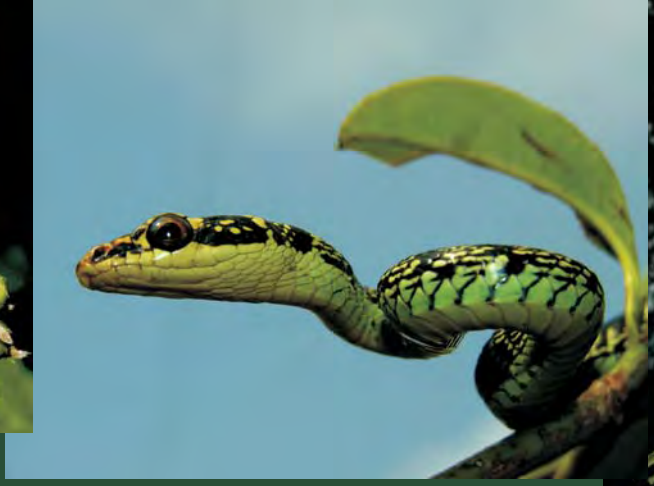

# ANNUAL REPORT
## 2006-07

भारतीय वन्यजीव संस्थान
Wildlife Institute of India

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3. V. Deepak 4. I.P. Bopanna
**Back Cover Credit:** Chandan Jani

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# Director's Note

I am pleased to present the Annual Report of Wildlife Institute of India for the year 2006-07. During the period under report, Institute continued to pursue the academic and research activities as approved by its General Body. Apart from on-going research projects and academic activities, the year also saw new initiatives undertaken by the Institute in areas of monitoring, evaluation, and advocacy. This includes publication of report entitled "Evaluating Tiger Habitat at the Tehsil Level". This report presents for the first time country level appraisal of geographical distribution of tigers vis-à-vis their habitat quality. The Institute also undertook preparation of management plans for protected area including preparation of management plan for the Gulf of Mannar a marine protected area. The forensic laboratory of the Institute provided 36 DNA sequences to the National Centre for biotechnological Information (NCBI) USA.

The faculty members of the Institute made significant contribution as members of various committees at state and national level thereby facilitating decision making process. The increasing participation of Institute in decision making process in the area of wildlife conservation and management is a sign of growing intellectual maturity of the Institute. This process is getting gradually mainstreamed at national level in various forms.

I take this opportunity to express my gratitude to the members of various committees of the Institute Governance System

including the Governing Body and Society for their constructive cooperation and support in managing the affairs of the Institute.

(P.R. Sinha)
Director

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V.P. Uniyal

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# Role & Mandate

## Introduction

Wildlife Institute of India (WII) established in 1982 emerged as 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 have allowed 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

The WII's 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 reports

Completed

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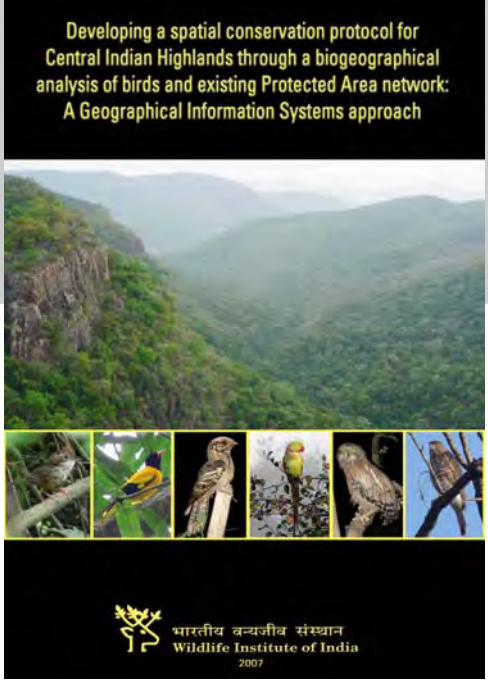
New Initiatives




# Developing a spatial conservation protocol for Central Indian Highlands through a biogeographical analysis of birds and existing Protected Area network: A Geographical Information Systems approach

**Funding Source:** Grant-in-Aid
**Investigators:** Shri Qamar Qureshi and Dr. Ravi Chellam
**Researcher:** Shri R. Jayapal
**Date of initiation:** February, 2001
**Date of completion:** February, 2007

**Objectives**: (i) To study ecological, environmental and socio-economic correlates of species diversity of breeding land birds in Central Indian Highlands, (ii) to investigate the spatial patterns of bird species richness, and (iii) to examine the adequacy of the current PA network in Central India and to identify potential areas of conservation significance using forest birds as indicator taxa.

**Output and outcomes:** Variations in number and distribution of species in space constitute one of the fundamental themes in ecological research. It is being increasingly recognized that studies on species diversity at regional scales are essential to understand the mechanisms of maintenance of biological diversity. Emergence of macroecology, where large-scale ecological phenomena are examined to test biogeographical hypotheses, has considerably widened the scope of these approaches to include application of empirical patterns in finding solutions to conservation issues. This study, adopting this macroecological framework, investigates the spatial patterns in species richness and distribution of breeding land birds in central India and demonstrates how these patterns can be used in identifying potential sites of conservation significance.

The study was conducted across the Satpura and Vindhya Ranges, collectively known as Central Indian Highlands, in Madhya Pradesh, India between March, 2002 and February, 2007. The study area was divided into 11 '*biogeographic regions*' on the basis of topography, natural vegetation, productivity, landscape heterogeneity, forest cover,human population and eco-climatology. Primary data on distribution of breeding land birds were collected for each quadrat using a spatially hierarchical sampling scheme. In total, distribution of 190 species of birds was mapped for 284 quadrats.

Bird species composition is found to be primarily determined by vegetation structure at regional level and by floristic composition at local scale. The fact that the local species richness does not increase, ad infinitum, with the size of the regional species pool suggests that bird communities in Central Indian Highlands are composed of truly saturated assemblages. It is hypothesized that sparse niche differentiation of the structurally impoverished tropical deciduous forests of Central India, contributes to the observed species

saturation of local bird communities in the landscape despite a depauperate avifauna. A region-wise analysis of species accumulation curves and species density rankings identify Satpura Plateau and Betul Plateau as '*diversity hotspots*' for Central Indian avifauna. Bird species diversity of forest and non-forest areas are governed by independently evolved regulatory mechanisms.

Species richness of birds is found to be significantly related to all the major environmental factors, even after the spatial effects are partitioned out using partial regressions. While bird species richness is positively associated with primary productivity (NDVI), landscape diversity, and forest cover, it decreases with rise in cropping area, human population density, and urbanization. Among climate, species richness increases with variables that describe water availability (i.e., rainfall, wet day frequency, and moisture availability), but shows inverse relationship with energy-related parameters (i.e. temperature, diurnal temperature range, and potential evapotranspiration). This finding supports the 'water-energy balance' hypothesis of species richness gradients, which states that temperature limits number of species at higher latitudes and rainfall determines species richness at warm lower latitudes.Among all the environmental variables, elevation range, landscape diversity, and forest cover emerge as the predictors of bird species richness in both spatial (generalized least squares regression) and non-spatial (ordinary least squares regression) models, though rainfall is also selected as an additional predictor in the latter. When land-use patterns are subsequently modeled independently with bird species richness, it is shown that every 10 sq. km. increase in cropping area in a quadrat would result in loss of one species of forest birds.

Adequacy of Protected Area (PA) network examined against IUCN's 10 % biome-area target, the low-rainfall dry deciduous forests emerge as the only under-protected biome in Central Indian Highlands with just 6 % area under PA network and the remaining three forest-biomes have more than 10 % area currently enjoying legal protection. In particular, the high-elevation moist deciduous forest biome features a fairly high proportion of area (c. 20 %) under PA network.Conservation assessment of sites in low-rainfall dry deciduous forest biome, using irreplaceability values, reveals that the first four top-ranking quadrats, all lying within Malwa Plateau, are marked by a complete absence of PAs. Correspondingly, the reserve selection algorithm selects Choral RF from the highest ranking quadrat as the topmost prioity site to complement the existing PA network. Interestingly, Rodgers & Panwar (1988), in their biogeographical review of PA network in India, had earlier proposed a PA status for Choral RF.

The findings of the study clearly illustrate the bias in PA network that a single-species approach can potentially bring about. The recent rediscovery of the critically endangered Forest Owlet (*Heteroglaux blewitti*), after a gap of 113 years, from these low-rainfall dry deciduous forests highlights the importance of extending adequate protection to all major biomes and the need for multi-species approach in design and maintenance of an efficient PA network.

B.S. Adhikari

# Institutional cooperation programme between Wildlife Institute of India and University of Tromso, Norway in natural research ecology and management

| | |
|---|---|
| **Funding agency:** | Indo-Norwegian Programme for Institutional Cooperation (NORAD) |
| **Investigators:** | Dr. S. Sathyakumar, Nodal Officer, (WII)<br>Dr. J.L. Fox, Coordinator (UiTo);<br>Dr. A.J.T. Johnsingh, Dr. G.S. Rawat,<br>Dr. K. Sankar and Dr. B.S. Adhikari |
| **Researcher:** | Mr. Ashwini Upadhyay |
| **Date of initiation:** | February, 2002 |
| **Date of completion:** | April, 2006 |

**Objectives:** The objectives of the project are to: (i) develop WII as a Centre of Excellence in mountain ecology and wildlife management, (ii) produce a state-of-the-art report on Himalayan wildlife conservation and sustainability of pastoralism in the region, (iii) enhance WII's laboratory facilities for wildlife food habit analysis, and (iv) continue ongoing collaboration on wild herbivores and predator research in the Himalaya.

**Progress:** Following the completion of the project period during April 2006, the final report was submitted to the funding agency and publications based on the results of the research project were communicated or presented as papers.

**Output and outcomes:** This research project added substantial information to our understanding of the alpine rangelands and their use by wild and domestic ungulates. The recommendations of this project have been provided to the concerned State Forest/Wildlife Departments for implementation in the study sites where the research activities were carried out. Apart from the final report, 10 publications based on the research findings of this project were made.

Tapajit Bhattacharya

# Study of animal-habitat interaction in the buffer zone of Nanda Devi Biosphere Reserve

| | |
|---|---|
| **Funding Source:** | MoEF, Government of India |
| **Investigators:** | Dr. S. Sathyakumar and Dr. G.S. Rawat |
| **Researcher:** | Shri Tapajit Bhattacharya |
| **Date of initiation:** | February, 2004 |
| **Date of completion:** | February, 2007 |

**Objectives:** (i) To assess the status of wildlife habitats along the gradients of human use, and (ii) to study the distribution, abundance and habitat use patterns of large mammals and pheasants.

**Progress:** During the reporting period, the analysis of data, plant and dung samples and report writing were completed. A presentation of the findings of this completed research project was made during the Annual Research Seminar, September 2006.

**Output and outcomes:** This research project added substantial information to our understanding of the status of wildlife and their habitats along gradients of anthropogenic use in the subalpine and alpine habitats in the buffer zone of Nanda Devi Biosphere Reserve. The recommendations of this project have been provided to the State Forest Department for the conservation and management of Bedini-Ali areas, where this study was carried out.

K. Sivakumar

# Current status and conservation of the Nicobar megapode *Megapodius nicobariensis*

**Funding Source:** Grant-in-Aid
**Investigator:** Dr. K. Sivakumar
**Date of initiation:** March, 2006
**Date of completion:** August, 2006

**Objectives:** (i) To assess the present conservation status and distribution of the Nicobar Megapode *Megapodius nicobariensis,* (ii) to assess the habitat availability, threats and conservation of this species, and (iii) to identify the permanent sampling sites for continuous long-term monitoring of population and habitat of these birds.

**Progress:** A field survey was carried out between March 20, to May 20, 2006 on the Nicobar megapode along with other coastal endangered species in the Nicobar group of islands in an effort to document the adverse impacts on their populations due to tsunami that occurred on December 24, 2004. As mounds are stationary, inanimate and represent breeding pair, the best way to estimate and monitor the megapode populations is by assessing the number of active mounds which are in use. As 80% megapodes occur in the low-lying coastal forests, the coastline of eight islands was surveyed for mounds. Variable width belt transects were used to count all the mounds present within the sampled area. Length of belt transects and the distance between the two sampling sites varied depending upon the size of islands but it was kept uniform for a single island. Average length of the belt transect was 2 km. The census was carried out with seven observers walking at 20 m interval parallel to the seashore. Interior forests of islands were sampled with fixed width transect *i.e.* 140 m width and 1km length.

Total number of active mounds, abandoned mounds, inactive mounds, mound types, mound size, canopy cover over mound, substratum of mound, number of pits present, possible number of megapode using the mound and distance between high tide mark and mound were recorded. A total of 328km long coastal habitat was identified as potential habitat for megapodes in the Nicobar Islands; of these 157.5km coastal forests were sampled in 80 transects. Of the 358.8 km long non-potential coastal habitat for megapodes, 77.9 km long coastal stretches were sampled in 39 transects. A total of 37 permanent monitoring plots have been identified and marked for long-term monitoring of megapodes and its habitat.

**Output and outcomes:** After tsunami in 2004, the Nicobar megapode continued to be found on all but two islands *viz.* Trax and Megapode in the Nicobars from where it was reported earlier. Car Nicobar, Chaura and Batti Malv islands of Nicobars were not surveyed as there were no records of

megapode in these islands in the recent past and extinction of population at Pilo Milo was re-confirmed. Polytypic *Megapodius nicobariensis* occur in Nicobar in two sub-species. *Megapodius nicobariensis abbotti* occurred in Great Nicobar, Little Nicobar, Kondul, Menchal, Treis, and Meroe. *M. nicobariensis* was present on Camorta, Trinkat, Nancowry, Katchall, Teressa, Bompoka and Tillanchong islands.

The endemic Nicobar megapode population showed a dramatic decline (nearly 70%) when compared to previous survey carried out in 1993-94. In 2006, there were approximately 800 breeding pairs in the coastal zones of these island groups. There was no evidence of Nicobar megapode in Megapode Island Wildlife Sanctuary and Trax Island during this survey, where Megapode was reported earlier. Crucial megapode habitats such as littoral forests of the island group were adversely affected. The populations of indicator species of the littoral forests *Barringtonia asiatica* and *Terminalia bialata* were severely impacted. However, regeneration of these species was found on the coastal region.

The island ecosystems are known for their resilience due to their ability for re-populating habitats and promoting regeneration. Raising plantation crops to generate revenue in the littoral forests should take into account the long-term effects of habitat alteration. Significant levels of wildlife habitats have been occupied by the tribals under the leadership of the tribal chiefs (known as Village Captain). A conservation awareness programme with the help of these Village Captains would be needed for implementing recovery plans of declining species.

*K. Sivakumar*

Bhuatirath RC

# Social organization and dispersal in Asiatic lions

**Funding Source:** Grant-in-Aid
**Investigators:** Dr. Y.V. Jhala, Dr. Ravi Chellam and Shri B.J. Pathak, IFS, CF (Wildlife) Junagadh Circle, Gujarat
**Researchers:** Ms. V. Meena and Shri Kausik Banerjee
**Date of initiation:** March, 2002
**Date of completion:** March, 2007

**Objectives:** The project aims to understand the social organization of male lion coalitions and the role they play in the population dynamics of Asiatic lions.

**Progress:** During the first phase, three male lions belonging to different coalitions were radio-collared in western Gir during December 2005 and January 2006. Satellite GPS collar and GPS/VHF collars were used for the first time on Asiatic lions. Data were collected on ranging patterns, dispersal, habitat and resource utilization from these lions. Additional lions within the protected area and outside are to be collared with GPS and satellite collars to address the objectives of studying dispersal and seasonal movement patterns.

**Output and outcomes:** Male lion home ranges were small (55-75 $km^2$) and were found to have a high level of overlap, suggesting lack of spatial territoriality in the strictest sense. Adult breeding male lions (or male coalitions) avoided confrontation by temporal segregation in areas of overlap within their range. GPS telemetry data from a pair of dispersing young lions (coalition of 3 year olds) showed that they covered a very large area of 174 $km^2$ before settling down in a smaller home range. Lion densities were highest in Gir east at 16 (standard error i.e. se 3) per 100 $km^2$, followed by Gir west at 12 (se 2), and least in central Gir (National Park) 8 (se 3) lions per 100 $km^2$. Group sizes of lions were smaller in central and western Gir compared to Gir east. In eastern Gir, contribution by livestock to the lion's diet was high resulting in higher densities and larger group sizes.

In light of the recent poaching events, the Gujarat Forest Department has granted approval for collaring 17 lions with the specific objective of keeping track of the movement patterns of satellite populations and for their quick and easy monitoring.

# Characterization of species from bone, tusk, rhino horn and antler to deal wildlife offence cases

**Funding Source:** Grant-in-Aid
**Investigator:** Dr. S.P. Goyal
**Researchers:** Smt. Rina Rani Singh and Shri Imran Khan
**Date of initiation:** July, 2001
**Date of completion:** July, 2007

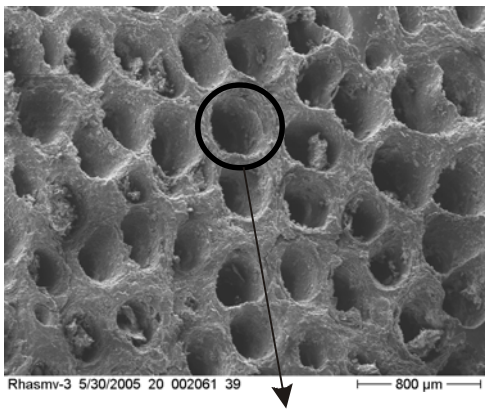
**Objectives:** Various techniques *viz.* morphological, analytical and DNA based techniques were used to standardize protocols for identifying species in this project to assist in the control of Illegal trade in India. The project has following objectives: (a) to develop morphometric, crystallographic and DNA based techniques to characterize species from bones of major animals such as tiger (*Panthera tigris*), leopard (*Panthera pardus*), chital (*Axis axis*), sambar (*Cervus unicolor*), barking deer (*Muntiacus muntjak*) and swamp deer (*Cervus duvauceli*); (b) to establish species-specific characteristics of raw and finished products of Asian ivory and prepare protocols to differentiate from other similar products, used in the trade; (c) to investigate source-area of Asian elephant ivory; (d) to determine characteristics of rhino horn; and (e) to establish species characteristics and keys to identify antler of deer species.

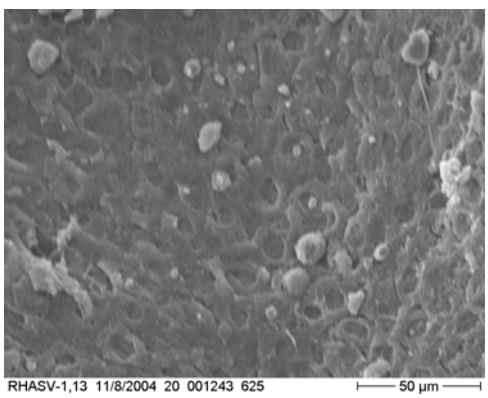
**Progress:** Different techniques like morphometry, scanning electron microscopy (SEM), X-ray diffraction (XRD), X-ray fluorescence (XRF), inductively coupled plasma – mass spectrometry (ICP-MS), thermo gravimetric analysis (TGA), protein profile, DNA analysis and isotopic analysis were attempted to characterize bone, tusk, rhino horn and antler.

Major bones of tiger (*Panthera tigris*) and leopard (*Panthera pardus*) were successfully differentiated based on morphological characteristics and in surface topography at core region. Discriminant function analysis revealed that a function comprising calcium (Ca), copper (Cu) and sodium (Na) concentrations could classify both bones with 100% accuracy using ICP-MS. DNA (300-400bp) was successfully extracted from bones of tiger and leopard using Gene clean and Bio Robotic methods and was also successfully amplified with cytochrome b and 16S rRNA genes. Level of polymorphism and important enzyme restriction sites for identifying tiger and leopard parts was done.

Tusk of Asian (*Elephus maximus*) and African elephant (*Loxodonta Africana*) was characterized based on different techniques. Schreger angle characteristics can differentiate ivory samples of African (n=12) and Asian (n=28) elephants. XRD pattern of ivory matched with hydroxyapatite minerals (American Standard Test matching file no. 9, card no.–432). Diffractogram in ivory showed slanting line after 50°. Crystallite size of ivory ranged between ~ 16.9 and 86.1 nm. It was also possible to distinguish Asian and African ivory

**Milestone**
The study has clearly indicated that the combination of different techniques can successfully differentiate bones of tiger and leopard, tusk of Asian and African elephants, rhinoceros horn and antlers of different deer species.




based on elemental analysis and TGA. Source of origin of Asian elephant ivory, based on isotopes of carbon (n=31), nitrogen (n=31) and strontium (n=26) was determined, which can be potentially used.

Morphological characteristic of rhinoceros (*Rhinoceros unicornis*) horn (RH) viz., presence of tubercles, grooves and bulge provide adequate features to identify this from others. Rhinoceros and buffalo horns have variable density. Protein profile analysis through SDS-PAGE reveals variation in number of protein bands and their positions in case of rhinoceros and buffalo horns. DNA sequence variations were done and observed enzyme restriction sites among RH and horns of other species.

Antlers of different deer species chital (*Axis axis*), sambar (*Cervus unicolor*), swamp deer (*Cervus duvauceli*), hog deer (*Axis porcinus*) and barking deer (*Muntiacus muntjak*) can be differentiated based on their morphological features. Inter-specific differences were observed in cross-section and scan micrographs of antlers. Crystallite size of antler ranged between ~ 26.5 and 169.8 nm. Weight loss pattern of antlers of different species showed remarkable differences in three temperature sections viz. 0-300°C, 450-700°C and 1000-1400°C. Discriminant function analysis of the mean concentrations of elements could classify antlers of different species with 100% accuracy using four functions comprising of 15 elements. Success was achieved in extraction of DNA and PCR amplification with cytochrome b (186 bp) region from antlers. DNA based protocols for differentiating antlers of *Axis axis, Cervus unicolor* and *Cervus duvauceli* have been developed using sequence polymorphism and enzyme restriction sites.

Md. Zahir

# Status and ecology of Leopard in Pauri Garhwal. Phase II: Ranging patterns and reproductive biology of leopard (*Panthera pardus*) in Pauri Garhwal

**Funding Source:** Grant-in-Aid
**Investigator:** Dr. S.P. Goyal
**Researchers:** Shri Devendra Singh Chauhan and Shri Bibek Yumnam
**Date of initiation:** July, 2002
**Date of completion:** June, 2007

**Objectives:** The project site was the Pauri Garhwal District of Uttaranchal (now Uttarakhand) and the aim was to understand the ecological and biological reasons of leopard-human conflicts as frequent conflicts had been reported from this area. The study was conducted with the following objectives: (i) to determine ranging patterns in relation to topography, vegetation, prey (wild & domestic) abundance, land use patterns, human dimension and reproductive status; (ii) to study reproductive biology with reference to frequency of pregnancy/extent of lactation; and (iii) to suggest mitigatory measures to minimize leopard-man conflicts based on Phase-I and II studies.

**Progress:** Information was collected on distribution, extent and severity of leopard-human conflicts in 15 administrative blocks of Pauri Garhwal district. Study area (5444 $km^2$) was divided into 2x2 grids and survey based on structured questionnaire was carried out in 50% villages in each grid. Based on information, the entire study area was stratified into three categories of conflicts viz. low, medium and high. Data reveals that leopards are distributed throughout the study area but their abundance vary. Three Intensive Study Areas (ISA) of around 50 $km^2$, representative of each conflict category were selected for detailed study to determine abundance of leopard and its prey species (wild and domestic) by using sign indices and camera traps. DNA based techniques using scats was also explored for predator abundance. Scats were collected from these intensive study sites to understand the food habits of leopards. A total of 428 scats were analyzed.

**Output and outcomes:** Average encounter rate of leopard scat was significantly ($x^2$=34.4; P<0.01) higher in high conflict category than other and ranged from 0 to 0.55/km during sampling periods. Track index has not shown any statistical difference across the conflict categories. Estimated capture frequency of leopard was highest in medium conflict category and ranged from 0.2 to 3.9/100 camera trap nights during sampling efforts. A declining trend in leopard abundance was observed in track index and capture frequency from 2002 to 2005. This may be as a result of leopard deaths in the surrounding three intensive study area during study periods. However, scat data has not shown such trend. Among wild prey species, barking deer *Muntiaccus muntjak*, wild

pig *Sus scrofa*, porcupine *Hystrix indica* and pheasant were recorded in all conflict categories and their relative abundance was very low in comparison to other studies in India or worldover. Barking deer encounter rate (no./km walk) was significantly high ($x^2$= 13.09; P<0.01) in low conflict categories and ranged from 0 to 0.20/km. The average encounter rate of cattle was highest than other domestic animals in all conflict categories. Leopard mainly preyed on domestic animal such as dog, cattle, goat and sheep, which made up 93% of total diet while wild species including barking deer, wild pig and pheasants contributed <3% of total diet. Among domestic species, dog is contributing 45% of total diet and is followed by cattle (42%).

Low leopard predation on human was found in blocks where predation on livestock was relatively high. Leopard attack on livestock and human were positively correlated with scrub cover. Proportion of livestock and human death was relatively high in those blocks, where large proportion of area was under scrub cover. There has been decreasing trend in leopard predation on human in the blocks where large number of leopards have been killed. Limited data (n=27) about sex of leopards killed as alleged man-eaters indicates that female leopards were more likely to cause conflict. After analyzing the events of conflict, it appears that leopards are targeting soft prey such as children. Majority of attacks were during rainy (45.8%) and winter (42.7%) seasons. Leopard attacks were varying across the time of day, as 68% human were killed between 1600-2100 hours and 16.4% in early morning between 0400 to 0800 hours. It was observed that leopard attacks on human might be affected by factors such as no electricity and distance of house from main village.

DNA based study was undertaken from the samples of the animals killed. 14 polymorphic microsatelite loci were identified. They have high probability of identity (sibling) i.e. one out of 81031. The average number of alleles per locus is 5 and ranged from 3 to 7 alleles with observed heterozygosity of 71% against expected (68%). Mitigatory measures were suggested to reduce leopard-human in this region based on data collected during Phase-I and II studies. There is a need to understand ranging behaviour and systematic population estimation of leopards specially in high to medium conflict categories in order to find out the reasons for such changed behaviour of species and plan strategies to reduce such conflicts.

# Mapping of national parks and wildlife sanctuaries: A pilot project

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|---|---|
| **Funding Source:** | MoEF, Govt. of India |
| **Principal Investigator:** | Dr. V.B. Mathur |
| **Co-principal investigators:** | Dr. P.K. Mathur, WII; Dr. S.P.S. Kushwaha, IIRS; Dr. A. Khan, AMU; and Dr. V.K. Srivastava, NRSA |
| **Research associate:** | Dr. Hitendra Padalia |
| **Junior research fellows:** | Ms. Ambica Paliwal, Ms. Neha Midha, Shri Amit Kumar Srivastava, Shri Shijo Joseph, Shri Pebam Rocky and Shri Mohit Kalra |
| **Date of initiation:** | April, 2004 |
| **Date of completion:** | December, 2007 |

**Objectives:** The pilot study aims to generate accurate, reliable and up to date baseline spatial information on forest types and density (using satellite imagery) and topographic features (supplemented by latest satellite imagery), which will be of direct relevance for preparation/revision of management plans of wildlife sanctuaries and national parks. Efforts will also be made to incorporate the compartment-wise plant and animal density, so that wildlife managers could use the information directly for conservation and management purposes.

**Progress:** The five pilot sites of the project are Corbett Tiger Reserve, Uttarakhand; Dudhwa Tiger Reserve, Uttar Pradesh; Tadoba-Andhari Tiger Reserve, Maharashtra; Annamalai Wildlife Sanctuary, Tamil Nadu; and Kaziranga National Park, Assam. Spatial database at 1:25,000 scale is being prepared for the project sites for which topographical data is to be provided by the Survey of India.

During the reporting period, field studies were carried out in the five project sites focusing on the preparation of land-use/landcover maps and detailed vegetation mapping. Data on animal distribution and abundance was also collected. One year no-cost extension has been granted upto December 2007 as some of the project activities/outputs could not be accomplished on account of the delay in supply of 1:25,000 scale digital topographic sheets by the Survey of India.

