initiative'.

Stakeholders' workshop on 'Conservation of Hangul and Other endangered Mountain Wildlife Biodiversity', Srinagar, J&K, *November 27-28, 2011*. Dr. S. Sathyakumar and Dr. Bilal Habib participated in this workshop, organized by Sher-e-Kashmir University of Agricultural Sciences and Technology, Kashmir (SKUAST-K), and provided technical inputs at the discussions.

Three-Day Assessors Training Workshop, Chandigarh, *December 1-3, 2011*. This 3-day workshop was organized by the National Accreditation Board for Education and Training (NABET), Quality Council of India, with an objective of discussing the issues and challenges linked to the assessment of EIA consultants. Most of the assessors experienced difficulties in understanding the ecology- and biodiversity-relevant issues that are to be addressed in an EIA and in assessment of the capability of the experts proposed by applicants. Dr. Asha Rajvanshi was invited by NABET to conduct a 90 minute session on "Ecology and biodiversity issues in EIAs: 'How to' guidance for assessors". This session provided much needed information for conducting the assessments.

UNESCO sub-regional workshop on 'Second cycle of the periodic reporting for West, Central and South Asia', Suwon, Republic of Korea, *December 5-12, 2011*. Dr. S. Sathyakumar participated in this subregional workshop, which was organized by UNESCO. He provided technical inputs to state parties during workshops and discussions.

CBD workshop "Sub-regional workshop for South, East and South-east Asia on capacity building for the implementation of the programme of work on protected areas under CBD", Dehradun, *December 6–10, 2011.* Dr. Bilal Habib attended the workshop.

International Mountain Day: Theme – Vulnerability of Forests in Himalaya, TERI, New Delhi, *December 9, 2011*. This workshop, held on International Mountain Day was intended to deliberate on vulnerability in the Himalaya and on approaches to mitigate it. The Energy Research Institute (TERI), New Delhi, organized the workshop. Dr. P.K. Mathur was invited as a resource person. The workshop was attended by policy makers, senior foresters, field managers, scientists and NGOs working in the mountains, particularly the Himalayan region. Dr. Mathur made a presentation on 'Biodiversity conservation in the Himalaya'. He highlighted the diversity and management challenges in the Himalaya and the need for the implementing landscape approach to conservation for management of natural living resources, sustainable livelihoods and development and summarized the current constraints in effectively dealing with this much desired approach of landscape management.

Meeting of State Board for Wildlife, Himachal Pradesh, Secretariat, Shimla, *December 16, 2011*. The meeting had multiple agenda items. Essentially, the board, under the chairmanship of the Hon'ble Chief Minister, deliberated on the status of wildlife in the state of Himachal Pradesh, challenges and constraints, human–wildlife conflicts, upcoming projects and of

the need to divert forest lands and capacity building. The meeting was convened by the PCCF (WL) and CWLW, Himachal Pradesh. Most of the non-official and *ex-officio* members were present at the meeting. Senior foresters and protected area managers were also invited. Dr. P.K. Mathur represented the WII at the meeting. He expressed concern about underutilization of training opportunities by the state at the Institute and highlighted the need for posting wildlife-trained personnel in the protected areas.

International conference on "Advances in ecological research" (ICAER-2011), Bikaner,*December 19-21, 2011*. Dr. Pranab Pal participated in this international conference, which was organized by Maharaja Ganga Singh University, Bikaner, India. The objective of the conference was to discuss the environment crises society is facing today. It focused on (a) Ecology and Environment; (b) Resources & Management; (c) Pollution & Environmental Degradation; (d) Monitoring, Conservation & Policies; and (e) Desert Ecology. The participants were invited from several parts of the country as well as abroad, *i.e.* Norway, USA, Sri Lanka, Bangladesh and Nepal. Dr. Pal presented a paper on "Impact of global warming and climate change on biodiversity".

Expert consultation to development future strategic programme for trans-boundary biodiversity management and climate change adaptation initiative in case of 'Brahmaputra Salween Landscape', Nay Pyi Taw, Myanmar, *December 21-23, 2011*. The overall objective of the consultation was to develop a framework for long-term programmatic action and to begin the process to develop the regional cooperation framework for the Brahmaputra–Salween Landscape (BSL). The ICIMOD, Kathmandu, Nepal, initiated this effort in the trans-boundary landscape. The BSL is a biodiversity-rich trans-boundary landscape that stretches across China, India and Myanmar in the eastern Himalaya. The landscape hosts several well-known protected areas such as Namdapha National Park and Tiger Reserve, Arunachal Pradesh; Hkakabo Razi National Park, Kachin State, Myanmar; and Gaoligongshan National Nature Reserve, Yunnan Province, China. These hold a contiguous habitat of several plant and animal species of global conservation significance. Besides harbouring an extremely rich biodiversity, this landscape is home to diverse ethnic communities with unique socio-cultural traditions. However, there are numerous environmental and socio-economic discrepancies impacting the existence of both the region's biodiversity and its people.

Striking a balance between traditional resource use patterns, globalization, sustainable development and biodiversity conservation in the region is the challenge at hand. Trans-boundary landscape complexes like the BSL are viewed as platforms for initiating cumulative regional action towards the long-term sustainability of the entire landscape and the environmental and socio-economic elements within them. The second consultation on the BSL again brought together ICIMOD and partner institutions from the 3 member countries to reflect on the outcomes of the first consultation in Tengchong, China, and to work out a framework for future programmatic action. About 30 participants representing academic and research institutes, government representatives, international organizations and ICIMOD attended the consultation. Dr. P.K. Mathur represented the WII in the expert consultation. The consultation was successful in producing a draft framework to define the long-term vision, goals, objectives and a strategic action plan to facilitate both national and regional biodiversity management in the BSL.

Workshop on 'Mount Kailash Sacred Landscape Conservation Initiative Implementation Plan – India: Partner's Consultation and Drafting', Almora, *December 23-27, 2011*. This workshop was organized by G.B. Pant Institute of Himalayan Environment and Development, Kosi-Katarmal, Almora. Dr. B.S. Adhikari participated in the workshop.

105th International Training Programme on "Environment Audit", New Delhi, *January 9 -February 3, 2012*. The International Centre for Information Systems and Audit (ICISA) organized the 105th International Training Programme on "Environment Audit" at New Delhi. Thirty-five public auditors from 24 countries participated in this programme. Dr. V.B. Mathur, Dean, was invited to present a paper on 'Mainstreaming environmental considerations in road transportation planning'.

Conference on 'Mining for sustainability', Goa, *January 13-14, 2012*. The Federation of Indian Mineral Industries (FIMI) invited Dr. Asha Rajvanshi as a resource person. The conference aimed to discuss various facets of sustainability as relevant to the mining sector and to review best practices on both environmental and social aspects for improving transparency and governance. Dr. Asha Rajvanshi made a presentation on *'Mainstreaming biodiversity conservation for sustainable mining: Regulatory reforms and best practice approaches*' in the technical session of the workshop. The workshop was organized by FIMI, and financial support for participation was provided by FIMI.

Meeting for preparation of implementation plan – Mount Kailash Sacred Landscape Conservation Initiative (KSLCI), Almora, *January 24, 2012*. The meeting aimed to brainstorm on the approaching execution of the implementation plan in the trans-boundary Mount Kailash Sacred Landscape. The participants included officials from the Ministry of Environment & Forests and the Uttarakhand Forest Department, scientists from the WII and the G.B. Pant Institute of Himalayan Environment & Development, and representatives from the International Centre for Integrated Mountain Development (ICIMOD) and Kumaun Mandal Vikas Nigam. Dr. P.K. Mathur and Dr. B.S. Adhikari represented the Institute. The discussion was organized under different sub-heads in the section on 'Exploring the 'Yatra Way' in the implementation of KSLCI. The ICIMOD has identified 7 landscapes to facilitate trans-boundary and sustainable development in the 8 regional member countries in the Hindu Kush Himalayan (HKH) region.

DST-sponsored Haryana Science Congress, RKSD (PG) College, Kurukshetra University, Kaithal, Haryana, *February 2, 2012*. Dr. V.P. Uniyal participated as a resource person and delivered a key note address on "Indian wildlife and protected areas management in India".

Training programme on "Management Effectiveness Evaluation of Protected Areas", Chitwan National Park, Nepal, *February 3-5, 2012*. Dr. V.B. Mathur, Dean, was invited as a resource person in the training programme. The training programme was organized by the Smithsonian Conservation Biology Institute (SCBI), USA.

VIII Meeting of the State Board for Wildlife, Government of West Bengal, Kolkata, *February 6, 2012.* Dr. Sushant

Chowdhury, from the WII, attended the meeting. The meeting was chaired by the Vice-Chairperson, Shri Hiten Burman, the Hon'ble Minister-in-Charge, Department of Forests, Government of West Bengal. Important agenda items that came up for discussion were: concerns about wounded elephants straying back from adjoining Nepal, death of elephants on rail tracks, deployment of elephant squads in Purulia, Bankura and Midnapore, a proposal for rhino reintroductions in Buxa and Rasomoti, setting up a tiger rescue/rehabilitation centre at Jharkhali and a bear rescue centre at Purulia, conducting a study on the prey base of the tiger and assessing the crocodile population in the Sundarbans, developing a satellite zoo at Bhagabanpur, etc.

Natural Heritage Conservation meetings, Japan, *February 12-18, 2012.* The Ministry of Foreign Affairs, Japan, and Chair, Japan Committee for IUCN, invited Dr. V.B. Mathur, Dean, to participate in 2 international meetings, *viz.* 'Heritage and Disaster Reduction' and 'Protected Areas and Disaster Reduction', in Japan.

A 2-day field training as part of the "Hunting the Hunters – II: Capacity building programme on wildlife crimes", Mount Abu, *February 18-19, 2012.* This field training was organized for the frontline staff of the Rajasthan Forest Department by Tiger Trust and was supported by US Fish & Wildlife Services. The programme aimed at building capacity in the area of wildlife crime detection, investigation and prosecution. Dr. Parag Nigam participated in the conference and provided teaching inputs on the relevance of proper sampling in wildlife crime investigation. A field demonstration of evidence collection in a crime scene, including biological sampling, labeling, packaging and report writing, was carried out.

Brainstorming session on 'Scientific plans for Larsemann Hills', Goa, *February 24, 2012.* Dr. S. Sathyakumar participated in this brainstorming session, held at the National Centre for Antarctic and Ocean Research, Goa. He made a presentation on the WII's scientific plans for the period 2012–17 and participated in the discussions.

One-day training workshops on 'Managing human–leopard conflict', Chandigarh, *February 27, 2012* and Pinjore, Haryana, *February 28, 2012*. Dr. Bilal Habib attended the workshops.

Asia regional workshop on 'Global Biodiversity Information Facility (GBIF)', Ivy Hall, Aoyama, Tokyo, *March 1-2, 2012*. The agenda items of the workshop were (i) State of MoU and expanding membership; (ii) presentation of reports by the participants; (iii) discussions and brainstorming sessions on 'Coordination of GBIF activities in the Asian region', and 'Promoting data accumulation in the Asian region'; and (iv) election of a representative from the Asian region.

This was organized by the Ministry of Environment, Japan, and the GBIF. Following the previous meetings in Thailand and India, the third round Asian meeting was held in Tokyo. In all, 20 participants from 6 countries attended the meeting. The goal of the workshop was to facilitate regional cooperation, with information sharing in the Asian region and inputs from the GBIF Secretariat. On strengthening the status of the GBIF in Asia, the discussions in the meeting were focused on 3 major challenges: (i) data publishing; (ii) scientific usage of GBIF data; and (iii) new data types. Dr. Gautam Talukdar attended the workshop.

Globalization studies senior seminar, Gettysburg College USA, *March 27–April 10, 2012*. Dr. Ruchi Badola was invited by Gettysburg College, USA, to give lectures to students and faculty members on the topic "Globalization, the environment, and sustainable development", based on her experience with conservation–development issues in India. During the visit, she was also requested to interact and present the work done on ecological economics and payments for ecosystem services at the Globalization Studies Senior Seminar.

Study Tours

Study visit on 'Effect of forest fragmentation on butterfly guilds in western Himalaya', to Hungarian Natural History Museum, Budapest, Hungary, *January - March 2012.* Shri Manish Bhardwaj visited the Animal Ecology Research Group, Hungarian Natural History Museum. The objective of the visit was to study the level of impact of forest fragmentation on butterfly communities in the Himalayan region. It was observed that small-sized, non-migratory and monophagous butterflies subsisting in small populations are severely threatened due to forest fragmentation and habitat degradation in the Himalaya. The visiting scholarship was awarded by the Hungarian Scholarship Board, Hungary.

Study abroad programme on 'Wildlife management and conservation', Dehradun, *December 18, 2011 - January 3, 2012.* A study abroad programme on wildlife management and conservation was organized by the Wildlife Institute of India for students of North Carolina State University. In all, 16 undergraduate (animal science majors) and DVM students from North Carolina State University, Raleigh, NC, attended the 2-week programme. The programme was designed with the objective of educating and familiarizing students with wildlife management practices in India, exposing students to the current conservation challenges faced by wildlife managers, discussing strategies to address them and acquainting students with aspects of Indian culture, traditions and history, integrating it with the wildlife education to enhance their learning experience.

The course essentially provided an overview of field strategies and the basics of laboratory analysis and interpretation approaches as well as tools that wildlife biologists use in management and conservation of wildlife. The course included 3 modules that focused on (i) research and management of wildlife in a national park, (ii) wildlife techniques and monitoring and (iii) theory lectures on various aspects of wildlife management and conservation, wildlife forensics, wildlife health and human–wildlife conflict issues.

PROFESSIONAL SUPPORT

Collaborations
Services
Environmental Impact Assessment
IT and RS & GIS
Wildlife Forensic
Library and Documentation Centre
Wildlife Health Services
Wildlife Extension & Audio Visual
Wildlife Policy Research
National Wildlife Database
ENVIS Centre
Research Laboratory
Herbarium
Campus Development
Sports

PROFESSIONAL SUPPORT

International Collaboration

Professionalizing Protected Area Management for the 21st Century – A World Heritage Biodiversity Programme for India (WHBI)

The United Nations Educational, Scientific and Cultural Organization (UNESCO), in collaboration with the United Nations Foundation (UNF), had given a planning grant in 2001 to the Ministry of Environment & Forests (MoEF), Government of India, to develop a 10-year World Heritage Biodiversity Programme (WHBP) for India. The goal of this WHB programme is to strengthen biodiversity conservation in protected areas by building replicable models at World Heritage sites that emphasize law enforcement, promote habitat integrity and connectivity and improve the professional, social and political profile of the protected area management community and its civil society partners. The MoEF entrusted the responsibility of developing a framework proposal for identifying priorities, actions and activities and their time frame and budget requirement under this project jointly to the Wildlife Institute of India and the Ashoka Trust for Research in Ecology and Environment (ATREE), Bangalore. The WHBP proposal was discussed and finalized in consultation with representatives from the UN Foundation, UNESCO, Ford Foundation and ATREE. The UN Foundation and its partners have agreed to provide funds amounting to US$1.83 million for the 4-year implementation phase of the WHBPI.

During the reporting period, a range of activities were carried out under the project "Building partnerships to support UNESCO's World Heritage Programme: India" in all 4 pilot sites, *viz.* Keoladeo National Park, Rajasthan; Nandadevi National Park, Uttarakhand; Kaziranga National Park, Assam; and Manas Wildlife Sanctuary, Assam. The responsibilities for implementation of the project activities in Keoladeo and Nandadevi National Park were assigned to the Wildlife Institute of India and to ATREE, Bangalore, for Kaziranga and Manas. Field equipment/gear was provided to the park staff, and livelihood enhancement activities were taken up at the project sites. Several thematic workshops were conducted to build the capacity of the frontline staff. The rickshaw pullers-cum-guides at Keoladeo National Park were given courses in the French and German languages. Fifty students

each from local communities and staff were selected in Keoladeo and Nanda Devi National Park on the basis of a competitive examination for the award of World Heritage Biodiversity scholarships. The 100 selected students are serving as ambassadors to carry forward the message of conservation awareness and natural heritage conservation.

The project activities were reviewed in the Project Steering Committee meetings chaired by the Additional Director General (WL). A mid-term evaluation of the project was carried out by a team from the National Institute of Ecology, New Delhi, which concluded that the project had made significant contributions to the conservation of biodiversity and to raising awareness about natural heritage conservation. The project is coordinated by Dr. V.B. Mathur. The site coordinator for Nanda Devi WHS and Keoladeo WHS are Dr. S. Sathyakumar and Dr. K. Sivakumar, respectively.

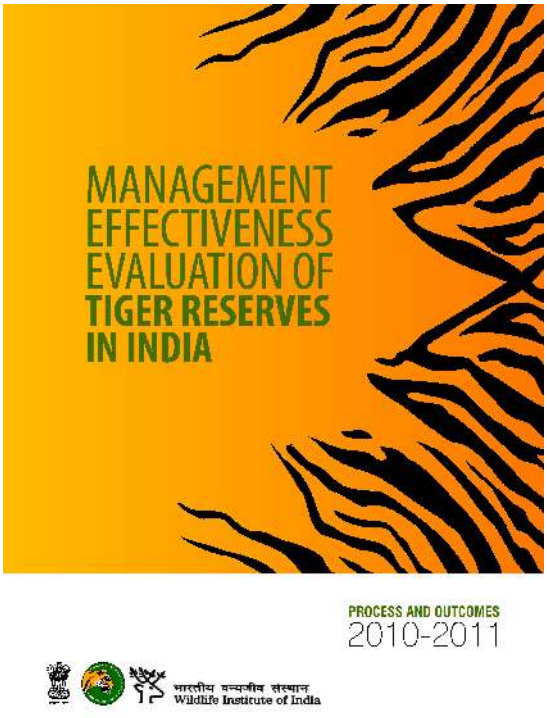
GBIF

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. GBIF membership is open to any country or relevant international organizations. A memorandum of understanding (MoU) has to be entered into for membership. The first MoU with the GBIF was for a 5-year duration, from 2001 to 2006, and the second MoU is for the period 2007–11. India's association with the GBIF is from July 2003. The CSIR (represented by NBRI) has been an Associate Partner of the GBIF through signing an MoU. The MoU signed by CSIR in 2003 was renewed in 2008 for a period up to 2011. In August 2009, the work relating to the GBIF was transferred to the MoEF, and it nominated the National Biodiversity Authority (NBA), Botanical Survey of India (BSI), Zoological Survey of India (ZSI), Foundation for Revitalisation of Local Health Traditions (FRLHT) and Wildlife Institute of India (WII) as GBIF-nodes in India. The WII was designated as the overall coordinating node. Several activities were undertaken since then, including participation in capacity building opportunities provided by the GBIF. In this period, India was able to mobilize approximately 7,000 records, through the Integrated Publishing Toolkit (IPT) instance, hosted at the WII, and was able to publish the first data paper in the journal *Zookeys*. The MoU of 2007–11 expired, and a new MoU came into force in 2012. India is yet to sign this MoU.

Services

Management Effectiveness Evaluation (MEE) of Tiger Reserves in India (2010–11)

The National Tiger Conservation Authority (NTCA) was assigned the responsibility of technical backstopping independent management effectiveness evaluation (MEE) of tiger reserves in



India. The NTCA constituted 5 independent MEE committees to conduct evaluations of all 39 riger reserves. The institute prepared a technical manual to guide the MEE process. The final report, *Management Effectiveness Evaluation of Tiger Reserves in India: Process and Outcomes 2010–2011*, was released by the Additional Director General (Wildlife) in July 2011.

Biodiversity Conservation and Rural Livelihood Improvement (BCRLI)

Funding Source : International Development Agency and Global Environment Facility through World Bank
Project Co-ordinator : Shri V.K. Uniyal
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 following objectives: (i) to achieve this, assist implementing forest departments to demonstrate the processes and outcomes of the approach; (ii) to this effect, build national and regional capacities in landscape-level management; and (iii) specific tasks including ecological mapping, identification of biological indicators and spearheading team trainings and consultation workshops with policy makers, implementing officers, stakeholders and key line departments.

Progress: The Wildlife Institute of India (WII) is one of the implementing agencies in the project, which is coordinated by the Ministry of Environment & Forests (MoEF). In order to formalize the implementation arrangements, an MoU was signed between the WII and MoEF on 25 July 2011. The MoU was subsequently revised to firm up financial arrangements within the WII, and the revised MoU was signed by the Director, WII, on December 19, 2011. After it was signed by the MoEF, the agreement became effective from January 2012.

During the financial year 2011–12, the following tasks were accomplished:

Three contract staff members, a Project Assistant (GIS), a Project Assistant (Technical) and an Accounts Officer, have been appointed. Implementation teams from the WII were constituted, base maps were procured and a preliminary field visit to the Askot Landscape was completed.

The Uttarakhand Forest Department and Gujarat Forest Department were consulted for the Askot and Little Rann of Kutch (LRK) landscapes, respectively, to finalize spearhead teams in the field. A draft curriculum was prepared. The preliminary visits of WII faculty members to the field learning centres at Periyar, Kalakad Mundanthurai Tiger Reserve and Gir served to initiate action on documentation of best practices and development of the curricula of the field learning centres.