# Strengthening field conservation through ecological studies, capacity building and conservation awareness in Ladakh Trans-Himalaya: A collaborative initiative

**Funding Source:** Grant-in-Aid
**Investigators:** Dr. V.B Mathur
**Participating faculty:** Dr. G.S. Rawat, Dr. S. Sathyakumar, Dr. S.A. Hussain, Shri Qamar Qureshi, Dr. V.P. Uniyal, Dr. B.S. Adhikari, Dr. Karthikeyan Vasudevan, Dr. Bivash Pandav, Dr. K. Sivakumar and Dr. Y.V. Bhatnagar (NCF)
**Researcher:** Ms. Shivani Chandola
**Date of initiation:** August, 2002
**Date of completion:** July, 2007

**Objectives:** (i) Generate baseline information through targeted field surveys on rare and endangered taxa and add to the spatial database being developed at WII, (ii) develop resource material for conservation education of various target groups in Ladakh, and (iii) build capacity of the local Government Department(s) and Non-Government Organizations for wildlife monitoring and management of their wildlife-related natural resources.

**Progress:** The Trans-Himalaya has unique biodiversity values, of which precious little is known. Recognizing this and the long-term interest in the region, the Wildlife Institute of India (WII) initiated a collaborative programme to enhance conservation and research activities in the Indian Trans-Himalaya, with a focus on the Ladakh region. Certain aspects of Ladakh's unique biodiversity have remained largely unexplored. It was also felt that there was tremendous scope and need for conservation awareness activities in Ladakh.

For the "Conservation Awareness" component of the project, ecological information available for the region was used for preparing the conservation education material. In collaboration with Centre for Environment Education (CEE), Ahemadabad, a poster series and an activity booklet 'Hardy mountains, fragile environments' was brought out. Implementation of the conservation education component was done through organizing five "Snow leopard conservation education workshops" in Leh and Kargil districts of the region in collaboration with CEE (North). The workshops were aimed at creating awareness about the significance of snow leopard as an indicator species of the well-being of high altitude mountain ecosystem and to press upon the need to conserve the flagship species and its habitat along with the mosaic of other species. The target audiences of the workshops were school teachers, staff of the Zonal Education Offices and other resource persons. 134 school teachers from 121 government schools and other resource persons from the Nyoma, Durbuk, Khaltsi education zones of Leh district, Kargil and Sankoo education zones of the Kargil district participated in the workshops.

Representatives from wildlife and forest departments also took part in the workshops. The workshops have highlighted the need for developing area-specific conservation education programmes. Interviews with the government officials of education department and participating teachers of the workshop brought forward the limitations of the education department in implementing the conservation education training programmes. But despite these limitations, it was suggested by the participants that both pre-service and in-service conservation education should be accorded high priority and even made compulsory first for all the science teachers and then for other non-science teachers as well.

As part of this project, a study on human-wildlife conflict was undertaken in Hemis National Park. The study found that people's dependency on resources of the park is extensive as well as intensive and is culturally linked. Wild resources play a key role in the cultural ceremonies too. Resources from the park are vital for income generation. Shift in economic condition and occupational patterns of the local residents were observed. Livestock predation cases were mostly reported when the livestock were left unattended or when they strayed away from the herd. Small bodied animals were found to be more prone to predation.

The present study also found that local economy suffers a monetary loss due to overall livestock loss, which was unpredictable. Study also found that the attitude of the people are formed by the economic loss or benefit associated with the activity they are involved in. Traditional resource use is decreasing in the region and tourism is emerging as major resource use. The shift in economic condition and occupational pattern in the study area can be seen as a positive sign for successful conservation of wildlife, but tourism should not be left unguarded in the region, as the region is the most vulnerable. It also provides habitat to the most vulnerable and endangered species. Regulated tourism plan needs to be made for the region to strike a balance between the booming economy of the residents and the wildlife habitat.

# Management of forests in India for biological diversity and forest productivity – A new perspective - Phase-II

**Funding Source:** USDA Forest Service Collaborative Project funded under the US held Indian Rupee Fund (USIF), supported by FERRO, American Embassy

**Investigators:** Indian Team - Dr. P.K. Mathur, Dr. S. Chowdhury, Shri A. Udhayan, Dr. B.S. Adhikari, Dr. K. Vasuevan and Dr. P. Nigam
US Team – Dr. John F. Lehmkuhl, Dr. Martin Raphael, Mr. Richard Holthausen, and Dr. Bruce G. Marcot

**Researchers:** Dr. Anshuman Tripathi, Mr. S. Harikrishnan, Miss Shipra Verma, Mr. S.A. Makhdoomi, Mr. R.K. Mohanta, Mr. Devendra Kumar and Mr. V. Malik

**Date of initiation:** September, 2004

**Date of completion:** February, 2007

**Objectives:** The goal of the Phase-II is to work with State and site level field managers to develop specific plans and guidelines for implementing the recommendations presented in the six-volume project technical report prepared in the Phase-I of the project. Following are the objectives set-forth: (i) convene site level workshops involving field managers for each of the four Conservation Areas (CAs); (ii) prioritize issues and actions for each CA, select a sub-set of issues for further work during the workshop; (iii) develop specific approaches for implementation of management recommendations on select issues; (iv) develop specific approaches for implement procedure for testing and monitoring management actions; and (v) describe key-steps to implement/ execute recommendations and potential pilot projects (including specific tasks, responsibilities, fund requirements and schedule).

**Progress:** During the reporting period, following six implementation tasks were executed in four project sites: (i) Terai Conservation Area (TCA) - Development of adaptive grassland management practices in Dudhwa Tiger Reserve (DTR); (ii) Garo Conservation Area (GCA) - Assessment of coal mining and its allied activities and horticultural development in GCA, their distribution and impact on forest fragmentation, elephant corridor, and aquatic life; (iii) GCA - Inventory of NTFPs, baseline information on select Non-Timber Forest Products (NTFPs), their extraction/harvest methods and amount, distribution, productivity and regeneration status; (iv) GCA - List and map the sacred groves in GCA, their biological values and status; (v) Satpura Conservation Area (SCA) - Assessment of the current extent, status and management practices of livestock grazing in Melghat Tiger Reserve and develop an implementation plan on grazing regulation involving

**Milestone**

The project provided an opportunity to discuss the adaptive management approach of wet, tall grasslands with the frontline staff, senior forest officials and scientists. Likewise, for the first time a contentious issue of livestock grazing in Melghat forests was discussed in stakeholders meeting. This facilitated identification of shortcomings in the existing grazing policy and grazing settlement report on one hand, while providing an opportunity to interact with affected pastoralists, local communities and to educate them about ill effects of livestock grazing in Melghat forest.

stakeholders; and (vi) Anaimalai Conservation Area (ACA) - Development of Adaptive management Approach for Phasing out monoculture plantations in the ACA.

**Output and outcomes:** A workshop on "Adaptive Grassland Management in TCA" involving forest officials in Dudhwa Tiger Reserve (DTR) and scientists who had earlier contributed on grassland ecosystem and associated faunal species was conducted in DTR. The workshop provided various recommendations for adoption of adaptive management approach for grasslands. Further, a stakeholders' workshop on 'Management of livestock grazing in Melghat forests' was organized wherein forest officials and other stakeholders were involved and provided recommendations for evolving appropriate strategy for livestock grazing management in Melghat forests.

The investigation carried out in GCA on the impact of coal mining and horticulture development on wild elephant revealed presence of 3893 active and 841 abandoned coal 'rat-hole' mines. Total impact of these coal mines at 49 locations in 4 Blocks was around 224 $km^2$. Current practices of uncontrolled 'rat-hole' coal mining are major cause of forest denudation as there are no restorative measures involved with them. Water quality reduction, increasing river bed loads, and reduction in Dissolved Oxygen level in river water are the major associated environmental problems. Investigation further revealed that increased settled horticulture in GCA is counterproductive to biodiversity values impacting mega- herbivores especially to the elephants in terms of availability of fodder.

Another concurrent short term study in GCA was able to identify, list, map and describe sacred groves sites in South Garo hills area. Study on different aged teak plantations in ACA and their use by wild animals has also provided an insight and recommendations for the management.

Aniruddha Majumder

# Ecology of tigers in Pench Tiger Reserves, Madhya Pradesh and Maharashtra

| | |
|---|---|
| **Funding Source:** | Grant-in-Aid |
| **Investigators:** | Dr.K. Sankar, Dr.Y. V.Jhala, Shri Qamar Qureshi, WII and Dr. Rajesh Gopal, Member Secretary, National Tiger Conservation Authority, N. Delhi |
| **Researcher:** | Shri Aniruddha Majumder and Shri Santanu Basu |
| **Date of initiation:** | September, 2005 |
| **Date of completion:** | September, 2009 |

**Objectives**: (i) To collect information on the ranging, movement, home ranges of tigers and their dispersal patterns, (ii) to collect information on the habitat use by tiger, (iii) to gather information on the food habits of tiger, (iv) to assess the population of prey species, (v) to prepare a habitat suitability map for tiger and its prey, and, (vi) to suggest recommendations for the effective management of tiger population in Pench Tiger Reserve and adjoining areas.

**Progress:** The field work was initiated in Pench Tiger Reserve (PTR), Madhya Pradesh during October 2005. To assess the density of prey species, line transect method was followed. For this purpose 30 line transects (60 km walk), covering all 30 beats of Pench National Park were walked once. Twenty vehicle transects, which varied in length from 10 to 12 km (in total 115.4 km) were also monitored once in winter to study the relative abundance of prey species in different vegetation types. Density (using DISTANCE 5.0) of prey species on line transects showed that chital was the most common ungulate species (55 animals/km$^2$), followed by sambar (5 animals/km$^2$), where as common langur (71 animals/ km$^2$) was the most abundant prey species in the study area. Carnivore sign survey which varied in length from 3 to 5 km in all beats (n=30) in the entire tiger reserve was conducted during winter to get information on abundance of large carnivore indirect evidences. Ninety six tiger scats were collected opportunistically, where ever encountered.

**Output and outcomes:** Scat analysis revealed that chital constituted major part of tiger prey in terms of number (44.8%), followed by sambar (37.5%), langur (12.5%), wild pig (3.1%) and cattle (3.1%). In total 36 kills of prey species were also studied opportunistically. Chital were found to be more preyed upon (50%) followed by samber (25%), nilgai (11.1%), wild pig (11.1%) and common langur (2.8%). A 200 cm tall density board marked into 20 blocks of 10 cm each, was used to find the stalking cover at the tiger kill sites (n=36). In addition, information on tree cover, shrub cover, grass height etc. were also collected at each tiger kill site. A tigress with four cubs were monitored opportunistically (between 6 a.m and 6 p.m) in the national park area and their locations using GPS (n=60) were taken during winter. It was observed that the home range of tigress family as per the Minimum Convex Polygon method was 23.8 sq.km during this period. Food habits of this family were also studied. During this period food habits of major co-predators of tiger's (leopard and dhole) were also studied.


# All India monitoring of tigers, co-predators, prey and their habitat

**Funding Source:** Project Tiger Directorate, Govt. of India
**Investigators:** Dr. Y.V. Jhala, Shri Q. Qureshi and Dr. R. Gopal
**Researchers:** A team of 40 researchers
**Date of initiation:** 2005
**Date of completion:** 2007

**Objectives:** The Project Tiger Directorate, Ministry of Environment & Forests, Govt. of India, entrusted the Wildlife Institute of India to develop and implement All India Tiger Status Evaluation and Monitoring in collaboration with the State Forest Departments. The tasks assigned to the WII were to: (i) develop an appropriate technical protocol and disseminate it to the State Forest Departments for implementation; (ii) to facilitate easy data entry at the State level, (iii) to collate and analyse the data for statistical inference in estimating tiger distribution and status; (iv) to generate spatial and aspatial data for modelling, evaluating and prioritizing landscapes for tiger conservation; and (v) to estimate tiger and prey densities in stratified samples within landscapes for long-term monitoring.

**Progress:** The phase I data collection were completed during the reporting period by the State Forest Departments and communicated to the Wildlife Institute of India by January 2007. Meanwhile, the phase II dataset was compiled in a geographic information system and a preliminary analysis of tiger habitat was completed for the country using tehsil level information on tiger presence. This report was released by the Hon'ble Prime Minister of India during the meeting of the National Board for Wildlife in Delhi. The analysis shows that India still has about 3,00,000 km$^2$ of tiger habitat in six separate landscape complexes. Within the past 150 years, tigers have become locally extinct in about 30% of their historic range of occupied districts. The north-eastern landscape has the maximum contiguous forested landscape that has potential tiger habitat of 64,300 km$^2$. The Shivalik-Gangetic plains landscape complex has a linear fragmented strip of 20,800 km$^2$ of potential tiger habitat. The central Indian landscape has potential tiger habitat of 1,56,000 km$^2$, while the Eastern Ghat complex has about 15,800 km$^2$, and Western Ghat landscape complex has about 51,800 km$^2$ of potential tiger habitat. The report highlights the major areas harbouring source populations of tigers in the country, their habitat connectivity, and conservation needs. The analysis was a precursor for mapping beat level tiger occupancy obtained from Phase I. Phase III data collection by the WII research team on estimating absolute densities of tigers and ungulates in clusters of select beats in different sign density strata was completed for the Central Indian Landscape. Twelve replicates covering a range from 0.125 to 12 tigers per 100 km$^2$ were sampled. These data will be analysed along with the Phase I data on tiger occupancy, signs & indices of ungulate abundance, and human pressures to arrive at population estimates for tiger occupied landscapes.

Y.V. Jhala

# Tiger population and habitat status evaluation in Satpura Maikal Landscape

**Funding Source:** Project Tiger Directorate, Govt. of India
**Investigators:** Dr. Y.V. Jhala, Shri Q. Qureshi, Dr. R. Gopal and Shri K. Nayak
**Date of initiation:** April, 2003
**Date of completion:** December, 2009

**Objectives:** The project objective is to develop simple but scientifically robust protocols for monitoring tiger status, population trends, habitat occupancy, tiger prey status, habitat and anthropogenic pressures.

**Progress:** These protocols were developed in consultation with the field officers and published in the form of a field guide in nine regional languages. About 58 thousand square kilometers covering 3,150 beats and 178 ranges were sampled by the frontline staff of the MP Forest Department in the Satpura-Maikal Landscape based on protocols developed in this project. Tiger densities were estimated by capture-recapture method using camera traps at 6 sites within the Satpura Maikal Landscape. Tiger densities ranged from 0.25 to 12 tigers per 100 km$^2$ with a good level of precision. Tiger densities were highly correlated with pugmark encounter rates ($r = 0.86$, $p<0.01$), wild ungulate prey encounter rates ($r=0.96$, $p<0.01$), and wild ungulate dung density ($r=0.8$, $p<0.05$) and negatively correlated with human disturbances like wood cutting signs ($r=0.77$, $p<0.05$).

**Minimum convex polygon ranges of collared tigers in Kanha Tiger Reserve.**

A predictive equation for tiger density based on wild ungulate encounter rate had the following form: Tiger density (tigers 100 km$^{-2}$) = 0.091 (±0.985) + 6.513(±0.89) Wild Ungulate Encounter Rate. $R^2 = 0.931$, Adj $R^2 = 0.91$, $p = 0.02$. The second part of the project was to understand the ecology and dispersal of tigers using GPS and satellite telemetry. A total of 9 tigers were radio-collared with standard VHF (2), GPS/VHF (4), and Satellite/GPS/VHF collars. Male tigers had large home ranges of over 100 km$^2$ while breeding tigress's had small ranges (20 km$^2$) due to the high prey densities.

Predation was primarily on chital as observed through 102 kills and continuous monitoring of collared tigers. Data collection through data downloads via ground VHF and satellite is currently being done in Kanha Tiger Reserve. The collared sub-adult tigers are likely to disperse within the next few months providing data on corridors and habitat connectivity in this important tiger conservation landscape. It is intended to put 5-6 additional transmitters on sub-adult tigers to get a reasonable sample size for making inferences on tiger dispersal patterns.

J.P. Bopanna

# Diclofenac project for vulture conservation

*[Collaborative project of BNHS, WII and Royal Society for the Protection of Birds (RSPB)]*

**Funding Source:** Bombay Natural History Society
**Investigators:** Dr. A. Rahmani, Director BNHS & Dr. Y.V. Jhala
**Date of initiation:** April, 2004
**Date of completion:** December, 2007

**Objectives:** The project aims to assess the prevalence of diclofenac, a non-steroidal anti-inflammatory drug (NSAID) in vulture foods throughout India. The drug, being used extensively as veterinary medication has been implicated as the major cause for the catastrophic decline in vulture populations throughout South East Asia.

**Progress:** Gyps vulture populations across the Indian subcontinent are declining rapidly and evidence indicates that veterinary use of the non-steroidal anti-inflammatory drug (NSAID) diclofenac is the major cause. Exposure of vultures to diclofenac is likely to arise from the consumption of livestock carcasses that have been treated shortly before death. However, detailed information regarding the prevalence and residual levels of diclofenac in carcasses available to vultures in India remains unreported. Diclofenac residues in 1848 liver samples taken from carcasses of dead livestock sampled at 67 sites in 12 States within India, between May 2004 and July 2005.

Diclofenac residues were detected in carcasses in all States except Orrisa, where only one site was sampled. The overall prevalence of detectable diclofenac (>10 μg $kg^{-1}$) across all States was 10.1% and varied significantly among states, with up to 22.3% prevalence determined in Bihar. The geometric mean concentration of diclofenac found in samples in which the drug was detected was 352 μg $kg^{-1}$. The prevalence of carcasses containing diclofenac is similar to that proposed by models to be required for causing the observed Gyps vulture decline in India. On 11th of May 2006, the Drug Controller General (India) ordered the withdrawal of all licenses granted for the manufacture of diclofenac for veterinary use within India. However, if Gyps vultures are to be protected, potentially substantial existing stocks now need to be quickly and effectively removed from the veterinary market.

Y.V. Jhala

# Ecological monitoring of Gir

**Funding Source:** Grant-in-Aid
**Investigators:** Dr. Y.V. Jhala and Shri Q. Qureshi
**Researchers:** Shri C. Dave and Shri K. S. Chauhan
**Date of initiation:** January, 2004
**Date of completion:** January, 2008

**Objectives:** The primary objective of the project is to continue with the monitoring activities proposed in the consultancy project done by WII for the Gujarat Forest Department. The specific objectives are: (i) to map the entire greater Gir region for land use and potential for lion movement between the protected area and the satellite populations of lions, and (ii) to further refine and continue with the population monitoring of lions, leopards and ungulates.

**Progress:** WII's TRAC approved a one year extension of the project at no additional cost. Data collection was continued for the interaction between domestic and wild (chital) ungulates, to evaluate the role of sympatric livestock grazing at various scales of potential competition. The wild ungulate density estimation was carried out for the entire park using a systematic block-wise line transect sampling strategy during winter 2006. The densities were estimated for all ungulate species for the entire park and in its three management zones. The data were also collected for the group sizes of all wild ungulates for winter and summer seasons. The body condition evaluation for chital population was carried out during summer 2006 for the entire park.

In intensive study area, chital and other wild ungulate densities and group sizes were monitored seasonally for two ecologically similar sites differing in livestock grazing pressure i.e. with sympatric livestock and without any livestock. During summer 2006, chital population was evaluated for the body condition in areas with sympatric livestock and devoid of livestock grazing within intensive study area. The data collection continued for the habitat and food utilization patterns of both the groups, i.e. Chital and Maldhari livestock. Five Maldhari settlements were monitored weekly to record lion and leopard predation events on livestock. The herd structure, composition and demography of Maldhari livestock were also monitored seasonally.

Data were also collected on vegetation parameters, which includes the monitoring of permanent vegetation exclosures; random quadrate sampling for the estimation of browse species density estimation in livestock grazing area of three different Maldhari settlements; and radial transects originating from current and relocated Maldhari settlements. The fiber content, crude protein and macro nutrients of food plant items of chital, cattle and buffalo were analyzed in the research laboratory of WII.

**Output and outcomes:** The average wild ungulate density was 48.25 (± 6.1) $km^{-2}$ for Gir PA. Chital was most abundant with a density of 44.77 ± 7.1 $km^{-2}$ followed by Sambar (*Cervus unicolor*) 2.86 ± 0.81 and Nilgai (*Boselaphus tragocamelus*) 1.16 ± 0.47. Average and typical group sizes of chital were 7.11 ± 0.76 and 18.52, Nilgai 2.45 ± 0.64, 4.11 and Sambar 1.68 ± 0.23, 2.43, respectively. The body condition of chital population was overall good for the entire PA. The wild ungulate density in Gir seems to follow a precipitation gradient, which decreases from west to east, whereas group sizes were larger in eastern Gir sanctuary compared to National Park and western sanctuary.

The comparisons of density, group sizes and body condition of chital population between two ecological similar sites within the intensive study area revealed no significant difference in any of the population parameters. The food habit study showed a marginal diet overlap between chital and buffalo (11.71 % in monsoon, 10.23 % in winter, 25.49 % in summer) as well as between chital and cattle (7.8 % in monsoon, 19.42 in winter, 13.39 % in summer). The chital diet was high in protein and low in fiber content. Whereas, livestock diet mainly composed of mature, long and perennial grasses, mostly poor in nutrients and high in neutral detergent fiber, acid detergent fiber and lignin.

I.P. Bopanna

# Research and conservation of endangered and threatened fauna of Kutch: An integrated approach

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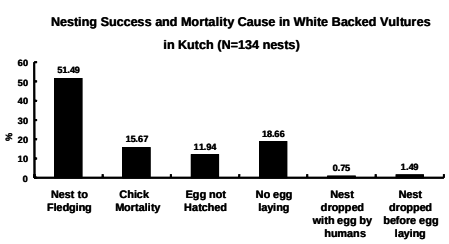
|---|---|
| **Funding Source:** | Grant-in Aid |
| **Investigators:** | Dr. Y.V. Jhala, WII, Dr. A. Rahmani, BNHS and Dr. Ravisankaranoo, SACON |
| **Researchers:** | Shri Bopanna I. P., Shri Kamlesh Maurya and Shri Sutirth Dutta |
| **Date of initiation:** | December, 2004 |
| **Date of completion:** | December, 2009 |

**Objectives:** (i) To study the ecology and seasonal movement patterns of the Great Indian Bustard, so as to develop an effective conservation strategy for the species in Kutch, (ii) to monitor the wolf, hyena, and caracal populations and evaluate the role of different mortality factors and dispersal in their population dynamics, (iii) to study the ecology of the Indian fox, (iv) to monitor the visiting populations of lesser floricans and Houbara bustards and study the migratory pathways and wintering habitats of the lesser florican, (v) to monitor the roosts and breeding status of vultures, (vi) to sensitize the local communities to the conservation needs of their endangered and threatened fauna, and (vii) to evaluate the ecological and economic sustainability of traditional pastoral practices, and evaluate the impact of wolf livestock depredation on the economics of these communities.

**Progress:** During 2006-07 data was collected on radio-collared wolves and hyenas in Abdasa Kutch. Additional hyenas were radio-collared during the early part of the reporting year. Possibility of using photographic mark-recapture models for population estimation of striped hyenas was assessed.

Kutch is still a major strong hold for a viable population of white backed vultures (*Gyps bengalensis*), during the 2006-07 breeding season, nests were located and fledging success recorded.

Mortality analysis suggests that survival probability of hatchling was 74% (66 to 85, 95% CI), mortality due to human causes was 1%, and mortality due to other causes was 25%. As a part of a collaborative effort between the Vanishing Herd Foundation, (Gir, Dudhala) and WII, diclofenac vials intended for veterinary use within the intensive vulture study area of Abdasa were exchanged for meloxicam.




An intensive study was conducted on the endangered spiny tailed lizard (*Uromastyx hardwickii*). Activity budget, behavioural thermoregulation, foraging behaviour and social interactions were observed using focal animal sampling, combined with scan animal sampling and ad- libitum sampling. Seasonal food habits were estimated from bite counts and pellet analysis.

Ranging patterns were studied by mapping individually identified lizards. Activity pattern shifted from bimodality in summer (duration: 119 mins/day, S.E.=12, n=25 lizards) to unimodality in monsoon (duration: 93 mins/day, S.E. =5, n=23 lizards). Body pigmentation changed from dark to light as temperature increased. Diet, comprising of grasses (Chrysopogon and Cymbopogon), insects (ants, termites and locusts) and shrubs (Clerodendron) in summer narrowed to herbs (Borreria, Euphorbia, Indigofera, etc.) and grasses (Chrysopogon and Cymbopogon) in monsoon. Density of active burrows was 42.45/ha. in summer and 66.04/ha. in monsoon.

Average home range was 0.2 ha (S.E.=0.04, n=23) in summer and 0.05 ha (S.E. =0.01, n=20 lizards) in monsoon. Male home ranges (0.39 ha in summer, S.E.=0.08, n=6 & 0.12 ha in monsoon, S.E.=0.03, n=4) were larger than females (0.15 ha in summer, S.E.=0.04, n=4 & 0.03 ha in monsoon, S.E.=0.02, n=3) and juveniles (0.12 ha in summer, S.E.=0.02, n=10 & 0.03 ha in monsoon, S.E.=0.01, n=7).

Aggressive behaviour with low overlaps in core areas and extensive overlapping in fringe areas of individual home ranges indicated territoriality in core but hierarchically or temporally spaced resource sharing in the peripheries of home ranges.

Bivash Pandav

# An ecological reconnaissance of colonial nesting birds in Bhitarkanika mangroves, Orissa, India

**Funding Source:** Grant-in-Aid
**Investigators:** Dr. Bivash Pandav & Dr. Karthikeyan Vasudevan
**Researcher:** Shri Harikrishnan S.
**Date of initiation:** January, 2004
**Date of completion:** December, 2007

**Objectives:** (i) To enumerate the number of bird species and individuals nesting in the heronry; (ii) to study the breeding biology of the birds in the heronry; (iii) to find out resource partitioning in terms of food and nesting requirements among breeding birds in the heronry; and (iv) to study the dependency of birds breeding in the heronry on areas outside the sanctuary limits.

**Progress:** A total of about 13,000 nests and 3500 nest trees were monitored for three years. The pattern in use of the nest heronry by different species was documented. The information collected from the field over three-year period was compiled. The data was entered and analyzed for preparation of the final technical report.

**Output and outcomes:** The nesting species in decreasing order of abundance were Asian openbill, large egret, little cormorant, intermediate egret, purple heron, night heron, grey heron, blackheaded ibis, oriental darter, cattle egret and little egret. Asian openbill accounts for nearly 66% of all the nests counted in the heronry. There was a significant change in the nest profile during various stages documented during the study.

Difference in growth rate was observed in chicks. Chicks that hatched out early had better growth rates than those that hatched late. Space use in the heronry revealed that species use specific sites in the heronry that was consistent over the years. The diet of different species was quantified and it has important conservation implications.

**Milestone**

(i) This study made a comprehensive assessment of resource partitioning among birds that use a heronry, and (ii) information of diet of the species was collected for the first time that will serve as important baseline for management of the species and heronry.

V. Deepak

# Ecology of two endemic turtles

**Funding Source:** Grant-in-Aid
**Investigators:** Dr. Karthikeyan Vasudevan and Dr. Bivash Pandav
**Researcher:** Shri V. Deepak
**Date of initiation:** January, 2006
**Date of completion:** January, 2010

**Objectives:** (i) To estimate the population density of Travancore tortoise and Cane turtle in a fragmented landscape; (ii) to quantify the diet of these two species and describe the feeding ecology with respect to their role in seed dispersal; (iii) to identify threats to the turtle population based on their habitat use, ranging pattern and food habits and recommend measures for their conservation; and (iv) to carry out a survey of these two species along the Western Ghats to ascertain the exact distribution in the context of Protected Area network in the region.

**Progress:** Thirty-two travancore tortoises were captured and marked in the study area. The data collected from the trails will be used to calculate occupancy, proportion of the area occupied (PAO) by Travancore tortoise. A multiple season model was used to calculate site occupancy rates. The feacal analysis reveals that the tortoise fed on both plant and animal materials. Twelve cane turtles were captured and marked. Out of the four sampled evergreen forest localities they were found in three of them. Two behavioural observations were made on the cane turtle.

**Output and outcomes:** Information on the extent of area occupied by both species of turtles was collected. Observations have lead to documentation of diet in the species, which was earlier not known.

**Milestone**

(i) This study is the first attempt to estimate a population parameter of the two endemic land tortoises that can potentially be used to monitor their population; and (ii) information of diet of the species is being collected for the first time and it will serve as important baseline for *in-situ* and *ex-situ* management of the species.

K. Ramesh

# Key areas for long-term conservation of *Galliformes* in north-west India

**Funding Source:** IUCN/SSC/Pheasant Specialist Group
**Investigators:** Shri Qamar Qureshi (WII), Dr. K. Ramesh (WPA) and Dr. Philip McGowan (WPA)
**Date of initiation:** May, 2005
**Date of completion:** April, 2008

**Objectives:** (i) To develop a spatial database on the distribution of *Galliformes* species in north-west India, (ii) to evaluate the role of existing PA network in *Galliformes* conservation, (iii) to delineate key areas of conservation significance for these species in the landscape, and (iv) to prepare conservation plans for key areas and species for each State covered under the project, describing necessary management and conservation inputs.

**Progress:** The field work for the project has been completed in temperate regions. GIS based thematic layers on various habitat features are being stored for analysis. Field work continued in the lower Himalayan region targeting Red Junglefowl, Peafowl, and Kalij Pheasant. Intensive field work was carried out in Kumaon and in the Nanda Devi region. Survey began near Pithoragarh town and Dharchula, and the entire Pindari valley in the west. In Chamoli district, both Mana and Niti valleys were surveyed. Total efforts for this particular survey represent ca.350 km of walk, and over 1000 km by road.

**Output and outcomes:** Field surveys revealed a high concentration of Satyr Tragopan in Kumaon region, particularly in the Namik Valley of Pithoragarh district. Information collected on the western limit of Satyr and the possible causal factors separating Western and Satyr Tragopans would be useful to refine the spatial model already developed for these species. Himalayan Monal (n=148) sighted during the survey, but the Koklass Pheasant (n= 4) was not as numerous as was expected. Chukar Partridge were counted in large numbers in Niti valley (n=27). Strikingly, most areas in Pithoragarh and Bageshwar districts are under 'Van Panchayat' (Forest village) controlled by local community and any conservation measures or suggestions for allocating areas for long-term conservation of Galliformes here are likely to be in the line of 'Community Reserve'. Some villages in Pindari valley have brought in significant regulatory measures and have banned poaching of any sort.

S. A Hussain

# Conservation ecology of Sangai *Cervus eldi eldi* and its wetland habitat

**Funding Source:** Grant-in-Aid
**Investigator:** Dr. S. A. Hussain and Dr. Ruchi Badola
**Researchers:** Ms. Kimjahlai Kipgen, Ms. Sangeeta Angom, Ms. Ngailian Vaiphei and Ms. Sangai Leima Thounaojam
**Date of initiation:** December, 2004
**Date of completion:** November, 2009

**Objectives:** (i) To monitor the extent and quality of habitat (*phumdis*) within the Keibul Lamjao National Park, (ii) to estimate the seasonal availability of browsing biomass for Sangai and associated grazers, (iii) to monitor the population of sangai in the Keibul Lamjao National Park so as to derive the population parameters such as density, demography and spacing, (iv) to quantify the basic needs of the species in terms of food, space and cover for sustained reproduction, (v) to determine the stocking rates of sangai and associated grazers in the park, (vi) to examine the variation in the mitochondrial DNA as well as nuclear DNA using control region and micro-satellite primers to gain a better understanding of the genetic population structure, and (vii) to explore the possibility of establishing a second home for sangai in wild within Manipur state.

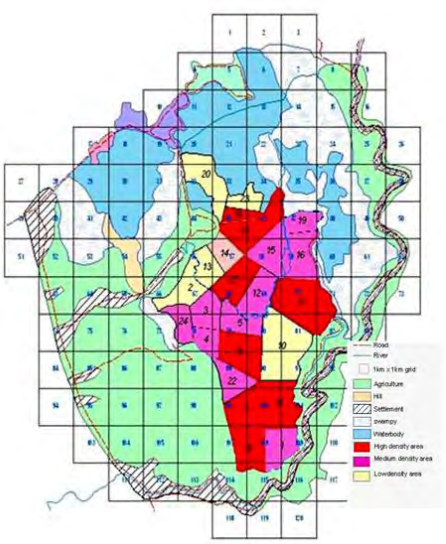
**Progress:** Distance sampling methods were used for population estimation. The population estimation was carried out in association with Manipur Forest Department. However, to examine the distribution of sangai and hog deer, during November 2005 to March 2006, 66 line transects of 500 m each were laid on 51 grids of 1 x 1 km covering the entire park. On these transects 578 plots of 50 m x 2 m size were laid. Dung of sangai and hog deer were searched on these plots. Presence of dung, their number, and type of phumdi at the sites were recorded. Based on number of dung recorded in each plot dung density for the grid was calculated. Once the dung density was derived it was plotted on the GIS based map. Dung density was calculated as number of pellet group/km$^2$.

The abundance of sangai and hog deer was estimated using point transects method in 18.86 km$^2$ area of the Park. At pre-selected sites, 20 *machan* of 7 m height were constructed for population monitoring. Morphological traits were used for individual identifications of different sex and age groups of Sangai. Adult male were identified with hard antlers, sub-adult male with single spiked antlers, whereas adult female (*c* 3 ft ), juveniles (*c* 2 ft) and fawns (*c* 1.5 ft) from their body size, were identified. Similar method was used to identify different sex and age of hog deer.

**Output and outcomes:** Pellet groups of Sangai and hog deer were recorded only in 22.26 km² area of the Park. Based on the distribution of pellet groups the entire Park area was stratified into high, medium and low density areas. The high density areas (8.93 km²) had 37.26 pellets/km² while medium density area (3.99 km²) had 13.83 pellets/km² and low density area (5.94 km²) had 9.0 pellets/km². The overall pellet density varied between 0.05 to 2.15 pellets/ 100 m². The high density areas (8.55 km²) had 14.13 pellets/km² while medium density area (4.66 km²) had 3.83 pellets/km² and low density area (5.65 km²) had 2.33 pellets/km². The overall pellet density varied between 0.1 to 0.60 pellets/100 m².

During the population estimation exercise, a total of 323 sightings of animals were made, of which 61% sightings were of sangai, 37% sightings were of hog deer and rest 2% were unidentified. To derive the density, distance based sampling models were used for decreasing detection at greater distance from the observer. By doing so, an Effective Detection Radius (EDR) was computed and the density of the animal was derived from this. The data was confirmed to uniform cosine model. Based on the maximum sightings the density estimate was done for 0600-0630 hours. The mean cluster size was found to be 0.71 and therefore, the individual density was 4.04 sangai/km² with an upper confidence interval of 5.51 sangai/ km².

For the population estimation of hog deer, based on sighting frequency, data for the period of 0630-0700 hours was used. The estimated group density was 1.35. The mean cluster size was 0.46 and therefore the individual density was 2.93 with an upper confidence interval of 4.27 hog deer/ km². The population estimation was 55 with a maximum of 80 animals in 18.86 km² area of the Park. The estimation of hog deer is incomplete as the entire park could not be covered. The *machan* could not be constructed in Kumbihipat, Laphupat and Myaidak area because of poor infrastructure.




**Distribution of dung of Sangai in the KLNP**

Based on sighting the population age structure of sangai was computed, which consisted of 25% males, 52.6% females, 12.8 % juveniles and 9.7% fawns. The observed male to female ratio was 47 males/100 females and fawn to female ratio was 18 fawns/100 females. For the hog deer, the population age structure consisted of 20.7% males, 60.3% females, 9.09 % juveniles and 16.44% fawns. The observed male to female ratio 34.24 males/ 100 females and fawn to female ratio is 16.43 fawns/100 females.

Food habits of sangai were studied in KLNP. Line transects of 500 m length were established in 5 permanent blocks to quantify food availability. Total counts of plant species were made in 0.5 m x 0.5 m quadrates (n=450) and pellet groups were collected from 2 m radius plots (n=300) established at an interval of 50 m on these transects. Reference slides of 36 plant species occurring in the Park were prepared. Microscopic slides from 40 pellet groups each for winter and summer were prepared with a composite of 10 pellets. In each slide 10 locations were randomly examined and plant fragments were identified by matching them with the reference slides. The availability and

*S. A Hussain*

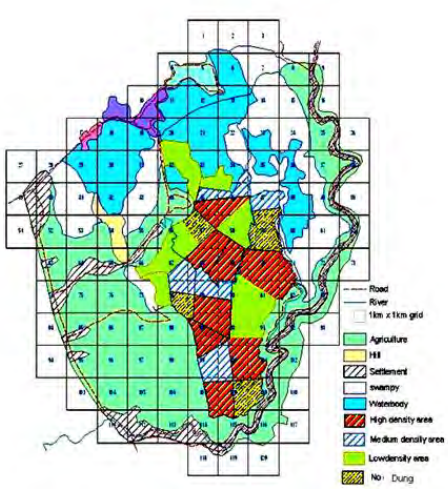
use data were tabulated as percent frequency and converted to Ivlev's index (IV) to compare food preferences across seasons.

Based on faecal analysis preference for various forage classes were calculated as 47.7% grasses, 31.6% forbs, 10.5% browse, while 10.5% remained unidentified. Monocots represent 70.6% of the diet. Family Poaceae was represented by nine species and Cyperaceae and Onagraceae by two species each, while rests of the families were represented by one species. Sangai used 17 species during winter and 12 species during summer.

A study on the vegetation composition and productivity of phumdi was carried out from October 2005 to July 2006 as it was important for the conservation of sangai. Eighteen transects of 500 m length were laid in nine blocks during winter and 53 transects during summer, covering 25 blocks. Vegetation sampling was done in 0.5 x 0.5 m plots on these transects. A total of 350 in winter and 781 plots in summer were laid. In each plot species composition, height and total number of individuals were recorded. To estimate the primary productivity of phumdis, twelve enclosures of 10m x 10m were constructed in four different regions of the park covering different phumdi thickness, water depth and soil pH. Cutting treatment was given for assessment of productivity.

In the Park, 83 plant species belonging to 21 families were recorded. Poaceae and Cyperaceae form the dominant families. Diversity indices shows species richness = 48, diversity = 0.29, evenness = 0.47 and richness = 81, diversity = 0.17, evenness = 0.52 for summer and winter respectively. Species richness is different in thin (48), thick (53) phumdi and on hard ground (14).

During winter and summer, eight plant communities were identified. Productivity was highest for *Zizania latifolia* with 13.90g $m^{-2}$ ± 5.01 for winter and 102.96g $m^{-2}$ ± 26.03 for summer, compared to all other species in all the enclosures. Productivity was greater in summer (63.75 g $m^{-2}$) than winter (15.76g $m^{-2}$). Productivity of annuals and perennials varied according to seasons and type of phumdis. Further investigation would provide better understanding of the community composition and productivity of the phumdis.




**Distribution of dung of Hog deer**

# An assessment of ecodevelopment initiatives in Periyar Tiger Reserve

**Funding Source:** Grant-in-Aid
**Investigators:** Dr. Ruchi Badola and Shri A.K. Bhardwaj
**Date of initiation:** April, 2002
**Date of completion:** September, 2007

**Objectives:** (i) To examine the kind of inputs provided to local communities (Eco-development Committees) through eco-development programme. (ii) To examine the impacts of such eco-development programme with respect to following parameters: (a) change in socio-economic conditions of local communities (EDC members) prior to and after the initiation of eco-development programme; (b) change in quantum of forest resource ( fuel wood, fodder, and NTFP) use by local communities; (c) extent of park-people conflicts after the implementation of the programme; (d) state of attitudes of local communities (EDC members) towards conservation; (e) to examine the viability of EDCs formed under the eco-development; and (f) programme with respect to: (a) structure and membership; (b) economic status (funds received/generated/invested/spent and audit system); (b) capacity building of members; (d) level of participation and empowerment of women and marginal groups; and (e) decision making and conflict resolution mechanism adopted; and (iii) on the basis of above findings critically examine the factors responsible for the success and failure of eco-development initiatives with respect to Periyar Tiger Reserve and suggest measures for effective implementation of the future programme.

**Progress:** During the reporting period data collection was completed and its analysis was initiated.

**Output and outcomes:** The study revealed a significant decline in the resource use from the PA, reduction in income from consumptive use of PA, significant increase in incomes of EDC members, reduction in income disparities and improved participation of local communities in various protection activities. The performance of EDCs was found to be positively related to women Self Help Groups (r = 0.59), social capital (r = 0.56), well being of local communities (r = 0.54) and secretary strength (r = 0.47). Interestingly, the parameters related to financial investments did not show direct correlation with positive performance of EDCs. Further, the role of capacity building had only limited effect on EDC performance. The study concludes that it is through a combination of social and economic empowerment, leadership capacity of the EDC Secretaries and the involvement of women, under an overall umbrella of enabling legal and management environment that this programme can make a meaningful contribution to biodiversity conservation and human well being.

Kuldeep S. Barwal

# Developing management capabilities for wild pigs damage control in agro-ecosystems in and around protected areas of India

**Funding Source:** Grant-in-Aid
**Investigator:** Dr. N.P.S. Chauhan
**Researchers:** Shri Kuldeep Singh Barwal and Shri Avadhoot Dilip Velankar
**Date of initiation:** December, 2004
**Date of completion:** December, 2008

**Objectives:** (i) To prepare habitat maps of Ranthambore National Park (RNP) and peripheral areas in relation to wild pig occurrence, and quantify vegetation composition and structure within each habitat; (ii) Study the spatial and temporal distribution of wild pigs; (iii) To study the population status and socio-biology of pigs; (iv) To develop capture techniques; (v) Quantify habitat use and ranging patterns and study the diurnal activity on seasonal basis; (vi) Study feeding habits and reproductive biology; (vii) Study health parameters of pigs; (viii) Assess the man-wild pig conflicts; (ix) To evaluate the use and efficacy of power fence in controlling crop damage; and (x) Suggest cost-effective methods to control wild pigs and mitigate agricultural crop damage.

**Progress:** For vegetation mapping in RNP, 40 transects, 1 km length each, in different habitat types within the park were laid. There are 20 transects in Sawai Madhopur range, 11 in Khandar range and 9 in Kundera range. All these transects were walked four times. Information of tree, shrub and herb species, cover, direct and indirect evidences of wild pigs and biotic pressure is being collected.

Based on direct and indirect sightings, the spatial and temporal distribution of wild pigs is being studied. Information on socio-biology *i.e.* group size, structure, age and sex classes is being collected. The group size varies from solitary animal up to 48 individuals. Direct observations were made on group size, structure, distribution and habitat use by pigs.

Wire mesh traps have been placed for capturing and radio-collaring the pigs in the strategic locations in the field areas. Bait comprising maize, groundnut, gram and molasses, is being provided on daily basis. Bait is increasingly attracting the wild pigs and consumed by them. By the end of reporting period, everything was in place to carry out capture operation for putting radio-collars.

To study the seasonal changes in the dietary intake and feeding habits of wild pigs, direct observations are being made, and faecal matter samples are being collected. So far, 255 samples have been collected and air dried.

Village survey is ongoing to assess the man-wild pig conflict. Information on agricultural crop damage pattern and crop preference is being collected on seasonal differences in specially designed questionnaire format. Out of 90 villages situated in the periphery of the park, 20 villages with severe crop damage problem have been surveyed. Quantitative crop damage assessment and socio-economic survey was started during December 2006 in selected villages around RNP.

Power fence of approximately 1.5 km length was constructed around crop fields in Jaitpur village during April 2006. The power fence has three main sections. Pig-proof power fence installed in the periphery of one small crop field with one gate. The fence encloses a rectangular field of about 0.5 hectares. This section has five strands; the first and third strands were earthed and second, fourth and fifth strands were live. The crops grown in this field was chilly, cucumber and vegetables. The main fence line of about 1 km was constructed along the eastern boundary of crop fields. This fence provided effective protection against wild pigs and large ungulates like Sambar. Fence is 8.5 ft high with 8 strands. The given voltage was found to be enough in controlling the movement of large ungulates and proved cost-effective. However, the power fence lines faced some maintenance problems.

**Output and outcomes:** Wild pigs were found distributed all over the national park as well as in the peripheral areas. Single and groups of wild pigs were sighted 259 times, which comprised of 1269 individuals. Number of sightings of wild pigs was maximum during October (n=56), followed by February and March (n=46) sightings each, and January (n=29).

The group size of 1-4 individuals was sighted maximum (n=170), followed by group size of 5-8 (n=45), 9-12 (n=30), 13-16 (n=9) and 17-20 (n=2) individuals. Lone pigs were sighted maximum times (24.7%) and they were mainly males. Group size of 49-52 individuals was seen only twice. The mean group size of wild pigs varied from 2 to 8 individuals in different months. During monsoon the mean male: female ratio of wild pigs was 1:1.37, whereas it was 1:0.77 and 1:0.6 during summer and winter respectively. Although the adult to sub-adult ratio varied considerably in different months, but the percentage of adults was more than sub-adults. They were found to use 8 habitat categories. The use of water body and bank by pigs was 77.1% and 74.2% during winter and summer respectively. During monsoon, pigs used *Anogeissus pendula* forest more (55.5%) and Riparian forest (16.7%) than summer and winter. They avoided steep hills and slopes.

The main crops grown during *rabi* season are wheat, mustard and gram. Chillies are also sown during monsoon and harvested during February and March. Ten control plots were laid in 6 different villages to assess the damage to *'rabi'* crops during December 2006 to March 2007. The data on crop yield was collected from both controlled and uncontrolled plots from different villages and is being analysed.

Devendra Kumar

# Comparative study of man-leopard conflict and socio-economic impacts on rural community in Mandi and Hamirpur districts, Himachal Pradesh

**Funding Source:** Grant-in-Aid
**Investigator:** Dr. N.P.S. Chauhan
**Researchers:** Shri Devendra Kumar and Shri Lalit Kumar Sharma
**Date of initiation:** December, 2005
**Date of completion:** December, 2008

**Objectives:** (i) To prepare land cover and land use pattern maps and determine areas suitable for leopard using Geographical Information System, (ii) to study distribution and relative abundance of leopard in relation to habitat characteristics, (iii) to assess impacts of biotic pressures on leopard habitat, (iv) to study nature and extent of man-leopard conflict problems in relation to land use pattern, (v) to study food habits in relation to prey species (wild and domestic) availability, (vi) to study the socio-economic impacts of leopard menace on rural community, (vii) to make comparison of man-leopard conflict problem of Mandi and Hamirpur districts with that of Pauri Garhwal, (viii) to suggest measures to minimize/contain man-leopard conflict in Mandi and Hamirpur districts, and (ix) to develop education awareness package for people living in the vicinity of man-leopard conflict areas.

**Progress:** A total of 62 transects of 1km each were laid in the study area to prepare land cover, land use and habitat maps and quantify vegetation composition and structure. Data on distribution and relative abundance of leopard based on direct sightings while walking on transects and outside transect areas in different habitats were also collected. The study area has been stratified into different habitat types on the basis of topography and vegetation using Land sat data. Data on tree composition canopy, cover, stand height, shrub composition and cover and herbaceous vegetation was collected from these sample plots of 10m, 5m, 1m respectively. The study was designed so that each transect was covered three times a year while the terrain characters and climatic factors were limiting factors. Four seasons data have already been collected walking on these transects.

Information on leopard distribution was collected through direct and indirect evidences, conflict area, place of scat collection, and mapping them.

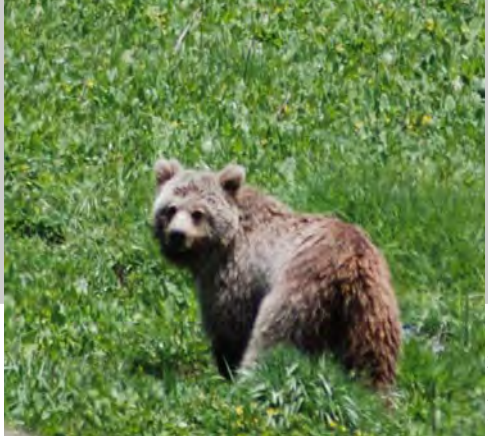
**Output and outcomes:** Leopard-man conflict was reported from all over Himachal Pradesh, but it has attained alarming proportions in villages located in the vicinity of five forest divisions, namely, Mandi, Sunder Nagar, Joginder Nagar, Nachan and Karsog in Mandi district.

The human-leopard conflict was studied in 5 forest divisions of Mandi district, Himachal Pradesh. Data on human killing and injury and livestock depredation

was collected from the records of the forest department from 1988 to 2005 and by interviewing the affected families of different villages from 2004 onwards. There were 132 human casualties in Mandi district by leopards. Human killings and injury cases were very high in Mandi Forest Division. Maximum cases occurred in the vicinity of villages (31.1%), followed by crop field (18.2%), grassland (12.1%), cow shed (6.1%) and forest (5.3%).

Livestock forms the second most important component of traditional subsistence economy in Himachal Pradesh. The livestock killings were mainly by leopard, Asiatic black bear and Himalayan brown bear in these areas. Large number of cattle-lifting cases in Himachal Pradesh perhaps could not be reported timely.

For the study on food habits of leopard, 103 scats from different habitats were collected in Mandi district. The scat analysis show predominance of goat, sheep, buffalo, cow, ox, dog, langur, wild pig, sambar, hare, rodent, birds and snakes in its diet.



Vivek Joshi

# Ecology of brown bear (*Ursus arctos*) with special reference to assessment of man-brown bear conflicts in Kugti Wildlife Sanctuary, Himachal Pradesh, India

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| **Funding Source:** | Grant-in-Aid |
| **Investigator:** | Dr. N.P.S. Chauhan |
| **Researcher:** | Shri Vivek Joshi and Shri Aishwarya Maheswari |
| **Date of initiation:** | March, 2006 |
| **Date of completion:** | March, 2009 |

**Objectives:** (i) To prepare land cover, land use, habitat maps, and quantify vegetation composition and structure in Kugti Wildlife Sanctuary, and determine areas suitable to brown bear using Geographical Information System; (ii) to study distribution and relative abundance of brown bear in relation to habitat characteristics; (iii) to study nature and extent of man-brown bear conflict: human casualties, livestock killing and nature and extent of agricultural crop damage; (iv) to assess impacts of biotic pressures on brown bear habitat; (v) to study food habits and seasonal changes in the dietary intake of brown bear; (vi) to study the socio-economic impacts of brown bear menace on rural community; and (vii) to formulate recommendations for mitigation of man-brown bear conflict and suggest conservation and management plans for bears in affected areas of Chamba district.

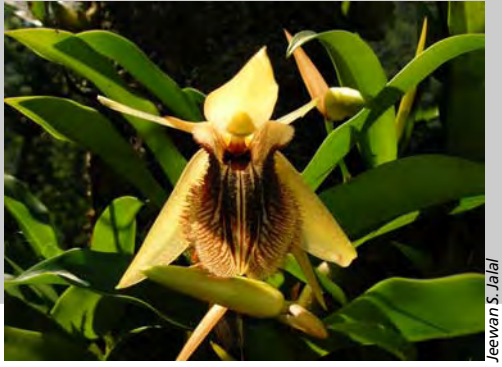
**Progress:** Transects were laid in alpine, sub-alpine areas to prepare land cover, land-use and habitat maps and quantify vegetation composition and structure. Data on distribution and relative abundance of *Ursus arctus isabellinus* based on direct sightings along transects and out side transect areas in different micro habitats within Kugti Wildlife Sanctuary was also collected. These transects were monitored throughout the year and the areas outside the transects were covered randomly for collecting any direct or indirect evidence of brown bear with in the area. The study area has been stratified into different habitat types. A total number of 39 transects, 1 km each, were laid in different habitats including alpine pastures. The data was collected season-wise from each transect. Data of two seasons has already been collected walking on these transects. Density, frequency, relative frequency, cover were recorded for trees, shrubs, grasses and herbs.

The Himalayan brown bear *Ursus arctos* occurs in low densities in rolling up lands, alpine meadows, scrub and sub-alpine forests. They were found to hibernate from mid-December to mid-April. They used 12 habitat categories for different activities. Out of 12 habitat categories, brown bear were found to use 11 habitats. They used agricultural land maximum (43.3% scats, 50.2% digs), followed by Himalayan moist temperate forest with conifers (17.9% scats, 18.6% digs), mixed forest with conifers & broad leaves species (13.6% scats, 2% digs) and grassland & forest blanks (10.6% scats, 15.6% digs). Bears

extensively used *Indigofera heterantha, Rhododentron campanulatum* and *Sorbaria tomentosa* shrubs as shelter.

To study food habits, a total of 110 scats were collected in summer 2006 and 96 scats in winter 2006. Scat analysis shows the diversity in food habits of brown bear. Scats showed presence of sheep, goat and goral. Vegetation part, found in scats were differentiated between monocots and dicots. Insects were also found in the scats. *Prunus cornuta* is found to be the most preferred food item as seeds were found in scats. Seeds of *Prunus persica* and *Foeniculum vulgare* were also recorded in scat analysis. In all 12 food items were recorded in scat analysis of brown bear.

Brown bear predation on livestock especially sheep and goat has been a major problem, which causes considerable losses to nomadic herders. 85% flocks of sheep and goats were found affected in Kugti Wildlife Sanctuary. During five month period, 580 sheep/goats (2.75%) were predated by bears. Alpine pastures 'Dhars' especially at 'gots' (resting sites for herders) were highly affected from bear attack. Maximum predation was recorded in August (40.51%), followed by July (23.27%) and September (20.17%). Most of the incidences of sheep and goat depredation (60.51%) occurred during night hours (2200-2400h). To assess agricultural crop damage by bears, 2 x 2 m control and uncontrolled plots have been laid in crop fields located near villages and forests.



Jeewan S. Jalal

# All India coordinated project on the taxonomy of Orchids

**Funding Source:** MoEF, Government of India
**Investigator:** Dr. G.S. Rawat
**Researchers:** Dr. Jeewan Singh Jalal and Shri Pankaj Kumar
**Date of initiation:** June, 2002
**Date of completion:** December, 2007

**Objectives:** (i) Survey, collection, identification and preservation of orchids in the States of Uttarakhand and Jharkhand, (ii) to develop user-friendly identification manuals on orchids of these States, (iii) to train college students, teachers and local communities in para-taxonomy.

**Progress:** (i) Field survey and identification of voucher specimens are nearly completed; (ii) Herbaria and libraries at CNH, Howrah, Botanical Survey of India (BSI), Dehradun and Forest Research Institute (FRI), Dehradun were consulted; (iii) A regional capacity building workshop on the orchid taxonomy and conservation was organized in collaboration with BSI, Dehradun at BSI on March 22–23, 2007. The orchid study teams from WII as well as BSI interacted with the forest officials, frontline staff and several local volunteers from the states of Uttarakhand, Jharkhand and north-eastern States and presented the status and conservation needs of orchids.

In Jharkhand, a total of 65 species were identified from the State and 24 host tree species for epiphytic orchids have been recorded. Seven species of orchids have been collected for the first time from the State. *Dendrobium herbaceum*, *Dendrobium regium*, *Geodorum laxiflorum*, *Habenaria gibsoni* var. *foetida*, *Nervilia carinata*, *Nervilia falcata* and *Pholidota pallida* are the 7 endemic orchids of India, which are distributed in the State of Jharkhand.

In Uttarakhand, a total of 130 species were identified from the State along with 71 host tree species for epiphytic orchids. An orchid conservation awareness program was initiated in Gori Valley. The target groups for the awareness programme were local volunteers, school children and women. For awareness generation among the local community, simple posters, brochures and drawings on orchids in local language were prepared. A low cost orchid restoration house was constructed at the middle of the lower Gori Valley, which is being maintained by the volunteers. This is used for keeping fallen and detached orchids. A total of 40 species are being maintained in live condition and about 120 individuals have been relocated in the valley at suitable habitats. The restoration house was also used for training activities. A total of 449 villagers participated in four workshops conducted under this project.