The Annual Work Plan and Procurement Plan for 2011-12 was prepared, and activities were initiated. The First Support Implementation visit by the World Bank and the MoEF to the WII was held in December, and interactions with the implementation teams of the WII took place. The process of recruitment of an international consultant has been initiated.

Outputs and Outcomes: (i) A draft concept paper on the landscape approach to conservation was finalised and sent to the World Bank for further action. (ii) Through consultation, further spearhead teams were formed in LRK and Askot. (iii) All field learning centres (Gir, Periyar Tiger Reserve and Kalakad Mundanthurai Tiger Reserve) were visited, and the course curriculum was proposed. (iv) The spearhead team prepared the course curriculum. (v) A methodological framework was prepared for ecological mapping and biological indicator studies.

Environment Impact Assessment

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

Professional Support to Other Organizations

Professional support to the Indian Road Congress (2011–13): Dr. Asha Rajvanshi was invited to serve as a member of the Environment Committee (G-3) of the Indian Roads Congress, which is a premier technical body for ensuring environmental conservation and sustainable development of highways projects in India. In this capacity, Dr. Rajvanshi continued to provide professional support. Subsequently, in March 2012, Dr. Asha Rajvanshi was invited to serve on the Committee on Reduction of Carbon Footprint in Road Construction and Environment (G-3).

Professional support to Quality Council of India's National Registration Board for Personnel and Training: As part of the ongoing initiative of the MoE&F 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). The Quality Council of India invited Dr. Asha Rajvanshi to become a member of the Technical Committee. In the reporting year, Dr. Rajvanshi continued to provide professional support to the QCI for standarization of the criteria for assessment of EIA reports and taking forward the scheme for implementation through contributions in several consultative meetings organized during the reporting year. Subsequently, in March 2012, Dr. Asha Rajvanshi was invited to serve on the Accreditation Committee for registration of EIA consultant organizations for NRBT registration. During the reporting year, Dr. Rajvanshi provided professional inputs in the evaluation of applications received for seeking accreditation of the QCI.

Professional Support to IAIA: The International Association for Impact Assessment (IAIA) is an interdisciplinary, non-profit professional society established in 1980. This professional body, with over 2,500 members representing EIA professionals, practitioners, government officials, project planners, administrators, teachers and students from across the globe, is the leading global authority for advancing innovations and communication of best practices in all forms of impact assessment. Dr. Asha Rajvanshi and Dr. V.B. Mathur have been members of this association for a long time. Dr. Asha Rajvanshi continued to be the advisor for its biodiversity section. In this capacity, Dr. Asha Rajvanshi assisted the new section chairs to take over the role of coordinating the activities of the biodiversity section. During this period, she also served as a link between the IAIA and the Global Biodiversity Information Facility (GBIF) for promoting the GBIF's initiatives of developing an EIA data publishing framework.

Professional Support to Qatar National Research Fund (QNRF): During the reporting year, Dr. Asha Rajvanshi was invited by the Director, Qatar National Research Fund (QNRF), Qatar Foundation, to serve as a peer for evaluating research proposals for the fourth cycle of their flagship programme, the National Priorities Research Program (NPRP).

Collaboration with Global Biodiversity Information Facility (GBIF) for EIA Biodiversity Mobilization: The pilot project for mobilization of EIA Biodiversity, developed under the interorganizational partnership between India and the Global Biodiversity Information Facility (GBIF) on the lines of the South African National

Biodiversity Institute (SANBI), was approved by the Ministry of Environment & Forests, Government of India. A memorandum of understanding was signed between the GBIF and the WII for initiating the project. Following this, the task of data discovery from EIA reports was initiated, and the framework adopted in South Africa was reviewed so that it could be adopted for the India Pilot Project.

During the reporting period, a meeting of the project partners from India and South Africa was held in Pretoria, South Africa (SA), during 19–20 April 2011 for reviewing the EIA Biodiversity Data Publishing toolkit as thus far developed by South Africa and to exchange knowledge between SA and India for development of pilots for the respective countries. Subsequently, efforts were made to discover data from existing EIA reports, develop the data publishing framework and conceptualize the design for the web-based EIA Biodiversity data publishing portal. Rapid progress has been made in accomplishing these tasks at the WII. Based on the experience of this project, a best practice guidance manual for publishing primary biodiversity data has been jointly developed by all project partners including the GBIF, SANBI and WII. This manual was showcased at the annual meeting of the International Association for Impact Assessment at Puebla, Mexico during May 31 to June 4, 2011.

Advisory support to Ministry of Environment & Forests, Government of India on matters related to environmental decision making

(i) Site visit of the proposed 4 × 60 MW captive thermal power plant with 1.0 MTPA cement grinding unit and 1.0 MTPA coal washery at Churk Village, Roberstsganj Tehsil, District Sonebhadra, UP: The WII continued to provide advisory services to the MoEF on matters related to environmental decision making. In response to the decision taken at the 22nd meeting of the National Board for Wildlife (NBWL), held on 25 April 2011, the MoEF requested the WII to carry out a visit to the site of the proposed 4 × 60 MW captive thermal power plant with 1.0 MTPA cement grinding unit and 1.0 MTPA coal washery at Churk Village, Roberstsganj Tehsil, District Sonebhadra, UP, in close proximity to Kaimur Wildlife Sanctuary, UP. Accordingly, the Institute nominated Dr. Asha Rajvanshi and Dr. Dhananjai Mohan to conduct the aforesaid site visit during July 17-19, 2011. Based on the observations made during the site visit and consultations with local forest officials and the project authorities, a report was submitted to the MoEF, Government of India.

(ii) Assessment of cumulative impacts of hydroelectric projects on aquatic and terrestrial biodiversity in Alaknanda and Bhagirathi basins, Uttarakhand: The MoEF, vide letter no. F 8-9/2008-FC dated July 23, 2010 requested the Wildlife Institute of India (WII) to conduct a study on the cumulative environmental/ecological impacts of hydroelectric projects in the Bhagirathi and Alaknanda river basins on the riverine ecosystem, including the terrestrial and aquatic biodiversity, in collaboration with specialized institutions. In response to this, the technical and financial proposal for the conduct of the study was submitted by the WII and approved by the MoEF. The study had the following objectives: (a) To assess the baseline status of rare, endangered and threatened (RET) species of flora and fauna dependent on the riverine habitats and floodplains of the Alaknanda and Bhagirathi river basins. (b) To identify the critical wildlife habitats along the existing and

planned hydroelectric projects located on the Alaknanda and Bhagirathi rivers up to Devaprayag. (c) Delineate river stretches critical for conservation of RET aquatic species. (d) To assess the key habitat variables for RET species, including the minimum flows and volume of water for ecological sustainability of the 2 rivers.

The research team for this project consisted of the investigators, Dr. V.B. Mathur, Dr. G.S. Rawat, Dr. Asha Rajvanshi, Dr. S. Sathyakumar, Dr. K. Sivakumar, Dr. J.A. Johnson and Dr. K. Ramesh, and the researchers, Dr. Manish Kandwal, Mr. Nand K. Dimri, Mr. Ajay Maletha, Mr. P. Gangaiamaran and Ms. Roshni Arora. The project also received advisory inputs from Mr. B.C. Choudhury, Dr. V.K. Melkani and Mr. V.K. Uniyal during the course of the study. The project team undertook a series of site visits within the zones of influence of different proposed projects for generating the ecological baseline and identifying sources of impacts and their receptors within the Alaknanda and Bhagirathi river basins. The assessment took into consideration the existing biodiversity values of the basins/sub-basins and identified development trends and predicted the cumulative impacts of existing and proposed developments on the specific ecosystems and their biodiversity values within 18 sub-basins in the 2 major basins. The final report of the project *"Assessment of Cumulative Impacts of Hydroelectric Projects on Aquatic and Terrestrial Biodiversity in Alaknanda and Bhagirathi Basins, Uttarakhand, Wildlife Institute of India"* has been prepared and submitted to the Ministry of Environment & Forests, Government of India.

(iii) Macro-level EIA study of Bellary, Chitradurga and Tumkur districts of Karnataka: The Hon'ble Supreme Court of India directed the Indian Council of Forestry Research and Education (ICFRE) to carry out a macro-level EIA study of Bellary, Chitradurga and Tumkur districts in collaboration with the Forest Survey of India (FSI)

and Wildlife Institute of India (WII), calling in other domain specialists as needed in consultation with the Ministry of Environment & Forests (MoEF). The National Environmental Engineering Research Institute (NEERI), Nagpur, and National Remote Sensing Centre (NRSC), Hyderabad, were included in the study as expert organizations in their respective fields. This study, involving 50 scientists and foresters and subject matter specialists in the fields of environment, wildlife mining and remote sensing, undertook the assessment and prepared the reports 'Macro-Level Environmental Impact Assessment Study Report of Bellary District, Karnataka' and 'Macro-Level EIA Study in Chitradurga and Tumkur Districts, Karnataka for submission to the Ministry of Environment & Forests, Government of India.

IT and RS & GIS

The Information Technology, Remote Sensing and Geographic Information System facility is the hallmark of WII for providing cutting edge technology relevant to wildlife research, education and training. The facility is available round the clock to the faculty members, trainees, researchers, students and collaborators working with the institute. A large number of desktop computers configured with updated operating systems and specialized analytical software for data processing and research purposes are made available in a dedicated lab. The computer facility is provided by wide array of

hardware connected to a local area network (LAN). There are Intel Pentium Xeon/Itanium servers for Internet, Intranet, database management and library automation services; workstations; a storage area network (SAN); and more than 300 nodes. The institute has Internet leased line connectivity. Wi-Fi connectivity has also been provided almost throughout the campus. All the computers of the institute are provided with Internet and mailing services. The institute is set on the path of e-governance for improved efficiency.

The Geo-informatics Laboratory at the WII, *with* a geographic information system and remote sensing and global positioning system (GPS) technology, caters to the research and training programme of the institute and to demands from field managers. The laboratory is equipped with the latest major software packages such as ArcGIS, ERDAS Imagine and Idrisi and several open source programs for modelling species distributions, niche requirements, landscape change detection, etc. A dedicated team is available for providing support and training in IT and geo-informatics. A module on remote sensing and GIS is conducted for the M.Sc., P.G. Diploma and Certificate courses at the WII, and hands-on training is also provided to other graduate students and interns. Work is in progress for the development of the National Wildlife Spatial Database.

IT facility enhancement: During the reporting year, the Wi-Fi facility in the guest house and hostels was enhanced to provide users and guests with a reliable and fast Internet connection.

The IT & RS/GIS Cell developed Web-based "Medical Information System Software", which is available through the Institute Intranet services (http://intranet/medical). The software was developed using Microsoft ASP Script and runs on MS Access. The software is capable of generating online reports, *viz.* date-wise claims (individual and complete claims), hospital-wise claims and custom reports. Individuals can view their claims using an authentication method.

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. Work is in progress on the development of a spatial database on the boundaries of all the national parks, wildlife sanctuaries, conservation reserves and community reserves in the country. Similarly, digitization of the division, range and beat boundaries of the 17 tiger range states in the country is in progress. Country-level data on climate, vegetation, topography and animal distribution are being made available.

Workshop/conference/training attended: Shri Dinesh Singh Pundir participated at the State ENVIS Centre website workshop related to website redesign, security audit and other issues during May 4-5, 2011 at Van Vigyan Bhawan, New Delhi. Shri Pundir participated in the "Regional Workshop on Strategies for Digitization and Mobilization of Natural History Collections Data" during June 15-17, 2011, at Kolkata, India. He also participated in the experts workshop on the "Global Biodiversity Information Facility (GBIF) Integrated Publishing Toolkit v. 2 (IPT)" held in Copenhagen, Denmark, during June 20-22, 2011. The objective of the workshop was to support and expand the GBIF-distributed helpdesk and training programmes. Ms. Alka Aggarwal participated in the training programme on remote sensing and GIS technology and applications at the National Remote Sensing Centre, Hyderabad, from November 14, 2011 to February 3, 2012. The course offered her an opportunity to learn the concepts of remote sensing, satellite image interpretation, digital processing, pattern recognition and geographic information systems (GIS). This course included theoretical and hands-on practical sessions. The training also included application of remote sensing and GIS to natural resource mapping, management

and monitoring. Participants were given a 3-week hands-on project work on thematic analysis in their respective areas of specialization. The participants were taken on a field visit to Earth Station, Shadnagar, in Hyderabad, to familiarize them with satellite data reception. They also visited Narsapur and surrounding areas to learn about visual interpretation of satellite images for land use, land cover and forest classes.

Shri Dinesh Singh Pundir presented a paper on "Application of Tools and Protocols of Biodiversity Informatics: Recent Experience" at the 2-day International ICT Conference 2011, at Doon University, Dehradun during November 28-29, 2011.

Wildlife Forensic

Since its inception, the main objectives of the Wildlife Forensic Cell (WFC) have been to develop and disseminate the techniques of wildlife forensics for implementation of the Wildlife (Protection) Act 1972 by various enforcement agencies. The overall activities undertaken by the WFC were as follows: (i) wildlife offence case analysis; (ii) developing protocols to identify species from different parts and products; and (iii) sensitization of enforcement agencies through training regarding wildlife crimes and how to achieve effective implementation of Wildlife (Protection) Act 1972.

Analysis of wildlife offence cases: Different wildlife offence cases were sent to the WFC by different enforcement agencies for species identification, and of the 283 wildlife offence cases received, 67.5% were from forest departments, 15.2% were from police departments, 15.2% were from courts and 1.7% were from customs. One case was also received from Nepal. Of the 283 cases received by WFC for analysis during the reporting period, 193 (86.4%) cases were analysed and reported based on morphometry- (50.7%) and DNA-based (35.7%) protocols, whereas 13.5% (n = 26) of the cases were returned due to a lack of protocols or reference samples or due to bad preservation techniques/contamination. During the reported period, the WFC also received 30 summonses for appearance in the court as an expert scientific witness under wildlife offence cases in various courts in Delhi, Sirsa, Darjeeling, Purolla, Ram Nagar, Balaghat, Lakhnadaun, Seoni, etc. Based on wildlife offence analysis reports made available to the enforcement agencies, convictions have been reported from Khatima, Uttarakhand and Allahbad, UP.

Development of protocols: Elephant tail hair has been widely reported in the wildlife trade, and 2 separate seizures of elephant tail hair were referred from Nepal and Tamil Nadu, India, for species

identification. Protocols for identification of elephant tail hair were developed based on microscopic analysis and DNA-based techniques. WFC also attempted to assign these samples to source populations based on the DNA technique by using a DNA database available in the public domain.

Since the material was very hard, WFC carried out a preliminary examination using the burning test to verify whether the sample was hair or any other synthetic material. The singeing pattern of a biological sample and a smell of burning protein revealed that the sample was a hair composed of keratinous material. Then the hair sample was subjected to microscopic analysis. Cross-sectional analysis of the hair was performed as per the WII protocol, and cross-sections were mounted on a microscopic slide in xylene for viewing under a comparison microscope at different magnifications. The analysis reveals that the examined samples were of the African elephant.

Besides microscopic analysis, samples were also analysed based on DNA techniques. Therefore, DNA was extracted using the commercially available DNeasy Tissue Kit (QIAGEN, Germany), and a lab-developed protocol was used to extract DNA from these samples. Partial fragments of the cytochrome b gene and 12s rRNA gene of mitochondrial DNA genes were chosen for species identification. DNA sequences of the African elephant and Asian elephant were downloaded from the *National Centre for Biotechnology Information* (NCBI) database GenBank and were aligned using the Clustal multiple sequence alignment tool. After complete alignment, it was concluded that the samples sent from Tamil Nadu, India and from Nepal were of the African elephant (*Loxodonta africana*). Additionally, WFC also made use of available Cyt b haplotype data reported in the literature for the African elephant to assign the source population. The elephant tail hair sent from Nepal was from the African population of north-central Africa (Clade 1), whereas, the four samples seized from Tamil Nadu, India, matched with the central Africa cyt b haplotype Clade 2 and Clade 3. The remaining sample matched with the southern–eastern African elephant cyt b haplotype Clade 4.

DNA sequences submitted to National Centre for Biotechnology Information, USA: A total of 104 DNA sequences of Cyt b, 12S rRNA, 16S rRNA and control region (D Loop) genes were submitted to NCBI from the WFC.

Training programme in wildlife crime scene investigation and evidence collection: A new initiative was taken up by conducting a 1-day mock exercise on “Wildlife crime scene investigation and evidence collection” for the officer trainees of the diploma and certificate courses at the institute. Similarly, hands-on training programmes were also taken up at Uttarakhand Forest Training Academy, Haldwani, and Corbett Wildlife Training Centre, Kalagarh, Uttarakhand.

Outreach and training activities: During the reporting period, various training outreach activities were undertaken by WFC. WFC has regularly been providing input to visiting groups such as those from the Tibetan Children's Village school, Selakui, and from Dehradun, Uttarakhand and Sambhota, Ponta Sahib, Himachal Pradesh as well as other visitors from different departments and educational institutions.

Participation in workshop/seminar/symposium: WFC has provided training input at the international workshop on “Strengthening wildlife law enforcement for wildlife protection in South Asia”, organized by the South Asian Wildlife Enforcement Network (SAWEN), in collaboration with Gujarat Forensic Science University, Gandhinagar, and TRAFFIC-India, and held at Gujarat Forensic Science University (GFSU), Gandhinagar during July 11-15, 2011.

Shri Malay Shukla, JRF, participated as a delegate in an international symposium on 'Forensic Science Services', which was organized by the Department of Forensic Medicine and Toxicology, J.S.S. Medical College, Mysore, Karnataka, and Gujarat Forensic Science University, Gandhinagar, at J.S.S. Medical College, Mysore, during September 24-25, 2011.

A seminar on “Education and research in forensic science: Issues and challenges”, organized by Department of Forensic Science, Punjabi University, Patiala, Punjab, during March 15-16, 2012 was attended by Shri C.P. Sharma and Shri Malay Shukla.

Library & Documentation Centre

The Library and Documentation Centre (L & DC) plays a vital role in dissemination of information to target scientists of research and training organizations. Therefore, the library and documentation centre is considered the backbone of any research institution. So is the case with the WII Library & Documentation Centre. It was established in line with the WII's mission as a multidisciplinary information and learning resource centre on biodiversity conservation and management. The L & DC has the following objectives: (i) To serve as a repository of all wildlife-related literature published in India. (ii) To acquire, organize and disseminate all relevant literature from around the world on biodiversity conservation and related fields. (iii) To serve the user readership through normal and special library and information services, such as circulation, reference, photocopying and documentation. (iv) To establish and maintain 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) To serve as a training centre for information personnel and users. (vi) To provide the above services to (a) the WII, (b) protected areas all over the country, (c) institutions engaged in nature conservation research in the country and abroad, (d) universities and colleges and (e) individual scholars working in related areas, as well as NGOs. (vi) To bring out periodic publications on (a) current contents of periodicals; (b) research in progress; (c) unpublished research literature, including dissertations and theses; (d) bibliographies; and (e) abstracts.

The L & DC now holds approximately 28,000 books, 7,355 maps/toposheets, 25,000 newspaper clippings and more than 6,459 bound volumes of old and rare journals. The library also maintains a good collection of scientific papers, numbering 10,800. It subscribes to more than 490 print and online journals.

The L & DC is fully computerized, using LIBSYS Library Management Software (WEBOPAC), UNESCO'S WINISIS Software, CD Server, Barcode and related technologies. For optimum resource use by researchers, students, officer trainees and other users, 12 computer terminals available in the library premises and the faculty desks have been inter-connected with a LAN. Being connected to the library facility, the users have privileges to access all in-house databases such as books, reprints, Indian wildlife abstracts, map/toposheet collections, press clippings and specialized bibliographic databases on the musk deer, application of telemetry to wildlife, wildlife and protected area

management in Madhya Pradesh, mountain ungulates, rainforests conservation in India, etc. Users also have access to the online database Ecology and Wildlife Studies Worldwide (1935 to date). The L & DC provides a variety of library and information services to its users.

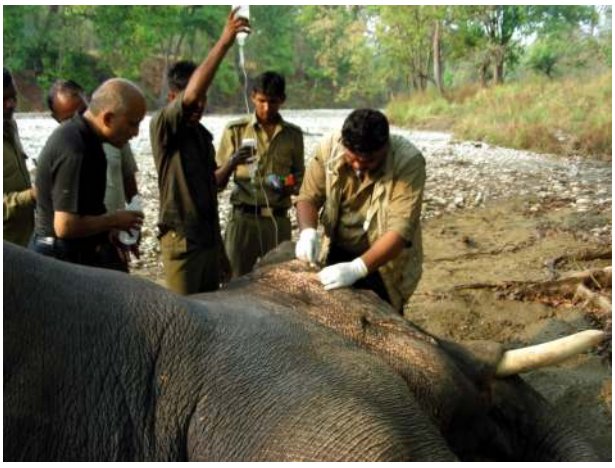
During 2011–12, over 17,147 pages of photocopies were provided to the users. Approximately 49,000 documents were issued and consulted during 2011–12. Value-added services were provided to 4,000 clients while the Ready Reference Service was provided to approximately 250 clients. Approximately 700 queries from outside users were attended to, and more than 8,000 bibliographic references were provided to users.