**Milestones**

(i) One species of *Habenaria* from Jharkhand seems to be new to science and efforts are being made to publish it and a species of *Geodorum* from Jharkhand is a new record for India and has been communicated to a peer reviewed journal for publication. (ii) A site in Jharkhand was proposed for establishment of an orchid park or rehabilitation centre and State Forest Department at Jharkhand has shown immense interest in this work. (iii) Ecological studies on orchids were undertaken in the State of Jharkhand and Uttarakhand and the data analysis is under progress. (iv) *Poneorchis nana* (King & Pantling) Soo was reported for the first time from Uttarakhand. (v) *Bulbophyllum secundum* Hook. and Eulophia *hormusjii* Duthie had earlier been mistakenly merged with other species (Deva and Naithani 1986). However, on critical examination they turned out to be distinct species. (vi) *Herminium pugioniforme* Lindl. *ex* Hook. f. has been rediscovered after almost 100 years.

Gajendra Singh

# Geospatial phytoresource inventory in the outer fringes of Kedarnath Wildlife Sanctuary, Garhwal Himalaya

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|---|---|
| **Funding Source:** | Department of Biotechnology, Ministry of Science and Technology, Government of India |
| **Investigator:** | Dr. G.S. Rawat |
| **Collaborators/Coordinators:** | Dr. P.S. Roy, National Remote Sensing Agency, Hyderabad |
| **Researcher:** | Shri Gajendra Singh |
| **Date of initiation:** | July, 2005 |
| **Date of completion:** | June, 2008 |

**Objectives:** (i) To quantify the availability of major and minor forest products and their utilization by the local communities in the study area, (ii) to study the factors influencing the abundance and distribution of key phyto-resources in various ecological zones, (iii) to generate a spatial database on the distribution and abundance of major phyto-resources for future monitoring and conservation planning.

**Progress:** The intensive study area spread over 100 km$^2$ in the southern part of the Kedarnath Wildlife Sanctuary, was stratified according to broad vegetation types and altitudinal zones. Within each stratum permanent trails/ transects (2 km each) were established and marked. Along each trail availability of various plant resources timber, fuel wood, fodder, bamboo and medicinal plants, their utilization, regeneration and pressure on them, were quantified using systematic plots of 10m radius circles following standard phyto-sociological techniques. Systematic enumeration of vascular plants for the forested tract of the study area was completed and all the seasonal livestock camps were visited for geo-referencing. Pressure by livestock grazing and Non-Timber Forest Product (NTFP) collection was assessed around these camps for mapping pressure zones.

**Output and outcomes:** Data analyzed so far reveals that the diversity of forest vegetation reduces and its structure becomes simpler with increase in altitude. However, due to heavy pressure on key fodder resources such as Banj oak *Quercus leucotrichophora* at low altitudes, the overall pattern of diversity between 1500 – 3500 m asl shows hump shaped curve. The sub-alpine Kharsu oak *Quercus semecarpifolia* forest had poorest regeneration status followed by low altitude Banj oak and best regeneration was found in case of middle elevation Moru oak *Quercus floribunda*. Based on a rapid survey of resource use pattern, it was revealed that the villagers use 16 species of timber, 60 species of leaf fodder, 57 species of grass fodder, 48 species of medicinal plants for their day to day use. Detailed analysis of fuel wood and fodder consumption per season is in progress.

V.P. Uniyal

# Effect of management practices on Spider diversity in Terai Conservation Area (TCA)

**Funding Source:** Grant-in-Aid
**Investigator:** Dr. V.P. Uniyal
**Researcher:** Shri Upamanyu Hore
**Date of initiation:** December, 2004
**Date of completion:** November, 2008

**Objectives:** (i) To evaluate species diversity of spiders in all ecosystem of TCA, (ii) to examine the occurrence of spiders in burnt and non-burnt grassland area, (iii) to observe the habitat and species associations in different vegetation community, and (iv) to suggest appropriate measures for the management of grassland, woodland, wetland etc. on the basis of spider diversity.

**Progress:** Spiders were sampled using pitfall traps and other time constrained collection methods *viz.* aerial and ground hand collection, vegetation beating, litter sampling and sweep netting. To determine the structural heterogeneity of each habitat type where spider sampling was carried out, number of plant species in four distinct categories: (i) herbs (ii) shrubs (iii) trees and (iv) grass were recorded. Ground vegetation height was measured. Physio-chemical features such as soil pH, soil moisture, soil temperature were observed. Litter depth (cm) was estimated using a ruler on four random points within the sampling point. Presence and absence data on four disturbance variables *viz*., presence of cut stumps (as surrogate for logging), felled tree, indirect sign (dung/pellets) – livestock, direct sighting of grazing by livestock, fire sign, were recorded at each sampling point.

**Output and outcomes:** In total, 160 spider species representing 22 families, 60 genera were recorded in five habitat types sampled. The number of species recorded represents 11.9 % of the spider fauna recorded in India. Statistically, significant differences were detected between habitat types for the richness of spiders. Furthermore, there were significant differences in the species mean abundance among habitat types. Species richness was found strongly related to ambient moisture plant species richness and PCA Axis 1 surrogate for fire and grazing occurrence. The response of spider assemblage was examined to habitat heterogeneity, revealed seven habitat attributes determining the affinities for association, soil temperature, proportion of litter cover, proportion of bare ground, proportion of canopy openness, ground vegetation height, ambient moisture and plant species richness. The study demonstrates that the response to the structural component of habitat is more related to species composition rather than species richness.

V.P. Uniyal

# Ecological assessment of tiger beetles as indicators for monitoring biodiversity in Shivalik landscape

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| **Funding Source:** | Department of Science & Technology |
| **Investigators:** | Dr. V. P. Uniyal and Dr. K. Sivakumar |
| **Researchers:** | Shri Vinay Bhargava and Ms. Swati Kittur |
| **Date of initiation:** | September, 2004 |
| **Date of completion:** | August, 2007 |

**Objectives:** (i) Assess species richness, distribution and abundance of tiger beetles, birds, and butterflies in different vegetation types; (ii) examine whether tiger beetle species richness is an indicator of biodiversity in the Shivaliks and if it correlates with the diversity of birds and butterflies, along different habitat types and gradients and which taxa is a better indicator at what scale.

**Progress:** The forest patches in which transects were laid at Simbalbara and Pong dam were divided into disturbed areas and relatively undisturbed areas. In Simbalbara, the undisturbed areas were in Sal dominated forests and the disturbed areas were in Eucalyptus plantations and Eucalyptus - Sal mix patches. Two of them were near the adjoining village and were subjected to regular lopping and grazing. In Pong dam, the relatively undisturbed transects were in mixed scrub forest and the disturbed transects were laid in villages.

Species richness (cumulative) for these areas was compared using T- tests and Mann - Whitney U test (used in case of butterflies in Pong dam because of unequal variances). Only bird species richness showed a significant difference between disturbed and undisturbed areas.

The positive response of bird species richness to disturbance indicates that birds are sensitive to disturbance and habitat changes. However, the number of species of birds in disturbed habitats was more than the relatively undisturbed mixed scrub forest in Pong dam. This could be because the sampled villages were close to forest patches and detection of birds could have been easier there, being relatively open habitats. Birds also correlated significantly with disturbance summed for each plot and averaged for each transect. Investigation of cross taxa correlation between bird and butterfly species richness was tested at two spatial scales.

There is a significant correlation between butterfly and bird species richness at the habitat level. The sampling at the pine forest at Nahan was included in this analysis. Even though the pine forest is not considered as under-sampled and not included in the analysis, the correlation was still seen to be significant. Pooled species richness for sites showed significant correlation among tiger beetles, butterflies and birds.

**Output and outcomes:** Bird and butterfly species richness showed a significant correlation across all habitat types. However, other aspects such as their correlation in diversity patterns need to be explored. Tiger beetles, butterflies and birds also showed significant correlations when the data was pooled for study sites. The data suggests that each of the three groups could act as surrogates for species richness in the study area.

Tiger beetle richness could be a good indicator to predict the richness of butterflies and birds. Nevertheless, further investigations in other sites with varied disturbance criteria and improved sampling techniques need to be carried out to arrive at a conclusion.

# Evaluation of the functional status and quality of corridors connecting fragmented populations of tiger in the Indian part of Terai Arc Landscape (TAL) - Phase II

**Funding Source:** Save the Tiger Fund, National Fish and Wildlife Foundation, USA

**Investigators:** Dr. S.P. Goyal, Mr. Qamar Qureshi and Dr. A.J.T. Johnsingh

**Researcher:** Shri Meraj Anwar

**Date of initiation:** November, 2004

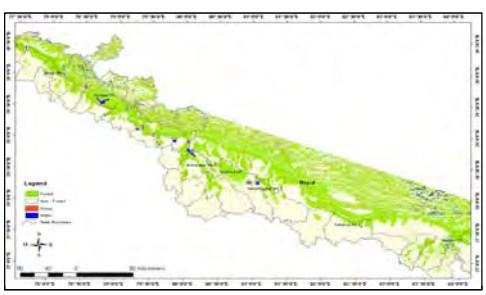
**Date of completion:** December, 2008

**Objective:** (i) To describe the functional status (use and intensity) of the corridors with reference to tiger, (ii) to study the biological characteristics (vegetation composition, prey distribution and abundance, and disturbance status) that determine the corridor quality and use, (iii) to document the socio-economic issues affecting the corridor existence and its use.

**Progress:** In the Rajaji-Corbett Corridor data have been collected from Laldhang, Kotdwar, Kothri and Dugadda ranges of Lansdowne Forest Division. The area between Chilla range, Rajaji National Park and Kalagarh division of Corbett tiger reserve was sampled. 463 plots for trees, shrubs, ground cover variables and for prey species pellet groups were laid on 51 transects. Pellet group data was analysed and compared with the distribution of tiger pugmarks over transects.

In the Nihal-Bhakra Corridor, data was collected from the Fatehpur and Kaladhungi range of Ramnagar forest division of Nihal-Bhakra corridor. 29 plots for vegetation and prey species pellet groups were laid on 2 transects totalling 6.75 km.

**Output and outcomes:** Laldhang and Kotdwar forest ranges of the corridor are under immense anthropogenic pressure from the villages of northern as well as southern boundary. High pellet group/dung density of domestic animals clearly shows the intensity of anthropogenic pressure in these two ranges which constitute the main corridor area. Tiger accesses the areas of Kothri and Dugadda ranges frequently than the rest two because of low disturbance and high prey species abundance in the area. Disturbance factor restricts the movement of tiger. Tiger ceases or lowers the access of the areas which has pellet group/dung density >200/ha of domestic animals and pellet group density <400/ha of prey species.



Small portion of Nihal-Bhakra Corridor was sampled during reporting period. The actual picture of functional status and quality of this corridor will only emerge after data collection from the whole corridor. Pellet group density of prey species in the sampled area was high and disturbance factor *i.e.* domestic animal pellet group/dung density was low. Presence of pugmark in the area revealed that it was used by the tiger.

Randeep Singh

# Comparison of tiger (*Panthera tigris*) population estimated using non-invasive techniques of pugmark, camera trap and DNA based analysis of hair and scat in Ranthambore Tiger Reserve-Phase I

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| **Funding Source:** | Grant-in-Aid |
| **Principal Investigator:** | Dr. S.P. Goyal |
| **Co-investigators:** | Dr. K. Sankar and Shri Q. Qureshi |
| **Researchers:** | Shri Randeep Singh and Shri Udayan Borthakur |
| **Date of initiation:** | December, 2004 |
| **Date of completion:** | June, 2007 |

This project aims at standardizing various protocols and sampling designs for collecting required data needed for estimating tiger *Panthera tigris* populations based on pugmarks, camera traps, and 'genetic identity' determined from scats and remotely collected hairs using DNA-based techniques. This study has been undertaken in order to compare these non-invasive techniques for tiger population estimation.

**Objectives:** The objectives of the project are to: (i) determine suitable sampling design, sample size and level of saturation in pugmark characteristics, if any, for identifying free ranging individual tigers based on pugmarks and camera traps; (ii) validate identity of individual tiger based on pugmark using photo identity; (iii) standardize techniques for collection of non-invasive sources of DNA samples by remote collection of tiger hair using hair snares, and scats; (iv) development of protocols for extracting DNA from hair and scat and determine number of polymorphic micro-satellite loci needed for identifying individual tigers; and (v) prepare Phase-II proposal based on standardized protocols, tiger population estimated by three methods.

**Progress:** Data was collected using camera trap, pugmark and the use of DNA based techniques for optimum sampling in estimating tiger population. There were three sampling session of 20–30 days in three sampling sites. During 226 days of trapping period, 6–35 camera traps were used in eight sessions at different trails, which have been commonly used by tigers. The total sampling effort amounted to 3,336 trap nights. The intensive monitoring of 114 trapping stations documented a total of 124 tiger photographs (78 right flanks, 46 left flanks). Out of these photographs, 11.9% were not suitable for identifying individual tigers and were not used for further analysis. Owing to the presence of good network of roads, all the trapping sites in each of these study periods were checked on a daily basis.

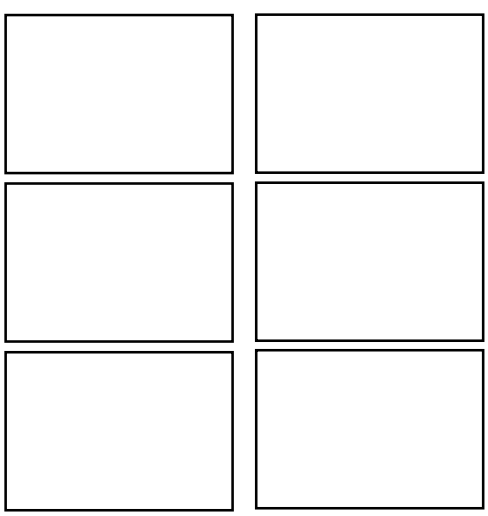
Hind left pugmark were digitally photographed (DP), traced using pugmark tracer and the pugmark cast using 'Plaster of Paris' was prepared in a variety of substrate including uniform soil surface on track plot (TP) and several type of soil surfaces like hard surface as well as smooth surface on out side the track plot (OTP) of same individuals. 38 DP pugmark sets from 13 individual, 34 sets of pugmark casts of 11 individuals, 31 sets of pugmark tracing of 9 individuals were

collected. Quantification, characteristic, and measurement of these pugmarks were done using SigmaScan Pro-4™ software (SPSS Inc., Chicago IL., USA) to determine the accuracy and precision of identifying individuals from pugmarks. The potential variables for measurement of pugmark and cast were selected based on the literature survey. A total of 23 (18 linear and 5 area) variables were selected for the analysis in order to identify the individual tiger.

For DNA based studies, field work for tiger scat collection was undertaken for three seasons. Scats were collected along with GPS locations and other secondary information by following the network of jungle roads within the study area. During the period June 2006 to July 2006, remote collection of tiger hair was also initiated in the study area. A total of 36 hair traps were laid along 6 different roads with two different cat lures. DNA extraction was performed for 89 scats and the quality was determined by a PCR prescreening with both nuclear (micro-satellite locus Fca 304) as well as mitochondrial (cytochrome b 186 bp fragment) DNA markers. DNA extraction and PCR amplification data were analyzed in comparison to different factors like scat morphology, age, presence or absence of colour in the extract. Fragment analysis for micro-satellite genotyping was performed using Genemapper software of Applied Biosystems.

Micro-satellite genotypes of some of the scat samples after fragment analysis with Genemapper software

**Output and outcomes:** During study period, 17 and 18 individuals were identified based on right side and left side stripe patterns respectively. Camera trap distance was found to be another factor which affects frequency of capture and recapture of individuals. Effect of camera trap distance, affect capture probability (p-hat) and it was observed that a relatively better p-hat value can be obtained if distance between each camera is <1 km. 23 variables were selected for analysis of pugmarks and possibilities to distinguish individuals were observed. Some robust variable which have sufficient power for individual identification were selected based on mean and CV. These variables were 13, 10 and 9 in case of DP, cast and tracing.



Individuals identified through camera trap on the basis of stripe patterns

A total of 92 scats were collected from March to April 2006 and 7 from June to July 2006. Two replicate surveys with an interval of 7-10 days were necessary for optimum scat collection from a particular road followed. From the pugmark impressions it was found that tiger had visited three hair traps, with hair obtained only on one occasion. A pre-screening of the samples with both nuclear as well as mitochondrial DNA markers was found to be extremely useful in reducing cost and effort involved in genotyping studies from scats. A high DNA extraction success of 83 percent was achieved from scats, whereas, the PCR amplification success were 57 and 67 percent for Fca 304 and Cytochrome b respectively. 14 micro-satellite loci were selected for further analysis on the basis of the quality of genotyping data. Expected and observed heterozygosity across these 14 loci was estimated. From HW test values, 5 loci were found to be deviating from Hardy-Wienberg equilibrium ($p$<0.05). From the calculation $P_{ID}$ and of $P_{ID\text{-}Sib}$ values, six tetra-nucleotide loci were selected (with mean $H_{exp}$ and $H_{obs}$ of 0.75 and 0.52 respectively) for further screening of the samples from the study area. The cumulative $P_{ID\text{-}Sib}$ of $7.83E^{-04}$ denotes that these loci can differentiate among siblings of up to 1200 individuals.

# *Panthera tigris* genome: Implication in wildlife forensics

**Funding Source:** Grant-in-Aid
**Investigator:** Dr. S.P. Goyal
**Researchers:** Shri Sudhanshu Mishra
**Date of initiation:** October, 2005
**Date of completion:** October, 2009

**Objectives:** The present study is aimed to develop genotyping protocols of tiger with following objectives: (i) to develop and establish protocols for identification of tiger from various seizures in the form of skin, nails, whiskers and bones based on DNA techniques; (ii) to establish non-invasive genotyping of different population of tigers in India; (iii) to determine source of origin of various tiger parts and products seized under wildlife offences; and (iv) to study genetic diversity in different tiger population of India.

**Progress:** More than 400 probable tiger scat samples were collected from different Tiger Reserves during the reporting period. GPS locations were taken of all the scats collected. All collected scat samples were catalogued after drying in oven at 55°C. Diameter and photographs were taken of all scat samples.

DNA was extracted from scat samples using QIAamp DNA Stool Mini Kit (Qiagen, Germany). After optimization of scat DNA extraction method the success rate was 90%.

Reference DNA was extracted from known tissue and blood samples of tiger (*Panthera tigris tigris*) by using DNeasy Tissue Kit (QIAGEN, Germany) and EZ1 Blood Kit (QIAGEN, Germany) with BIO ROBOT EZ1 (QIAGN, Germany) respectively. These DNA samples were prepared to standardize Polymerase Chain Reaction (PCR) conditions for species and sex identification and to standardize PCR conditions for primers of different micro-satellite loci.

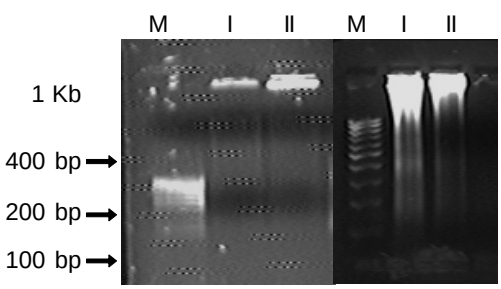



**Figure 1:** Electrophoretic analysis of (a) DNA extracted from known tissue sample and (b) DNA extracted from known blood samples of tiger on 0.8% agarose gel showing first (I) and second (II) elutions of the same sample. M, MW marker 100bp ladder.

Genomic and mitochondrial DNA was extracted from thirty scat samples. Extraction was done using QIAamp DNA Stool Mini Kit (Qiagen, Germany). After optimization of scat DNA extraction method the success rate was 98% regardless of quantity and quality of extracted DNA.

A partial fragment (146bp) of mitochondrial cytochrome b gene (Farell *et al.,* 2000) was amplified from scat DNA samples for species identification. Amplified PCR products and scat DNA samples were purified using QIAquick®

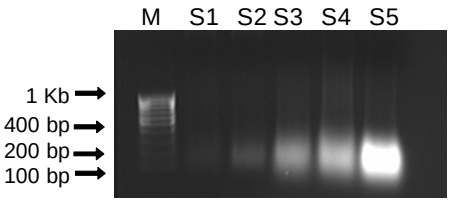



**Figure 2:** Electrophoretic analysis of DNA extracted from different scat samples ($S_1$-$S_5$) probably of tiger on 0.8% agarose gel. M, MW marker 100bp ladder. $S_1$ to $S_5$, different scats.

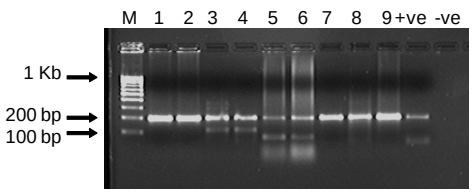



**Figure 3:** Electrophoretic analysis of PCR products of 146bp fragment from the mt. cyt b gene of different scat DNA sample (1-10) on 2% agarose gel. M, MW marker 100bp ladder. –ve, negative control, +ve, positive control.

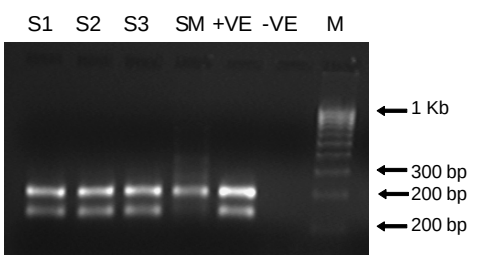



**Figure 4:** Electrophoretic analysis of PCR products showing two bands of partial fragments of X and Y chromosomes with different scat DNA templates ($S_1$-$S_3$) on 2% agarose gel. M, MW marker 100bp ladder. SM, PCR product with sambar DNA, –ve, negative control, +ve, positive control.

PCR Purification Kit (Qiagen, Germany). Cycle sequencing PCR was performed for these purified PCR products. Cycle sequencing PCR products were purified using "Big dye terminator clean-up" method. These products were then subjected for sequencing match of scat DNA sequences with reference DNA sequences of partial fragments of mt. cyt. 'b' gene for species identification. The result indicate that 90 scats were of tiger.

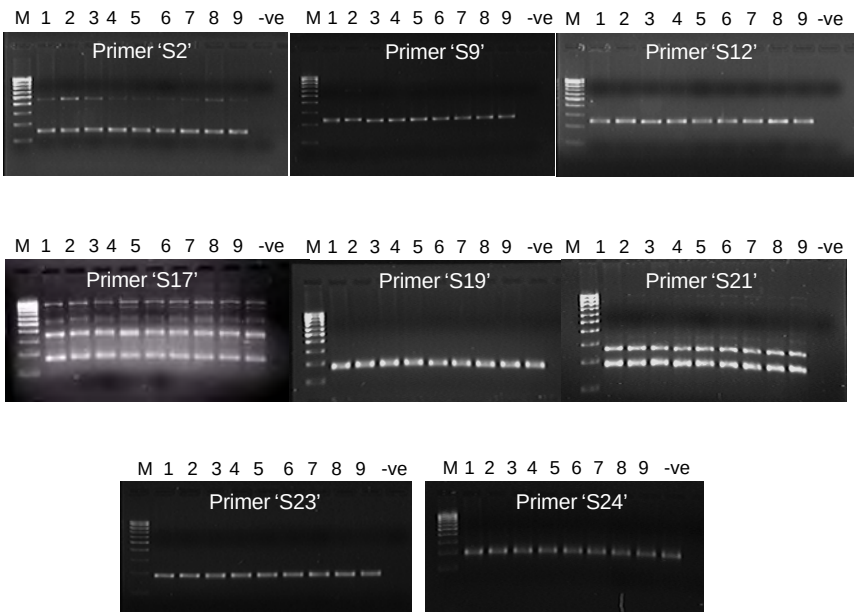



**Figure 5:** Electrophoretic analysis showing bands of amplified PCR products with different tiger blood DNA templates (1-9) using different primers (Loci code range from $S_2$-$S_{24}$) on 2% agarose gel. M, MW marker 100bp ladder. ve, negative control.

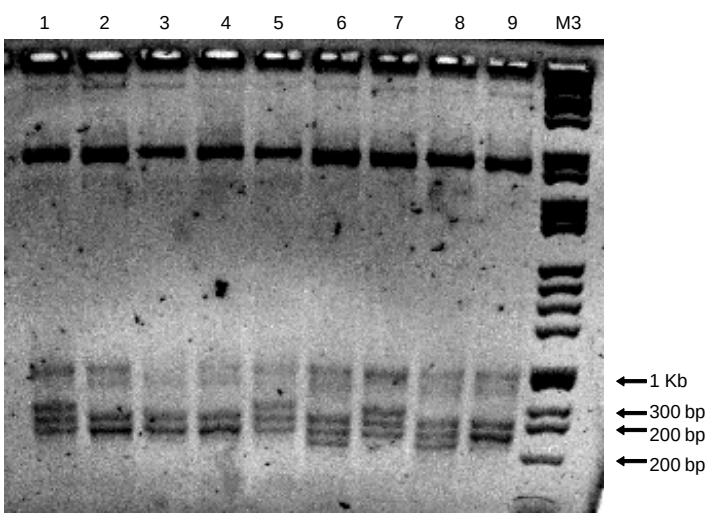



**Figure 6:** Electrophoretic analysis showing bands of amplified PCR products with different tiger blood DNA templates (1-9) using Primer '$S_{14}$' on Elchrom EL 400 mini-gel. $M_3$, MW marker.

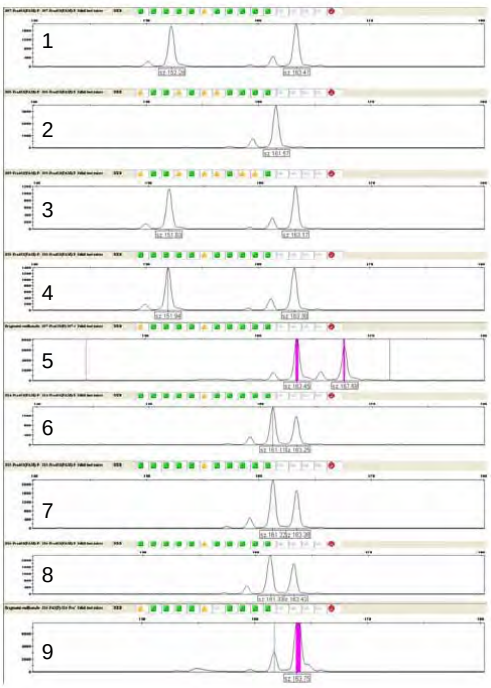



**Figure 7:** Electropherogram showing some of the alleles at the STR locus 'S3' in different tiger blood DNA samples (1-9).

For identifying sex, a primer pair was used for the amplification of partial fragments of ZFX/ZFY gene (unpublished primer sequence) following the optimized PCR conditions with reference DNA samples.

39 micro-satellite loci were amplified with 9 reference tiger blood DNA samples for initial screening using their respective primers. These micro-satellite primers were labeled fluorescently with four different dyes.

Both the methods for the screening of micro-satellite loci using Elchrom gels (Elchrom Scientific, Switzerland) and ABI 3130 genetic analyzer were compared. Initially, 8 micro-satellite loci were screened with 9 reference tiger blood DNA for the amplification of different micro-satellite loci with their respective primers (S5, S14, S17, S19, S21, S22, S23 and S24). These PCR products were then run on EL 400 minigel using SEA 2000® (Elchrom Scientific, Switzerland) to check polymorphism.

The amplified PCR products for 24 micro-satellite loci were then subjected to Applied Biosystems 3130 Genetic Analyzer for fragment analysis with Hi Di formamide and LIZ. These loci were then analyzed for allele size ranges, allele numbers and percentage of allele occurrence with all the positive samples.

**Output and outcomes:** DNA was extracted successfully from scats and amplified using mitochondrial cytochrome b gene for species identification. These PCR products were sequenced successfully and 90% scats analyzed so far were found to be of tiger.

During the studies of sex identification from scat DNA samples using primers for ZFX/ZFY gene, it was found that the primer was cross-amplifying with the DNA of sambar (*Cervus unicolor*). Therefore, there is a need to re-design the primer to avoid this cross amplification for using with scat. But it has potential for using with degraded samples reported in wildlife offences. 38 micro-satellite loci were amplified successfully with 9 reference tiger DNA samples. These loci were then analyzed for allele size ranges, allele numbers and percentage of allele occurrence with all the positive samples. Few loci were found useful for the study.

A comparative study was also done between the results of ABI genetic analyzer and Elchrom scientific. Initially, results of both the methods were found almost the same. There is need for conducting more trials with large sampling for comparison and conclusion.

S. Harikrishnan

# An evaluation of endemism of herpetofaunal assemblages in the Western Ghats using molecular techniques

**Funding Source:** Department of Biotechnology, Govt. of India
**Investigators:** Dr. Karthikeyan Vasudevan (WII) and Dr. Ramesh K. Aggarwal (CCMB)
**Researcher:** Shri Niladri B. Kar
**Date of initiation:** October, 2003
**Date of completion:** April, 2007

**Objectives:** (i) To ascertain whether currently recognized taxa represent true natural assemblages/species using DNA typing approaches; (ii) to evaluate the species richness and distribution patterns of *Rhacophoridae* and *Uropeltidae* using DNA sequencing of phylogenetically informative genomic domains.

**Progress:** Intensive field sampling was carried out in Kudremukh Wildlife Division in the Central Western Ghats. Lab analysis of samples for phylogenetically informative domains was carried out by the CCMB based research team. The teams in WII and CCMB compiled all the information collected during the study period, analysed the data and prepared the technical report.

**Output and outcomes:** The project collected and sequenced a large number of anuran samples for phylogenetic informative domains and could draw monophyly of endemic anuran lineages. Monophyly of extant Rhacophoridae members was also demonstrated with suggestions on the systematic positions of anuans belonging to the genus *Philautus*.

V.P. Uniyal

# Monitoring changes in biological diversity after relocation of *gujjars* in Rajaji-Corbett Conservation Area

**Funding Source:** Grant-in-Aid
**Investigators:** Dr. B.S. Adhikari, Dr. Bivash Pandav, Dr. Karthikeyan Vasudevan, Dr. K. Sivakumar and Dr. V.P. Uniyal
**Date of initiation:** November, 2003
**Date of completion:** November, 2008

**Objective:** The objective of the project is to monitor the changes in biological diversity after relocation of *gujjars* in Rajaji-Corbett Conservation Area (RCCA).

**Progress:** During the reporting period the spatial and temporal diversity and richness patterns of key families of butterflies and beetles were studied, following relocation of Gujjars from the sanctuary area. Species were recorded in pre-established nine line transects in different habitat types of the sanctuary.

**Output and outcomes:** Prominent families from butterflies included Nymphalidae and Papilionidae while Scarabaeidae and Cicindelidae from beetles. While butterflies (total 72 species) diversity was found to be more in relocated areas, the rarity and abundances were restricted to most undisturbed parts of the sanctuary. Beetles were found to be more or less uniformly distributed in the transects and the most abundant were dung beetles (total 15 species) on dung of ungulates, followed by tiger beetles (total 12 species) most abundant in *raus*.

The study focussed on the changes in prey and tiger population in Chilla range of Rajaji National Park (RNP) and assessed the status of probable areas of dispersal. It has documented the occurrence of tigers and leopards along the forests on the west of RNP, and estimated ecological densities of ungulate species. The estimates of ungulate prey density arrived at in this study show that west RNP harbour high density of prey species (108.23 individuals/sq. km). Despite of high prey densities, low use of the habitat by tiger is alarming. Areas with ungulate biomass similar to that estimated in RNP, west of the River Ganga, are known to support greater use by tigers elsewhere. It is therefore, indicative of a decline in tiger use of the habitat, during the study period in RNP west of the River Ganga. A study on grass species diversity in grasslands of Chilla range was also carried out as part of the monitoring work. The diversity of grasses in different river courses were assessed. The study reveals that grasslands are highly dynamic and species composition vary with seasons.

K. Sankar

# Ecological studies in Sariska Tiger Reserve

**Funding Source:** National Tiger Conservation Authority
**Collaborative Agency:** Rajasthan Forest Department
**Investigators:** Dr. K. Sankar and Shri Qamar Qureshi
**Researchers:** Shri Darsh K. Worah and Dr. Krishnendu Mondal
**Date of initiation:** August, 2006
**Date of completion:** August, 2007

**Objectives:** (i) Distribution and status of leopard and small carnivores; (ii) Distribution and status of prey animals, (iii) Vegetation and land cover map of Sariska Tiger Reserve and (iv) Study the socio-economic profile and resource dependency of local people in the notified National Park area.

**Progress:** In order to estimate the population density of leopards in the Intensive Study Area (ISA) (Sector I and Sector II), photographic capture-recapture analysis was chosen as an appropriate method. Following a reconnaissance, 15 camera trapping sites were identified in each sector. Within the area of *ca* 64 km$^2$ in Sector I and *ca* 60 km$^2$ in Sector II, GPS locations were noted. The camera traps were deployed for 15 consecutive days in each sector. There were a maximum of 15 sampling occasions during 15 days of trapping in each sector. Each leopard captured was given a unique identification (*e.g.* L1, L2 etc.) after examining the rosette pattern on the flanks, limbs and fore-quarters. The camera traps were also used for presence and abundance of lesser carnivores like jungle cat, caracal, hyena, jackal and ratel. Evidences of jungle cat, hyena and jackal were obtained throughout the Core I area and few evidences of ratel in some areas. But no photographic evidence of caracal was obtained except one direct sighting in November 2006. The matrix for leopard in sector I and II was prepared, and 18 individual leopards were observed so far. In other sectors, camera trapping is continuing. The matrices for other lesser carnivores are being prepared.

Prey densities are being determined by using line transects of length 1.5 km to 3 km. A beat is considered as a unit for sampling. GPS locations for beginning points and end points of transect were also recorded. The angle and distance of animals encountered on the line transect were recorded. Each transect walk was repeated for minimum of three times and maximum of five times. For each cluster of prey animals encountered on transects, the following variables were being recorded: (1) species (2) cluster size (3) angular sighting distance and (4) bearing. Following this methodology, transect walks in Sariska ranges and Akbarpur ranges have been completed. In Sariska range, 18 transects were walked three times each.

In consideration with the heterogeneity of the terrain, Stratified Random Sampling was used. Sampling for vegetation was carried out by establishing sampling plots at fixed interval of 250 m on transects line laid down by Forest Department. These transects were laid in each beat of the Sariska Tiger Reserve.

Rapid survey method like Releve method (Muller and Dombois, 1970) was used for collecting ground truthing data and quantification of vegetation. Tree species, their numbers, GBH (Girth at Breast Height) and height were recorded in 10m radius circular plots; shrub species and their heights were enumerated in 5m radius circular plot. Herbs and grass species were enumerated in 1m x 1m quadrate along with percentage of dry litter, bare ground cover and percentage of rocks occupying the sampling plot. At each sampling plot forest type, distance of the plot from the nearest human settlement, water point, access road or trails were also recorded.

For socio-economic profile and resource dependency of local people, 20 households were interviewed from Kiraska village and three households from Haripura village during the reporting period. Data on level of anthropogenic disturbance (wood cutting, lopping, grazing, livestock dung) from each of the vegetation sampling plots were collected using standard methodology.

Udayan Borthkarur

# Conservation of Red Jungle fowl (*Gallus gallus*) in India

**Funding source:** Grant-in-Aid

**Investigators:** Dr. S. Sathyakumar, WII, Dr. Rahul Kaul, Wildlife Trust of India, New Delhi and Dr. Rajiv S. Kalsi, M.L.N. College, Yamuna Nagar, Haryana

**Collaborator:** Dr. Deepak Sharma, Central Avian Research Institute, Bareily, U.P.

**Researchers:** Mr. Merwin Fernandes and Mr. Mukesh Thakur

**Date of initiation:** September 2006

**Date of completion:** February 2008 (Phase-I)

**Objectives:** (i) Assessing the status and distribution of Red Junglefowl (RJF) in India (ii) Identification of pure RJF populations by molecular genetic studies (iii) Study social interactions between wild Red Junglefowl and domestic fowl and (iv) Prepare conservation action plan for the identified RJF populations.

**Progress:** Field work was initiated in July 2006. Field investigations on the distribution, morphological traits, abundance estimates and behaviour were carried out between October 2006 and March 2007. For genetic studies on RJF, blood samples were collected from wild and captive Red Jungle fowl populations in the States of Andhra Pradesh, Assam, Chhattisgarh, Meghalaya and Orissa.

Basudev Tripathy

# Determining the offshore distribution, migration and movement of Olive Ridley sea turtle (*Lepidochelys olivacea*) along the east-coast of India

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| **Funding source:** | Director General of Hydrocarbons Ministry of Petroleum & Natural Gas, Govt. of India |
| **Investigators**: | Shri B.C. Choudhury, Shri A.K. Nayak, Dr. K. Sivakumar and Dr. C.S. Kar (Orissa Forest Department) |
| **Researchers:** | Dr. Basudev Tripathy, Shri R. Suresh Kumar, Shri Subrata Kumar Behera, Shri Sandeep Ranjan Mishra |
| **Date of initiation:** | October, 2006 |
| **Date of completion:** | October, 2008 |

**Objectives:** (i) To 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) to 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) to track the long range migratory route of the adult olive ridley and to determine the non-breeding area for the ridleys using east coast of India for nesting. (iv) to determine various other environmental parameters and possible impacts of developmental activities both in the marine and coastal nesting habitats.

**Progress**: Both offshore distribution and onshore nesting activities of olive ridley turtles were monitored from November 2006 to May 2007. The offshore monitoring was limited to within 10 km from the coastline and up to 20 km along the coastline stretch of each field site. A systematic monitoring of the offshore distribution of turtles was carried out at the Rushikulya and Devi rookeries. Due to logistic difficulties the same could not be carried out regularly at Gahirmatha.

**Output and outcomes:** A total of 30 PTTs procured from SIRTRACK Ltd., were fixed on turtles, at the highest and front end of the carapace. Turtles were fitted with the transmitters in batches and over a period of two months from March through April. Movement of all PTT tagged turtles are being monitored through Argos Satellite Tracking System. Most turtles fitted with PTTs had completed nesting, and were observed to soon leave the breeding grounds or the offshore waters of Orissa since release. All turtles moved southwards and few reached the south-east coast of Sri Lanka and appeared to move into the Indian Ocean, when last location was received. One tagged turtle entered the Palk bay and the last location received was close to the Jaffna peninsula along the north-west coast of Sri Lanka. Another turtle reached close to Andaman Sea, from where it started to move up towards the coast of Myanmar and then moved up to Bangladesh, and finally returned to the offshore waters of Orissa when last location was received.

G.S. Rawat

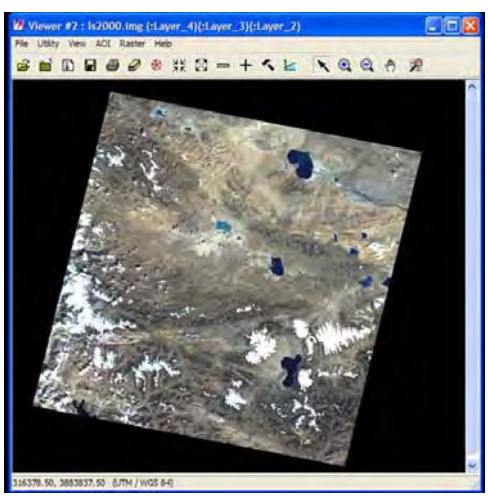
# Habitat ecology and conservation status of wild ungulates in northern parts of Changthang Wildlife Sanctuary, Ladakh

**Funding source**: Grant-in-Aid
**Investigators**: Dr. G.S. Rawat and Dr. K. Sankar
**Researcher:** Shri Ashwini Kumar Upadhyay
**Date of initiation**: February, 2007
**Date of completion**: February , 2010

**Objectives:** (i) To study the population status and seasonal movement patterns of Tibetan antelope and associated species in Changchenmo valley (ii) to study the habitat characteristics and habitat use by the ungulates (iii) to identify the threats and management issues of critical importance and (iv) to evolve long-term population and habitat monitoring protocols for these species.

**Progress:** Permissions to carry out the research project from the Jammu & Kashmir State, Wildlife Protection Department have been obtained. Literature survey is in progress. Satellite LANDSAT images for the study area have been procured and preliminary processing of the remote sensing data was done. Unsupervised classification of the satellite image was done in order to delineate percentage of broad class categories and stratify the study area.

An unsupervised Maximum Likelihood Classification using Landsat ETM+ spectral bands 1, 2,3,4,5 was carried out with four classes. Out of the four classes created in unsupervised classification: one was of glacier, snow, ice and clouds with (5.2%) cover. The other two classes represent the desertic formations (40.9 %) and undulating terrain with sparse vegetation (33.2 %) which would need further ground validation and analysis. This would be investigated in the field during summer 2007.



# Response of tiger population to habitat, wild ungulate prey and human disturbance in Rajaji National Park, Uttarakhand

**Funding source:** Save the Tiger Fund, National Fish and Wildlife Foundation, USA
**Investigators:** Dr. Bivash Pandav and Dr. S.P. Goyal
**Researcher:** Shri Abishek Harihar
**Date of initiation:** August 29, 2006
**Date of completion:** August 28, 2007

**Objectives:** Following relocation of human settlements from parts of Rajaji National Park (RNP), the habitat and wild animals have shown rapid signs of recovery. Considering the need to document these recoveries the present study was formulated with the following objectives: (i) To record the occurrence patterns of tiger and leopard in the relocated site (ii) to document the densities of wild ungulate prey species (iii) to document the density of tiger, and (iv) to study the food habits of tiger and leopard.

**Progress:** Sign surveys along 19 dry river beds (*raus*) were carried out in order to document the patterns of occupancy of tigers and leopards across RNP. The seasonal variations were observed in capture probabilities of adult tigers in the Chilla range of RNP. Field sampling was initiated in October 2006 so as to assess variations in capture probabilities across seasons (October-November; post monsoon, January-February; winter and April-May; summer).

Camera trapping in conjunction with capture recapture sampling was used to estimate the tiger population. A total of 40 trapping stations covering an area of 85 $km^2$ in Chilla Range were sampled across the seasons. While, line transects (12 spatial replicates) in conjunction with distance sampling method was used to estimate prey species densities across these seasons. Camera trapping was also carried out in an additional 45 $km^2$ in the ranges of Dholkhand east and Dholkhand west. Scat samples of tigers and leopards (sympatric carnivores) were also collected from entire study area to assess the food habits.

**Output and outcomes:** Results show that the major prey species (Chital and Sambar) were distributed widely across the RNP, despite variations in anthropogenic influence. However, it is of importance to note that there exists a difference in sign encounter rates of tigers, leopards and prey species across the RNP. Within the western part of RNP, there exists a distinction between areas still under the influence of the *Gujjars* and those evacuated by *Gujjars*, indicating that areas of human influence adversely affect movement patterns of prey and predator populations. An assessment of the pugmark encounter rates of tigers and leopards across the streambeds in RNP shows a marked difference in sign encounter rates of tigers in west and east RNP.

However, there was no significant difference among sign encounter rates of leopards across the RNP. The systematic monitoring protocol established there across the seasons aimed to assess changes in prey and predator populations. Results of the present study showed that prey densities varied across the three sampled seasons, from ~50 individuals per $km^2$ (post monsoon) to ~80 individuals per $km^2$ (summer) within Chilla range of RNP, while adult tiger densities did not vary significantly across the seasons (~3 individuals per $100km^2$). However, individual turnover was noticed with only two individual tigers being common to all the three sampled seasons. It was also noticed that capture probabilities varied across the three seasons, indicating increased tiger movement during winter within the Chilla range of RNP.

K. Sivakumar

# Preparation of status report of Indian Coastal and Marine Environment and a network of Marine Protected Areas

**Funding Source:** Grant-in-Aid
**Investigators**: Shri B.C. Choudhury and Dr. K. Sivakumar
**Researchers:** Shri K.R. Saravanan and Shri Stalin Jeganathan
**Date of initiation:** November, 2005
**Date of completion:** November, 2007

**Objectives:** (i) To survey the coastal and marine areas of the country to answer the following questions: (a) What are the biological values or resources which require conservation along the Indian coast? (b) What is the present PA situation with respect to coverage of those resources? (c) What spatial gaps exist within the present coastal and marine PA network? (d) How can these gaps be filled? and (ii) To prepare a comprehensive report on the state of India's existing coastal and marine PAs.

**Progress and outcomes**: Reconnaissance survey of important biodiversity hotspots in two east coast and three west coast states of India was conducted from January 2006 onwards. The biodiversity hotspots locations included mangroves, estuaries and backwater, mudflats, sand dunes, sea turtle nesting beaches, lagoons as well as coastal and marine protected areas. Biodiversity rich locations outside the coastal and marine protected areas have been identified during this survey. Land reclamation, encroachment, fluvial deposits, pollution, tourism, infrastructure and industrial development were noticed to be the main threat to the identified biodiversity rich locations.

Most of the coastal states are yet to finalize the Coastal Regulatory Zones (CRZ) and this has been observed to be the reason for degradation of important biodiversity areas. Mangrove restoration efforts further strengthened after post-tsunami scenario appeared to be the only active conservation and management action along the coast. Alien coastal vegetation propagation as shelter belts, hard engineering structures as mechanical alternatives to dune barrier are also observed to be the new threats to coastal and marine biodiversity. Involvement of coastal communities and NGOs have shown a good result in restoration process. Preliminary review on Indian Marine Protected Areas revealed that most of the MPAs are not managed with proper management plan, which needs to be prepared. This project is an ongoing activity of the NICMB.

K. Sivakumar

# Assessment of current status of threatened and protected marine flora and fauna in trade in India

**Funding Source:** Grant-in-Aid
**Investigators**: Shri B.C. Choudhury and Dr. K. Sivakumar
**Researchers:** Shri Sajan John and Shri B.M. Praveen Kumar
**Date of initiation:** November, 2005
**Date of completion:** November, 2007

**Objectives:** (i) To prepare a list and level of protected marine flora and fauna in trade, and (ii) to identify the hotspots and routes of protected marine life trade in India

**Progress**: A survey was carried out in nine coastal states of India during December 2005 to August 2007 to assess the present status of protected species in trade which are listed in the Schedules of the Indian Wildlife (Protection) Act, 1972. The survey included collection of information on the illegal trade of protected sea shells, hard corals and sea horses as marine curios, marine turtles, marine mammals and elasmobranches in food trade.

**Output and Outcomes:** Marine artifact trade dominated the east coast. Tamil Nadu had large number of retail shops (n=174) selling protected marine species curios followed by West Bengal (n=127). Least number of shops were recorded in Gujarat (n=4). A total of 14 species of mollusks and branching corals, listed in the Schedule I of WPA dominated the illegal marine curio trade. Coastal tourist and pilgrimage centers were found to be the major locations of marine curios trade.

Shark fin trade fluctuated from State to State depending on the catch and landing centers. Chennai was found to be the major export hub for shark fins. Salted and dried shark meat finds its major market in Kerala. Marine mammals though consumed locally are also used as bait in shark fishery (mainly *Dolphins*) and rarely comes to the open market for trade. Marine turtle meat and eggs are still poached through out the Indian coast, though not in large quantities.

The study reveals that public awareness on this illegal trade is low and market demands along with lack of enforcement are the major reasons for the existing illegal trade of the marine protected species in the Indian coastline. The Andaman & Nicobar islands and Lakshdweep Islands are to be covered during the remaining period of the project.

K. Sivakumar

# Preparation of management plan for the Gulf of Mannar Biosphere Reserve

**Funding Source:** Grant-in-Aid
**Investigators**: Shri B.C. Choudhury and Dr. K. Sivakumar
**Researchers:** Shri B.M. Praveen Kumar, Shri Kevin Mosses and Shri S. Subburaman
**Date of initiation**: November, 2005
**Date of completion**: March, 2007

**Objectives:** To prepare the management plan for the Gulf of Mannar Marine National Park and Biosphere Reserve. The Plan was to specially address the issues of: (i) Conservation of biodiversity and ecological integrity of the National Park and Biosphere Reserve through protection, restoration and management of the coral reef systems in the Gulf of Mannar region; (ii) Sustainable development in the Biosphere region to ensure the wise use of common ecological goods and services for the benefit of the local community; and (iii) Develop a model plan and mechanism for multi-sectoral involvement in managing a globally important but fragile coastal and marine ecosystem in India.

**Progress and outcomes**: The Government of Tamil Nadu had established the Gulf of Mannar Marine National Park (GOMMNP) under the provision of the Indian Wildlife (Protection) Act, 1972, encompassing the 21 off-shore islands and surrounding coral reef system in the Bay of Bengal, along the coastal districts of Ramnathapuram, Tuticorin in the year 1986. The primary objective of the establishment of the GOMMNP is to conserve the rich marine biodiversity of the Gulf of Mannar region by providing protection and through management and restoration of the degraded marine coral reef system, which have been mined and exploited to an unsustainable level.

Almost 50,000 fisher-folk are dependent on artisanal fisheries based livelihoods in the region and their well being is closely linked to the ecological security of the coral reef ecosystems in the Gulf of Mannar region in Tamil Nadu. Advised by the Ministry of Environment & Forests, Government of India, the Tamil Nadu Government has also ratified the formation of a 10500 sq. km. of surrounding seascape and landscape around the GOMMNP as India's, and that of South Asia's first Marine Biosphere Reserve – the Gulf of Mannar Biosphere Reserve (GOMBR).


The Gulf of Mannar Biosphere Reserve Trust has given the Wildlife Institute of India, the responsibility of developing a 10 year Management Plan for the GOMMNP and GOMBR addressing the issue of: (a) Conservation of biodiversity and ecological integrity of the GOMMNP and GOMBR through protection, restoration and management of the coral reef systems in the Gulf of Mannar

region; (b) Sustainable development in the GOMBR region maintaining the ecological integrity of the coastal and marine eco-systems to ensure the wise use of common ecological goods and services for the benefit of the local inhabitants and community; and (c) Develop a model plan and mechanism of multi-sectoral involvement in managing the globally important fragile coastal and marine ecosystem in India.

Since the management plan of a terrestrial PA is different from the Marine Protected Area, the Wildlife Institute of India adapted a modified management plan development guidelines using the IUCN-Marine PAs Management Plan Guidelines and Management Plan Preparation Guidelines developed by Shri V.B. Sawarkar. The Wildlife Institute of India has initiated the integrated management plan development exercise during January 2006 and through a team of field researchers has inventorised the ecological, socio-economic and developmental settings of the region.

Based on this information and several stakeholders meetings, a draft management plan has been prepared and shared with the GOMBRT and GOMMNP authorities. Analyzing the feed backs from these two agencies, the WII organised a Management Plan sharing exercise with the other stakeholders before finalizing the plan and submitting to the Tamil Nadu Government through the GOMBRT and the State Department of Environment & Forest. The whole exercise was completed by March 2007 and the final Management Plan is expected to be submitted by the first week of September 2007.

# Academic & Training

V.P. Uniyal

X M.Sc. in Wildlife Science

Status of Doctoral Research

XXVII PG Diploma Course

XXVIII PG Diploma Course

XXII Certificate Course

Vinod Verma

# Academic Programmes

## X M. Sc. (Wildlife Science) Course *July 2005 to July 2007.*

As a part of the III semester curriculum, students of the ongoing X M.Sc. Course visited Central Zoo Authority and National Zoological Park, New Delhi from July 28-30, 2006. During October 1-23, 2006, they undertook the 'Conservation Practice and Management' tour to southern Western Ghats and Central India and were exposed to various issues of biodiversity conservation and PA management practices. The IV$^{th}$ semester commenced in November, 2006 and all the eight students developed projects in consultation with their supervisors and completed the fieldwork. The following is a list of dissertation topics:

**X M. Sc. (Wildlife Science) field project/dissertation titles and supervisors**

Deep Contractor,**Evaluating the importance of scale in estimating tiger populations.** (Supervisors) Dr. Y.V. Jhala and Sh. Q. Qureshi.

Mousmi Ghosh, **Winter ecology of three species of *Phylloscopus* warblers.** (Supervisors) Sh. Pratap Singh and Sh. D. Mohan.

Aparna Lal, **Patterns in resource utilisation by the green turtle (*Chelonia mydas*) and sea-grass associated fish communities in the Agatti lagoon, Lakshadweep**. (Supervisors) Sh. B.C. Choudhury and Dr. K. Sivakumar.

Navendu Page, **Patterns of species richness in sacred groves (forest fragments) of Western Ghats, Karnataka.** (Supervisors) Sh. Q. Qureshi and Dr. G.S. Rawat.

Garga Mohan Das, **An assessment of select anthelmintics on parasitic control and health status of cervids in captivity.** (Supervisors)Dr. Parag Nigam and Sh. Debashis Chakraborty.

Pranav Chanchani, **Patterns of habitat use and food selection among wild and domestic ungulates in the Sikkim Trans-Himalaya.** (Supervisors) Dr. G.S. Rawat and Dr. S.P. Goyal.

Ishan Aggarwal, **Resource partitioning and patterns of diversity in lizards of Thar Desert, Rajasthan.** (Supervisors) Dr. S.P. Goyal and Sh. Q. Qureshi.

Varun Torsekar, **A taxonomic evaluation of three endemic ranid genera of the Western Ghats.** (Supervisors) Dr. Karthik Vasudevan and Dr. Parag Nigam.

## Status of Doctoral Research in WII

**THESIS SUBMITTED**

Rashid. H. Raza (2006): **Diversity and rarity in avifaunal assemblages in the Western Himalaya: A study of patterns and mechanisms".** FRI University, Dehradun. Supervisor: Dr. V.B. Mathur and Co-supervisor: Dr. Kevin J. Gaston.

Sharma, N.K. (2006): **Analysis of landscape features in part of Kumaun Himalaya with special reference to woody vegetation.** FRI University, Dehra Dun. Supervisor: Dr. G.S. Rawat and Co-supervisor: Dr. A.K. Tiwari.

Tambe, S. (2007): **Ecology and management of alpine landscape in Khangchendzonga National Park, Sikkim.** FRI University, Dehra Dun. Supervisor: Dr. G.S. Rawat.

**REGISTERED**

Tej B. Thapa (2006): **Habitat suitability evaluation for leopard (*Panthera pardus*) using remote sand GIS in and around Chitwan National Park, Nepal.** Saurashtra University, Rajkot. Supervisor: Dr. V.B. Mathur and Co-supervisor: Dr. S.P. Goyal.

Tiwari, R. (2006): **Habitat ecology of swamp deer in Jhilmil Jheel Conservation Reserve, Uttarakhand.** Saurashtra University, Rajkot. Supervisor: Dr. G.S. Rawat

Upamanuyu Hore (2006): **Diversity and structure of spider assemblages in Terai Conservation Area (TCA).** Saurashtra University, Rajkot. Supervisor: Dr. V.P. Uniyal.

Vinay Bhargav (2006): **Assessing the potential role of coleoptera (Insecta) as bio-indicators in Simbalbara Wildlife Sanctuary, Himachal Pradesh.** Saurashtra University, Rajkot. Supervisors: Dr. V.P. Uniyal and Dr. K. Sivakumar.

**DISSERTATION SUPERVISED**

Archi Rastogi (2006): **Stakeholder analysis for Corbett National Park.** Forest Research Institute University, Dehradun. Supervisors: Dr. Ruchi Badola and Dr. S.A. Hussain.

Bipin Kumar (2007): **Potentials of community based ecotourism at Jhilmil Jheel Conservation Reserve, Uttakarakhand.** Gurukul Kangri Vishwavidyalaya, Haridwar. Supervisor: Ms. Bitapi C. Sinha

Deepika Prasad (2006): **Habitat occupancy and relative abundance of tiger and its prey in the western part of Ganges, Rajaji National Park, Uttaranchal.** A.V.C.College, Mayiladuthurai, Bharatidasan University. Supervisor: Dr. S. Sathyakumar.

Digvijay Semwal (2006): **Phytosociological analysis along altitudinal gradient in mixed forest of Garhwal Himalaya.** Sikkim Manipal University. Supervisor: Dr. Ruchi Badola.