Wildlife Health Services

Management of wounded trapped leopard near Chandi Forest Chowki, Haridwar Forest Division, *May 10, 2011.* Based on a request from the CF, Shivalik Circle, Dr. Parag Nigam provided technical assistance in management of a wounded trapped leopard. The leopard had sustained multiple injuries, was dehydrated, and in a comatose condition. The animal had strayed into a storehouse of a cattle shed at Chandi Forest Chowki. Dr. Nigam, along with the forest department team, successfully immobilized and rescued the animal. Intensive care was provided at the Chidiyapur transit camp for about 2 weeks. The animal showed an uneventful recovery and was released back into the wild in the Haridwar Forest Division, adjoining Rajaji National Park.

Management of wild tusker in distress at Dholkhand Range, Rajaji National Park, *May 29, 2011.* An adult wild tusker (*Elephas maximus*) was reported to be exhibiting signs of severe colic as manifested by dullness, groaning, crouching and frequent lying down and getting up. A request for managing the animal was received from the Director, Rajaji National Park. Dr. Parag Nigam provided technical assistance in management of the animal. The animal was successfully immobilized and treated for colic and dehydration. The tusker showed an uneventful recovery and subsequently joined a herd.

Management of rogue tusker at Dr. Sushila Tiwari herbal garden, Shivpuri Range, Narendranagar Forest Division, Uttarakhand Forest Department, *January 7, 2012.* An adult male tusker was involved in conflicts with humans in the Narendranagar Forest Division since October 2011. Based on a request from the forest department, Dr. Parag Nigam, Dr. Pradeep Malik and Dr. Sushant Chowdhury, as part of the WII team, provided technical assistance in the management of the rogue tusker. The animal was successfully immobilized, restrained and translocated to Rajaji National Park.



Re-introduction of gaur in Bandhavgarh Tiger Reserve, *March 3-11, 2012.* As a part of the gaur reintroduction project, 31 gaurs (*Bos gaurus gaurus*) were translocated to Bandhavgarh Tiger Reserve from Kanha Tiger Reserve in January 2012 under a collaborative project between the Madhya Pradesh Forest Department, & Beyond (previously called CC Africa) and the Wildlife Institute of India. The team of WII, comprising Dr. Parag Nigam, Dr. K. Sankar and project researchers B. Navaneethan, Manas P. Manjarekar, Ujjwal Kumar and Aniruddha Majumder, provided technical assistance with the capture, radio-collaring, sampling and transport of the gaur to BTR. Thirty-one gaurs were successfully captured and translocated to BTR during March 3-11, 2012.

Wildlife Extension & Audio Visual

The Cell caters to the need of various requirements of academic activities. It maintains 16 mm films, video films, synchronized programmes, CD/DVDs, conference systems, projection systems, audio-visual equipment, still and video cameras with accessories and a photo library.

As in every year, World Environment Day was celebrated by the institute on 5 June 2011. It was an occasion to create awareness in the younger generation. As part of nationwide celebrations on the occasion of World Environment Day under the aegis of the Ministry of Environment & Forests, Government of India, the institute organized 2 programmes:

(I) Awareness programme at Mana on June 1, 2011: The Wildlife Institute of India organized an awareness programme in collaboration with the 127 Infantry Division, Ecological, Indian Army, on 1 June 2011 at Mana, the last Indian village bordering China. This was a unique celebration organized in biting cold and a drizzle, which of course could succeed in stalling the landing of a helicopter bringing the chief ministers of Uttarakhand and Madhya Pradesh but did not succeed in dampening the spirit of the 400 people gathered there.

The Chief Minister of Uttarakhand, who could not travel to Mana due to inclement weather, addressed the gathering via mobile telephone. During the occasion the 10 million and 1 plant of Bhoj Patra *Betula utilis* was planted by the local MLA. Bhoj patra was once abundant in the area.The Director, WII, also planted a sapling of the local species. The ladies and the children of Mana village participated in a drawing competition. A puppet show titled *Ped na Kato* (do not cut trees) was organized for the jawans and their families. An exhibition on the 'Biodiversity of Uttarakhand' was also put up as part of the celebrations. The celebration at Mana brought all the stakeholders on one platform – the people, government agencies and policy makers.

(ii) Workshop on 'Emerging Issues in Wildlife Conservation', June 5, 2011: The workshop was conducted at the institute campus. Padma Vibhushan Shri Sunderlal Bahuguna Ji, leader of the Chipko Movement, was the chief guest on this

occasion. Ms. Susanne Bech, Associate Programme Officer, UNEP, Nairobi, also attended the workshop and briefed the participants about the UNEP's programmes. A total of 60 participants, of whom 27 represented 15 NGOs and civil societies of Uttarakhand, including WII faculty members, students, researchers and officer trainees, attended the workshop. The objectives of the workshop were (i) to provide a comprehensive understanding of biodiversity conservation issues in India; (ii) to build capacity for effective and sustained participation of civil society organizations/NGOs in biodiversity conservation; and (iii) to have a platform to examine how civil society can contribute to biodiversity conservation.

The participants were divided into 2 groups to deliberate upon the topics. Participants provided local perspectives on issues. The workshop was able to identify areas of cooperation between the civil society groups and the forest department for future action.

(iii) The "IX Wildlife and Environment Quiz, 2011", a collaborative activity of Wildlife Institute of India and Friends of Doon Society, was organized on October 1, 2011 at the institute to mark the Wildlife Week 2011 celebrations. Eight schools participated in the elimination round. Five teams qualified for the final round. Ann Mary School topped the list and won the WII-FoD Rolling Trophy, Book Prize and Sameer Ghosh Memorial Nature and Wildlife Rolling Trophy. Welham Girls School won the second prize, and St. Thomas College won the third prize and received the WII-FoD Book Prize. Ms. Savita Sharma, Principal, Central Academy for State Forest Service (CASFoS), graced the occasion as the chief guest and distributed the prizes to the winning teams.

(iv) A state-level quiz competition was also organized for the students of different districts of Uttarakhand as part of the Corbett Platinum Jubilee celebrations on October 8, 2011 at the institute. It was conducted by the institute in collaboration with the Forest Department of Uttarakhand. The winners were awarded prizes during the Corbett Platinum Jubilee celebration.

Wildlife Policy Research

The cell organized meetings of the core group to develop theme-based policy discussion papers. The cell also produced the first discussion draft on the guidelines for management of invasive plants in protected areas and presented it to the Governing Body members.

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 bio-geographic 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 also with other data centres; and (iii) facilitate research and training activities related to wildlife by providing bibliographic references on protected areas, habitat types and animal species.

During 2011–12, the main thrust of the activities was on updating the Protected Area, Species and Wildlife Bibliography databases, by collection of information from various possible sources. The Protected Area Network Report was also updated

for newly notified protected areas during the reporting period. The state summaries of the PA Network report have been revised by incorporating the latest information received from various states. The Protected Area Database of India has been updated, and presently there are 670 protected areas, including 102 national parks, 515 wildlife sanctuaries, 4 community reserves and 49 conservation reserves in the country, covering 1,61,583 km^2, which is 4.91% 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 the addition of current literature published on Indian wildlife in various issues of journals/periodicals received during the reporting period. The Trainees Database has been updated further, and now there is information on 596 Diploma and 488 Certificate officers trained in various courses, including 173 foreign nationals. The website of the Database Cell has been modified and updated further by incorporating the latest information. Nearly 300 queries were received, and outputs were provided in the desired formats.

ENVIS Centre

The Ministry of Environment & Forests, Government of India, established the 23rd centre, of the Environment Information System in September 1997 at the Wildlife Institute of India. The thematic area of the WII ENVIS Centre is 'Wildlife and Protected Areas'. The mission of ENVIS is to support and facilitate a diverse clientele, from policy makers to researchers and industries, and 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 on wildlife sciences; (ii) provide information for decision making at the apex level, relating to conservation and development; (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 WII ENVIS Centre published a thematic bulletin on 'Telemetry in Wildlife Science'. This ENVIS bulletin was released by Dr. K. Kasturirangan, Member, Planning Commission.

Research Laboratory

The laboratory is equipped with advance equipment such as atomic absorption spectrophotometers, high performance liquid chromatographs, UV–Visible spectrophotometers, microwave reaction systems, automatic nitrogen and fibre analysers, Millipore water purification systems, digital pH and conductivity meters, controlled flame photometers and digital analytical balances, which are required for analysis of various physio-chemical parameters of ecological samples. Teaching classes at the laboratory, followed by practicals, were conducted for various ongoing courses of the institute and for the students and Ph.D. scholars from other organizations and universities such as FRI University and WWF. This included analysis of herbivore pellets/dung samples and carnivore scat analysis, collection and preservation of biological materials, age and sex determination of wild

animals, osteology of mammals and analysis of ecological samples for various parameters. The laboratory staff conducted on-site water quality analysis in the WII campus for DO, EC, pH, turbidity and salinity. During the reporting period, a total of 900 samples were analysed in the Research Laboratory. Of these, 617 were ecological samples. In addition, scat samples (n = 128) of tiger, leopard, jackal, wild dog and sloth bear and herbivore pellets (n = 155) of chital, sambar, markhor and goral were analysed for food habit studies. The laboratory staff provided technical inputs in various field training programmes conducted by the institute, which includes demonstration of camera traps, mist netting for birds, radio-telemetry and the use of GPS.

The laboratory staff also collected meteorological data in the WII campus. During the reporting period the maximum temperature recorded was 39°C on October 12, 2011, and the minimum was 2.3°C, recorded on December 24, 2011. The total recorded rainfall was 1,148.23 mm.

Herbarium

During the reporting period, the herbarium staff provided their inputs in various field activities and surveyed different protected areas. Approximately 500 plant species collected by research scholars, diploma and certificate trainees and faculty members from various parts of the country (Corbett Tiger Reserve, Rajaji National Park, WII Campus, Sariska Tiger Reserve, Kedarnath Wildlife Sanctuary, Keibul Lamjao National Park) and about 100 photographs were also identified from various protected areas. Apart from routine work, digitization of plant specimens is being carried out.

Campus Development

During the reporting period, repair/renovation of the kitchen and the tiled flooring of the courtyard of the New Hostel block and internal finishing work in the New Hostel and guest house were completed. Repair of the 1 × 320 KVA D.G. set was also completed.

Sports

During the reporting period, the WII contingent participated in the 19th All India Forest Sports & Games Meet, held at Dehradun during December 16-20, 2011, in various activities such as cricket, carroms, rifle shooting, table tennis, lawn tennis, billiards, golf and chess. Dr. Manoj Kumar Agarwal of the Institute secured the bronze medal in the rifle shooting event.

VISITORS

VISITORS

- Scientists and research officers undergoing the Induction Training Course at the Indian Council of Forestry Research & Education, Dehradun on April 15, 2011.
- Students of B.Sc. Forestry from Hemwati Nandan Bahuguna Garhwal University Srinagar, Garhwal, on April 18, 2011.
- Van Daroga and other officials from the Forestry Training Academy, Haldwani, Nainital, on April 20, 2011.
- Forest guard professional trainees from Corbett Wildlife Training Centre, Kalagarh, Garhwal, on April 25, 2011.
- Students from Kashmir University, Sri Nagar, J&K, on April 25, 2011.
- Students and teachers from Kendriya Vidyalaya, O.L.F. Raipur, Dehradun on April 28, 2011.
- Range Forest Officers from Forest Academy, Hyderabad, Andhra Pradesh, on May 5, 2011.
- Students and a teacher from Agriculture University, Kanke, Ranchi, Jharkhand, on 6 May 2011.
- Students and teachers from Unison World School, Dehradun on May 13, 2011.
- Russian delegates, May 25, 2011.
- Students from University of Agriculture Science, Bangalore, and College of Forestry, Ponampet, Kodagu, on June 13, 2011.
- Dr. T. Chatterjee, Secretary, MoEF, June 25, 2011.
- Forest guards from Punjab Forest Department, Hoshiarpur, Punjab, on July 28, 2011.
- Cadets and masters from Rashtriya Indian Military College, Dehradun on July 29, 2011.
- In-service SFS officers from SFS College, Central Academy for State Forest Service, Dehradun on September 8, 2011.
- IFS Officers (of 17 years services) from Indira Gandhi National Forest Academy, Dehradun on September 13, 2011.
- Students, faculty and staff from SIES College, Sion (West), Mumbai on September 26, 2011.
- Students from Alpine Institute of Management & Technology, Dehradun on September 28, 2011.
- Army staff members from 22 Rashtriya Rifles (Punjab) on September 30, 2011.
- Students from Tamil Nadu Agricultural University, Forest College & Research Institute, Mettupalayam on October 7, 2011.
- Forest Guards from Civil & Soyam Van Prabhag, Almora, on October 10, 2011.
- Students from Bikaner University, Rajasthan, on October 11, 2011.
- Students from Carman School, Dehradun on October 13, 2011.
- Trainees of Foresters Training Course (2011–12) from Office of the Divisional Forest Officer, Training Division, Pinjore, on October 14, 2011.

- RFO trainees from Uttarakhand Forestry Training Academy, Haldwani, Nainital, on October 14, 2011.
- Nature guards and forest guards of Rampur Range under Nature Guide Training Programme (Phase-II) from Rajaji National Park on October 14, 2011.
- Students from Lacoo College, Jodhpur on November 2, 2011.
- B.Sc. students from Bharatiya Vidya Bhawan; H.S. College of Arts & Science; and J.P. College of Commerce & Management Studies, Mumbai, on November 15, 2011.
- FRO trainees (Batch 2010-11) from Forest Rangers College, Balaghat, Madhya Pradesh on November 16, 2011.
- Students, teachers, JCO and OR under project Sadbhavana by Army for the underprivileged students from Kupwara district in J&K, November 22, 2011.
- Students of M.Sc. Environmental Science and a faculty member from Birla College, Kalyan, Maharashtra, on November 28, 2011.
- Students of environmental science from Mumbai University on December 8, 2011.
- Officers undergoing the promotional course for assistant commandants along with one instructor from SSB Academy, Srinagar (Garhwal), on December 16, 2011.
- Students from Indian Institute of Forest Management, Bhopal, on December 26, 2011.
- Students from Indian Institute of Forest Management, Bhopal, on December 28, 2011.
- Dr. Nandita Chatterjee, Additional Secretary, MoEF, December 30, 2011.
- IFS officers of Professional Skill Upgradation Course from Indira Gandhi National Forest Academy, Dehradun on January 6, 2012.
- B.Sc. (Forestry) students from Government Degree College, Kamareddy, on January 10, 2012.
- IFS Officers under training at FSI on 'Forest Inventory and TOF Inventory Techniques', from Forest Survey of India, Dehradun on January 17, 2012.
- Shri Ranjan Chatterjee, Consultant (E&F), Planning commission and Dr. Biswajit Banerjee, Director (Forestry), Planning Commission, January 19, 2012.
- Teachers and researchers from Division of Genetics & Tree Propagation, Forest Research Institute, Dehradun on January 23, 2012.
- Cadets and 2 masters from Rashtriya Indian Military College, Dehradun on January 31, 2012.
- B.V.Sc. students from Karnataka Veterinary Animal & Fisheries Sciences University, Veterinary College, Mavdinagar, Karnataka, on February 4, 2012.
- Final year students of Veterinary College, Shivamoga, on February 8, 2012.
- M.Sc. final year students from HNB Garhwal University, Srinagar, Garhwal, on February 15, 2012.

- SFS officer trainees (2011–13 Batch) from Central Academy for State Forest Service, Coimbatore, on February 21, 2012.
- P.G. Diploma/M.Tech. Officer trainees and Dr. S. Nandy, Scientist 'SC' from Indian Institute of Remote Sensing, Dehradun on February 22, 2012.
- Forestry Class from Nepal, February 22, 2012.
- Students from Woodstock School, Mussoorie, on February 29, 2012.
- B.Sc. (Forestry) students from Tribhuwan University, Institute of Forestry, Hetauda Campus, Pokhra, Nepal, on March 9, 2012.
- SFS officers of 2011–12 batch from Indira Gandhi National Forest Academy, Dehradun on March 13, 2012.
- Students (5th year M.V.Sc.) from College of Veterinary Science & Animal Husbandry, Jabalpur, Madhya Pradesh, on March 14, 2012.
- Students from Department of Biosciences, Saurashtra University, Rajkot, Gujarat on March 14, 2012.
- Students from Sanskriti School, Chanakyapuri, New Delhi, on March 16, 2012.
- B.Lib./M.Lib. students from Institute of Technology & Management, UTU, Dehradun on March 22, 2012.
- Students of Tibetan School from Winterline Nature Trust, Cosy Nook Estate, Landour, Mussoorie, on March 31, 2012.

GOVERNANCE

Soceity

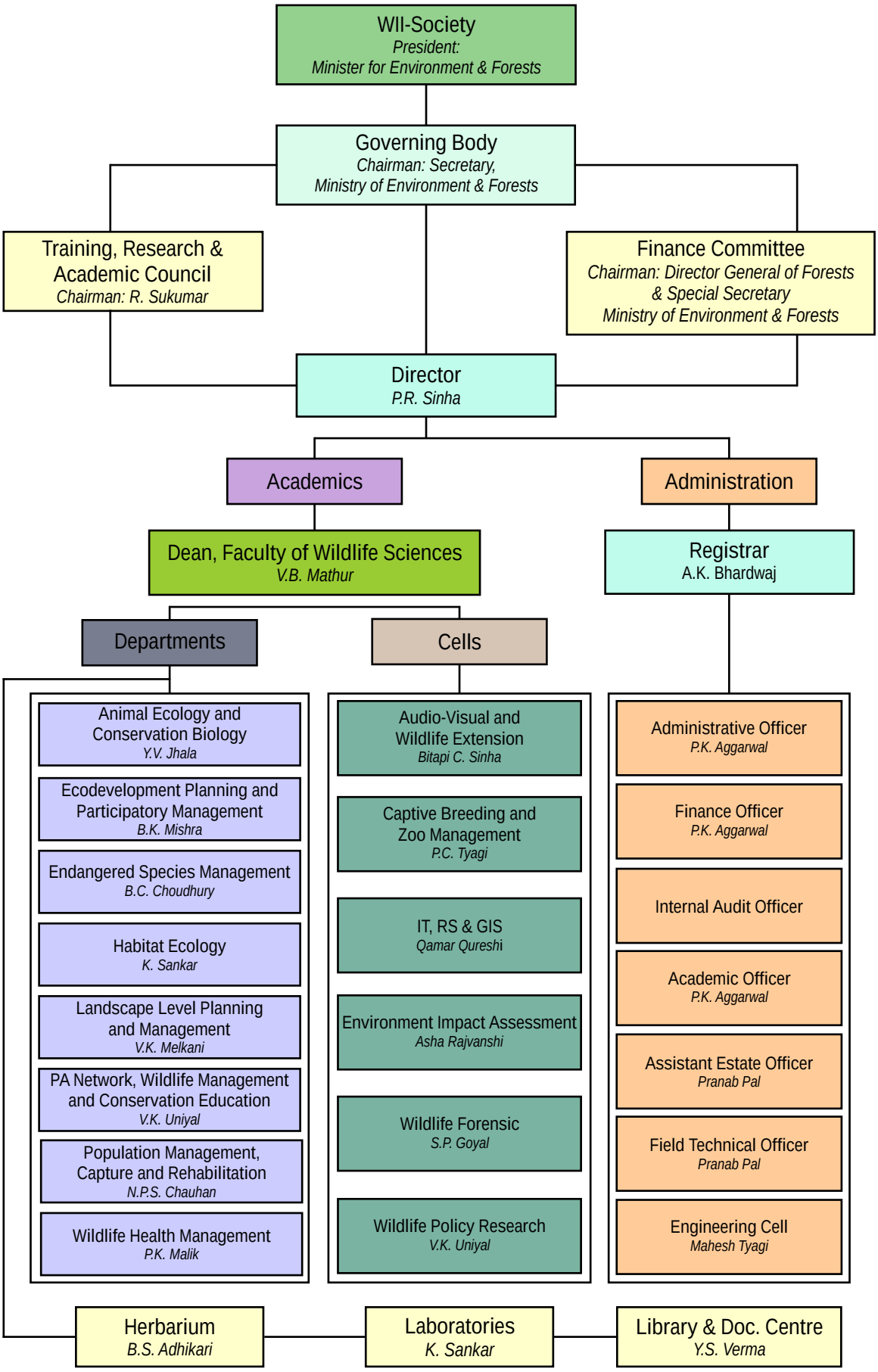
Governing Body

TRAC

Finance

Building

Organizational Structure of WII



GOVERNANCE

The Society of Wildlife Institute of India

The composition of WII Society, the apex body of governance, is as under:

1. Smt. Jayanti Natarajan
   President
   Union Minister of State (Independent Charge)
   Environment & Forests, Government of India
   Ministry of Environment & Forests
   Paryavaran Bhawan, 'B' Block,
   CGO Complex, Lodi Road
   New Delhi – 110 003

Members**

2 to 14. Minister In-Charge of the portfolio of Wildlife and/or Forests on a regional rotational basis:

North-east India	-	Sikkim, Tripura and Assam
Eastern India	-	Andaman & Nicobar and Bihar
Western Region	-	Gujarat and Goa
Southern India	-	Karnataka and Andhra Pradesh
Northern India	-	Punjab and Haryana
Central India	-	Uttar Pradesh
Permanent Invitee	-	Uttarakhand

Non-official Members**

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

16. Dr. Ullas Karanth,
    403, Seebo Apartments,
    26-2, Aga Abbas Ali Road,
    Bangalore 560 042 (Karnataka)

17. Shri Mahendra Vyas,
    53 D, Block-H, Saket,
    New Delhi 110 017

18. Shri Pranay Waghray,
    1 Old Block, Samrat Complex, Saifabad,
    Hyderabad (Andhra Pradesh)

19. Shri Biswajit Mohanty
    Shantikunj, Link Road,
    Cuttack (Orissa)

20. Shri P.K. Sen,
    B-2, 2275, Vasant Kunj,
    New Delhi

21. Shri Ashok Singh,
    5, Clive Road, Civil Lines,
    Allahabad (Uttar Pradesh)

22. Dr. Albert Rajendran,
    Department of Zoology,
    St. John's College,
    Palaymkottai (Tamil Nadu)

23. Prof. V.C. Soni,
    Department of Biosciences,
    Saurashtra University,
    Rajkot (Gujarat)

24. Representative of National Board for Wildlife

Members

25 to 29. Representatives of the following organizations:

(i) Bombay Natural History Society, Mumbai;
(ii) World Wide Fund for Nature-India, New Delhi;
(iii) Wildlife Preservation Society of India, Dehradun;
(iv) Centre for Environment Education, Ahmedabad;
(v) Prakriti Samsad, Kolkatta**

Members (Ex-officio)

30. Secretary to Government of India,
    Ministry of Environment & Forests,
    Paryavaran Bhavan, “B' Block,
    CGO Complex, Lodi Road,
    New Delhi - 110 003

31. Secretary to the Government of India,
    Ministry of Finance, North Block,
    New Delhi

32. Secretary to the Government of India,
Ministry of Science and Technology,
Technology Bhawan, New Mehrauli Road,
New Delhi

33. Secretary to the Government of India,
Department of Education,
Ministry of Human Resource Development,
Shashtri Bhawan, New Delhi

34. Representative of the
Planning Commission,
Yojna Bhawan,
Sansad Marg,
Government of India, New Delhi

35. Representative of the University Grants Commission,
Bahadur Shah Zafar Marg,
New Delhi - 110 002

36. The Chief Secretary,
Government of Uttarakhand,
"Sachivalaya",
Dehradun - 248 001

37. Director General of Forests &
Special Secretary to the Government of India,
Ministry of Environment & Forests,
Paryavaran Bhavan, "B" Block,
CGO Complex, Lodi Road,
New Delhi - 110 003

38. Director, Wildlife Preservation,
Government of India,
Ministry of Environment & Forests,
Paryavaran Bhavan, 'B' Block,
CGO Complex, Lodi Road,
New Delhi - 110 003

39. Additional Secretary & Financial Advisor,
Ministry of Environment & Forests,
Paryavaran Bhavan, 'B' Block,
CGO Complex, Lodi Road,
New Delhi - 110 003

40. Director General,
Indian Council of Forestry Research & Education,
P.O. New Forest,
Dehradun – 248 006

41. Director,
Zoological Survey of India,
M-Block, New Alipore,
Kolkata - 700 053

42. Director,
Botanical Survey of India,
3 MSO Building, Block F-5th & 6th Floor,
DF Block, Sector-I, Salt Lake City,
Kolkata (W.B.)

Members

43. Dr. V.B. Mathur**
Dean, Faculty of Wildlife Sciences,
Wildlife Institute of India,
Dehradun
(Faculty representative of WII)

44. Dr. V.K. Melkani**
Scientist-F,
Wildlife Institute of India,
Dehradun
(Faculty representative of WII)

Member Secretary

45. Director,
Wildlife Institute of India,
Dehradun

Permanent Invitee

46. Inspector General (WL),
Ministry of Environment & Forests,
Paryavaran Bhavan, "B" Block,
CGO Complex, Lodi Road,
New Delhi 110 003

47. Member-Secretary,
National Tiger Conservation Authority,
Bikaner House, Shahjahan Marg,
New Delhi 110 011

48. Director (Project Elephant),
Ministry of Environment & Forests,
Paryavaran Bhavan, 'B' Block,
CGO Complex, Lodi Road,
New Delhi 110 003

** The term of the members at Sl. Nos. (2 to 24), (29), and (43 to 44) is for a period of 3 years w.e.f. 3 June 2009, notified vide OM No.DWII/580/2005 dated 03.06.2009.

Governing Body

The current Governing Body composition includes official and non-official members as under:

1. Chairman,
   Secretary to Government of India,
   Ministry of Environment & Forests,
   Paryavaran Bhavan, 'B' Block,
   CGO Complex, Lodi Road,
   New Delhi - 110 003

2. Vice- Chairman,
   Director General of Forests & Special Secretary,
   Ministry of Environment & Forests,
   Government of India,
   Paryavaran Bhavan, 'B' Block, CGO Complex,
   Lodi Road, New Delhi - 110 003

Members (Non-official)*

3 Shri Brijendra Singh,
28, Sunder Nagar, New Delhi 110 003

4 Dr. Ullas Karanth,
403, Seebo Apartments, 26-2, Aga Abbas Ali Road,
Bangalore 560 042 (Karnataka)

5 Shri Mahendra Vyas,
53 D, Block-H, Saket,
New Delhi 110 017

6 Shri Pranay Waghray,
1 Old Block, Samrat Complex, Saifabad,
Hyderabad (Andhra Pradesh)

7 Shri Biswajit Mohanty,
Shantikunj, Link Road,
Cuttack (Orissa)

8 Representative of National Board for Wildlife

Members (Ex-officio)

9. Financial Advisor & Additional Secretary,
   Ministry of Environment & Forests,
   Paryavaran Bhavan, 'B' Block,
   CGO Complex, Lodi Road,
   New Delhi - 110 003

10. Chief Secretary,
    Government of Uttarakhand,
    "Sachivalaya", Dehradun-248 001

Members*

11–16. Chief Wildlife Warden on a regional rotational basis

Central Region	-	Madhya Pradesh
Southern Region	-	Karnataka
North-east Region	-	Meghalaya
Eastern Region	-	Orissa
Northern Region	-	Himachal Pradesh
Permanent Invitee	-	Uttarakhand

Member (Ex-officio)

17. Director, Wildlife Preservation,
    Ministry of Environment & Forests,
    Paryavaran Bhavan, 'B' Block, CGO Complex,
    Lodi Road, New Delhi - 110 003

18. Director General,
    Indian Council of Forestry Research & Education,
    P.O. New Forest,
    Dehradun – 248 006

Member

19. Chairman,
    Training, Research and Academic Council (TRAC),
    Wildlife Institute of India,
    Dehradun

20. Dean, FWS
    Wildlife Institute of India,
    Dehradun - 248 001

Member Secretary

21. Director,
    Wildlife Institute of India,
    Post Box 18, Chandrabani,
    Dehradun - 248 001

Permanent Invitee

22. Inspector General of Forests (WL),
    Ministry of Environment & Forests,
    Paryavaran Bhavan, 'B' Block,
    CGO Complex, Lodi Road,
    New Delhi 110 003

23. Member-Secretary,
    National Tiger Conservation Authority,
    Bikaner House, Shahjahan Marg,
    New Delhi 110 011

24. Director (Project Elephant),
    Ministry of Environment & Forests,
    Paryavaran Bhavan, 'B' Block,
    CGO Complex, Lodi Road,
    New Delhi 110 003

* The term of the membership is for a period of 3 years w.e.f. 3 June 2009, notified vide OM No. DWII/580/2005 dated 03.06.2009

Training, Research & Academic Council (TRAC)

1. Dr. R. Sukumar, Professor
   Chairman *(from 26 Sept. 2011)*
   Centre for Ecological Sciences
   Indian Institute of Science
   Bengaluru – 560 012 (Karnataka)

Members

2. Dr. S. Shivaji
   Scientist,
   Centre for Cellular & Molecular Biology
   Habsiguda, Uppal Road
   Hyderabad – 500 007 (Andhra Pradesh)

3. Dr. Reena Mathur
   Professor and Head
   Department of Zoology, University of Rajasthan
   Jawahar Lal Nehru Marg
   Jaipur – 302 004 (Rajasthan)

4. Dr. P.S. Easa
   'Anugraham', Apsara Gardens
   Nellikunnu–Paravattani Road
   East Fort P.O.
   Thrissur – 680 005 (Kerala)

5&6 Two representatives from University who are members of WII-Society
(to be nominated by President, WII-Society)

Dr. V.C. Soni
Professor, Department of Bio-Sciences
Saurashtra University, University Campus
Rajkot – 360 005 (Gujarat)

Dr. Albert Rajendran
Department of Zoology
St. John's College, Palayamkottai
Tirunelveli – 627 002 (Tamil Nadu)

Members (Ex-officio)

7. The Director, Wildlife Preservation,
   Ministry of Environment & Forests,
   Government of India,
   Paryavaran Bhavan, 'B' Block
   C.G.O. Complex, Lodhi Road
   New Delhi – 110 003

8–20 Chief Wildlife Wardens on a regional rotational basis.

Northern Region	-	Haryana, Himachal Pradesh
Eastern Region	-	Bihar, West Bengal
Central Region	-	Madhya Pradesh
Western Region	-	Gujarat, Maharashtra
Southern Region	-	Tamil Nadu, Kerala
North-Eastern Region	-	Tripura, Arunachal Pradesh & Mizoram
Permanent Invitee	-	Uttarakhand

21. The Director
    Botanical Survey of India
    Ministry of Environment & Forests
    CGO Complex, 3 MSO Building
    Block F, 5th & 6th Floors, DF Block
    Sector-I, Salt Lake City
    Kolkata – 700 064 (West Bengal)

22. The Director
    Zoological Survey of India
    Prani Vigyan Bhawan, M-Block, New Alipore
    Kolkata – 700 053 (West Bengal)

23. The Member-Secretary
    Central Zoo Authority (CZA)
    Bikaner House, Annexe-VI, Shahjahan Road
    New Delhi – 110 011

Members

24. A representative of the Indian Council of Forestry Research & Education (ICFRE),
    P.O. New Forest
    Dehradun – 248 006 (Uttrakhand)

25. The Dean, Faculty of Wildlife Sciences
    Wildlife Institute of India
    P.O. Box # 18, Chandrabani
    Dehradun – 248 001 (Uttarakhand)

26& 27 Two senior most Head of Departments *(in terms of pay-scale)*
Wildlife Institute of India
P.O. Box # 18, Chandrabani
Dehradun – 248 001 (Uttarakhand)

28. The Research Coordinator
Wildlife Institute of India
P.O. Box # 18, Chandrabani
Dehradun – 248 001 (Uttarakhand)

Member-Secretary

29. The Director,
Wildlife Institute of India,
P.O. Box # 18, Chandrabani
Dehradun – 248 001 (Uttarakhand)

Finance Committee

1 Director General of Forests & Special Secretary,
Ministry of Environment & Forests,
Paryavaran Bhawan, 'B' Block,
CGO Complex, Lodi Road,
New Delhi 110 003

2. Addl. Director General of Forest &
Director (Wildlife Preservation),
Government of India,
Ministry of Environment & Forests,
Paryavaran Bhawan, 'B' Block,
CGO Complex, Lodi Road,
New Delhi 110 003

3. Financial Advisor & Joint Secretary,
Ministry of Environment & Forests,
Paryavaran Bhawan, 'B' Block,
CGO Complex, Lodi Road,
New Delhi 110 003

4. Shri R. Sukumar,
Chairman, TRAC,
Centre for Ecological Sciences
Indian Institute of Science
Bengaluru – 560 012 (Karnataka)

5. Shri Biswajit Mohanty,
Shantikunj, Link Road,
Cuttack (Orissa)

6. Dr. V. B. Mathur,
Dean, FWS,
Wildlife Institute of India,
Dehradun

7. Shri P.R. Sinha,
Director,
Wildlife Institute of India,
Dehradun

PUBLICATIONS

Peer Reviewed National Journals

Peer Reviewed International Journals

Books and Book Chapters

Reports

Technical Reports

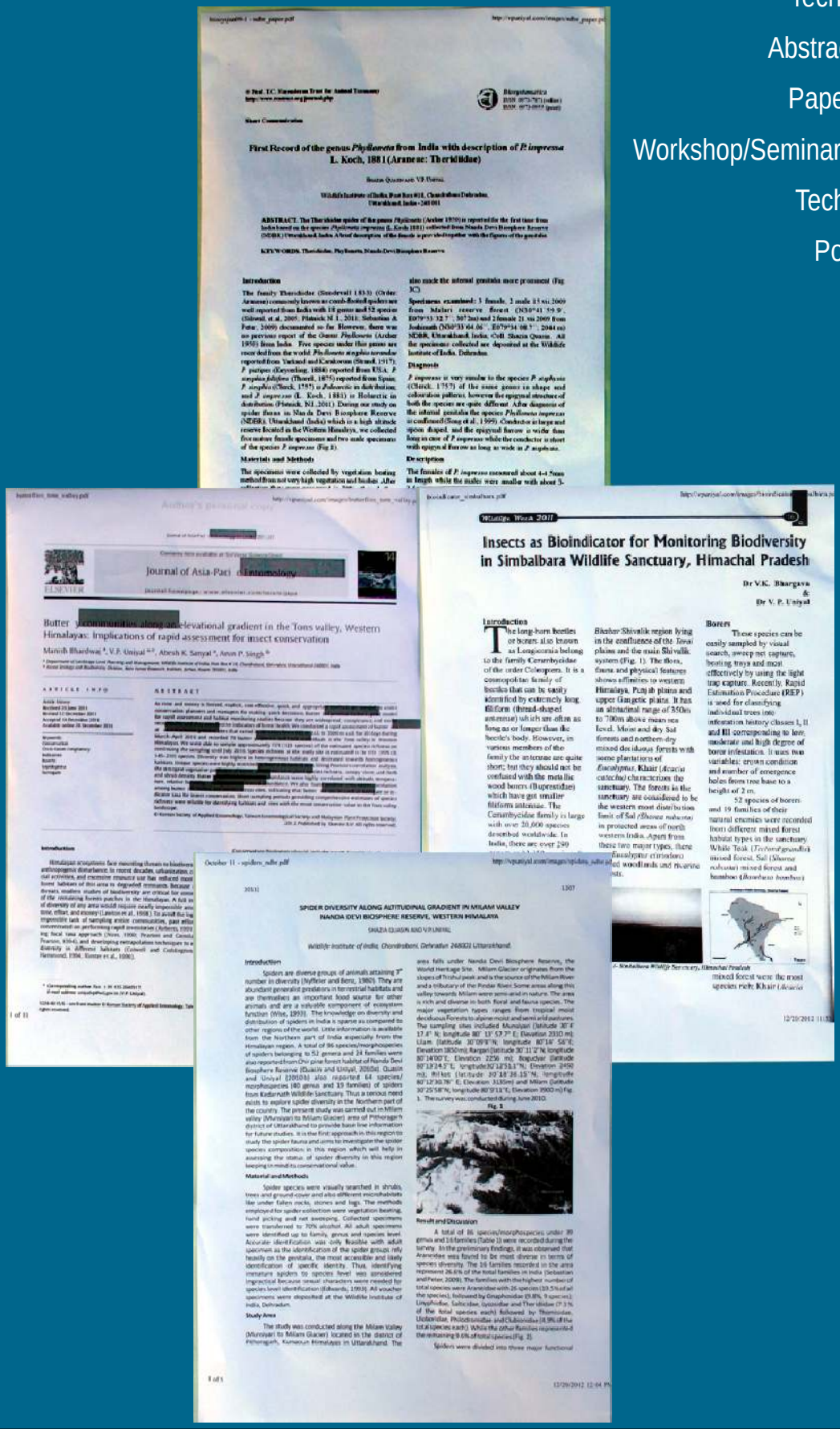
Abstracts Published

Papers Presented

Workshop/Seminar Proceedings

Technical Manual

Popular Articles



First Record of the genus *Phyllonethis* from India with description of *P. impressa* L. Koch, 1881 (Araneae: Theridiidae)

Journal of Asia-Pacific Entomology

Butterfly communities along an elevational gradient in the Tons valley, Western Himalayas: Implications of rapid assessment for insect conservation

Wildlife Week 2011

Insects as Bioindicator for Monitoring Biodiversity in Simbalbara Wildlife Sanctuary, Himachal Pradesh

SPIDER DIVERSITY ALONG ALTITUDINAL GRADIENT IN MILAM VALLEY NANDA DEVI BIOSPHERE RESERVE, WESTERN HIMALAYA

PUBLICATIONS

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Bhardwaj, Manish and Uniyal, V.P., 2011. Species richness, diversity and rarity of butterflies along an altitudinal gradient in the Gangotri Landscape, Uttarakhand. UGC sponsored national seminar on "Global warming and its impacts on biodiversity". Organized by Gandhi Memorial (PG) College, Ambala Cantt, India. November 8–9, 2011.

Quasin, Shazia and Uniyal, V.P., 2011. Spider (*Araneae*) diversity patterns along altitudinal gradient in Nanda Devi Biosphere Reserve, The World Heritage Site, Uttarakhand. National Seminar on 'Global warming and its impact on Bio- Diversity'. Department of Zoology Gandhi Memorial National (P.G) College, Ambala. November 8–9, 2011.

Bhardwaj, Manish and Uniyal, V.P., 2011. Testing butterflies as indicator of insect diversity in three high altitude protected areas of Gangotri Landscape. 6th Uttarakhand State Science & Technology Congress, Almora, India, November 14–16, 2011.

Quasin, Shazia and Uniyal, V.P., 2011. Guild structure and composition of spider assemblages in Nanda Devi Biosphere Reserve, Western Himalaya, India. 6th Uttarakhand State Science and Technology Congress (USSTC)-2011, S.S.J. Campus, Almora, November 14–16, 2011.

Rajvanshi, Asha, 2011. Socio-economic considerations in environmental decision-making in India. Paper presented at the workshop on 'Capacity-building for research and information exchange on socio-economic impacts of living modified organisms under the Cartagena Protocol on Biosafety', New Delhi, November 14–16, 2011.

Mathur, V.B., 2011. Developing biodiversity information facility: The Indian initiative. Paper presented in the National Workshop on Bio-Informatics: Development of Web Portal for the Western Ghats, Bangalore, November 24, 2011.

Rajvanshi, Asha, 2011. Ecology and biodiversity issues in EIAs: 'How to' guidance for Assessors. Three-day assessors training workshop at Chandigarh organized by National Accreditation Board for Education and Training (NABET), Quality Council of India, December 1–3, 2011.

Rastogi, A., Hickey, G.M., Badola, R. and Hussain, S.A., 2011. Reading between the stripes: Results of a content analysis of media resources for tiger conservation. 25th International Congress for Conservation Biology, Auckland, New Zealand, December 5–9, 2011.

Mathur, V.B. 2012. Mainstreaming environmental considerations in road transportation planning. Paper presented in the 105th International Training Programme on “Environment Audit”, New Delhi, January 9 – February 3, 2012.

Rajvanshi, Asha, 2012. Mainstreaming biodiversity conservation for sustainable mining: Regulatory reforms and best practice. Paper presented at the Conference on 'Mining for Sustainability' at Goa, January 13–14, 2012.

Badola, R. and Hussain, S.A., 2012. REDD+ and biodiversity conservation in the Uttarakhand Himalayas. Paper presented at the workshop on "Climate change in the Uttarakhand Himalayas: Quantification, mitigation and exploring opportunities from international carbon trade mechanisms', January 24, 2012.

Poster Presented

Bashir, T., Bhattacharya, T., Poudyal, K., and Sathyakumar, S. 2011. Conservation status of wild canids in Khangchendzonga Biosphere Reserve, Sikkim, India. Poster presented at the brainstorming conference towards a consortium on 'Biodiversity research in eastern Himalayas and Eastern Ghats', Chemchi, Sikkim, Compilation of Abstracts: 47 pp, April 9-12, 2011.

Bhattacharya, T., Bashir, T., Poudyal, K., Sathyakumar, S. and Saha, G.K., 2011. Ungulates of Khangchendzonga Biosphere Reserve, Sikkim: Spatial distribution, habitat use and site occupancy. Poster presented at the brainstorming conference towards a consortium on 'Biodiversity research in eastern Himalayas and Eastern Ghats', Chemchi, Sikkim, Compilation of Abstracts: 46 pp, April 9-12, 2011.