Kiran Yadav (2006): **Distribution, status and ecology of common birds in Haridwar town, Uttaranchal, India.** Kanya Gurukul Mahavidyalaya, Gurukul Kangri Vishwavidyalaya, Haridwar. Supervisor: Dr. K. Sivakumar.

Krishnendu Bose (2006): **Leopard and ungulate abundance estimation in Rajaji National Park, Uttranchal.** Forest Research Institute University, Dehradun. Supervisor: Dr. Y.V. Jhala.

Navonil Das (2006): **Distribution, status and habitat preference of the Red Jungle fowl in the Rajaji National Park.** Forest Research Institute, Dehradun, India. (Supervisor): Dr. K. Sivakumar.

Neha Sinha (2006): **Sustaining livelihoods of people relocated from protected areas.** Gokhale Institute of Politics and Economics. Supervisor: Dr. Ruchi Badola.

Pushpendra Pal Singh (2007): **Dependency of local community on Jhilmil Jheel Conservation Reserve, Uttarakhand**. Gurukul Kangri Vishwavidyalaya, Haridwar. Supevisor: Ms. Bitapi C. Sinha

Rajarshi Chakraborthy (2006): **Comparative food habits of four sympatric carnivores (wolf, fox, hyena, and jackal) in Kutch.** Forest Research Institute University, Dehradun. Supervisor: Dr. Y.V. Jhala.

Santanu Basu (2006): **Developing species specific occurrence models for Satpura Tiger Reserve.** Forest Research Institute University, Dehradun. Supervisor: Dr. Y.V. Jhala.

Sneha Thapliyal (2006): **Assessment of ecosystem services of Corbett Tiger Reserve.** Forest Research Institute University, Dehradun. Supervisors: Dr. Ruchi Badola and Dr. S.A. Hussain.

Sutirtha Dutta (2006): **Ecological aspects of spiny tailed lizard during summer in Kutch.** Forest Research Institute University, Dehradun. Supervisor: Dr. Y.V. Jhala.

Thapa, P. (2006): **Vegetation structure in and around Bijapur Canal, Upper Dehradun Valley.** Kanya Gurukul Mahavidyalaya, Gurukul Kangri University, Haridwar. Supervisor: Dr. B.S. Adhikari.

Vasundhara Kandpal (2006): **Study of effects of relocation of villages from Corbett Tiger Reserve**. Forest Research Institute University, Dehradun. Supervisors: Dr. Ruchi Badola and Dr. S.A. Hussain.

Vidya Iyer (2007): **Evaluation of coastal habitats of Gulf of Mannar Biosphere Reserve: An indicator species analysis.** Bharathidasan University, Tamil Nadu. Supervisor: Dr. K. Sivakumar.

V.P. Uniyal

# Training Activities

| | |
|---|---|
| The Institute's Gold Medal for Top Trainee | Dr. Parag Madhukar Dhakate |
| Wildlife Preservation Society Silver Medal for Second in Merit | Shri Manjunath R. Chavan |
| Silver Medal for Best All Round Wildlifer | Shri Ravikiran S. Govekar |
| N.R. Nair Memorial Silver Medal for Best Management Plan | Shri Ravikiran S. Govekar<br>Shri Angshuman Mukhopadhyay |
| Best Management Term Paper | Shri Ravikiran S. Govekar |
| Top Trainee in Wildlife Biology | Shri Manjunath R. Chavan |

## XXVII Diploma in Wildlife Management *September 2005 to May 2006.*

The XXVII P.G. Diploma Course in Wildlife Management commenced on September 1, 2005 for a duration of nine-month with a total of 19 officer trainees of the rank of Deputy Conservator of Forests/Assistant Conservator of Forests/Veterinary Officers and equivalent levels.

During the period the teaching of the final module 'Wildlife Management Planning' was imparted from April 3-12, 2006. Thereafter, the officers undertook their Management Plan Exercise tour to Melghat Tiger Reserve (Maharashtra) from April 14 to May 6, 2006, which was followed by Management Planning writing and submission. Prior to conclusion of the course, the Viva-Voce examination and sports events for officer trainees, faculty and staff were also held.

The Valedictory Function was organized on May 31, 2006. The Chief Guest of the function, Dr. D. Pandey, Director-General, Forest Survey of India presented the Diploma, awards & prizes to the passing out officers. All 19 officers were awarded 'Diploma in Wildlife Management' on their successful completion of the course. Six officer trainees *i.e.* Dr. Parag Madhukaer Dhakate (Uttarakhand), Shri Manjunath R. Chavan (Karnataka), Shri Rajendra G. Garawad (Assam), Shri Ravikiran S. Govekar (Maharashtra), Md. Sarwoar Alam (Bangladesh) and Shri N.T. Sajan (Kerala) were awarded 'Honours Diploma' for obtaining 75% and above marks.

## XXVIII Diploma in Wildlife Management *September 2006 to May 2007.*

The XXVIII Course commenced on September 1, 2006 for nine-month duration. A total of 17 officer trainees joined the course; one each from Assam, Karnataka, Mizoram, Maharashtra, Madhya Pradesh, Rajasthan, Tripura, Uttarakhand and Uttar Pradesh and two lady officer trainees from Himachal Pradesh. In addition, there were six foreign nationals one each from Sri Lanka, Nepal and Bhutan under the sponsorship of SAARC Wildlife Management Fellowship Scheme and one each from Bhutan and Bangladesh sponsored by the Global Tiger Forum, New Delhi. One officer from Sri Lanka was sponsored by Protected Area Management & Wildlife Conservation Project, Sri Lanka.

As integral part of the course, the following field tours/visits were undertaken by the officer trainees during the reporting period :

(i) One-day field trips: Two visits to Rajaji National Park (Dholkhand, Beribada,Ranipur and Chilla), Binog Wildlife Sanctuary and Asan Barage. (ii) Orientation tour was conducted at Kalagarh, Corbett Tiger Reserve (Uttarakhand) from October 5-9, 2006. The objective of this tour was to introduce the concept of vegetation and habitat, identification of birds, mammals and other animals, understanding and interpreting signs, evidences and tracks of various animals. (iii) High altitude techniques tour was undertaken at Kedarnath Wildlife Sanctuary and Nanda Devi Biosphere Reserve from October 31 to November 5, 2006. The objective of the tour was to study the habitat requirements of Himalayan flagship species like snow leopard, Himalayan Musk Deer, Himalayan Tahr and Monal and its conservation in the Western Himalaya. The issue of ecotourism in the Himalayas and management of special habitats like the cold deserts were also exposed to the officers. (iv) Techniques tour: Sariska Tiger Reserve (Rajasthan) from November 19 to December 2, 2006. (v) Management tour was undertaken to several PAs/ Wildlife Sanctuaries and Zoological Parks in Rajasthan, West Bengal and Orissa from January 31 to February 24, 2007. (vi) Captive management tour was undertaken to National Zoological Park, Central Zoo Authority and National Museum of Natural History in Delhi from March 11-13, 2007. (vii) Management Term Paper Exercise was undertaken in Pench Tiger Reserve including a visit to Kanha Tiger Reserve in M.P. from March 14-25, 2007. The term paper along with recommendations was presented in a seminar by all officer trainees held on April 10, 2007 followed by interaction and discussion among seminar participants.

## XXII Certificate Course in Wildlife Management *November 2006 to January 2007.*

The course commenced on November 1, 2006. Eighteen Range Forest Officers and equivalent ranks joined the course. One candidate each from West Bengal, Tripura, A&N Islands, Sikkim, Jharkhand and Bihar, two each from Andhra Pradesh, Arunachal Pradesh and Kerala were sponsored by Ministry of Environment & Forests. One candidate each from Bangladesh, Bhutan, and Nepal were sponsored by Global Tiger Forum. One candidate from Pakistan was sponsored by WWF-Pakistan and two participants from Bhutan were sponsored by the Royal Bhutanese Govt.

| | |
|---|---|
| The Wildlife Conservation Gold Medal for the Top Trainee | Ms. Reney R. Pillai |
| The Best All Round Wildlifer | Shri A.C. Tilak |
| The Best Foreign Trainee | Mr. Muhammad Waseem, Pakistan |
| Institute's Prize for Wildlife Management. | Shri P. Dhanesh Kumar |

The theory classes started from November 6, 2006. An orientation-cum-techniques tour was organized at Rajaji National Park to appraise the trainees about field techniques, wildlife habitats, monitoring and application of different modern techniques from November 25, 2006 to December 3, 2006. All the officer trainees successfully completed the course. Ten of them got the Honours Certificate securing 75% and above marks.

The valedictory function was organized on January 31, 2007. Shri Anil Kumar, Director, Forest Education, Dehradun was the Hon'ble Chief Guest of the function. He presented the Certificates and awards to the officer trainees and delivered the Valedictory Address on the occasion.

# Capacity building


Vinod Verma

Workshops, Seminars & Conferences

Organized

Attended

## Workshops, Seminars and Conferences Organized

**One-week training programme on 'Wildlife Census and Data Analysis Techniques', Dehradun,** *April 3-8, 2006.* Based on the request by the Royal Government of Bhutan, this training programme on Wildlife Census and Data Analysis Techniques for Park Wardens, Department of Forests, Royal Government of Bhutan was conducted at the Institute. The objective of this programme was to train the Park Wardens in wildlife census and data analysis techniques. Two officers joined the training programme. The officers were exposed to data entry, basic data management, the All India Tiger Monitoring Programme, Use of MS Excel basic data analysis, data transportation and use of DISTANCE Program, Interpretation of data analyzed using distance programme. Scat collection and analysis of scat samples were part of the training programme. The officers were given hands-on training in field research methods at Rajaji National Park.


**Workshop on 'Management Effectiveness Evaluation (MEE) of protected area network in India', New Delhi,** *April 6-7, 2006.* In response to a directive from the office of Prime Minister of India to conduct an independent audit of all protected areas in India, the MoEF requested the Wildlife Institute of India to organize this workshop. The objectives of the workshop were: (i) to deliberate on issues related to evaluation of management effectiveness of protected area network in the country; and (ii) to decide on the methodology, framework and schedule for evaluation. A total of 38 participants participated in the workshop.

**Asia-Pacific Forestry Commission Pre-Session Workshop on Forests and Poverty Reduction, Dehradun,** *April 15, 2006.* The main objectives of this workshop were to: (a) increase awareness of links between forestry and poverty reduction; (b) identify barriers limiting forestry's contribution; and (c) explore possible actions to reverse the situation. This workshop was attended by 85 participants from 17 countries including international, regional and non-governmental organizations. Professor R.D. Munda, former Vice-Chancellor of Ranchi University was the chief guest, who delivered the key-note address. Three thematic presentations set the stage for the discussions in three parallel working groups, which addressed the following issues: (i) innovative and equitable laws and policies for poverty reduction; (ii) approaches for strengthening incentives for community based forest management and forest based enterprises; and (iii) refinement of local authority and management structures to balance the respective rights and duties of State and local communities.

The participants reviewed the issues and identified recommendations for the consideration by countries and Food and Agriculture Organisation (FAO).

Several recommendations were directed to countries with a view towards improving policies, legislation, institutional arrangements and incentives for expanding the opportunities for community based forest management.

*V.B. Mathur*

**Mainstreaming biodiversity in EIA and SEA for improved environmental decision-making, Stavanger, Norway,** *May 21–22, 2006.* This pre-meeting training course was organized under the Capacity Building for Biodiversity in Impact Assessment (CBBIA) Project of the International Association for Impact Assessment (IAIA). The objectives of the course were to: (i) emphasize the need to mainstream biodiversity using Impact Assessment (EIA and SEA); (ii) discuss EIA and SEA approaches and procedures, focusing on key 'insertion points' for biodiversity; (iii) provide guidance on methods, tools and processes for biodiversity-inclusive IA; (iv) build capacity of participants to conduct, supervise and review IAs to ensure integration of biodiversity in impact assessment; (v) evaluate experience by examining lessons, case studies; and (vi) facilitate sharing and peer-based learning among IA professionals.

Apart from the Institute's faculty members Dr. V.B. Mathur and Dr. Asha Rajvanshi, course inputs were also provided by Dr. Jo Treweek, Technical Programme Manager, IAIA-CBBIA Programme, with additional inputs from Usman Iftikhar of IUCN. The course was sponsored by International Association for Impact Assessment (IAIA). A total of 26 participants from 20 countries participated in the course.

**Training workshops on care and maintenance of immobilization equipment and role of frontline staff in rescue and rehabilitation of wild animals, Dehradun,** *June 27, July 5, August 1, August 8, August 17, and August 18, 2006.* The workshops were designed for the frontline staff of Uttarakhand Forest Department to sensitize them regarding the importance of proper handling, care and maintenance of immobilization equipment and also to expose the participants to various procedures involved in rescue and rehabilitation of wild animals.

A total of 42 participants from various Uttarakhand Forest Divisions namely Shivalik, Garhwal, Lansdowne, Kotdwar, Haridwar, Chidiyapur, Champawat, Ramnagar, Bageshwar, Kumaon, Tehri, Pauri Garhwal, Dehradun, Haldwani, Terai west, Terai east and Terai central participated.

**Training programme for veterinary students from University of Saskatchewan, Canada,** *June 29-July 4, 2006.* The objective of the programme was to appraise the participants on various wildlife health issues and procedures involved in wildlife management. The training programme was organized by Dept. of Wildlife Health Management, WII. A total of four participants participated in the training programme.

**One-day workshop on field techniques for animal abundance estimation, Kalesar,** *June 2006.* A one-day workshop for the wildlife staff of Haryana

Forest Department in field techniques for animal abundance estimation was conducted. The objective of the workshop was to conduct wildlife population estimation and status evaluation in the Haryana State. More than 40 participants attended the workshop.

**Workshop on "Raising stakes of local community in conservation of forests and wildlife: Institutionalization of ecotourism involving local communities", Periyar Tiger Reserve,** *July 5-6, 2006.* The objectives of the workshop were: (i) to sensitize the participants about concept and issues of ecotourism as a tool for conservation; (ii) to expose participants to important community based ecotourism initiatives in and around natural ecosystems; and (iii) to come out with recommendations for institutionalization of ecotourism programmes for building stakes of local communities and conservation.

It was organized by Wildlife Institute of India and sponsored by the Ministry of Environment and Forest, Govt. of India. Ten Indian Forest Service Officers participated in the workshop.

**Special course on GIS & RS application in animal husbandry, Dehradun,** *July 6–7, 2006.* The two-day course was planned with the objective of sensitizing the officials of National Centre for Animal Health, Govt. of Bhutan to various aspects of wildlife health and management and role of GIS and RS in disease mapping. The course was organized by Indian Institute of Remote Sensing in collaboration with WII. A total of four participants participated in the course.

**Training for trainers: Workshop on wildlife rescue & rehabilitation, Bhopal,** *August 11-13, 2006.* The workshop was organized at Van Vihar National Park, Bhopal with the objective of enhancing capacities locally to deal with wildlife emergencies. The workshop was organized by Care of the Wild, India and Madhya Pradesh Forest Department with technical assistance from Wildlife Institute of India. In all, 25 participants participated in the workshop. In addition to technical inputs on immobilization techniques and general field procedures, field demonstration of immobilization in leopard and sambar deer were carried out.

**Two-day attachment course, Dehradun,** *August 21-22, 2006.* A two-day course for the trainees of first certificate course from Uttarakhand Forest Department was organized in collaboration with the Corbett Wildlife Training School, Uttarakhand. During the course, lectures were delivered by faculty members on the following topics: An over view on Wildlife Conservation in India; Mammals of conservation importance; Status of mammals and birds in Nanda Devi Biosphere Reserve; Biodiversity assessment; Wildlife Management in India; Himalayan forest ecosystems; Rescue and rehabilitation of wild animals; Insect diversity of west Himalaya; Nature interpretation and Birds and Fishes of Uttarakhand. Trainees were exposed to different facilities at WII *viz.,* Forensic lab, Herbarium, Research lab and Library. A nature trail walk for bird watching in the campus was also conducted. More than 20 participants attended the course.

**Collaborative Workshop on "Tools for managers: Communications, proposal and report writing", Dehradun,** *August 27–31, 2006.* The United Nations Institute for Training and Research (UNITAR) Hiroshima Fellowship for Afghanistan, started in late 2003, is a long-term initiative aiming at building leadership and management skills and providing technical and institutional support to a core group of senior Afghan government officials, academics and practitioners. The programme's long-term objective is to build a dedicated Fellowship Community in Afghanistan which can become a reference for planning and implementing capacity-building and training activities at the local and national levels. In order to provide a better learning environment and considering the security issues, the UNITAR, Hiroshima Office for Asia and the Pacific (HoAP) requested the Institute to organize a workshop for Afghan civil servants. The objectives of the workshop were: (i) to enhance proposal-writing skills which help in successfully gathering support for a project; (ii) to improve professional communication skills in English, including letter and report writing; (iii) to expose the participants to the basics of planning a workshop, such as curriculum design and engaging participation; and (iv) to review and further develop team projects and training plans. The workshop was organised by Wildlife Institute of India and sponsored by UNITAR, Hiroshima Office for Asia and the Pacific, Japan. 30 senior civil servants from various ministries and departments of the Government of Afghanistan, two faculty members and one research associate from WII participated in the workshop.

**Training workshop on the "Scope of landscape planning in forest management" for the Indian Forest Officers (IFS), Dehradun,** *August 30-31, 2006.* The workshop was organized with the aim to acquaint field officers with the concepts, principles, and approaches relevant to the landscape management approach to forest planning and conservation. It was sponsored by the Ministry of Environment and Forests and attended by 16 participants. There were six sessions in the workshop. The first session aimed to provide an introduction of the workshop, its agenda, structure and expectations. Subsequent to this introductory session, the workshop had four brainstorming sessions focused on: (i) Forest planning and management – changing perspective, challenges and future dilemma; (ii) Management of wildlife and protected areas – contribution, accomplishments, and new initiatives; (iii) Livelihoods, conflicts, community participation, and development; and (iv) Building alliances. The workshop included presentations on two specific case studies: the management approach for conservation of floodplain ecosystem in Kaziranga, and second Relevance of landscape planning for tiger conservation. One full session titled "Future direction and priority actions" was included to provide adequate opportunity for participants to deliberate and make recommendations on the workshop theme.

**Internal Research Seminar (IRS),** *September 14-15, 2006* **and the XX Annual Research Seminar (ARS) of WII,** *September 22-23, 2005.* The Internal Research Seminar (IRS) was chaired by Dr. V.B. Mathur, Dean, Faculty of Wildlife Sciences. During the IRS, a total of 23 presentations were made in

| Name | Topic of Presentation |
|---|---|
| Vivek Sahajpal | Standardization of DNA extraction and amplification protocols for hair and skin samples obtained as wildlife offence case exhibits. |
| Kamlesh Kumar Maurya | Species composition, demographic structure and reproductive success of vultures in Kutch. |
| Vivek Kumar Joshi | Observations on Himalayan brown bear, its behaviour and livestock depredation pattern in Kugti Wildlife Sanctuary, Himachal Pradesh. |

five sessions *viz.* (i) Studies on Coastal and Marine Biodiversity; (ii) Molecular Genetics and Forensic Studies; (iii) Human-Wildlife Interactions; (iv) Vegetation and Animal Studies; and (v) Biodiversity Assessment & Wildlife Monitoring, to represent all research projects that have been initiated recently. These presentations were made by 19 research fellows. The presentations were evaluated by a panel of judges comprising of three faculty members of the Institute. The three best presentations were awarded book prizes worth Rs. 1,000/- each.

Shri V.B. Sawarkar, Chairman, Training, Research and Academic Council, chaired the XX Annual Research Seminar of the Institute. In total, 28 presentations were made in seven sessions. These included studies on large carnivores, molecular genetics & forensic studies, vegetation studies & habitat mapping, biodiversity assessment, avifaunal studies, studies on ungulates-I and II. The presentations were based on completed and ongoing research studies. They were made by 26 research fellows and two faculty members.

About 300 delegates/participants attended the ARS that included the Principal Chief Conservators of Forests (PCCFs), 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 Post Graduate Diploma course officer trainees of WII. Five presentations were adjudged as the best presentations. The winners were given book awards worth Rs.1,000/- each.

| Rank | Name | Topic of Presentation |
|---|---|---|
| **I** | **Neha Midha** | Study on land use /land cover mapping, vegetation assessment and river dynamics in Dudhwa Tiger Reserve, Uttar Pradesh. |
| **II** | **R. Jayapal** | Birds, Environment, and Protected Area Network in Central Indian Highlands, Madhya Pradesh. |
| **III** | **Abishek Harihar** | Status of tiger and its prey species following relocation of human settlements in Chilla Range, Rajaji National Park. |
| **IV** | **Vinay Bhargav** | Distribution patterns of *Cicindelidae* in Simbalbara Wildlife Sanctuary, Himachal Pradesh. |
| **V** | **Gopi G.V.** | Breeding patterns among colonial water-birds in the heronry at Bhitarkanika National Park, Orissa. |

Vinod Verma

The significant enhancement in quality of the presentations in terms of visuals, graphics, scientific content and incisive analysis was appreciated. Shri S.C. Dey, Chairman, ICSAP, WII suggested that the findings of research projects as discussed during the ARS should be communicated to the field managers and WII should take up research projects in multiple use areas and also on human-wildlife conflict issues. Shri Vinay Tandon, Addl. PCCF & CWLW, Himachal Pradesh complimented the quality of the seminar presentations.

He suggested that long-term research in Himalayas by WII should continue and he requested that WII should conduct training programme on 'capacity building' for the State forest officials.

Shri V.B. Sawarkar, Chairman, TRAC observed that the probing questions raised and suggestions made by the participants stimulated intellectual discussions and made significant contribution to conservation. He summarised the two- day proceedings and highlighted on the salient features of various themes of the seminar and their contribution to wildlife conservation.

**Seminar-cum-workshop for establishment of *ex-situ* conservation centres for vultures in Indian zoos, Pinjore, Haryana,** *November 1-3, 2006.* The workshop was conducted for Zoo Officials of four identified zoos in four States as well as the Chief Wildlife Wardens and other officials of Assam, Uttaranchal, Himachal Pradesh and Punjab. This workshop was organized by Central Zoo Authority in collaboration with the Wildlife Institute of India, Dehradun for the development of proposals for establishment of *ex-situ* Conservation Centres for Vultures in Zoos at Hyderabad, Bhopal, Bhubaneswar and Junagarh.

The workshop was held at Pinjore in Haryana where a vulture breeding centre is in existence. In all, 43 participants participated in the workshop. The proposals of four zoos were thoroughly reviewed and the gap areas for revision of the proposals were identified.

**Endangered Species and Zoo Management Course for Middle Level Officers, Arignar Anna Zoological Park, Chennai** *November 9-18, 2006.* The training course for middle level officers in Indian Zoos was organised by the Wildlife Institute of India at Arignar Anna Zoological Park, Chennai acting as the local host. The Central Zoo Authority provided financial support for the course. The course had twenty-seven participants from 23 zoos of the various Indian States.

The curriculum encompassed various facets of zoo management with special emphasis on the theme of the course 'Marking and Record Keeping in Zoos'**.** The classroom lectures were followed by field visits. Shri P. Sreedharan, PCCF, Tamil Nadu, in his speech highlighted the need for *ex-situ* conservation and the importance of holding such training programmes to train officers from zoos in upgrading their skills. The Valedictory Function was held on November 18, 2006 which was presided by Shri A.L. Anathaswamy, IFS, Director, Arignar Anna Zoological Park, Chennai.

**One-week compulsory training course in wildlife management: issues, concerns and practices,** *December 4-8, 2006.* The course focused on the wildlife management issues, concerns and practices and covered a range of current wildlife management issues including the tiger crises. It was organized by the Institute for the IFS Officers and sponsored by MoEF, GOI, New Delhi. A total of 20 participants participated in the course. Eleven faculty members from WII and four external resource persons provided inputs during the workshop.

**Meeting of forests officials on management of livestock grazing in Melghat Forests, Dehradun,** *December 20, 2006.* The meeting primarily involved all concerned field managers (RFOs to CF) working in Melghat forest so as to deliberate on the current practices of livestock grazing management in Melghat forests and understand relevant issues concerning this theme. The meeting was organized as a part of the specific implementation task on livestock grazing management carried out under the ongoing WII-USDA Forest Service Collaborative Project in Melghat Forests. Twenty two participants attended the meeting.

**UNESCO-IUCN project 'Enhancing our Heritage (EoH) Review Meeting: Planning the final phase of the EoH project in south Asia, New Delhi,** *February 6-8, 2007.* A meeting to review the progress of ongoing UNESCO-IUCN project 'Enhancing our Heritage (EoH): Managing and monitoring for success in World Heritage Sites' was held in New Delhi. The objectives of the meeting were: (i) to review the EoH project implementation in Keoladeo, Kaziranga and Chitwan National Parks; (ii) to share lessons learned; and (iii) to plan the EoH final assessment and final years activities. Dr. Marc Hockings, Project Manager, University of Queensland, Australia along with site managers from Kaziranga and Keoladeo National Park in India and Chitwan National Park in Nepal and Scientists and Researchers from WII participated in this meeting. Representatives of Civil Society organizations also participated in this meeting.

Dr. Marc Hockings presented a review of the initial EoH assessments carried out in the three pilot sites in South Asia. He appreciated the high quality initial assessment reports from the 3 South Asian sites. He said that the final assessments to be carried out in Year IV should be comprehensive and the gaps identified in initial assessments should also be appropriately plugged. Dr. Marc Hockings provided a brief update on the EoH Workbook. He said that based on the experience of project implementation across project sites in Africa, Latin America and South Asia, the EoH Workbook has been appropriately revised.

Based on the discussions with the site managers and the project coordinators, it was decided that final assessments will be carried out as follows: (i) Kaziranga National Park: June, 2007; (ii) Chitwan National Park: July, 2007; (iii) Keoladeo National Park: August, 2007.

**Two-day course for the trainees of second certificate course on Wildlife Management, Dehradun.** *February 13-14, 2007.* A two-day course for the trainees of second certificate course from Uttarakhand Forest Department was organized. During the course, lectures were delivered by the various faculty members on the following topics: An over view on Wildlife Conservation in India; Mammals of conservation importance; Status of mammals and birds in Nanda Devi Biosphere Reserve; Biodiversity assessment; Wildlife Management in India; Himalayan forest ecosystems; Rescue and rehabilitation of wild animals; Insect diversity of west Himalaya, Nature interpretation, Birds and Fishes of Uttarakhand. Trainees were exposed to

different facilities at WII *viz.,* Forensic lab, Herbarium, Research lab and Library. A nature trail walk for bird watching in the campus was also conducted. More than 20 participants attended the course.

*S. Wilson*

**Consultation workshop of the MoEF's Animals and Plants Committee for Development of Criteria for inclusion of flora and fauna in the Schedules of the Indian Wildlife (Protection) Act, 1972, Dehradun,** *February 21, 2007.* Under the direction of the National Board for Wildlife, the Ministry of Environment & Forests (MoEF) has constituted the Animal and Plant Committee for reviewing the list of plants and animals in the various schedules of the Indian Wildlife (Protection) Act, 1972. In a joint meeting of the Animal and Plants committee chaired by the Secretary, MoEF, it was decided that select members of the Animal and Plants Committee and other specialists should be invited by the Wildlife Institute of India (WII) for a two-day consultation workshop in which the criteria for placing plants and animals in various schedules of the Indian Wildlife (Protection) Act be developed. A joint meeting of Animal and Plant Committee was organized at the Wildlife Institute of India during March 19-20, 2007. A total of 26 participants from various Institutions and organizations participated in this workshop. A draft criterion for inclusion of flora and fauna in the Schedules of the Indian Wildlife (Protection) Act, 1972 was prepared in the workshop.

**2-day consultative workshop on the "Adaptive grassland management", Dudhwa Tiger Reserve, Dudhwa, Uttar Pradesh,** *February 23-24, 2007.* The workshop aimed to familiarize with the concept and need of adaptive management required in case of tall grasslands so as to maintain the diversity of upland and lowland grasslands and their associated faunal species in long run. The workshop was organized as a part of the implementation task on adaptive grassland management under the ongoing WII-USDA Forest Service Collaborative Project at Dudhwa in collaboration with the Uttar Pradesh Forest Department. Twenty participants attended the workshop.