Poudyal, K., Bhattacharya, T., Bashir, T. and Sathyakumar, S., 2011. Abundance, occupancy and activity of galliforms in Prek Chu catchment of Khangchendzonga Biosphere Reserve, Sikkim, India. Poster presented at the brainstorming conference towards a consortium on 'Biodiversity research in eastern Himalayas and Eastern Ghats', Chemchi, Sikkim, Compilation of Abstracts: 45 pp, April 9-12, 2011.

Pragatheesh, A, Rajvanshi, A, Mathur, V.B., 2011. Spatial patterns and factors influencing the mortality of avifauna on the National Highway-7 passing through Pench Tiger Reserve, Madhya Pradesh. Poster paper presented at the 2011 International Conference on Ecology and Transportation (ICOET), Sustainability in Motion, at Seattle, Washington, USA, August, 21-25, 2011.

Seminar, Workshop and Conference Proceedings

Borah, Joli, Gosh, Mousumi, Harihar, Abishek, Pandav, Bivash and G.V., Gopi, 2011. Foraging behaviour of four sympatric kingfishers in Bhitarkanika mangroves. *In proceedings* of the first international conference on 'Indian Ornithology (ICIO 2011)' November 19-23, 2011. Pp: 34-36.

Gopi, G.V. and Pandav, Bivash, 2011. Ecology of a near threatened colonial waterbird, black-headed ibis *Threskiornis melanocephalus* at Bhitarkanika mangroves, Orissa. *In proceedings* of the first international conference on 'Indian Ornithology (ICIO 2011)', November 19-23, 2011. Pp. 133–134.

Lakshminarasimha, R., Bose, S., Dhiman, S.P., Gulaati, A., Nigam, P. and Ramesh, K., 2011. Breeding history of Western Tragopan (*Tragopan melanocephalus*) in Sarahan Pheasantry, Himachal Pradesh. *In proceedings* of the first international conference on 'Indian Ornithology', November 19-23, 2011. 301 pp.

Malviya, M., Lakshminarasimha, R., Bose, S., Dhiman, S., Nigam, P. and Ramesh, K., 2011. Stocking for the future: Genetic and

demographic correlates of Western Tragopan (*Tragopan melanocephalus*) in captivity. *In proceedings* of the first international conference on 'Indian Ornithology', November 19-23, 2011. 301 pp.

Status Survey Reports

Habib, B. and Talukdar, G., 2011. Status of wildlife in the State of Goa – 2010. Survey Report, Wildlife Institute of India, Dehradun, 23 pp.

WII, 2011. Assessment of minimum water flow requirements of Chambal river in the context of Gharial (*Gavialis gangeticus*) and Gangetic dolphin (*Platanista gangetica*) conservation. 40 pp.

Technical Manual

Hussain, S.A., Mohan, D., Gopi, G.V., Talukdar, G. and Sivakumar, K., 2011. Management plan for Okhla Bird Sanctuary. Plan submitted to Government of Uttar Pradesh. 216 pp.

Popular Articles

Lyngdoh, Salvador, Selvan, K.M., Gopi, G.V. and Habib, B., 2011. First photos of marbled cat in Pakke Tiger Reserve, western Arunachal Pradesh, India. Cat News, 55: 7–8.

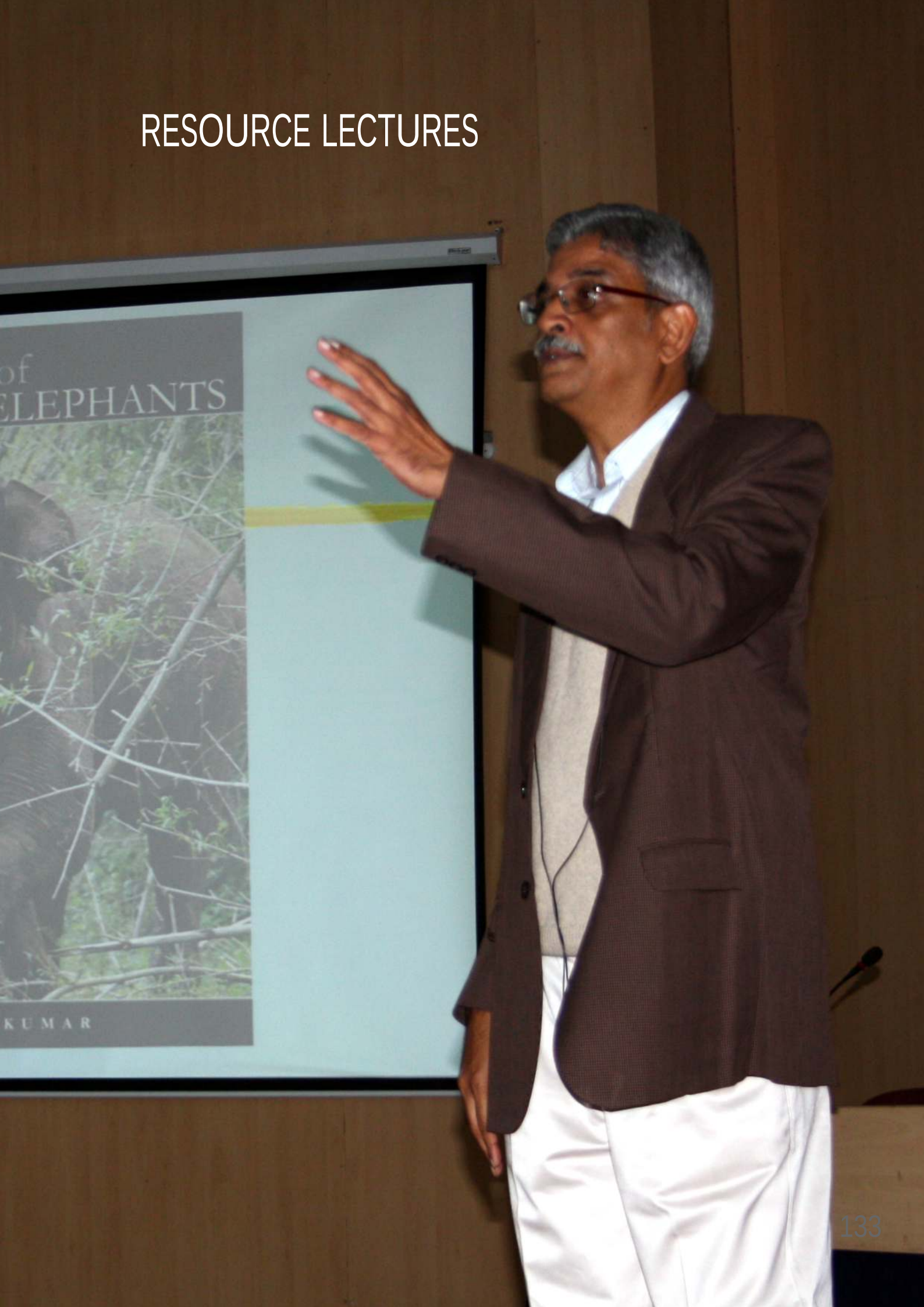
Lyngdoh, Salvador, Selvan, K.M., Gopi, G.V., Habib, B. and Hazarika, M., 2011. Sighting and first photograph of Asiatic golden cat in western Arunachal Pradesh. Cat News, 54: 17–18.

Sivakumar, K., 2012. Marine biodiversity conservation in India. Go4BioDiv Newsletter, 2(2):10–12.

Sathyakumar, S., 2012. Tracking bashful black bears in paradise. SAEVUS. Nature Photography Consciousness, 1(1): 28–36.

Verma, R., Kahdka, M., Badola, R. and Wangdi, C., 2011. Gender experiences and responses to climate change in the Himalayas. Resource material ICIMOD.

RESOURCE LECTURES



RESOURCE LECTURES

WII Faculty as Resource Speakers

Dr. Asha Rajvanshi (April 8, 2011). Solar PV power plants and impacts on ecology / biodiversity. Lecture to participants of the Continuing Professional Development Programmes (CPDPs), conducted by the Center for Climate Change at Engineering Staff College of India (ESCI).

Dr. P.K. Mathur (April 13, 2011). 'Biodiversity conservation - Challenges and approaches'. 10-Week Induction Training for Scientists & Research Officers of Indian Council of Forestry Research and Education, Dehradun.

Dr. G. Talukdar (May 11, 2011). Application of geo-informatics (Remote Sensing, GIS and GPS) in wildlife science. Wildlife Conservation Awareness Programme for Gentleman Cadets, Indian Military Academy, Dehradun.

Dr. S. Sathyakumar (May 23, 2011). Habitat ecology. Indira Gandhi National Forest Academy, Dehradun.

Dr. Ruchi Badola (June 1, 2011). Ecosystem services from forests. Module on Environmental Economics for 2009-11 course of IFS (P), Indira Gandhi National Forest Academy, Dehradun.

Dr. Ruchi Badola (June 2, 2011). Valuation of ecosystem services. Module on Environmental Economics for 2009-11 course of IFS (P), Indira Gandhi National Forest Academy, Dehradun.

Dr. Sushant Chowdhury (June 16, 2011). Landscape/ landuse planning for conservation and management of elephants. Amity School of Natural Resources and Sustainable Development, Amity University, Noida.

Dr. Parag Nigam (June 23-30, 2011). Eight lectures on wildlife health management, infectious and non-infectious diseases, management of health and disease in protected areas and in captivity. Hands on exercise on immobilization equipment and dart assembly were also carried out for the 2010-12 IFS probationers. Indira Gandhi National Forest Academy, Dehradun.

Dr. Asha Rajvanshi (July 7, 2011). Relevance of biodiversity-inclusive impact assessment. Lecture to the IFS probationers of 2009–11 batch at Indira Gandhi National Forest Academy, Dehradun.

Dr. Asha Rajvanshi (July 8, 2011). Mainstreaming tools for biodiversity-inclusive impact assessment. Lecture to the IFS probationers of 2009–11 batch at Indira Gandhi National Forest Academy, Dehradun.

Dr. J.A. Johnson (July 12, 2011). Biological Diversity Act, 2002. Central Academy for State Forest Service, Dehradun.

Dr. B.K. Mishra (July 25, 2011). Community participation for biodiversity conservation. Indira Gandhi National Forest Academy, Dehradun.

Shri V.K. Uniyal (July 26-27, 2011). Silviculture viva voce of IFS Probationers of 2009-11 course. Indira Gandhi National Forest Academy, Dehradun.

Dr. J.A. Johnson (July 30-31, 2011). Bird Conservation in India. Central Academy for State Forest Service, Dehradun.

Dr. B.K. Mishra (August 2, 2011). Social issues in biodiversity conservation: Challenges in India. Uttaranchal Academy of Administration, Nainital.

Shri V.K. Uniyal (August 10, 2011). Elective paper of an IFS Probationer on EDCs of Valley of Flowers National Park. Indira Gandhi National Forest Academy, Dehradun.

Dr. V.P. Uniyal (September 5, 2011). Himalayan Pollinators. Navdanya farm at Ramgarh, Dehradun.

Dr. Asha Rajvanshi (September 6, 2011). Development and conservation strategy. Lecture to the participants of the Training-cum-Workshop on *Wildlife Management* for in-service SFS Officers at Central Academy for State Forest Service, Dehradun.

Dr. J.A. Johnson (September 9, 2011). Eco-tourism and Interpretation. Central Academy for State Forest Service, Dehradun.

Dr. V.B. Mathur (September 17, 2011). Protected area management in India: Issues, challenges and way forward. Professional Skill Upgradation Course, SFS College Dehradun.

Dr. Ruchi Badola (September 21, 2011). Payment for Ecosystem Services. General refresher course for in-service SFS officers, Central Academy for State Forest Service, Dehradun.

Dr. G. Talukdar (September 21, 2011). GIS Applications in Wildlife Conservation. One week training program in GIS, Forest Survey of India, Dehradun.

Shri V.K. Uniyal (September 23, 2011). Classes for in-service ACFs on habitat management. Central Academy for State Forest Service, Dehradun.

Dr. V.P. Uniyal (October 3, 2011). Protected Areas Management in Himalayan Region. Zoology Department, Kurukshetra University, Haryana during Wildlife Week Celebration.

Shri V.K. Uniyal (October 3-9, 2011). Techniques tour of IFS Probationers 2010-12 Course to Sariska Tiger Reserve. Indira Gandhi National Forest Academy, Dehradun.

Dr. Ruchi Badola (November 1, 2011). REDD and REDD+. Training program on Combating Desertification and Climate Change, Central Academy for State Forest Service, Dehradun.

Dr. Ruchi Badola (November 8, 2011). Stakeholder's Participation. Joint training program for IAS, IPS and IFS officers on forest management and interface with various stakeholders, Indira Gandhi National Forest Academy, Dehradun.

Dr. V.P. Uniyal (November 14, 2011): Inputs and appropriate comments provided during session on "Emerging issues in Forestry Research in Himalayan Mountain". G.B. Pant Institute of Himalayan Environment & Development, Almora.

Dr. V.P. Uniyal (November 14-16, 2011): Inputs provided during brain storming session, 6th Uttarakhand State Science & Technology Congress, Almora.

Dr. V.B. Mathur (November 29, 2011): Environment, forest & wildlife conservation in India: An overview. Orientation Course for Indian Revenue Service Officers, Indira Gandhi National Forest Academy, Dehradun

Dr. Sushant Chowdhury (December 1, 2011). Elephant conservation issues and human-elephant conflicts. Sri Lankan Course in Advance Wildlife Management.

Dr. V.B. Mathur (January 3, 2012): How secure are our protected areas. Professional Skill Upgradation Course, SFS College Dehradun.

Dr. Ruchi Badola (January 10, 2012). Gender Issues in Forestry. Professional Skill Up-Gradation Course for IFS Officers, Indira Gandhi National Forest Academy, Dehradun.

Dr. V.P. Uniyal (January 17, 2012): Himalayan Pollinators. Navdanya farm at Ramgarh, Dehradun.

Dr. Asha Rajvanshi (January 17, 2012). Introduction to biodiversity/framework for biodiversity conservation. Lecture to the participants of the 105th International Training Programme at International Centre for Information Systems and Audition at ICISA, Noida.

Dr. V.B. Mathur (January 18, 2012): Role of world heritage convention in managing outstanding universal values of natural and cultural heritage. Training course on 'International conventions on climate change, forestry and wildlife', Indira Gandhi National Forest Academy, Dehradun.

Dr. Asha Rajvanshi (January 31, 2012). Infrastructure projects and environment. Lecture to the participants of the 105th International Training Programme at International Centre for Information Systems and Audition at ICISA, Noida.

Dr. B.K. Mishra (January 31, 2012): Wildlife conservation in India: Challenges and way forward. Ch. Charan Singh Haryana Agricultural University, Hisar.

Dr. K. Vasudevan (February 6-8, 2012). Biogeography concepts; Island biogeography theory. Biology of Indian wildlife. Indira Gandhi National Forest Academy.

Dr. Ruchi Badola (February 8, 2012). Payment for ecosystem services. Professional Skill Up-Gradation Course for IFS Officers, Indira Gandhi National Forest Academy, Dehradun.

Dr. Sushant Chowdhury (February 16, 2012). Understanding elephants: Ecology, conservation and management. Training programme for Wildlife Conservation for Wildlife Enthusiasts.

Dr. S. Sathyakumar (February 17-18, 2012). Wildlife of the Himalaya: Conservation through science. During the SAEVUS Wildlife Magazine launch at Little Rann of Kutch, Gujarat, February 2012.

Dr. K. Vasudevan (February 27 – March 8, 2012). Field herpetology: Ecological studies. Design of field studies. DST – School in Herpetology, North Orissa University.

Dr. V.B. Mathur (March 1, 2012). (i) Biogeography, conservation planning and protected area network in India; and (ii) Natural heritage conservation and inscription of the Western Ghats on the Natural World Heritage List. P.G. Diploma/ M.Tech. Training Course at Indian Institute of Remote Sensing, Dehradun.

Dr. V.B. Mathur (March 15, 2012).
(i) Biogeography, conservation planning and protected area network in India; and (ii) Guidelines for selection and design of protected areas. Training Course for IFS Probationers of 2011 Batch at Indira Gandhi National Forest Academy, Dehradun.

Dr. Asha Rajvanshi (March 19, 2012). EIA – Legislative and procedural aspects and framework for biodiversity-inclusive impact assessment. Professional inputs for mid-career training of IFS at Indian Council of Forestry Research and Education, Dehradun.

Speakers at WII

Dr. Trevor Price, University of Chicago, *July 4, 2011.* How summer and winter seasons act to regulate warbler distributions. *June 6, 2011.* Origin of bird species. *July 1, 2011.* Why there are more bird species in the east than in the west in Himalayas?

Dr. R. Sukumar, Chairman, TRAC, *February 21, 2012.* Asian elephants: Ecology and conservation.

Dr. Dale Miquelle and Dr. John Goodrich of Wildlife Conservation Society, Russia Program, *November 24, 2011.* (i) The Siberian Tiger Project: Research and conservation in the Russian Far East.

Dr. Marc Hockings, Professor and Programme Director (Environmental Management), School of Geography, Planning and Environmental Management, The University of Queensland & Vice-Chair (Science, Knowledge and Management of Protected Areas) IUCN World Commission Protected Areas Senior Fellow, and UNEP-World Conservation Monitoring Centre, *February 24, 2012.* Management effectiveness evaluation of protected areas: Global experience.

Awards

Dr. Pradeep. K. Malik, Scientist-G and Head, Department of Wildlife Health Management, was awarded a lifetime achievement award for outstanding contributions in wildlife health by the Association of Indian Zoo and Wildlife Veterinarians (AIZWV) during the National Congress on Wildlife Health and Forensics held at Jabalpur on September 15-16, 2011.

Dr. Parag Nigam, Scientist-D, Department of Wildlife Health Management, was awarded a certificate of appreciation for outstanding contributions in wildlife health by the Association of Indian Zoo and Wildlife Veterinarians (AIZWV) during the National Congress on Wildlife Health and Forensics held at Jabalpur on September 15-16, 2011.

Ms. Shazia Quasin bagged a Young Scientists Award (Oral – first position) in the National Conference on Biodiversity vis-à-vis Environment Degradation in Hilly Terrains, Department of Zoology D.B.S College, Dehradun (Uttarakhand), May 2011. She also received a Young Scientists Award (Oral – first position) at the 6th Uttarakhand State Science and Technology Congress (USSTC), SSJ Campus, Kumaun University, Almora, November 2011.

ACCOUNTS

Separate Audit Report on the Accounts of Wildlife Institute of India, Dehradun for the year 2011-12.

We have audited the attached Balance Sheet of Wildlife Institute of India, as on 31 March 2012, the Income & Expenditure Account and the Receipt & 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 38G of the Wildlife (Protection) Act, 1972. The audit has been entrusted upto 2015-16. These financial statement are the responsibility of the WII's management. Our responsibility is to express an opinion on these financial statements based on our audit.

1. 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.

2. 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 statement. We believe that our audit provides a reasonable basis for our opinion.

3. 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. Capital Fund

Income & Expenditure Account show the excess of expenditure over income to the tune of Rs. 174.72 lakh whereas the amount deducted from Schedule-1 Capital Fund was shown as Rs. 181.59 lakh. The figures need reconciliation.

2. Understatement of Current Assets:

- Schedule 11-B: Current Assets- Loans, Advances and other assets - Interest accrued on pension fund was shown as Rs. 56.90 lakh whereas in I&E Account of Pension Fund, it was shown as Rs. 59.90 lakh. the figures need reconcilation.

Schedule-11 (B)- Loans, Advances and Other Assets show TDS on Pension Fund, GPF and Corpus Fund to the tune of Rs. 9.23 lakh to be refunded by ITO. This amount did not include refundable amount for the last year resulting in understatement of Current Assets and liabilities to the same extent.

Lack of Response: The management did not furnish the reply to the draft SAR within the prescribed timeframe.

B: Grants-in-Aid:
The Institute received Rs. 1870.00 lakh as Grant-in-Aid during the year 2011-12 which was utilized in full.

C: 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, the said financial statement read together with the Accounting Policies and Notes on Accounts and subject to the significant matters stated above and other matters mentioned in Annexure I to this Separate Audit Report give a true and fair view in conformity with accounting principles generally accepted in India.

a. In so far as it relates to the Balance Sheet, of the state of affairs of the Wildlife Institute of India, Dehradun as at 31 March 2012 and
b. In so far as it relates to Income & Expenditure Account of the deficit for the year ended on that date.

For and on behalf of C&AG of India.

Place: New Delhi
Date: 31.12.2012

Pr. Director of Audit (SD)

Annexure - I

1. Adequacy of Internal Audit System: The internal audit of WII, Dehradun has been conducted for the first time since inception during 2010-11 by the internal audit part of PAO MOEF. The internal audit system was not adequate in the areas of administrative lapses & establishment matters.