The workshop was attended by Shri D.N.S. Suman, PCCF, UP and other senior officials of DTR. The workshop recommended an urgent need for adopting an adaptive management approach in case of tall grasslands. Deliberations highlighted the need for developing detailed maps of prominent grasslands in DTR and for capacity building programme of frontline staff for identification of grasses so as to facilitate effective monitoring.

**Stakeholders meeting on livestock grazing management in Melghat forests,** *March 14, 2007.* The meeting involved all concerned with livestock grazing in Melghat forests *i.e.* forest frontline staff and officials (Foresters to CCF) working in Melghat forest, scientists, representatives of Animal Husbandry, Tribal Development, Zila Panchayat, NGOs, and local village communities - pastoralists so as allow frank deliberations on the issues related to livestock grazing and evolve appropriate strategy for its effective management. The meeting was organized as a part of the specific implementation task on livestock grazing management carried out under the ongoing WII-USDA Forest

Service Collaborative Project in Melghat Forests. The meeting was conducted by WII team members in collaboration with the Project Tiger- Melgat TR, Maharashtra. A total of seventy five participants attended the meeting.

**Workshop on UNESCO-IUCN project 'Enhancing our Heritage (EoH)' - Introducing and reviewing the methodology for South Asia, Dehradun,** *March 14-15. 2007.* The workshop was organized to introduce the issue of management effectiveness evaluation particularly focussing on the 'Enhancing our Heritage' methodology. The workshop objectives were: (i) to introduce the issue of Management Effectiveness Evaluation (MEE) and the Enhancing our Heritage (EoH) methodology to the new site managers and representatives of the three EoH pilot sites in South Asia; (ii) to practice using and review each of the twelve EoH tools; and (iii) to plan for the final EoH assessment to be conducted in each of the three sites.

Ms. Robyn James, Project Assistant, University of Queensland, Australia along with site managers from Kaziranga and Keoladeo National Park in India and Chitwan National Park in Nepal and Scientists and Researchers from WII participated in this meeting. In addition to the above, site managers from the other three World Heritage Sites in India viz. Manas, Sunderbans and Nanda Devi also participated in this meeting, for which special funding was provided by UNESCO-New Delhi. The revised project workbook and tools were discussed with the participants and a framework for conducting management effectiveness evaluation including social indicators was agreed upon.

*V.P. Uniyal*

**Special course in wildlife protection, law and forensic science for the IRS (Customs and Central Excise) group 'A' probationers of 57th batch, Dehradun,** *March 26 – April 6, 2007.* The objectives of the course were to sensitize the Customs Officers about the unique biodiversity values of the country and to appraise about the quantum and gravity of illegal trade in wildlife and wildlife products. The course was organized by the Wildlife Institute of India and sponsored by National Academy for Customs, Excise and Narcotics (NACEN), Faridabad. In all, 34 participants participated in it. As a part of this course, various theory classes, field trips and laboratory based practical classes were organized. Apart from the classroom teaching, a three-day field visit was organized to Dudhwa Tiger Reserve from April 2-4, 2007.

# Workshops, Seminars and Conferences Attended

**Workshop under e-governance project "ENVISION", New Delhi,** *April 3, 2006.* Shri A.K. Bhardwaj, Professor, Shri Rajesh Thapa, System Manager and Shri Dinesh Singh Pundir, Asstt. Programmer attended the workshop held at Ministry of Environment & Forests, New Delhi under the chairmanship of the Secretary (E&F). The purpose of the workshop were: (i) to provide details of the services offered by the respective organizations to the various stakeholders, and likewise prioritization of the services for software development and its implementation in phases; and (ii) to capture the feedback on current processes and expectations about proposed processes in interaction with Ministry of Environment and Forests (MoEF); and to suggest process improvements.

**National seminar on "Environmental audit of hydroelectric projects for sustainable development", Dehradun,** *April 10-11, 2006.* Dr. V.P. Uniyal attended the national seminar, which was organized by Department of Zoology, Govt. College, Dak Pathar, Dehradun. He presented a paper on "Hydropower and Developmental Projects in Himalayan region: Impact on Biodiversity, Parbati Hydroelectric Project, Kullu, Himachal Pradesh.

**Interpreting world heritage conference, San Juan, Puerto Rico,** *May 1-5, 2006.* The National Association of Interpreters organized the conference with the theme "Connecting people to places through sustainable heritage tourism". Bitapi C. Sinha was awarded a scholarship by the National Association of Interpreters. The conference was attended by 160 delegates from 30 countries representing six different continents. A paper titled "Temple, tiger and tribal: Planning and development of interpretive facilities in Panna Tiger Reserve, Madhya Pradesh, India" was presented by Bitapi C. Sinha.

**Second meeting of the State board of wildlife, H.P.,** *May 20, 2006.* This was the second meeting of the State Board for Wildlife, Himachal Pradesh as per the requirements of the Wildlife (P) Act, 1972. The Board reviewed the major activities of the Wildlife Wing, Forests Department in the field of wildlife conservation in the State and approved different proposals of rationalization of PA boundaries as submitted by the CWLW and the Member Secretary. Dr. P.K. Mathur attended the meeting.

**Annual conference on "Power, poverty and sustainability: the role of impact assessment of the International Association of the Impact Assessment (IAIA)", Stavanger, Norway,** *May 23-26, 2006.* Dr. Asha Rajvanshi and Dr. V.B. Mathur attended the 26th Annual Conference of IAIA. The conference theme for IAIA'06 - "Power, poverty and sustainability: the role of impact assessment" provided EIA professionals with an opportunity to discuss how impact assessment in its various forms can contribute to poverty eradication and

sustainable development and play constructive role in the struggle between various interests involved in these efforts. In the technical session of the biodiversity stream – Capacity building for biodiversity (part 2), Dr. Asha presented the paper "Capacity Building for Biodiversity Inclusive Impact Assessment: the findings of the needs assessment surveys in India". Dr V.B. Mathur presented the paper "Development of a guidance tool for professionalizing biodiversity-inclusive EIA". The participation of Dr. Asha and Dr. V.B. Mathur was funded by the International Association of Impact Assessment (IAIA) under the project Capacity Building in Biodiversity and Impact Assessment (CBBIA) Project.

**Workshop on World Environment Day at University of Petroleum and Energy Studies, Dehradun,** *June 5, 2006*. Dr. Asha Rajvanshi participated in the above workshop as the Chief Guest and delivered workshop address "The relevance of biodiversity conservation in promoting energy projects". The objective of the workshop was to promote awareness about environmental issues associated with the development of industry. The workshop was organized by University of Petroleum and Energy Studies, Dehradun.

**Workshop on marine biodiversity conservation and community, Gandhinagar,** *June 15-16, 2006.* Mr. Sajan John, Shri B.C. Choudhury and Dr. K. Sivakumar presented a paper entitled "An assessment on protected marine species in fishing and in trade in Indian coast". It was organized by GEER Foundation.

**All India professional development program on resettlement and rehabilitation issues in development projects - Principles and practices, Hyderabad,** *June 27 – July 1, 2006***.** The Engineers Staff College of India organized this national level training, which aimed at bringing together various professionals involved in Resettlement and Rehabilitation (R&R) projects to a common platform to discuss the R&R principles and practices adopted in different development projects through a multi-stakeholders dialogue process. Various sessions covered in the workshop were: (i) land acquisition issues related to R&R projects, (ii) R&R National Policy, (iii) resettlement plan in project cycle, (iv) NTPC R&R program, (v) income generation and restoration of project affected families, (vi) social assessment for R&R, and (vii) monitoring and evaluation of R&R projects. Dr. B.K. Mishra attended this training and provided technical inputs on "Conservation induced resettlement and rehabilitation".

**12th Annual Meeting of the European Hair Research Society (EHRS), London, UK,** *June 29 - July 1, 2006.* Shri Vivek Sahajpal, SRF attended the meeting. EHRS is an organization that is dedicated to promote the research on hair biology and hair disease in the world. The meeting was attended by over 200 leading scientists, dermatologists, professionals and students working in the field of hair research from around the globe. The meeting was sponsored by Pfizer and Unilever. Over 72 research papers on various aspects of hair research were presented at the meeting. His paper titled "Microscopic hair characteristics: A tool for dealing wildlife offence cases in India" was selected

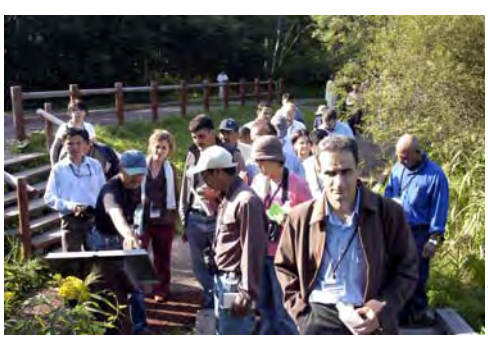
as the best oral presentation in the meeting. The participation was funded partially by EHRS and WII.

**Round table conference on medicinal herbs and herbal products – Livelihood and trade option, Dehradun,** *July 7, 2006.* Dr. B.S. Adhikari attended the conference, which was organized by Industrial Development & IT, Govt. of Uttaranchal. The workshop discussed livelihood and medicinal plants trade in the State.

**One-day workshop on "Ecotourism for biodiversity conservation", Bhopal,** *July 8, 2006.* The workshop was organized by Madhya Pradesh Ecotourism Board. Shri A.K. Bhardwaj presented a paper entitled "Ecotourism-a tool for biodiversity conservation and livelihood security".

**National consultation workshop on "Project snow leopard", Leh, Ladakh, J&K,** *July 10-11, 2006.* Dept. of Wildlife Protection, J&K, and MoEF, GOI in technical collaboration with Nature Conservation Foundation, Mysore organized this national consultation workshop. WII was represented by Shri P.R. Sinha, Dr. V.B. Mathur and Dr. S. Sathyakumar. They presented two papers and also participated in the deliberations of the workshop.

**Visit to different PAs of Himachal Pradesh as a member of the central team on the rationalisation of PA boundaries,** *August 17-19, 2006.* As per the directives of the Addl. DG (Wildlife), MoEF, the Committee was required to visit select PAs in Himachal Pradesh so as to examine and comment on the proposals submitted by State of Himachal Pradesh for rationalization of PA boundaries. Dr. P.K. Mathur participated as member of the Central Committee. Dr. R. Sukumar, Indian Institute of Science, Bangalore was the other member. The central team along with the Addl. PCCF (Wildlife) and CWLW, Himachal Pradesh visited Nargu, Darlaghat and Naina Devi Sanctuaries in Mandi, Solan and Bilaspur districts so as to have familiarity with the diversity of each area, conservation significance and management challenges. The visiting team also interacted with the local forest officials and representative of local communities and Panchayats at each site so as to obtain first hand information of their concerns and the realistic need of rationalization of PA boundaries. Based on the field visit, analysis and synthesis of information provided, interactions with village representatives and consultations with forest officials, the report was finalized and submitted to the CWLW, H.P. and Addl. DG (Wildlife), MoEF.



*K. Sivakumar*

**Training workshop on ecosystem, water and biodiversity, Kushiro, Japan,** *August 26-31, 2006.* The training programme was organized by United Nations Institute for Training and Research (UNITAR). The objectives of the workshop were to contribute to national policy planning related to biodiversity conservation and management in the Asia-Pacific region. Dr. V.P. Uniyal and Dr. K. Sivakumar attended the training workshop. They presented case studies on "Regional Programme for the Promotion of Integrated Wetland Management in the Conservation of Migratory Water Birds and Maintenance/

Restoration of Ecosystem Services in Afghanistan, Azerbaijan, India, Iran, Kazakhstan and Kyrgyzstan" and 'Biodiversity in Himalayas'.


**Map Asia 2006 – 5th international conference, Bangkok, Thailand,** *August 29 to September 1, 2006.* Map Asia 2006, 5th Annual International Conference and Exhibition in the field of GIS, GPS, Aerial Photography and Remote Sensing technologies was held at Queen Sirikit National Convention Centre, Bangkok. Map Asia conference provides a forum for the geo-informatics community of Asia Pacific region to discuss and deliberate on the issues related to the usage of Geospatial Technology. Dr. Manoj Kumar Agarwal participated and presented a paper titled "Monitoring habitat characteristics using GIS and Remote Sensing: A case study for mitigating human – leopard conflict in Pauri Garhwal, India" in the conference. Map Asia 2006 witnessed a total participation of over 1000 delegates from 45 countries.

**Two-day training programme on "Training design for forest staff", Dehradun,** *August 2006.* Shri A.K. Bhardwaj attended the two-day training programme organized by Indira Gandhi National Forest Academy, Dehradun, which was sponsored by Ministry of Environment and Forests, Government of India.

**Seminar on quality in higher education, D.A.V. College, Dehradun,** *September 4, 2006.* The objective of the seminar was to enhance quality in higher education. The seminar was organised by the University Grants Commission and Zoology & Botany Departments, D.A.V. Collage, Dehradun. Dr. N.P.S. Chauhan attended the seminar.

**IV world congress on mountain ungulates, Munnar, Kerala,** *September 12-15, 2006.* It was organized by IUCN/SSC/Caprinae Specialist Group, High Ranges Wildlife & Environment Preservation Association. Major objectives of the conference were to share the latest information on the Ecology and conservation of mountain ungulates all over the world. WII has been actively engaged in the mountain ungulate research since 1986. The Institute participated in this conference and shared the information collected from Tso Kar basin and Kedarnath Wildlife Sanctuary. Dr. G.S. Rawat presented a paper in the conference. Dr. S. Sathyakumar also presented four papers (oral presentations) and two posters.

**National Seminar on Solid Waste Management: Solutions and Concerns, Chandigarh,** *September 16-18, 2006.* Dr. Pranab Pal attended the seminar at Punjab University, Chandigarh. He presented a paper on "Waste Management for Environmental Safety and Protection". The seminar was organised by Centre for Environment and Vocational Studies (CEVS), Punjab University, Chandigarh, and sponsored by Punjab University, National Environmental Science Academy, Dept. of Science of Science & Technology, UT Administration, Chandigarh in collaboration with Dayanand National Academy of Environmental Sciences (DNAES), Chandigarh, Society of Environmental Sciences (SES), New Delhi, & Dr. K.K. Nanda Foundation (KKNF), New Delhi. More than 110 participants attended the seminar.

**International workshop "To understand Asian bears for their future - Present status and conservation" Karizuwa, Nagano, Japan,** *October 1-7, 2006.* Dr. S. Sathyakumar participated in the international workshop held during 17th international conference on bear research and management, which was organized by International Bear Association & Japan Bear Network. The objective of the conference was the conservation and management of bear species in World. He presented an oral paper "Status and Distribution of Asiatic Black Bear (*Ursus thibetanus*) and Himalayan Brown Bear (*Ursus arctos*) in India". Dr. N.P.S. Chauhan also attended this international conference.

**IV international symposium on trade in bear parts, Nagano, Japan,** *October 4, 2006.* It was organized by TRAFFIC & WWF-Japan. Dr. S. Sathyakumar participated in the group discussions and deliberations of the symposium.

**National seminar on wildlife biodiversity conservation, Pondicherry University,** *October 5-7, 2006.* Dr. K. Sivakumar attended the national seminar and presented a paper entitled "Status and conservation of the Nicobar megapode after tsunami". This UGC sponsored national seminar was organized by the Department of Ecology and Environmental Sciences, School of Life Sciences of the Pondicherry University. Seminar began with a formal inaugural function followed by technical sessions and a field trip to the near by lake and the eco-restored land. Dr. B.K. Mishra presented an invited paper entitled "Joining hands for biodiversity conservation" in the seminar.

**Brainstorming session on the academic programme and development of Doon University, Uttaranchal,** *October 9, 2006.* The meeting specifically aimed to deliberate on the academic programme and over all development of newly created University by the Govt. of Uttaranchal and make recommendations so as develop the same as a model modern University of higher learning. It was organized by Vice Chancellor, Doon University, Uttaranchal. Dr. P.K. Mathur attended the brainstorming session. The participants discussed about the status and pattern of upcoming University, expected academic programmes and thrust areas.

**Training workshop on "Field applicability of forestry and wildlife research outputs- Issues and strategies", Bangalore,** *October 10-11, 2006.* Shri A.K. Bhardwaj attended the training workshop at Institute of Wood Science & Technology (IWST), Bangalore. This workshop was sponsored by Ministry of Environment and Forests, Government of India.

**Second meeting of the State Board of Wildlife, Gujarat,** *October 12, 2006.* This was the second meeting of the State Board for Wildlife, Gujarat as per the requirement of the Wildlife (P) Act, 1972. The Chief Wildlife Warden, Gujarat presented an overview of wildlife conservation initiatives and current activities undertaken in the State. The Board considered a number of proposals/ agenda items related to rationalization of PA boundaries in light of different upcoming developmental projects, new initiatives, and other priority conservation measures relevant to management of endangered flora and fauna in the State. Dr. P.K. Mathur attended the meeting.

**Two-day training workshop on "Personal effectiveness programme", Dehradun,** *October, 2006.* Shri A.K. Bhardwaj attended the two-day training workshop which was organized by Prasanna Trust, Secunderabad and Indira Gandhi National Forest Academy, Dehradun and sponsored by Ministry of Environment and Forests, Government of India.

**Regional meeting on "Knowledge sharing and management in mountains of Uttaranchal", Dehradun,** *November 3, 2006.* Dr. V.P. Uniyal participated in this regional meeting which was organized by Environment Communities, Solution Exchange-UNDP Country Team initiatives.

**International workshop on elephant, Kolkata,** *November 4, 2006.* The Hon'ble Chief Minister of West Bengal, Shri Buddhadev Bhattacharjee inaugurated this International workshop and shared his deep concern for habitat denudation and encroachment of forest areas occupied by elephants in West Bengal. The technical deliberations on management of wild elephants in West Bengal also included several trans-border issues across neighboring countries of Bhutan and Nepal and inter-state elephant movement issues across Assam. In the working session of the workshop, three groups were formed which deliberated on various issues and adopted recommendations on conservation and management, minimizing human-elephant conflicts in southern Bengal adjoining to Orissa and Jharkhand and use of advance technologies for better management of elephants through informed decision making. Dr. Sushant Chowdhary participated in the workshop and presented a paper on 'Technology mobilization in elephant conservation' that emphasized establishment of social capital through relationship of trust, reciprocity, knowledge sharing and exchange through Institution development.

**All India seminar on environmental conservation in planning and design of power projects, Dehradun,** *November 9, 2006.* The Institution of Engineers, Uttaranchal State Centre invited Dr. Asha Rajvanshi to deliver a key-note address in the all India seminar on Environmental Consideration in Planning and Design of Power Projects. She delivered the key note address on "Relevance of mainstreaming nature conservation in the planning of hydropower projects". The main objective of the workshop was to bring together power engineers, environmentalists, planners and policy makers to discuss and to deliberate on new techniques relevant for improving the environmental aspects in the planning and design of power projects. The workshop was organized by The Institution of Engineers, Uttaranchal State Centre, Dehradun.

**Indo-US workshop on the management of alien invasive species in protected areas, Corbett Tiger Reserve (CTR),** *November 13-15, 2006.* Dr. G.S. Rawat presented a paper entitled 'Priority ranking and management strategies for alien invasive species in wildlife protected areas of India'. Several protected areas (PAs) in India are facing acute problems of habitat degradation and loss due to colonization by alien invasive species (AIPs). Keeping this in view, a joint workshop was held at CTR where a number of ecologists and managers

participated to share their experiences on dealing with AIPs. Dr. G.S. Rawat participated in the deliberations and discussions.

**Workshop on elephant census methodology, data collection, analysis and future modification, Malleswaram, Bangalore,** *November 18, 2006.* In view of the upcoming National estimation of elephants in 2007, Project Elephant, Ministry of Environment & Forests, GOI, organized the workshop at Malleswaram. The workshop was attended by the various elephant bearing States, Project Elephant and Institutions involved in elephant research. The Principal Chief Conservator of Forests/ Chief Wildlife Warden, Karnataka presided over the workshop. The workshop discussed the methods of elephant estimation and making it more effective and robust in 2007 national estimates. Dr. Sushant Chowdhary participated in the workshop and provided necessary inputs for improving the upcoming elephant estimation planned in 2007.

**Local project advisory committee of DST, GOI funded Project "Expert system for Indian woods – Their microstructure identification and uses,** *November 23, 2006.* The objective was to review the progress on ongoing DST, GOI supported project and advise on matters related to project theme, governance and accomplishments. Dr. P.K. Mathur attended the meeting, which was organized by ICFRE, Dehra Dun.

**National seminar on "Biodiversity in northwestern India: Status, conservation and future prospects, M.L.N. College, Yamuna Nagar, Haryana,** *November 25, 2006.* Dr. S. Sathyakumar was invited to make a theme presentation on "Biodiversity conservation and management initiatives in the north-western and western Himalayan regions of India: Lessons learnt and future prospects" at this national seminar.

**International seminar on sustainable agriculture in an environmental perspective, Hanoi, Vietnam,** *November 25 - December 4, 2006*. Former participants of Swedish International Development Agency (SIDA) programme on "Sustainable Development" were invited by Svalöf Consulting AB, Svalöv, Sweden to participate in a SIDA sponsored follow-up international seminar at Hanoi, Vietnam. The objectives of this seminar were: (i) retrospection of the programme in Sweden, (ii) to review recent advances in the field of sustainable development, (iii) to share follow-up actions by the participants' in their own country after the training in Sweden, and (iv) to discuss local examples and lessons learnt in implementing sustainable development projects. Dr. B.K. Mishra participated in this seminar and also presented a paper entitled "Capacity building for sustaining conservation and development - an Indian experience".

**International Workshop on 'Environmental Toxicology and Waste Management with Special Reference to Hospitals of Northern India', New Delhi,** *December 2-4, 2006.* Dr. Pranab Pal attended the international workshop held at the Convention Centre of Jamia Hamdard University, New Delhi. It was organised by National Environmental Science Academy (NESA),

New Delhi in collaboration with the Department of Medical Elementology and Toxicology of Jamia Hamdard. It was sponsored by Indian Council of Medical Research (ICMR) and Council of Scientific and Industrial Research (CSIR), New Delhi and Jamia Hamdard, New Delhi. Dr. Pal presented a paper in the workshop. Over forty five participants attended the workshop.

**Regional workshop on "Policy priorities for sustainable rangeland management in Hindukush Himalaya", Kathmandu, Nepal,** *December 4-7, 2006.* The regional workshop was organized by ICIMOD, Nepal. Dr. S. Sathyakumar presented a paper "Alpine rangelands and wildlife conservation: Development of a policy framework for sustainable livestock grazing in the Himalaya".

**Three days workshop on "Planted forests (ecosystem goods and services)", Dehradun,** *December 13-15, 2006.* The workshop was organized by Forest Research Institute, Dehradun. Shri A.K. Bhardwaj presented a paper in the workshop on "Balancing costs of conservation and development - a case study of Periyar Tiger Reserve".

**Regional conference on natural resources conservation, use and sustainability in drylands, Kutch,** *December 18-19, 2006.* The regional conference aimed to deliberate on the ecology and conservation issues relevant to drylands. GEF supported the conference which was organized by the Gujarat Institute of Desert Ecology (GUIDE), Kutch, Gujarat. Dr. P.K. Mathur attended the conference and presented a paper entitled "Biodiversity in dryland ecosystem: challenges and opportunities for conservation".

**Training programme on "Right to Information Act 2005", Gurgaon, Haryana,** *December 21-22, 2006*. Shri A.K. Bhardwaj attended the training programme which was organized by Impact Academy of Training and consultancy, Gurgaon, Haryana.

**National Symposium on "Role of Applied Zoology in Food Production and Human Health",** *December 23-24, 2006.* Dr. V.P. Uniyal attended the National Symposium which was organized by Department of Zoology, M.S. College Saharanpur, U.P. He presented a paper on "Assessing Tiger Beetles (*Cicindelidae*) as Indicator in Protected Forest areas of Shivalik Landscape".

**Two days project planning workshop, Madurai, Tamil Nadu**, *January 5-7, 2007.* As per the request of Gulf of Munnar Biodiversity Conservation Trust, Shri A.K. Bhardwaj attended the workshop. He facilitated the workshop along with Dr. Sejal Worah, of WWF India for re-planning the project strategies. The workshop was attended by 36 participants belonging to different stakeholders groups. The major objectives of the workshop were: (i) to carry out a participatory analysis of the existing problems/threats contributing to biodiversity loss in the area; (ii) to identify broad areas of intervention and main strategies for the proposed project based upon the above problem analysis; (iii) to identify and agree on the roles of different stakeholders in

project planning, implementation and monitoring; and (iv) to bring different stakeholders together and build consensus and synergy among them for efficient management of this multi-stakeholder project.

**Global event on payment for environmental services, Lombok, Indonesia,** *January 22-27, 2007*. Dr. Ruchi Badola participated in this Global Event. The event was organized by the World Agro-Forestry Centre under its RUPES (Rewarding upland poor for environmental services) program, in association with USAID, Ford Foundation, WWF international and The ADB. The event brought together more than 150 participants from 16 countries. It comprised a two-day scientific conference, one-day training on ecosystem services, practice workshop and an information market as well as a field trip to the watershed areas where RUPES is implementing one of its project on payments for environmental services.

**Two-day national seminar on "Human rights and related environmental issues", Amity School of Natural Resources and Sustainable Development, Noida,** *January 24-25, 2007.* Shri A.K. Bhardwaj presented a paper on "Biodiversity conservation, livelihood security and human rights - a case study from Periyar Tiger Reserve".

**Workshop on human-leopard conflict, New Delhi,** *January, 2007.* The objective of the workshop was the mitigation of human-leopard conflicts, conservation and management of leopard. It was organised by Wildlife Trust of India, New Delhi. Dr. N.P.S. Chauhan attended the workshop.

**Training on "Wildlife monitoring techniques", at Talra Wildlife Sanctuary, Himachal Pradesh,** *February 1, 2007.* Dr. S. Sathyakumar provided inputs on high altitude wildlife monitoring techniques for the field staff of Himachal Pradesh State Forest Department at Talra Wildlife Sanctuary. Field staff from the sanctuary, and other nearby areas attended this training programme that included abundance estimation and monitoring techniques for mountain ungulates, other large mammals, and pheasants.

**Participation in the IUCN led CBBIA-IAIA (Asia) project review meeting, Colombo,** *February 14 -16, 2007.* Dr. Asha Rajvanshi and Dr. V.B. Mathur participated in project review meeting of the IAIA-CBBIA (Asia) Project. During the meeting, IUCN - WII team reviewed the project outcomes, finalized the best practice guidance manual developed as a major output under the Asia component of the project and held discussions on collaborations for future initiatives under the CBBIA project of IAIA.

**International conference on "Emerging conservation strategies for endangered species" Karnavati Club, Ahmedabad,** *February 27-28, 2007.* Dr. Y.V. Jhala gave a presentation on "Monitoring lion and tiger populations in India" at the international conference, which was organized by the Gujarat Forest Department & Vanishing Herds Foundation.

**Lecture workshop on molecular ecology, Coorg,** *March 1-4, 2007.* A workshop was conducted on integration of molecular tools and ecological concepts leading to strengthening of molecular ecology as a discipline. The workshop had twelve invited speakers, who presented information on the application of molecular tools to answer ecological and evolutionary questions. Dr. Karthikeyan made a presentation on "Phylogeography of the Indian subcontinent based on the distribution of extant amphibians and reptiles". The workshop was sponsored by the Department of Biotechnology, Government of India and the Indian Academy of Sciences, Bangalore. A compendium of published papers in the field of molecular ecology in the form of "Suggested readings in molecular ecology" was released during the workshop.

**International training of trainers on wetland management, Bogor, Indonesia,** *March 5-23, 2007.* It was organized by Wageningen International and the South East Asian Regional Centre for Tropical Biology (SEAMEO BIOTROP) and sponsored by RAMSAR Conventions Secretariat and Dutch Ministry of Agriculture, Nature & Food Quality. A total of 23 participants from 10 different countries participated in it. The course focused on facilitation of multi-stakeholder processes and curriculum development. Shri Anup Kumar Nayak attended the training programme.