2. System of Physical Verification of Assets.
Physical verification of Assets has been conducted for the period 2010-11 and for the year 2011-12 was in progress.

3. System of Physical Verification of Inventory
Inventory of plantation costing Rs. 34.38 lakh and trees Rs. 24.34 lakh have not been maintained.

4. Adequacy of Internal Control System:
The internal control system was adequate.

5. Regularity in payment of statutory dues:
WII is generally regular in payment of undisputed statutory dues except in some cases not involving significant amount.

Asstt. Audit Officer

WILDLIFE INSTITUTE OF INDIA
Receipts & Payments Accounts for the financial year 2011-12

RECEIPTS				Previsou Year	PAYMENT				Previous Year
Particulars	Plan	Non Plan	Total		Particulars	Plan	Non Plan	Total	
(A) GRANT-IN-AID					Expenses				
To Opening Balance					Salaries & Allowances	82020527	9200000	91220527	79774039
Cash in Bank	4,568,676	0	4,568,676	7,550,147	Medical	6228080		6228080	5501764
Cash In Hand	110,035	0	110,035	203,604	LTC	1934813		1934813	1732908
			0		OTA	467054		467054	457902
To Grant in Aid (Revenue)	175,000,000	12,000,000	187,000,000	165,500,000	Honorarium	25900		25900	30500
To Grant in Aid (Capital)			0	1,500,000	Wages	8258044	2800000	11058044	9322748
To Grant (other Projects)			0	0	Bonus	386983		386983	393152
MSc Course Fee	957,005		957,005	369,600	Fellowship			0	736582
			0	0	Travel Exp. (Grant in Aid)	3165194		3165194	2897631
To Bus Charges	96,733		96,733	86,009	FA (Res. Proj)	172075		172075	0
To Rent	658,226		658,226	508,535	Travel Exp. (Res. Proj)	642899		642899	1018292
To WII Products	74,721		74,721	82,698	Fellowship & Wages (Research Project)	6662926		6662926	7828138
To Misc Receipts	326,037		326,037	128,811	Base Camp Expenses (Research Project)	272400		272400	518977
To Elect & Water	336,524		336,524	268,472	Leave Salary Pension Con	2059453		2059453	0
To Telephone	17,253		17,253	26,936	POL, Hiring of Veh. (Res. Proj.)	1849169		1849169	2679958
To Interest on Saving A/c	970,510		970,510	656,299	Contingencies (Res. Proj)	2077865		2077865	4341207
To Loan & Advance	136,950		136,950	671,396	M.Sc. Courses Expenses	2615132		2615132	1485263
(Recovered from staff)			0	0	Travel Advance (M.Sc.)	0		0	33300
To Hostel Caution Money	42,700		42,700	40,200	Forests Advance (M.Sc.)	0		0	501476
To GPF			0	3,901	Telephone	799321		799321	679091
Travel Advance recovered	72,664		72,664	132,373	Postage	208590		208590	201461
FA Recovered	416,048		416,048	52,810	Electricity & Water Exp	7257632		7257632	7132942
To LTC Advance	11,132		11,132	370,414	Guest House Maint.	78887		78887	57060
To Medical Advance	164,831		164,831	68,164	Hospitality & Enter.	263043		263043	192497

To T A (Research Project)	26,432		26,432	144,119	Repair of Equipment/ Furniture	142032		142032	367006
To FA (Research Project)	0		0	406,924	POL for WII Vehicle	2076289		2076289	1825515
Journals & Periodicals	56,101		56,101	44,681	Repair & Maint of Veh	1065462		1065462	691895
Internal Loan	1,481,033		1,481,033		Training Cost Expenditure	13500		13500	5000
To TDS			0	35,023	Sty & Cmptr Consum.	799555		799555	609961
To CGEGIS			0	91,970	Sports	274550		274550	32846
To TA/FA (M.sc.)	505,326		505,326	0	Legal Expenses	138925		138925	235755
Fellowship (Liability)			0	65,754	Operational Expenses	1122797		1122797	680020
			0		Printing & Binding	13996		13996	105020
CCU New Delhi	206,809		206,809	0	Maint. of WII Campus	933975		933975	404176
					Estate Security	9129035		9129035	8207228
					Lab Expenses (Health Lab)			0	1067921
					Lab Expenses (Gen Lab)	492477		492477	128640
					Lab Expenses (Res Lab)	243318		243318	179939
					Lab Expenses (For Lab)	1798442		1798442	1017057
					Publication	431017		431017	549401
					AMC of Computers	1855049		1855049	840115
					Transferred to Trg A/c for Expenditure	9450000		9450000	6000000
					Govt cont to Pension Fund	0		0	5000000
					Sharing of cost of Kendriya Vidyalaya	5000000		5000000	2200000
					Annual Research Seminar	937752		937752	1200445
					World Environment Day	267298		267298	0
					CGEGIS	94250		94250	0
					Trfrd to Corpus Fund			0	3673288
					TDS	45148		45148	0
					By GPF	4673		4673	0
					EMD Release	58045		58045	283500
					EPF	0		0	52278
					Internal Loan			0	905610
					Project Costs	1403000		1403000	1286530
					Refund of Project Cost			0	868025
					Computer & Accessories	977584		977584	1046435
					By Furniture & Fixture			0	57344

					By Journals & Periodicals	3929553		3929553	2260495
					By Lab Eqpt (Res. Lab)	321945		321945	249931
					By Lab Eqpt (For Lab)	870271		870271	1899467
					By Office Equipment	20015		20015	274127
					Civil Maintenance Work	208607		208607	148762
					Adv Paid to CPWD	1400000		1400000	0
					Vehicle Purchase	0		0	1465691
					By Office Eqpt (Res. Proj)	95057		95057	96934
					By Camp Eqpt (Res. Proj.)	243047		243047	896884
					Closing Balance				
					In Bank	12891553		12891553	4568676
					In Hand	41542		41542	110035
A' Total	186,235,746	12,000,000	198,235,746	179,008,840	A' Total	186235746	12000000	198235746	179008840

GPF

RECEIPTS					PAYMENT				
Particulars		Non Plan	Total	Previous Year	Particular		Non Plan	Total	Previous Year
To Opening Bal (Bank)	2243068.00		*2,243,068.00*	*3,016,892.00*					
To GP Fund Contribution	13809737.00		*13,809,737.00*	10,608,790.00	By Final Payment	1,420,567.00		1,420,567.00	770,583.00
To Int. on saving a/c	48748.00		*48,748.00*	132,881.00	By Invtmt in FDR (GPF)	0.00		0.00	20,400,000.00
Encashment of FDRs			*0.00*	14,099,254.00	By Advance/withdrawl	8917733.00		8,917,733.00	4,444,166.00
To Interests on FDRs	148297.00		*148,297.00*	0.00	TDS on Interest on FDRs	148297.00		148,297.00	0.00
					By Closing Balance (Bank)	5,763,253.00		5,763,253.00	2,243,068.00
F' Total	16,249,850.00	0.00	16,249,850.00	27,857,817.00	F' Total	16,249,850.00	0.00	16,249,850.00	27,857,817.00

PENSIONS

RECEIPTS					PAYMENT				
Particulars		Non Plan	Total	Previous Year	Particular		Non Plan	Total	Previous Year
To Opening Balance			0						
Cash in Bank	*480628.00*		480628.00	*470,160.00*	By Investment in FDR	0.00		0.00	9,700,000.00
					By Commuted Value of				
To encashment of FDR	0.00		0.00	3,271,553.00	Pension	246,017.00		246,017.00	669,212.00
To Interest (Pension A/c)	20147.00		20147.00	42,914.00	By Pension/ Family Pension	2,851,845.00		2,851,845.00	2,352,607.00
To WII Contribution	3499078.00		3499078.00	9,288,386.00	By Closing Balance			0.00	
To Interest on FDRs	670228.00		670228.00		TDS on Interest on FDRs	670,228.00		670,228.00	
To Pension Contribution	222106.00		222106.00	129,434.00	Cash in Bank	1,124,097.00		*1,124,097.00*	480,628.00
D' Total	4,892,187.00	0.00	4,892,187.00	13,202,447.00	D' Total	4,892,187.00	0.00	4,892,187.00	13,202,447.00

CORPUS FUND

RECEIPTS				Previous Year	PAYMENT				Previous Year
Particulars		Non Plan	Total		Particular		Non Plan	Total	
To Opening Balance	580063.00		580063.00	1143049.00					
Misc Receipts	823810.00		*823,810.00*	6717482.00	By Investment	10,770,684.00		10,770,684.00	14,300,000.00
Interests on Saving A/c	240042.00		*240,042.00*	96746.00	TDS on Interest on FDRs	104644.00		104,644.00	
To Encashment of FDR	9919174.00		*9,919,174.00*	6922786.00					
To interest on FDRs	104644.00		*104,644.00*						
Interests Received on FDRs on pre extension of period	8975.00		*8,975.00*	0.00	on FDRs on pre extension of period	8,975.00		8,975.00	0.00
					Closing Balance	792,405.00		792,405.00	580,063.00
F' Total	11,676,708.00	0.00	11,676,708.00	14,880,063.00	F' Total	11,676,708.00	0.00	11,676,708.00	14,880,063.00

TRAINING ACCOUNT

RECEIPTS					PAYMENT				
Particulars	Plan	Non Plan	Total		Particulars	Plan	Non Plan	Total	
To Opening in Bank	*134,365.00*		*134,365.00*	*6,327,932.52*	By Equipment	76108.00		76,108.00	471922.00
Grant Received	9,450,000.00		*9,450,000.00*	6,000,000.00	By Office Equipment	19000.00		19,000.00	10061.00
Interest Received	39,314.00		*39,314.00*	1,688,918.00	By Furniture & Fixture	0.00		0.00	540791.00
Other Receipts	3,218.00		*3,218.00*	175,981.00	By Hostel Items	167779.00		167,779.00	272647.00
					By Cont/Misc	775824.00		775,824.00	670197.00
					By Training Allowance	19170.00		19,170.00	309915.00
					By Travelling Expenses	2771348.00		2,771,348.00	2469641.00
					TA/DA & Honorarium (Guest Faculty)	391123.00		391,123.00	274318.00
					Stationery Items			0.00	132242.00
					POL & Maint of Vehicle	788951.00		788,951.00	668887.00
					Boarding & Lodging	2187779.00		2,187,779.00	5169585.00
					Books	951563.00		951,563.00	297141.00
					Forests Advance	0.00		0.00	292704.00
					Salary & Wages	198712.00		198,712.00	267294.00
					Advance to Firm	1070538.00		1,070,538.00	65700.00
					Sports Item	10164.00		10,164.00	31261.00
					Transf. to corpus Fund	0.00		0.00	2114160.00
					By Closing in Bank	198838.00		198,838.00	134365.52
C' Total	9,626,897.00	0.00	9,626,897.00	14,192,831.52	C' Total	9,626,897.00	0.00	9,626,897.00	14,192,831.52

CONSULTANCY PROJECTS

RECEIPTS				Previous Year	PAYMENT				Previous Year
Particulars	Plan	Non Plan	Total		Particulars	Plan	Non Plan	Total	
To Opening Balance:	0	0	0						
at Bank	*22,046,811.00*		*22,046,811.00*	*18,364,168.37*	By Camp Equipment	65,206.00		65,206.00	32,426.00
Grant Received	28,171,478.00		*28,171,478.00*	20,147,518.90	By Office Equipment	771,499.00		771,499.00	556,301.00
Interest Saving A/c	675,974.00		*675,974.00*	412,481.00	By Camp Expenses			0.00	3,889.00
Other Receipt	1,184,720.00		*1,184,720.00*	4,767.00	By Contingenciges/Misc	4,312,716.00		4,312,716.00	4,261,021.00
Loan from Director A/c No.									
50650	350,000.00		*350,000.00*		By Fellowship & Wages	967,625.00		967,625.00	1,886,596.00
					By Travel Expenses	2,191,870.00		2,191,870.00	3,522,030.16
					By POL & Maint. of veh.	104,222.00		104,222.00	385,007.00
					By GIS of office Data			0.00	33,950.00
					By Forests Advance (FA)	25,625.00		25,625.00	40,000.00
					Other Advance			0.00	0.00
					By Boarding & Lodging	10,338,770.00		10,338,770.00	5,214,880.00
					By TA /DA & Honorarium	102,778.00		102,778.00	247,574.00
					Books	136,066.00		136,066.00	232,483.00
					Duties & Taxes (Service Tax)			0.00	115,967.00
					Transf. To Corpus Fund	190,700.00		190,700.00	0.00
					Publication & Printing	57,470.00		57,470.00	0.00
					Loan Director A/c No. 50650	0.00		0.00	350,000.00
					By Bank Balance	33,164,436.00		33,164,436.00	22,046,811.11
E' Total	52,428,983.00	0.00	52,428,983.00	38,928,935.27	E' Total	52,428,983.00	0.00	52,428,983.00	38,928,935.27
Grand Total	281,110,371.00		293,110,371.00	288,070,933.79	0.00	281,110,371.00		293,110,371.00	288,070,933.79

(P.K. Aggarwal)
Finance Officer

(P.R. Sinha)
Director

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANIZATION)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
Balance Sheet as on 31 March, 2012

CORPUS /CAPITAL FUND AND LIABILITIES	Schedule	Current Year	Previous Year
CORPUS /CAPITAL FUND	1	248805212.6	257939956.00
RESERVE AND SURPLUS	2	0.00	0.00
EARMARKED FUND	3	33164436.00	22046811.00
SECURED LOAN AND BORROWINGS	4	0.00	0.00
UNSECURED LOAN AND BORROWINGS	5	325428.00	314318.00
DEFERRED CREDIT LIABILITIES	6	0.00	0.00
CURRENT LIABILITIES AND PROVISION	7	170454011.00	155083642.00
TOTAL (A)		452749087.60	435384727.00
ASSETS			
FIXED ASSETS	8	163545543.60	179636624.00
INVESTMENTS- FROM EARMARKED / ENDOWMENT FUNDS	9	0.00	0.00
INVESTMENTS- OTHERS	10	199400492.00	192090006.00
CURENT ASSETS, LOANS, ADVANCES ETC.	11	89803052.00	63658097.00
MISCELLANEOUS EXPENDITURE (to the extent not written off or adjusted)			
TOTAL (B)		452749087.60	435384727.00

(P.K. Aggarwal)
Finance Officer

(P.R. Sinha)
Director

Financial Statement (Non-Profit Organization)

Wildlife Institute of India, Dehraun

SCHEDULES FORMING PART OF BALANCE SHEET FOR THE YEAR ENDED 31 MARCH 2012

(Amt. Rs.)

			Current Year	Previous Year
SCHEDULE 1: CORPUS/ CAPITAL FUND				
Balance as at the begninig of the year			210011576.00	220891745.00
Add: Contribution towards Corpus/ Capital fund			6884767.00	19598592.00
Less : Pre receipted Bill of consultancy Project			-617000.00	-3804705.00
Add/(Deduct) : Balance of net income (expenditure) transferred from			-17472274.93	-26674056.00
TOTAL			198807068.07	210011576.00
Corpus Fund				
	Opening Balance		47928380.00	40064170.00
	Received during the year		816062.00	6717482.00
	Add Accrued Interest		917991.00	964571.00
	Add Interest Earned		335711.00	182157.00
Total			49998144.00	47928380.00
Total A+B			248805212.07	257939956.00
SCHEDULE3 : EARMARKED FUNDS				
a)	Opeining Balance of the Funds		22046811.00	18364168.37
b)	Addition to the Funds			
	i	Grants Received	28171478.00	20147518.90
	ii	Interest Received	675974.00	412481.00
	iii	Other Receipts	1184720.00	4767.00
	iv	Pre receipted Bill issued	617000.00	4535675.00
	v	Refund of Loan from A/c No. 50650	350000.00	0.00
		Total	30999172.00	25100441.90
		TOTAL (A+B)	53045983.00	43464610.27
	Utilisation/Expendition towards objectives of funds			
c)	i			
		Camp Equipment	65206.00	32426.00
		Office Equipment	771499.00	556301.00
		Books	136066.00	232483.00
		Camp Expenses	103035.00	3889.00
		Contigencies/Misc.	4369929.00	4261021.00
		Fellowship & Wages	967625.00	1886596.00
		Travel Expenses	2191870.00	3769604.16
		POL & Maint. Of Vehicle	104222.00	385007.00
		GIS & Office Data	0.00	33950.00
		Advance for Expenses (FA)	25625.00	40000.00
		Boarding & Lodging	10338770.00	5214880.00
		Transferred to Corpus Fund	190700.00	0.00
		Duties & Taxes (Service Tax)	0.00	115967.00
		Loan D/WII A/c No. 50650	0.00	350000.00
	iii	Pre receipted Bill yet to be received	617000.00	4535675.00
		TOTAL-C	19881547.00	21417799.16
NET BALANCE AS AT THE YEAR-END (A+B-C)			33164436.00	22046811.11

SCHEDULE 5 : UNSECURED LOANS AND BORROWINGS		
(1) Central Govt.	0.00	
(2) State Govt.(Specify)	0.00	
(3) Financial Instittions	0.00	
(4) Banks		
(i) Term Loans	0.00	
(ii) Others (specify)	0.00	
(5) Other Institutions and Agencies	0.00	
(6) Debentures and Bonds	0.00	
(7) Fixed Deposits		
(8) Others (Specify)		
Security Deposit	314318.00	314318.00
Internal Loan	11110.00	
TOTAL	325428.00	314318.00
SCHEDULE 7 : CURRENT LIABILITIES AND PROVISION		
(A) CURRENT LIABILITIES		
(1) Acceptances		
(2) Sundry Creditors		
(1) For Goods		
(2) For Others		
Other Payments outstanding(Grant-in-aid) (07-08)	0.00	33976.00
Other Payments outstanding(Grant-in-aid) (09-10)	0.00	295666.00
Other Payments outstanding (Grant in Aid) (10-11)	0.00	323860.00
Other Payments outstanding (Grant in Aid) (11-12)	2534531.00	0.00
Other payments outstanding (Res Project) (11-12)	1089764.00	
(3) Advances Received		
Hostel Caution Money	201660.00	158960.00
(4) Interest accrued but not due on		
(1) Secured Loans/Borrowings	0.00	
(2) Unsecured Loans/Borrowings	0.00	
(5) Statuary Liabilities		
(1) Overdue		
(2) Others (Specify)		
Pension Fund	115599626.00	108174429.00
GP Fund	50359477.00	45344983.00
(6) Others (Specify)		
EMD Received	481308.00	539353.00
TOTAL (A)	170266366.00	154871227.00
(B) Provisions		
(1) For Taxation		
TDS	2155.00	47303.00
(2) Gratuity		
(3) Superannuation/ Pension		
(4) Accumulated Leave Encashment		
(5) Trade Warranties/ Claims		
(6) Others (Specify)		
GPF	0.00	4673.00
CGEGIS	435.00	94685.00
Payment made to Sh Rajkishore Mohanto (Res Project)	119301.00	0.00
Fellowship (Arrear)	65754.00	65754.00
TOTAL (B)	187645.00	212415.00
TOTAL (A+ B)	170454011.00	155083642.00

SCHEDULE 8: FIXED ASSETS

Pariculars	Gross Block					DEPRECIATION				NET BLOCK	
	Cost as at the beginning 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								
LAND											
BLOCK: 0%											
Avenue Plantations	3438280.00	0.00	0.00	0.00	3438280.00	0.00	0.00	0.00	0.00	3438280.00	3438280.00
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	0.00	0.00	0.00	2432709.00	0.00	0.00	0.00	0.00	2432709.00	2432709.00
TOTAL	12478203.58	0.00	0.00	0.00	12478203.58	0.00	0.00	0.00	0.00	12478203.58	12478203.58
BUILDINGS											
BLOCK: 10%											
Arch. & Sprvson Fee	3472440.79	0.00	0.00	0.00	3472440.79	385826.75	347244.08	0.00	347244.08	3125196.71	3472440.79
Auditorium	5199875.72	0.00	0.00	0.00	5199875.72	577763.97	519987.57	0.00	519987.57	4679888.15	5199875.72
Boundary Fencing	316884.97	0.00	0.00	0.00	316884.97	35209.44	31688.50	0.00	31688.50	285196.47	316884.97
Boundary Wall	560287.76	0.00	0.00	0.00	560287.76	62254.20	56028.78	0.00	56028.78	504258.98	560287.76
Building Complex	74981570.53	0.00	0.00	0.00	74981570.53	8331285.61	7498157.05	0.00	7498157.05	67483413.48	74981570.53
Campus Development	23346966.38	2529200.00	208607.00	0.00	26084773.38	2594107.38	2598046.99	0.00	2598046.99	23486726.39	23346966.38
Corr. As pointed out by the Audit	0.00	-687126.00			-687126.00	0.00	-68712.60	0	-68712.60	-618413.40	0.00
Materials and Supplies	1501794.61	0.00	0.00	1501794.61	0.00	0.00	0.00	0.00	0.00	0.00	1501794.61
Tennis Court	205663.03	0.00	0.00	0.00	205663.03	22851.45	20566.30	0.00	20566.30	185096.73	205663.03
Sports Complex	130317.73	0.00	0.00	0.00	130317.73	14479.75	13031.77	0.00	13031.77	117285.96	130317.73
BLOCK: 20%											
Road & Culvert	306945.08	0.00	0.00	0.00	306945.08	76736.27	61389.02	0.00	61389.02	245556.06	306945.08
Staff Quarters	3824574.67	334500.00	0.00	0.00	4159074.67	956143.47	831814.93	0.00	831814.93	3327259.74	3824574.67
Corr. during the year for Staff Qtrs	380472.47	0.00	0.00	78309.58	302162.89	95118.12	60432.58		60432.58	241730.31	380472.00
TOTAL	114227793.74	2176574.00	208607.00	1580104.19	115032870.55	13151776.41	11969674.97	0.00	11969674.97	103063195.58	114227793.27
PLANT MACHINERY & EQPT											
BLOCK: 20%											
Vehicle	2081103.08	0.00	0.00	0.00	2081103.08	337064.40	416220.62	0.00	416220.62	1664882.46	2081103.08
Development of Foerensic Laboratory	6135191.24	182839.00	687432.00	0.00	7005462.24	1317477.44	1332349.25	0.00	1332349.25	5673112.99	6135191.24
Training Equipment	780235.01	0.00	0.00	0.00	780235.01	195058.75	156047.00	0.00	156047.00	624188.01	780235.01

BLOCK: 25%											
AC Plant	656378.13	0.00	0.00	0.00	656378.13	218792.71	164094.53	0.00	164094.53	492283.60	656378.13
Camp Equipment (project)	178443.53	0.00	0.00	0.00	178443.53	59481.18	44610.88	0.00	44610.88	133832.65	178443.53
DG Set	1298923.76	0.00	0.00	0.00	1298923.76	432974.59	324730.94	0.00	324730.94	974192.82	1298923.76
EPABX	125980.98	0.00	0.00	0.00	125980.98	41993.66	31495.25	0.00	31495.25	94485.74	125980.98
Lab Equipment	3658153.74	240902.00	81043.00	0.00	3980098.74	1219384.58	984894.31	0.00	984894.31	2995204.43	3658153.74
Office Equipment	2080230.09	5800.00	486288.00	839505.00	1732813.09	683402.53	582293.52	0.00	582293.52	1150519.57	2080230.09
Training Equipment (Trg. A/c)	3569753.30	31708.00	63400.00	0.00	3664861.30	1114631.60	908290.33	0.00	908290.33	2756570.98	3569753.30
Office Equipment (Project)	8713.83	0.00	0.00	0.00	8713.83	2904.61	2178.46	0.00	2178.46	6535.37	8713.83
Office Equipment (Res. Project)	2260798.36	95057.00	0.00	0.00	2355855.36	752345.45	588963.84	0.00	588963.84	1766891.52	2260798.36
Camp Equip. (Res. Project)	5717182.93	239220.00	3827.00	0.00	5960229.93	1806236.48	1489579.11	0.00	1489579.11	4470650.82	5717182.93
TOTAL	28551087.98	795526.00	1321990.00	839505.00	29829098.98	8181747.98	7025748.03	0.00	7025748.03	22803350.95	28551087.98
FURNITURE, FIXTURES										0.00	
BLOCK : 15%										0.00	
Furinitures & Fixtures	6452739.47	12572.00	0.00	0.00	6465311.47	1137290.73	969796.72	0.00	969796.72	5495514.75	6452739.47
Furniture & Fixture (Training)	471707.63	0.00	0.00	0.00	471707.63	75098.94	70756.14	0.00	70756.14	400951.49	471707.63
TOTAL	6924447.10	12572.00	0.00	0.00	6937019.10	1212389.67	1040552.87	0.00	1040552.87	5896466.24	6924447.10
OFFICE EQUIPMENT										0.00	
BLOCK : 20%										0.00	
Office Equipment (Training A/c)	171073.08	0.00	0.00	0.00	171073.08	41510.64	34214.62	0.00	34214.62	136858.46	171073.08
TOTAL	171073.08	0.00	0.00	0.00	171073.08	41510.64	34214.62	0.00	34214.62	136858.46	171073.08
COMPUTER/PERIPHERALS											
BLOCK : 20%											
Comp. and Periphrals	784835.73	776478.00	206406.00	0.00	1767719.73	196208.93	332903.35	0.00	332903.35	1434816.38	784835.73
BLOCK : 60%	0.00									0.00	
Comp. & Accessories	990985.64	0.00	0.00	0.00	990985.64	1211578.70	594591.38	0.00	594591.38	396394.26	990985.64
E Governance	382438.08	0.00	0.00		382438.08	573657.12	229462.85	0.00	229462.85	152975.23	382438.08
TOTAL	2158259.45	776478.00	206406.00	0.00	3141143.45	1981444.75	1156957.58	0.00	1156957.58	1984185.87	2158259.45
BOOKS											
BLOCK : 10%											
Journals & Periodicals	13199185.66	1609039.00	2197184.00	0.00	17005408.66	1459703.96	1590681.67	0.00	1590681.67	15414726.99	13199185.66
Corr. As pointed out by the Audit	38489.00	0.00			38489.00	0.00	3848.90	0.00	3848.90	34640.10	38489.00
Library Books	1926573.03	0.00	0.00	0.00	1926573.03	214063.67	192657.30	0.00	192657.30	1733915.73	1926573.03
TOTAL	15164247.69	1609039.00	2197184.00	0.00	18970470.69	1673767.63	1787187.87	0.00	1787187.87	17183282.82	15164247.69
GRAND TOTAL	179675112.62	5370189.00	3934187.00	2419609.19	186559879.43	26242637.08	23014335.93	0.00	23014335.93	163545543.50	179675112.15

SCHEDULE :10 INVESTMENT - 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)	27416000.00	27416000.00
Investment in RBI Bond (Pension)	35808000.00	35808000.00
Investment in RBI Bond (Corpus Fund)	29800000.00	29800000.00
(5) Subsidaries and Joint Ventures		
(6) Others (Specify)		
Investment in FDR (GPF)	15685915.00	14824032.00
Investment in FDR (Pension Fund)	72307473.00	67658228.00
FDR Corpus Fund	18383104.00	16583746.00
TOTAL	199400492.00	192090006.00

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)	143735.00	91519.00
Closing Balance of WII Publication	820453.00	888874.00
(2) Sundry Debtors		
(1) Debts Outstanding for a period exceeding six months	123991.00	108978.00
(2) Others (Specify)		
(3) Cash balances in hand (including cheques/drafts and imprest)		
Grant-in-Aid A/c	41542.00	110035.00
Training A/c	0.00	0.00
Pension Fund A/c	0.00	0.00
GPF A/c	0.00	0.00
Corpus Fund	0.00	0.00
(4) Bank Balances		
(1) With Scheduled Banks		
Grant-in-Aid A/c	12891553.00	4568676.00
Training A/c	198838.00	134365.00
Pension Fund A/c	1124097.00	480628.00
GPF A/c	5763253.00	2243068.00
Corpus fund No 4032	792405.00	580063.00
Endowment Funds	33164436.00	22046811.00
TOTAL (A)	55064303.00	31253017.00

(B) LOANS, ADVANCES AND OTHER ASSETS		Current Year	Previous Year
(1) Loans			
(1) Staff			
Loan & Advances to Staff		661894.00	798225.00
Advance for expenses (Staff) (26094+238155+30000+9192+26115)		329556.00	1499558.00
Advance for Expenses to Staff (Training A/c)		0.00	292704.00
Advance for expenses (Research Projects)		460156.00	195212.00
Land Acquisition Charges (Deposited in Hon'ble High Court)		18000000.00	18000000.00
(2) Other entities engaged in activities /objectives similar to			
(3) Others (Specify)			
Adv for civil work to CPWD		2427184.00	2450500.00
Loan for World Environment Day (MoEF)		267298.00	0.00
Internal Loan		*0.00*	1469923.00
(2) Advances and other amounts recoverable in cash or in kind or			
(1) On Capital Accounts			0.00
(2) Prepayments			0.00
(3) Others (Specify)			0.00
Security Deposit for Electricity Connection		412283.00	412283.00
Advance payment to firm (Training)		1070538.00	65700.00
TDS to be refunded by the ITO (Pension Fund)		670228.00	0.00
TDS to be refunded by the ITO (GPF)		148297.00	0.00
TDS to be refunded by the ITO (corpus fund)		104644.00	0.00
(3) Income Accrued			
(1) On Investments from Earmarked / Endowment Funds			
(2) On Invesments -Others			
Interest Accrued in FDR (GPF)		1346012.00	861883.00
Interest Accrued in FDR (Pension Fund)		5689828.00	4227573.00
Interest Accrued in FDR (Corpus Fund)		917991.00	964571.00
(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		0.00	0.00
(4) Expenses payable towards capital/fixed Assets			
(1) Grant in Aid A/c 2007-08	(339757-305781)	0.00	33976.00
(2) Grant in Aid (2009-10)	(575645-281048)	0.00	294597.00
(3) Grant in Aid (2011-12)		815467.00	0.00
(4) Research Project (2011-12)		578998.00	0.00
TOTAL (B)		34738749.00	32405080.00
TOTAL (A+B)		89803052.00	63658097.00

(P.K. Aggarwal)
Finance Officer

(P.R. Sinha)
Director

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANIZATION)

Wildlife Institute of India, Dehradun

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR 2011-12

	Schedule	Current Year	Previous Year
INCOME			
Income from Sales/Services	12	0.00	0.00
Grants/Subsidies	13	180115233.00	147401408.00
Fees/Subscriptions	14	10410223.00	8058518.00
Income from Investments (from earmarked/endowment Funds Transferred to funds)	15	0.00	0.00
Income from Royalty, Publication etc	16	1509494.00	1096461.00
Interest Earned	17	1059057.00	1259089.00
Other Income	18	0.00	219170.00
Increase/decrease) in stock of Finished goods and works-in-progress	19	0.00	0.00
TOTAL (A)		193094007.00	158034646.00
EXPENDITRUE			
Establishment Expenses (Plan & Non Plan)	20	119844052.00	111836019.00
Other Administrative Expenses (Plan & Non Plan)	21	67707894.00	46463180.00
Expenditure on Grants, Subsidies etc.	22	0.00	0.00
Interest	23		0.00
Depreciation (Net Total at the year end - corresponding to Schedule 8)		23014335.93	26409503.33
Total (B)		210566281.93	184708702.33
Balance being excess of Income over Expenditure (A-B)		-17472274.93	-26674056.33
BALANCE BEING SURPLUS (DEFICIT) CARRIED TO CORPUS/CAPITAL FUND		-17472274.93	-26674056.33

(P.K. Aggarwal)
Finance Officer

(P.R. Sinha)
Director

Financial Statement (Non-Profit Organization)

Wildlife Institute of India, Dehraun

SCHEDULES FORMING PART OF BALANCE SHEET FOR THE YEAR ENDED 31 MARCH 2012

SCHEDULE :13 GRANTS/SUBSIDIES		Current Year	Previous Year
(1) Central Government			
Grant -in- Aid from MoEF		187000000.00	167000000.00
Amt capitalized	(-)	6884767.00	19598592.00
Total		180115233.00	147401408.00
(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		180115233.00	147401408.00
SCHEDULE :14 FEES/ SUBSCRIPTIONS			
(1) Entrance Fees			
M.Sc.Course Fee		957005.00	369600.00
(2) Annual Fees/ Subscriptions		0.00	0.00
(3) Seminar/ Program Fees			
Seminar/ Workshop Fees		0.00	0.00
(4) Consultancy Fees			
Consultancy refund		0.00	0.00
(5) Others (Specify)			
Other Receipt (Training)		3218.00	1688918.00
Receipt for Training courses		9450000.00	6000000.00
Pre-receipted bill issued but not received		0.00	0.00
Misc. Receipts (Training A/c)		0.00	0.00
Receipt for Training Cost			
TOTAL		10410223.00	8058518.00
SCHEDULE :16 INCOME FROM ROYALTY, PUBLICATION ETC.			
(1) Income from Royalty			
(2) Income from Publications			
(3) Others (Specify)			
Misc. Receipts		326037.00	123811.00
WII Products		74721.00	82698.00
House Licence Fee		658226.00	508535.00
Bus Charges		96733.00	86009.00
Electricity & Water Charges		336524.00	268472.00
Telephone		17253.00	26936.00
TOTAL		1509494.00	1096461.00

SCHEDULE :17 INTEREST EARNED		
(1) On Term Deposits		
(1) With Scheduled Banks		
Int. on Bank Deposits	0.00	0.00
Interests on FDR	0.00	0.00
Int on Investments	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	970501.00	656299.00
Interest on Saving A/c (Training A/c)	39314.00	175981.00
(2) With Non-Scheduled Banks		0.00
(3) Post Office Savings Account		0.00
(4) Others (Specify)		0.00
(3) On Loans		
(1) Interest on Loan & Advance	49242.00	426809.00
(2) Others	0.00	0.00
(4) Interest on Debtors and Other Receivables		
TOTAL	1059057.00	1259089.00
SCHEDULE :18 OTHER INCOME		
(1) Profit on Sale/Disposal of Assets		
(1) Owned Assets	0.00	
(2) Assets acquired out of grants, or received free of cost	0.00	
(2) Export Incentives realized		
(3) Fees for Misc. Services		
(4) Others (Specify)		
Misc. Receipts	0.00	0.00
EMD Forfeited	0.00	5000.00
Receipt for Project	0.00	214170.00
TOTAL	0.00	219170.00
SCHEDULE :19 INCREASE/DECREASE IN STOCK OF FINISHED GOODS		
(1) Closing Stock		
(1) Finished Goods		
Closing Stock of WII Publication	0.00	0.00
(2) Work-in-progress	0.00	0.00
(2) Less : Opening Stock		
(1) Finished Goods	0.00	0.00
(2) Work-in-progress	0.00	0.00
TOTAL	0.00	0.00

	Current Year		Previous Year	
	Plan	Non Plan	Plan	Non Plan
SCHEDULE :20 ESTABLISHMENT EXPENSES				
(1) Salaries and Wages				
Fellowship	0.00		736582.00	
Honorarium	25900.00		30500.00	
Medical	6228080.00		5501764.00	
Salaries & Allowances	77017752.00	9200000.00	64343764.00	10000000.00
Stipend	305148.00		348049.00	
Wages	8258044.00	2800000.00	7322748.00	2000000.00
Fellowship & Wages (Research Project)	6662926.00		7762384.00	
(2) Allowances and Bonus				
Bonus	386983.00		393152.00	
OTA	467054.00		457902.00	
LTC	1934813.00		1732908.00	
Corps Fund (Training)	0.00		2114160.00	
Transferred to Corpus Fund	0.00		3673288.00	
Honorarium (Training A/c) (398873-7750)	391123.00		274318.00	
(3) Others (Specify)				
(4) Contribution to Other Fund (Specify)				
Leave Salary and Pension Contr.	5558531.00		4288836.00	
(5) Staff Welfare Expenses				
Uniforms	0.00		0.00	
(6) Expenses on Employees Retirement and Terminal Benefits				
Final Payment				
Leave Encashment & Gratuity	335298.00		336687.00	
(7) Others (Specify)				
Camp Expenses (Research Project)	272400.00		518977.00	
TOTAL	107844052.00	12000000.00	99836019.00	12000000.00
SCHEDULE :21 OTHER ADMINISTRATIVE EXPENSES				
AMC of Computers	1855049.00	0.00	840115.00	
Annual Research Seminar	937752.00	0.00	1200445.00	
Contingencies/Misc. (Research Project) (2077865-323860)	1754005.00	0.00	4341207.00	
Cont./Misc.(Training Account)	4291821.00	0.00	6840367.00	
Electricity and Water Charges	7257632.00	0.00	6720659.00	
Estate Maintenance	933975.00	0.00	552938.00	
Estate Security	9129035.00	0.00	8207228.00	
Govt. Contribution to Pension Fund	0.00	0.00	5000000.00	
Lab Expenses (Research lab)	243318.00	0.00	179939.00	
Lab Expenses (Forensic Lab)	1798442.00	0.00	633606.00	
Lab Expenses (Genetic Lab)	492477.00	0.00	128640.00	
Lab Expenses (Health Lab)	0.00	0.00	812984.00	
Legal Expenses	138925.00	0.00	235755.00	
M.Sc. Course Expenditure (2615132-305148-489945)	1820039.00	0.00	1137214.00	
Operational Expenses	1464727.00	0.00	928481.00	
Pension Contribution	1168399.00	0.00	804752.00	
POL & Maintenance of Vehicle (Research Project)	1849169.00	0.00	2679958.00	

POL & Maintenance of Vehicle (Training A/c)	788951.00	0.00	668887.00	
POL for Vehicles	2076289.00	0.00	1825515.00	
Postage & Telegrams	208590.00	0.00	201461.00	
Printing & Binding	13996.00	0.00	105020.00	
Printing of Books for Project	0.00	0.00	23700.00	
Publication	431017.00	0.00	549401.00	
Repair & Maintenance of Vehicles	1065462.00	0.00	691895.00	
Repair & Maintenance furniture & Fixture	142032.00	0.00	367006.00	
Sharing of cost of Kendriya Vidyalaya	5000000.00	0.00	2200000.00	
Sports Goods	274550.00	0.00	32846.00	
Stationery	799555.00	0.00	580986.00	
Training Allowance	19170.00	0.00	309915.00	
Telephone & TC	799321.00	0.00	679091.00	
Training & Skill Upgradation of Staff	13500.00	0.00	5000.00	
Training Cost Expenditure	9450000.00	0.00	6000000.00	
Travel Exp. (Grant in Aid)	3165194.00	0.00	2897631.00	
Travel Exp. (Research Project)	642899.00	0.00	1018292.00	
Travelling Expenses (Training A/c) (2934757-163409)	2771348.00	0.00	2469641.00	
Refunded to MoEF towards unspent balance of Project Cost (08-09)	0.00	0.00	868025.00	
Refunded to Other Project towards project cost	1403000.00	0.00	1477000.00	
Write off the Material & Supplies as suggested by Audit	1501794.00	0.00	0.00	
Write Off the Office Equipment during 2009-10 as pointed out by the Audit Team	839505.00	0.00	0.00	
Less : Cancellation of Supply Order (2007-08) (265449-33976)	0.00	0.00	-231473.00	
Add : Expenditure wrongly less in 09-10		0.00	155193.00	
Less : Payment made in 2006-07 towards repairing of DG Set as pointed by CAG	-289000.00	0.00	0.00	
Less : Depreciation charged on Campus Devlpmnt since 04-05 to 10-11 as adv. was booked directly in Assets instead of Current Assets as pointed by CAG	-673874.00	0.00	0.00	
Less : Payment shown in Legal expenses in 09-10(instead of Sch- 11)	0.00	0.00	-18000000.00	
Payment Outstanding of Research Project (2010-11)	0.00	0.00	323860.00	
Payment Outstanding of Research Project (2011-12)	0.00	0.00	0.00	
Payment Outstanding of Grant in Aid(2011-12)	2129830.00	0.00	0.00	
Total	67707894.00	0.00	46463180.00	0.00

(P.K. Aggarwal)
Finance Officer

(P.R. Sinha)
Director

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANIZATION)

Wildlife Institute of India, Dehradun

FIXED ASSETS PURCHASED FROM FUNDS REFLECTED IN SCHEDULE -3

Pariculars	Gross Block				
	Cost as the beginning of the year	Addition during the year	Deduction during the year	Costs as at the end of the year	Cost as at the previous year end
Equipment					
Camp Equipment	10066084.29	65206.00	0.00	10131290.29	10066084.29
Office Equipment	845409.38	771499.00	0.00	1616908.38	845409.38
Books	232483.00	136066.00	0.00	368549.00	232483.00
TOTAL	**11143976.67**	**972771.00**	**0.00**	**12116747.67**	**11143976.67**

(P.K. Aggarwal)
Finance Officer

(P.R. Sinha)
Director

FORM OF FINANCIAL STATEMENTS (NON PROFIT ORGANIZATIONS)
NAME OF EQUITY: WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
Schedules Forming part of the Accounts for the period ended on 31st March 2012

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

(P.R. Sinha)
Director

GENERAL PROVIDENT FUND ACCOUNT NO. 518502010001297

Wildlife Institute of India, Dehraun

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2011-12

Income		Expenditure	
Particulars	Amount	Particulars	Amount
Opening Balance	2243068.00	Final payment of GPF	1420567.00
Interest Received on Saving Account	48748.00	Investment	0.00
Interest Earned on FDR	148297.00	Advance/Withdrawal paid	8917733.00
GPF Contribution	13809737.00	Interest Accrued and invested	1346012.00
Encashment of FDR		TDS on Interest on FDRs	148297.00
Interest Accrued on FDR	1346012.00	Bank Balance	5763253.00
Total	17595862.00	Total	17595862.00

PENSION FUND ACCOUNT NO. 518502010000018

Wildlife Institute of India, Dehraun

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2011-12

Income		Expenditure	
Particulars	Amount	Particulars	Amount
Opening Balance	480628.00	Investment in FDR	0.00
Interest Received on Saving Account	20147.00	Commuted Value of Pension	246017.00
Interest Earned on FDR	670228.00	Family Pension/ Pension	2851845.00
WII Contribution	3499078.00	Interest Accrued and invested	5989828.00
Encashment of FDR	0.00	TDS on Interest on FDRs	670228.00
Pension Contribution	222106.00	Bank Balance	1124097.00
Interest Accrued	5989828.00		
Total	10882015.00	Total	10882015.00

WILDLIFE INSTITUTE OF INDIA
Receipts & Payments Accounts

MONITORING OF SOUORCE POPULATION OF TIGERS IN RANTHAMBORE TIGER RESERVE			
Receipt	Amount	Payment	Amount
Opening Balance	5631942.00	Equipment	1183661.60
Interest received	153908.00	Contingency	96969.00
		Fellowship & Wages	140460.00
		Travel	3902.00
		Vehicle Hiring	159681.00
		FA	70000.00
		TA	5000.00
		Grant Total	1,584,673.60
		Bank UBI -64	4,201,176.40
	5,785,850.00		5,785,850.00

Monitoring of Re-introduced Tigers in Sariska Tiger Reserve			
Receipt	Amount	Payment	Amount
Opening Balance	264934.00	FA	10000.00
Interest received	27264.00	Fellowship	174800.00
Grants received	1500000.00	Field Asstt	313200.00
		Vehicle Hiring	424214.00
		Purchase of Radio Collars	236470.00
		Misc/Contingency	146733.00
		Grant Total	1,305,417.00
		Bank UBI-50545	486,781.00
	1,792,198.00		1,792,198.00

Radio Collaring of Tigers in Sunderbans Tiger Reserve			
Receipt	Amount	Payment	Amount
Opening Balance	1434435.00	Fellowship & Wages	373910.00
Interest received	36327.00	Veh & Boat hiring	140287.00
Grants received	2900000.00	Equipment	1188732.00
		Travel	4030.00
		Contingencies	176612.00
		TA	10000.00
		Grant Total	1,883,571.00
		Bank UBI-50546	2,487,191.00
	4,370,762.00		4,370,762.00

Monitoring Re-introduced Gaurs in the Bandhavgarh Tiger Reserve(MP)			
Receipt	Amount	Payment	Amount
Opening Balance	746235.00	Purchase of radio telemetry items (4 GPS,11 VHF	985734.24
Interest received	37273.00	Payment of ARGOS data acquisition	150037.47
Grants received	2324000.00	Fellowship & wages	375210.00
		TA/DA for the researcher/Investigators	196386.00
		Purchase of a four-wheel drive vehicle(Gypsy)	507442.00
		Vehicle POL and maintenance	378917.00
		Misc/Contingency	218294.00
		Grant Total	2812020.71
		Bank UBI-50529	295487.29
	3,107,508.00		3107508.00

Radio Telemetry Monitoring of Source Population of Tigers in Kanha Tiger Reserve

Receipt	Amount	Payment	Amount
Opening Balance	3766278.61	Travel	36180.00
Interest received	133969	GPS/Sat Collars	233758.00
		Genetic Study	45941.00
		Camera Traps	24990.00
		POL	224391.00
		Fellowship/Wages	376761.00
		Contingency	135803.00
		TA	9000.00
		Grant Total	1,077,824.00
		Bank UBI-50685	2,822,423.61
	3,900,247.61		3,900,247.61

Okhla Bird Sanctuary Management Plan

Receipt	Amount	Payment	Amount
Opening Balance	708271.00	Project Personnel (3)	36000.00
Interest received	22701.00	Vehicle hire @ 15000 for 6 months	12660.00
		Travel cost for the project personnel including DA	28675.00
		Stationary including CD and other office equipment	93426.00
		Contingency & unforeseen expenditure	69924.00
		Grant Total	240,685.00
		Bank UBI-50885	490,287.00
	730,972.00		730,972.00

Ecological Monitoring of Tiger Population in Panna Landscape (MP)

Receipt	Amount	Payment	Amount
Opening Balance	3486621.00	Fellowship	359360.00
Grants received	1622000.00	Wages	168292.00
Interest received	130247.00	V/Hiring	863351.00
		Contingency	119812.00
		Equipment	868742.45
		Refund of Grant	360000
		TA	3000.00
		Grant Total	2,739,557.45
		Bank UBI-50908	2,499,310.55
	5,238,868.00		5,238,868.00

Development of appropriate techniques for minimizing man-animal conflicts

Receipt	Amount	Payment	Amount
Opening Balance	119353.00	Engagement of Research/Field personnel,Fileld asstt,	42415.00
Interest received	4064.00	Cost of TA and DA for travel in field areas in Gujrat	9824.00
		contingencies	31570.00
		Service Ta @ 10.30%	10124.00
		Grant Total	93933.00
		Bank UBI-50710	29484.00
	123417.00		123417.00

GIR LION PROJECT

Receipt	Amount	Payment	Amount
Opening Balance	1645.00		
Interest received	65.00	Bank UBI-50572	1,710.00
	1,710.00		1,710.00

Procurement of Satellite and VHF Collars for study of tiger behaviour

Receipt	Amount	Payment	Amount
Opening Balance	531408.00		
Interest received	20783.00	Bank UBI-50709	552,191.00
	552,191.00		552,191.00

WII Management Effectiveness Evaluation (MEE) Project

Receipt	Amount	Payment	Amount
Opening Balance	678608.00	Wages	157926.00
Interest received 2011-12	21473.00	Contingencies	14934.00
		Travel	89052.00
		MEE Tiger Reserve	194949.00
		Bank Balance A/C No - 62	243220.00
Grant Total	700081.00	Grant total	700081.00

WII Barcoding Anurans of India

Receipt	Amount	Payment	Amount
Opening Balance	64456.00	Fellowships	0.00
Interest received 2011-12	2554.00	Consumeable	0.00
		Travel	0.00
		Bank Balance A/C No - 65	67010.00
Grant Total	67010.00	Grant total	67010.00

WII A Study on the Population Dynamics and Site Fidelity of the Olive Ridley Sea Turtles at the Rushikulya Roorkery in Orissa Coast of India

Receipt	Amount	Payment	Amount
Opening Balance	181437.00	Fellowships	0.00
Interest received 2011-12	7675.00	Consumeable	0.00
		Corpus fund	189112.00
		Bank Balance A/C No - 50187	0.00
Grant Total	189112.00	Grant total	189112.00

WII Survey & Mapping of Medicinal Plants in Uttrakhand

Receipt	Amount	Payment	Amount
Opening Balance	1822116.00	Fellowships	241500.00
Interest received 2011-12	56316.00	Consumeable	43803.00
		Travel	62897.00
		Contingencies	3018.00
		Equipment	2100.00
		Expenditure Assessment of Banj Oak Forests in	9956.00
		Expenditure Assessment of Sand Mining in	445248.00
		Bank Balance A/C No - 50188	1069910.00
Grant Total	1878432.00	Grant total	1878432.00

Current Status and Availability of High Value Medicinal Plants in Alpine Zones of Dhauladhar Wildlife Sanctuary

Receipt	Amount	Payment	Amount
Opening Balance	300995.00	Fellowships	188387.00
Interest received 2011-12	11357.00	Contingencies	24897.75
Grant Received	110977.00	Equipment	1424.00
		Overhead charges	208620.25
		Bank Balance A/C No - 50281	0.00
Grant Total	423329.00	Grant total	423329.00

Conservation of the Endangered Asiatic Wild Dog Cuon Alpinus in Western Arunachal Pradesh : Linking Ecology Ethnics & Economics to Foster better Coexistence			
Receipt	Amount	Payment	Amount
Opening Balance	401734.00	Fellowships	304613.00
Interest received 2011-12	13265.00	Consumeable	43992.00
Grants received	700000.00	Travel	112960.00
		Contingencies	41685.00
		Equipment	115464.00
		Wages to Field Assistants	55750.00
		Bank Balance A/C No - 50672	440535.00
Grant Total	1114999.00	Grant total	1114999.00

Project Tiger Co-predator, Prey & Habitat Phase IV			
Receipt	Amount	Payment	Amount
Opening Balance	1622207.00	Fellowships	226400.00
Interest received 2011-12	57913.00	Consumeable	9955.00
		Travel	224928.00
		Contingencies	126298.00
		Wages to Field Assistants	66080.00
		Advances Paid	70000.00
		Bank Balance A/C No - 50673	956459.00
Grant Total	1680120.00	Grant total	1680120.00

Housing & Enclosure Enrichment of Some Species in selected Indian Zoos			
Receipt	Amount	Payment	Amount
Opening balance	1910893.00	Fellowships	637013.00
Interest received 2011-12	59006.00	Stationery	65783.00
		Travel	180738.00
		Miscellaneous & Contingencies	93064.00
		Equipment	353369.00
		Development of Enrichment	2867.00
		Bank Balance A/C No - 50912	637065.00
Grant Total	1969899.00	Grant total	1969899.00

Diversity and conservation of endangered fish genetic resources of KMTR, Tamilnadu			
Receipt	Amount	Payment	Amount
Opening balance	313483.00	Fellowships	172800
Interest received upto	8395.00	Consumeable	70259
		Travel	4315
		Contingencies	15433
		Equipment	2500.00
		Bank Balance A/C No - 50982	56571.00
Grant Total	321878.00	Grant total	321878.00

Macroecology of the Terrestrial Herpetofauna in Andaman & Nicobar Archipelago			
Receipt	Amount	Payment	Amount
Opening Balance	187661.00	Fellowships	279870.00
Interest received 2011-12	7616.00	Consumeable	57524.00
Grant received	700000.00	Travel	147275.00
		Contingencies	32050.00
		Equipment (Overhead)	70563.00
		Wages to Field Assistants	68520.00
		Bank Balance A/C No - 51031	239475.00
Grant Total	895277.00	Grant total	895277.00

Ecology of Leopard in Relation to Prey Abundance & Land Use Pattern in Kashmir Valley			
Receipt	Amount	Payment	Amount
Opening Balance	1812822.00	Fellowships	288000.00
Interest received 2011-12	56286.00	Consumeable	111803.00
Grant received	800000.00	Travel	208766.00
		Contingencies	91746.00
		Equipment	935738.00
		Wages to Field Assistants	81760.00
		Advances Paid	6000.00
		Bank Balance A/C No - 51480	945295.00
Grant Total	2669108.00	Grant total	2669108.00

Ecological Assessment of Banj Oak Forests in Kedarnath Wildlife Sanctuary, Western Himalaya with reference to invasion by Pine			
Receipt	Amount	Payment	Amount
Opening Balance	459929.00	Fellowships	511548.00
Interest received 2011-12	14084.00	Consumeable	9307.00
Grant received	500000.00	Travel	20980.00
		Equipment	43662.00
		Bank Balance A/C No - 51671	388516.00
Grant Total	974013.00	Grant total	974013.00

WII-UNESCO PROJECT			
Receipt	Amount	Payment	Amount
Opening Balance	3,624,938.25	Office Equipment	102,060.00
Intt.Received	142,969.00	Travel Expenditure	329,544.00
Loan:-Envis (Software	1,016,080.00	Contigencies	90,224.00
		Software ERDAS Apollo Suite	6,642.00
		Loan: Director WII A/c No. 32	200,000.00
		Loan: Director WII A/c No. 50245	150,000.00
		Expenditure Total	878,470.00
		Bank Balance A/c No. 44	3,905,517.25
	4,783,987.25	Grand Total	4,783,987.25

WII-DGH Seaturtle Telemetry Project			
Receipt	Amount	Payment	Amount
Opening Balance	3,844,263.26	Fellowship and Wages	483,032.00
Grant:	7,777,800.00	Logistic Expenses	147,314.00
Intt. Received	106,915.00	Base Camp Expenditure	9,100.00
		Travelling Expenses	127,805.00
		Contingency	370,817.25
		Advance for Expenses	815,119.00
		Workshop & Saminar	825,406.00
		Expenditure Total	2,778,593.25
		Bank Balance A/c No. 59	8,950,385.01
	11,728,978.26	Grand Total	11,728,978.26

AVIAN MALARIA PROJECT			
Receipt	Amount	Payment	Amount
Opening Balance	367,676.00	Contigencies	8,000.00
Intt. Received	12,830.00	Loan Refund- Director WII A/c No. 08	350,000.00
		Expenditure Total	358,000.00
		Bank Balance A/c No. 50650	22,506.00
	380,506.00	Grand Total	380,506.00

Tiger Response to Pray Human Disturbance			
Receipt	Amount	Payment	Amount
Opening Balance	1,228,113.30		
Interest Received	48,405.00	Expenditure Total	0.00
		Bank Balance A/c No. 60	1,276,518.30
	1,276,518.30	Grand Total	1,276,518.30

WII-Building Partnership to Support UNESCO World Heritage Programme			
Receipt	Amount	Payment	Amount
Opening Bal.	191,337.20	Fellowship and Wages	1,034,887.00
Grant Received	5,229,180.00	Travelling Expenses	487,775.00
Intt. Received	18,530.00	Scholarship	298,000.00
Loan A/c No. 44	150,000.00	Training & Workshop	137,693.00
		Office Equipment	85,221.00
		Equipment	227,235.00
		Base Camp Expenditure	93,548.00
		Advance for Expenses	1,711.00
		Misc. & Contigencies	487,489.00
		Expenditure Total	2,853,559.00
		Bank Balance A/c No. 50246	2,735,488.20
	5,589,047.20	Total	5,589,047.20

WII-ENVIS PROJECT			
Receipt	Amount	Payment	Amount
Opening Balance	211,051.75	Fellowship and Wages	251,862.00
Intt. Received	12,502.00	Travelling Expenditure	15,959.00
Grant Received	1,016,080.00	Contigency	76,339.00
Loan-Director WII A/c No. 44	200,000.00	Report Writing	32,265.00
		Specialized Software Erdas Appollo	1,016,080.00
		Office Equipment	4,912.00
		Expenditure Total	1,397,417.00
		Bank Balance A/c No. 32	42,216.75
	1,439,633.75	Total	1,439,633.75

ISRO-GBP Project on LULC Dynamics			
Receipt	Amount	Payment	Amount
Opening Balance	274,329.00	Fellowship & Wages	144111.00
Grant Received	900,000.00	Office Equipment	75410.00
Intt. Received	14,935.00	Travel Expenditure	140319.00
		Contigencies	277789.00
		Camp Equipment	15591.00
		Base Camp Expenditure	4652.00
		Advance for Expenses	1819.00
		Expenditure Total	659,691.00
		Bank Balance A/c No. 51241	529,573.00
	1,189,264.00	Total	1,189,264.00

Integrated Development of Wildlife Habitats			
Receipt	Amount	Payment	Amount
Opening Balance	698,370.00	Fellowship & Wages	239600.00
Intt. Received	22,773.00	Travel Expenditure	20844.00
		POL & Maint. Of Vehicle	1700.00
		Contigency	26617.00
		Advance for Expenses	14646.00
		Expenditure Total	303,407.00
		Bank Balance A/c No. 51240	417,736.00
	721,143.00	Total	721,143.00

WII-Monitoring Land-Use by Wildlife. Livestock and Human in Khangchendzonga Biospheres Reserve

Receipt	Amount	Payment	Amount
Opening Balance	520,101.00	Fellowship & Wages	180596.00
Intt. Received	15,112.00	Lab. Expenditure	180391.00
		Contigencies	10467.00
		Advance for Expenses	5000.00
		Expenditure Total	376,454.00
		Bank Balance A/c No. 51411	158,759.00
	535,213.00	Total	535,213.00

I U C N Cell

Receipt	Amount	Payment	Amount
Opening Balance	1,432,655.50	Travel Expenditure	285053.00
Intt. Received	56,795.00	Misc. Expenses	112645.00
Member Ship Fees	80,000.00	Advance for Expenses	15000.00
		Expenditure Total	412,698.00
		Bank Balance A/c No. 41	1,156,752.50
	1,569,450.50	Total	1,569,450.50

WESTERN TRAGOPAN PROJECT

Receipt	Amount	Payment	Amount
Grant	2,606,000.00	Fellowship & Wages	277181.00
Intt. Received	56,290.00	Travel Expenses	105345.00
		Base Camp Expenditure	8000.00
		Office Equipment	6500.00
		Camp Equipment	38424.00
		Contigencies	12966.00
		Advance for Expenses	79500.00
		Expenditure Total	527,916.00
		Bank Balance A/c No. 52465	2,134,374.00
	2,662,290.00	Total	2,662,290.00

Structural and Functional Attrubutes of Plant Communities in Cold Arid Region of Nanda Devi Biospheres

Receipt	Amount	Payment	Amount
Grant	647,500.00	Fellowship & Wages	283545.00
Intt. Received	13,799.00	Travel Expenses	23598.00
		Base Camp Expenditure	3000.00
		Contigencies	16959.00
		Expenditure Total	327,102.00
		Bank Balance A/c No. 52529	334,197.00
	661,299.00	Total	661,299.00

WII - ALL INDIA TIGER ESTIMATION PROJECT

Receipt	Amount	Payment	Amount
Brought Forwarded	32,096,143.00	Equipment (Camera Trap, Compass, Range Finder,	4,027,396.00
Interest Received	901,305.00	Contractual tech for data collection	2,605,584.00
Grant Received	1691400.00	Vehicle hiring for data collection	1,794,011.00
Grant Received	407,000.00	Wages for field assistant	609,341.00
		Travel exp(including International for Conferences)	679,857.00
		GIS Staff (Contructual for Data Analysis)	333,381.00
		Pub & Trg material	807,572.00
		Grant for Sariska	1,500,000.00
		Grant for Sunderban	2,900,000.00
		Total expenses	15,257,142.00
		Forest Advance	15,000.00
		Tour Advance	25,366.00
		Grant Total	15,297,508.00
		Bank UBI-50968	19,798,340.00
	35,095,848.00		35,095,848.00

WII - RE-INTRODUCTION OF CHEETAH PROJECT

Receipt	Amount	Payment	Amount
Grant Received	2,499,000.00	Biologists / sociologist	667,768.00
Intrest	58,615.00	Wages	48,290.00
		POL & Veh Main	457,515.00
		Travel Exp	231,019.81
		Contingences	57,838.00
		Advance for Expenses	23,014.00
		Grand Total	1,485,444.81
		Bank UBI-50968	1,072,170.19
	2,557,615.00		2,557,615.00

IMPACT OF GLOBAL CHANGES ON SPECIES COMPOSITION IN WESTREN HIMALAYAS

Receipt	Amount	Payment	Amount
Opening Balance	306,481.00	Fellowship	86,030.00
Intrest	8,321.00	Travael	12,123.00
		contingences	13,490.00
		Total expenditure	111,643.00
		Bank UBI-51164	203,159.00
	314,802.00		314,802.00

WII - BCRLI PROJECT			
Particulars	Amount	Particulars	Amount
Grant Received	4,355,000.00	Equipment (Camera Trap, Compass, Range Finder,	0.00
		Contractual tech for data collection	99,581.00
		Vehicle hiring for data collection	78,790.00
		Wages for field assistant	500.00
		Travel exp(including International for Conferences)	192,731.00
		Training workshop (Six)	0.00
		GIS Staff (Contructual for Data Analysis)	0.00
		Contingencies	3,810.00
		Pub & Trg material	14,002.00
		Total expenses	389,414.00
		Loan	-5,000.00
		Forest Advance	40,000.00
		Tour Advance	75,000.00
		Grant Total	499,414.00
		Bank UBI-50968	3,855,586.00
	4,355,000.00		4,355,000.00

NNRMS MAPPING PROJECT (A/C			
Particulars	Amount	Particulars	Amount
Particulars		Particulars	
To opening Balance (Cash)	16,608.00		
To opening Balance	2,184,252.00	Misc expenses	5,590.00
Interest Received	85,304.00		
		Closing Balance (Cash)	16,608.00
		By Closing Balance (Bank)	2,263,966.00
	2,286,164.00		2,286,164.00

Study to Assess Cumulative Environmental Impact of Various Hydro Electric Projects (HEP) & Bellary Study			
Particulars	Amount	Particulars	Amount
Opening Balnce	2,680,851.00	Fellowships/Manpower	800,150.00
Interest received 2011-12	77,393.00	Vehicle Hiring	320,089.00
Grant received	1100000.00	Travel	119,653.00
		Miscellaneous & Contingencies	398,882.00
		Field Equipment	48,220.00
		Spital Data	31,195.00
		Expenditure Bellary Study	450,390.00
		Professional Fees Bellary Study	252,000.00
		Miscellaneous & Contingencies Bellary study	220,078.00
		Bank UBI-50968	1,217,587.00
	3,858,244.00		3,858,244.00

(P.K. Aggarwal)
Finance Officer

(P.R. Sinha)
Director

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