**Inaugural conference of the Asian Chapter of the Association of Tropical Biology and Conservation: Averting biodiversity meltdown in the Asian tropics, Mammalapuram,** *March 6-8, 2007.* The conference was organized by Association for Tropical Biology – Asia Chapter. The Chapter focused on the progress in research on conservation of biological diversity of the Asian Tropics. There were four plenary sessions in which, plenary lectures were made by Prof. Peter Ashton, Dr. William Laurance, Dr. Jin Chen, Dr. Jaboury Ghazoul and Dr. Margaret Lowman. There were about 60 paper presentations and 18 poster presentations at the conference. The Asia Chapter meeting and some deliberations on the "Heart of Borneo" issue took place at the conference. Dr. Karthikeyan Vasudevan attended the conference.

**National seminar on biodiversity of Himalayan States with special reference to Uttarakhand, G.K.U. Haridwar,** *March 17–18, 2007.* Dr. G.S. Rawat attended the seminar and presented a paper entitled 'Alpine meadows of Uttarakhand: Biodiversity and conservation issues'. The University Grants Commission had sponsored the seminar to generate awareness among the University teachers and students on the current issues of biodiversity conservation. The seminar focused on the Himalayan States, which was attended by where more than one hundred participants.

**Regional capacity building workshop on Orchid taxonomy and conservation, Dehradun,** *March 22-23, 2007*. Dr. B.S. Adhikari participated in the workshop which was organized by Botanical Survey of India and Wildlife Institute of India, Dehradun.

# Professional exchange


*B.S. Adhikari*

## International Collaborations

**Collaboration with USDA Forest Service (USFS)**

The Institute continued its collaboration with the USDA Forest Service on the ongoing WII-USFS Project. During the current year, four USFS scientists Dr. John F. Lehmkuhl, Dr. Bruce G. Marcot, Mr. Richard Holthausen, and Dr. Martin G.Raphael provided technical inputs for the execution of six short duration implementation tasks in four sites while the USFS/FERRO, American Embassy provided required financial support. During the period, one of the associates with managers from SCA field site was supported to participate in the international conference in Canada and present a paper. US collaborators continued to provide inputs for bringing out joint publications arising from the Phase I studies of the project.

**UNESCO-UNF project on 'Enhancing our heritage: Monitoring and managing for success in World Natural Heritage Sites'**

The UNESCO World Heritage Centre (WHC) in collaboration with the IUCN World Commission on Protected Areas (WCPA), the University of Queensland, Australia and with funding support from the United Nations Foundation (UNF) have initiated this project. The project aims to improve the management of World Heritage Sites through the development of better assessment, monitoring and reporting systems and the application of the results of these systems to adopt/enhance site management as required. Based on the results of the project, IUCN will provide recommendations to the World Heritage Committee on a consistent approach to assessment, monitoring and reporting on the state of conservation and management effectiveness of the World Heritage Sites.

Nine World Heritage Sites in Africa, Latin America and South Asia have been included under this project. The three South Asian pilot sites are Kaziranga National Park, Assam, Keoladeo National Park, Bharatpur and Chitwan National Park (CNP), Nepal. The Ministry of Environment and Forests, Government of India has entrusted the responsibility of project implementation to the Wildlife Institute of India (WII) as a regional partner institution.

During the reporting period, extensive monitoring of the waterfowl populations was carried out in Keoladeo National Park (KNP). A total of 34 satellite wetlands ranging between 1-70 $km^2$ in size were identified within 200 km radius of KNP in 5 districts (*viz*. Bharatpur, Dausa, Jaipur, Karauli, Dholpur) of Rajasthan and 2 districts (*viz*. Mathura and Agra) of Uttar Pradesh. Of these, 9 wetlands were large perennial, 4 small perennial, 16 large seasonal

and 5 small seasonal. Except Nonera (Bharatpur), Hulwana and Sankhi (Mathura), which are brackish water wetlands, the remaining are all fresh water wetlands.

Many of these wetlands hold high conservation value for several water bird species both migratory and resident by providing them wintering, staging and roosting grounds. During the study, a total of 76 water bird species were recorded from the KNP whereas 94 species were observed in satellite wetlands. Common Shelduck *Tadorna tadorna*, Sociable Plover *Vanellus gregarious* and White-eyed Pochard *Aythya nyroca* could only be recorded from KNP while Pied Avocet *Recurvirostra avosetta*, Lesser Flamingo *Phoenicopterus minor*, Maskfinfoot *Heliopais personata*, Great Thick-knee *Esacus recurvirostris*, River Lapwing *Vanellus duvaucelii* and Indian Skimmer *Rynchops albicollis* were observed in satellite wetlands only.

In Kaziranga National Park, capacity building programmes for frontline staff were conducted. Insurgency and civil strife in Chitwan National Park, Nepal, that had constrained the project activities in this pilot site abated during the reporting period allowing the resumption of some of the activities. In the final year of the project *i.e.* 2006-07, Management Effectiveness Evaluation (MEE) as per the IUCN-WCPA framework will be carried out in the project sites. A 'Project Review Meeting' was held on February 6-8, 2007 in which Dr. Marc Hockings, Project Manager, site managers and project team participated at WII. A workshop on 'Assessment and Monitoring of Natural World Heritage Sites' was organized on March 14-15, 2007 in Dehradun to discuss the revised project workbook and toolkits and to plan the MEE in the project sites during the final year of the project. Site managers from three world natural heritage sites in India *viz.* Sunderbans, Manas and Nanda Devi were also invited to participate, for which additional funds were provided by UNESCO, New Delhi.

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

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 and Forests (MoEF), Government of India, to develop a ten-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 & 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 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 three meetings of the Project Steering Committee under the Chairmanship of Additional Director General (Wildlife), MoEF were organized to discuss the operational modalities and budgetary re-allocation in view of the reduced funding now available for the project.

**Capacity Building Programme through IAIA – CBBIA Project (Asia)**
The 'Capacity Building for Biodiversity and Impact Assessment (CBBIA)' project, which is managed by International Association for Impact Assessment (IAIA) and funded by the Netherlands Government, was initiated in 2005. This three-year global project was aimed to share information and experience and support capacity building, through transfer of knowledge, institution-building and networking. The CBBIA project seeks to integrate biodiversity conservation in Impact Assessment (both Environmental Impact Assessment or EIA at project-level, and Strategic Environmental Assessment or SEA at policy, plan or programme levels), and develop capacity among stakeholders in developing countries in several regions, including southern Africa, central America and Asia. The anticipated outcome of this project was the development of guidance on biodiversity-inclusive EIA and SEA, training materials and the documentation of case studies. The project in Asia that was initiated in December 2005 with IUCN and WII as partner organization is running in its second year. The following tasks have already been accomplished under the above project: (i) Identification of the target countries for providing capacity building support. (ii) Need assessment survey for identifying capacity needs for the countries in the region. (iii) Finalization of the sectors: oil and gas, transportation and mining as key sectors for targeting the development of biodiversity inclusive impact assessment. (iv) Compilation of country specific information on EIA legislations, processes and case studies. (v) The development of draft guidance manual.

## International Consultancy

Dr. Asha Rajvanshi was entrusted a short-term consultancy assignment by the Wetlands International to conduct the mid-term evaluation of the Green Coast Project "Green coast for nature and people after the tsunami" in India and Sri Lanka. Dr. Asha undertook this consultancy assignment with two other consultants- Roel Slootweg and Hilde Janssen from the Netherlands and Indonesia respectively. The task involved visit to project implementation sites in India and Sri Lanka and appraisal of project outputs, extensive consultations with project managers in India and Sri Lanka, stakeholders, project beneficiaries, regional experts, Govt. representatives and project staff. Dr. Asha submitted the final evaluation report jointly with other partners in December 2006.

*Asha Rajvanshi*

**Collaboration with Department of Civil and Environmental Engineering (DICA) of the University of Trento, Italy for EIA related research**

In order to provide a mechanism for scientific and professional cooperation between Republic of India and Republic of Italy, the Wildlife Institute of India (WII) and the Department of Civil and Environmental Engineering (DICA) of the University of Trento signed an international exchange agreement to conduct mutually beneficial cooperative activities including developing research and training activities within the scope and expertise of the two institutions. The Memorandum of Understanding between WII and DICA, University of Trento, Italy was signed on July 20, 2005 to establish a basic framework for conducting cooperative activities between WII and DICA and promote professional exchange between the two institutions. Under the provisions of a joint MoU, a collaborative research 'development of spatial decision support system for ecological impact assessment of urban developments in natural areas' was initiated under the joint supervision of Prof. Corrado Diamantini and Dr. David Geneletti of DICA and Dr. Asha Rajvanshi. The research work on the above topic is being pursued by Dawa Dorje. The focus of the research is on the impacts of tourism driven development, urban growth and factors responsible for environmental deterioration in Laddakh.

## Services

**State Empowered Committee on Forests and Wildlife Management, Government of Rajasthan**

In the wake of the crisis faced by the three prominent protected areas in Rajasthan *viz.* Sariska, Ranthambhore and Keoladeo, the Government of Rajasthan constituted a State Empowered Committee (SEC) on Forests and Wildlife Management under the Chairmanship of Shri V.P. Singh, Member of Parliament. Dr. V.B. Mathur was a member of the SEC. The SEC requested the Institute to provide technical inputs in the planning and implementation of herbivore and carnivore census operations in Sariska and Ranthambhore Tiger Reserves. The SEC submitted its report to the Government of Rajasthan in August, 2005. The SEC has been re-constituted into 'Steering Committee on Forestry and Wildlife Management' with a broader mandate that *inter-alia* includes the follow-up of the recommendations for the three PAs in Rajasthan. As a member of this re-constituted committee, Dr. V.B. Mathur provided inputs in the committee meetings.

**High Level Committee for re-introduction of tigers in Shivpuri National Park, Government of Madhya Pradesh**

The Government of Madhya Pradesh constituted a High Level Committee for the re-introduction of tigers in Shivpuri National Park under the Chairmanship of Shri Samar Singh, former Secretary General, WWF-India. Shri P.R. Sinha and Dr. V.B. Mathur were invited to become members of this committee. The Institute was requested to conduct a survey of the park in January, 2006 based on which a report 'Rapid Assessment of Habitat Use and Wildlife Values of Madhav National Park, Shivpuri' was submitted to the committee. Meetings

of the committee were held in Shivpuri and New Delhi to work out strategies. The final report of the committee was submitted in November, 2006.

**Delhi Development Report for the Planning Commission**

The Planning Commission, Government of India requested the Institute to prepare a chapter on 'Wildlife Conservation and Management' for the Delhi Development Report (DDR). Dr. V.B. Mathur and Dr. Ashish David provided inputs in the deliberations of the committee constituted by the Planning Commission and submitted a chapter on 'Wildlife Conservation and Management' for the DDR. A presentation on the report was organized by the Planning Commission and the report was accepted in March, 2007.

**IUFRO Task Force on Endangered Species and Nature Conservation**

Dr. V.B. Mathur was invited to become a member of the International Union of Forestry Research Organizations (IUFRO) Task Force on Endangered Species and Nature Conservation. The Task Force is chaired by Dr. Robert Szaro, Chief Scientist for Biology, US Geological Survey and has ten scientists from Russia, Sweden, Slovenia, USA, Belgium, Slovakia, Malaysia, Canada, Switzerland and United Kingdom. The goal of the Task Force is to increase the understanding of the role of conservation efforts in responding to endangered species and the development of a set of recommended best management practices.

**An ecological assessment of Baan Ganga wetlands, Uttarakhand**

**Funding agency**: Forest Department, Uttarakhand

**Team members:** Dr. V.B. Mathur, Dr. G.S. Rawat, Dr. K. Sankar, Dr. R. Badola, Smt. B.C. Sinha, Dr. S.A. Hussain, Dr. B.S. Adhikari, Dr. Bivash Pandav, Dr. K. Sivakumar, Dr. H. Padalia, Shri R.K. Chaturvedi and Shri M.M. Babu

**Date of initiation:** May 2006

**Date of completion:** April 2007

**Objectives:** (i) To make a floral inventory of the Baan Ganga Wetlands; (ii) Rapid Assessment of major faunal groups *viz.*, mammals, birds and fishes; (iii) Assessment of the soil and water quality of the area especially effects of industrial waste; (iv) To prepare a baseline map of the wetland and its connectivity to adjacent natural areas; (v) To study the dependency of local communities on the resources of the wetlands; and (vi) To design an interpretive facility for the Baan Ganga Wetlands.

**Progress:** An ecological survey of the River Baan Ganga and the associated wetlands (henceforth named as Baan Ganga Wetlands). The Baan Ganga Wetlands represents the remnant Tarai habitat in Uttarakhand. A total of 178 plant species were recorded from the Baan Ganga wetlands. Of these, 40 species were hydrophytic, 122 species semi-aquatic and 117 mesophytic.

Based on the rapid ecological surveys on various aspects, following major recommendations were given for the conservation and management of the Baan Ganga Wetlands: It was recommended that the Forest Department in

consultation with Revenue Department and local people should take up demarcation of the area for identifying and prioritizing areas for conservation and for maintaining *status quo* of the land use practices. There is need to develop a participatory conservation action plan for Baan Ganga groups of wetlands. This area needs to be included with Jhilmil Jheel Conservation Reserve and should be managed together as a single unit. It was strongly recommended that minimum water flow in the River Baan Ganga be maintained and activities that diminish the water flow should be controlled.

This study has established baseline information on the water quality at various sections along the River Baan Ganga. Continued monitoring of water quality on year to year basis would be valuable in detecting the amount of pollutants added to the river. The wetlands are suffering from water hyacinth infestation. Removal of water hyacinth in the wetlands should follow a two pronged approach. Firstly, the larger reservoirs of water hyacinth located upstream need to be cleared by flushing out such patches during monsoon and also manually removing from the water bodies. This should be followed by periodic removal of water hyacinth from the down stream areas. Efforts should be made to compost the water hyacinth and use it as green manure.

*Phragmites* and *Typha* patches along the river bank and on the islands provide ideal shelter for swamp deer as well as breeding sites for the resident water birds. Removal of *Typha* and *Phragmites* patches through cutting and burning needs to be regulated and this could be allowed only from the pre-designated areas on rotational basis. It was proposed to go for small scale culture fisheries in nearby village ponds. It was recommended that the State Forest Department along with the State Fisheries Department can take up projects to promote aquaculture in this region using existing water bodies with native fish species. This will significantly reduce pressure on the Conservation Reserve and its biodiversity.

Current methods of traditional fishing may be continued with following conditions: Fishing should not be allowed between November and March. Fishermen should not be allowed to camp in the mounds/islands. Destructive fishing methods such as dynamiting, electrifying, poisoning in the area needs to be controlled. A proper guideline for fishing needs to be developed with the consensus of Gram Panchayat, State Forest Department and Fisheries Department.

Consultative meetings with other stakeholders at the local level should be conducted for identification of sustainable livelihoods and alternate enterprise development. The Baan Ganga Wetlands needs a minimum number of signs at strategic locations to welcome, direct or control visitors. It also needs small brochures to educate the visitors about its biodiversity, functions and values. This may be prepared on priority and make available to the visitors.

The conservation reserve supports a sizeable population of migratory waterfowl, a wide variety of fish, endangered swamp deer and because of

its proximity to Rajaji National Park and Haridwar city it is an ideal destination for ecotourism. Development of an interpretation centre highlighting the biological and conservation significance of these wetlands would enhance the tourism potential of the area.

## Advisory Support

**Advisory support to Ministry of Environment and Forests, Govt. of India on matters related to environmental decision making**

WII continued to provide advisory services to MoEF on matters related to environmental decision making. WII is represented on the Expert Committee for mining projects. In this capacity, WII is advising the Environment Division of MoEF in the evaluation of EIA reports on mining projects for decision making with respect to environmental clearance. The nature of work involved extensive review of EIA documentation, attending Expert Committee Meetings at MoEF for environmental appraisal of projects and review of project specific Conservation Plans prepared as part of Environmental Management Plans (EMP). Dr. Asha Rajvanshi and Dr. B.K. Mishra are members of the Expert Committee (mining).

**Advisory support to Committee for Infrastructure enhancement in PAs under XI plan constituted by the Ministry of Environment and Forests, Govt, of India**

Dr. Asha Rajvanshi was invited to become a member of the Committee for Infrastructure enhancement in PAs under XI plan constituted by the Ministry of Environment and Forests, Govt, of India. In this capacity, Dr. Asha attended the meetings of the committee and coordinated the task of prioritization of Protected Areas for suggesting infrastructure enhancement under XI plan that was assigned to WII. This involved extensive literature search, review of WII database, discussions with State representatives and with WII faculty and finally the compilation of information for MoEF.

Additionally, the task also involved developing the concept of retrofitting practices and identifying sites for implementation of retrofitting best practices within PAs. Based on the conceptualization of ideas and the preliminary work on this task presentation on "Retrofitting best practices for mitigating impacts of existing infrastructure in and around Protected Areas and other sensitive habitats" was made before the Secretary, MoEF on June 22, 2006 to share the concept and provide a practical scheme for initiating trials in some pilot sites. Further consultations with wildlife managers, conservation community, wildlife experts and technocrats on identification of sites for implementation of the concept of retrofitting are in progress for identification of pilot sites.

**Committee of Environment of Indian Road Congress**

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. Asha attended the quarterly

meetings of the committee and provided the needed professional support in accomplishing the committees mandate of preparing EIA guidelines, developing manuals for landscaping and tree plantation on highways, manuals for formulation of Environmental Management Plan for road projects and development of guidelines for biodiversity sensitive planning of roads and highways.

**Development of criteria for registration of EIA consultants**

As a part of the ongoing initiative of MoEF for revision of environmental clearance process, the Quality Council of India initiated the development of registration scheme for EIA consultants through National Registration Board for Personnel and Training (NRBPT). Dr. Asha Rajvanshi was invited to serve as an expert in the core group constituted by Quality Council of India for developing comprehensive criteria for registration scheme (registering firms and individual consultants) to undertake EIAs. In this capacity, she participated in the consultative meetings organized by NRBPT and provided professional support in the development of guidelines/criteria for certification of EIA consultants for the focal area – Ecology & Biodiversity. Following the development of the registration scheme (now already uploaded on the website of Ministry of Environment and Forests, Govt. of India), the Quality Council of India has invited Dr. Rajvanshi to become a Member of the Technical Committee for the scheme. In this capacity, Dr. Rajvanshi is participating in the meetings of the committee and is providing advisory support in review of the criteria for EIA consultant organizations for NRBPT registration.

**Department of Wildlife Protection, Government of Jammu & Kashmir**

Three assignments were given to Wildlife Institute of India by the Department of Wildlife Protection, Government of Jammu & Kashmir. These were:

**(a) Preparation of Management Plan for Protected Areas of J&K,**
**(b) Preparation of Hangul Conservation Action Plan, and**
**(c) Planning & Development of Interpretive Facilities**

For first assignment two draft management plans *i.e.* for Hemis High Altitude National Park and Kishtwar High Altitude National Park have been completed and communicated to the department. For second assignment, Hangul Conservation Action Plan has been prepared and sent to department. Interpretive plan has been developed for Gharana Wetland Reserve, Jammu. Detailed layouts and panel designs have been suggested. A booklet titled "Feathered friends" has also been developed.

**Evaluation of centrally sponsored scheme, Project Elephant in Orissa,** *December 12-18, 2006,* **Jharkhand,** *January 3-6, 2007* **& Uttarakhand,** *December 23-25, 2006.* On the invitation of Project Elephant, MoEF, WII undertook an evaluation of Project Elephant implementation in Orissa. Dr. Sushant Chowdhary and Shri Anup Nayak visited three elephant reserves out of five existing or proposed in Orissa. The evaluation was done based on the objectives of the scheme, organizational set up, constraints in preparation, sanction and implementation of the scheme, performance against objectives, continued

relevance of the scheme, suggested changes to enhance efficiency and accountability and impact of the scheme to forest dwelling tribals and women beneficiaries.

Dr. Sushant Chowdhary visited the Singhbhum Elephant Reserve (ER) in Jharkhand. It was found that lack of secured elephant source habitat is the major impediment in Singhbhum ER. Identifying Conservation Reserve in the region with community involvement has been recommended.

An evaluation team comprising Dr. Sushant Chowdhary, Dr. Bivash Pandav and Dr. Parag Nigam visited the Shivalik Elephant Reserve (ER) in Uttarakhand. Securing more source elephant habitats in eastern part of Shivalik ER covering forests of Terai East, Haldwani and Champawat FDs as conservation was emphasized. Several other recommendations including corridor maintenance, conflict resolution and trans-border co-operations are submitted. Detailed reports of the evaluation in three States have been submitted to Project Elephant, MoEF, GOI.

# Visitors

*Vinod Verma*

- Students of B.Sc. from G.B. Pant Institute, Ranichauri on April 10, 2006.
- M.Sc. (Forensic Science) students from Punjab University, Patiala on April 17, 2006.
- Forest Guard Trainees of 88$^{th}$ batch with two instructors from Natural Resource Management Centre (NRMC), Forest Department, Haryana, Sohna (Gurgaon) on May 3, 2006.
- P.G. students and faculty members from Department of Zoology, Cotton College, Guwahati on May 4, 2006.
- IFS officers of 1989 batch from IGNFA, Dehradun on May 10, 2006.
- Range Forest Officer Trainees and two faculty members from Kurseong on May 12, 2006.
- Shri V.L. Chopra, Member of Planning Commission on May 18, 2006.
- Dr. Kamlesh Joshipura, Vice Chancellor, Saurashtra University on May 19, 2006.
- Students and four teachers from Methodist High School, Kanpur on May 19, 2006.
- IFS officers of 1975 batch from Indira Gandhi National Forest Academy (IGNFA), Dehradun on May 29, 2006.
- Students from Veterinary College, Anand, Gujarat on May 31, 2006.
- IFS officers of 1996 batch from IGNFA, Dehradun on June 6, 2006.
- Students from SFS College, Dehradun on June 13, 2006.
- IFS Officers of 1989 batch, participating in the Advance Forest Management Course at IGNFA, Dehradun, on July 19, 2006.
- Cadets accompanied by their masters from the Rashtriya Indian Military College, Dehradun Cantt on July 28, 2006.
- IFS Officers from IGNFA, Dehradun on August 23, 2006.
- Forest Guards of the Department of Forests, Himachal Pradesh from the Forest Training Centre, Sunder Nagar on August 29, 2006.
- Students of B.Sc. Forestry and a staff member from Tamil Nadu Agricultural University, Forest College and Research Institute, Mettupalayam on September 4, 2006.
- IFS officers of 1996 batch, from IGNFA, Dehradun, on September 5, 2006.
- Students of B.Sc. Forestry from Dolphin Institute of Bio-Medical & Natural Sciences, Dehradun on September 6, 2006.
- Participants of a training course from State Forest Service College, Dehradun on September 12, 2006.
- Range Forest Officer trainees and faculty members of State Forest Service College, Coimbatore on September 15, 2006.
- Students of B.Sc. (Hons) Botany of the Zakir Husain College, University of Delhi, New Delhi on September 20, 2006.
- Students of M.Sc. Botany and two faculty members of Akkineni Nageswara Rao College, Gudivada on September 24, 2006.

- Students accompanied by their teachers and officers from Shri Harikisan Public School, Bhatinda (Punjab) on September 29, 2006.
- Veterinarians from Tamilnadu Veterinary and Animal Sciences University, Madras Veterinary College, Chennai, on September 29, 2006.
- B.Sc. students and professors form Jagannath Barooah College, Jorhat, Assam, October 6, 2006.
- B.Sc. (Hons.) Botany students from Zakir Husain College, University of Delhi, New Delhi on October 20, 2006.
- B.Sc. Forestry students and faculty members from College of Forestry, Kerala Agricultural University, Thrissur on October 25, 2006.
- Students of final year from Carmel College of Arts, Science & Commerce for Women & faculty members, Nuvem, Goa, on October 30, 2006.
- Members of Forest Development Agency, Pattan, Lahaul Forest Division, Kullu Forest Circle, Himachal Pradesh, on October 30, 2006.
- Senior Retired Forest Officers (1954 Batch officers of Indian Forest College) on October 31, 2006.
- B.Sc. Forestry students form Bangalore College of Forestry, University of Agricultural Sciences, Ponnampet, Kodagu, on November 3, 2006.
- IFS Officers of 1981-1984 batches, who participated in the Advance Forest Management Course at IGNFA, Dehradun, on November 8, 2006.
- Students accompanied by their teachers from Lovedale Academy, Clement Town, Dehradun, on November 14, 2006.
- IFS Officers of 1986-1988 batch, who participated in the Advance Forest Management Course at IGNFA, Dehradun, on November 21, 2006.
- Students from the Institute of Forestry, Nepal, on November 21, 2006.
- Visit of Senior Police Officers undergoing Staff Officer Level – I course at Indo Tibet Border Police Academy, Mussoorie, on November 24, 2006.
- Students from Forestry Training Centre, Sundranagar (H.P.), on November 27, 2006.
- Students from Dept. of Zoology, Jai Narain Vyas University, Jodhpur, on November 29, 2006.
- Students from Carman School, Shyampur, Premnagar, Dehradun, on November 29, 2006.
- B.Sc. Forestry students from Institute of Forestry, Pokhra (Nepal), on December 1, 2006.
- B.Sc. students from College of Fisheries, Sairgaon (Maharashtra), on December 6, 2006.
- Participants of Seraj Forest Division, Banjar Distt. Kullu, Himachal Pradesh, on Dec. 7, 2006.
- B.V.Sc. students from College of Veterinary Sciences and Animal Husbandry, Jabalpur (M.P.), on December 8, 2006.

- Students from Delhi College of Engineering, Bawana Road, Delhi, on December 11, 2006.
- In-service SFS Officers of the General Refresher Course at SFS College, Dehradun, on December 13, 2006.
- Officers of 3rd Special Advanced Forest Management Training Course for Indian Forest Service Officers from Indira Gandhi National forest Academy on January 10, 2007.
- Students accompanied by their teachers from PG Department of Zoology Raja N.L. Khan Women's College Gope Place, Midnapore Paschim, Medinipur on January 13, 2007.
- Cadets and two masters from Rashtriya Indian Military College, Dehradun, on January 31, 2007.
- B.Sc. forestry students accompanied by their faculty members from College of Forestry, Dapoli, Dist. Ratnagiri, Maharashtra, on February 15, 2007.
- Range Forest Officer trainees accompanied by their faculty members from Eastern Forest Rangers College, Kurseong, Distt. Darjeeling, W.B. on February 19, 2007.
- Senior Army Officers from National Defence College, New Delhi during their economy, science and technology study tour during February 19 to 23, 2007.
- Trainees of KFC course 2006-07 from Soil Conservation Training School Miran Sahib, Jammu, J&K on February 23, 2007.
- Senior officers, ITBP undergoing senior officers' management level-II course in Indo Tibet Border Police Academy, Mussoorie, on February 23, 2007.
- Trainees of Ranger class from J&K on February 28, 2007.
- Trainees of Forest Guard Training from Natural Resource Management Centre (NRMC) Forest Department Haryana, Sohna (Gurgaon) on March 8, 2007.
- B.Sc. forestry students accompanied by their faculty members from Allahabad Agricultural Institute - Deemed University, Allahabad, U.P. on March 14, 2007.
- B.V.Sc. students from College of Veterinary Sciences, Bikaner, Rajasthan Agricultural University on March 19, 2007.
- Students of B.V.Sc. final from College of Veterinary Science & A.H., Ch. Sarwan Kumar H.P. Krishi Vishwavidyalaya, Palampur on March 19, 2007.
- Visitors from National Defence College, New Delhi, on March 19, 2007.
- Students of final B.V.Sc. along with their faculty members and staff from College of Veterinary Science & A.H., Rajasthan Agricultural University, Bikaner on March 20, 2007.

# Professional Support

EIA

Computer & GIS

National Wildlife Database

Wildlife Forensic

Audio Visual & Wildlife Extension

Library and Documentation Centre

ENVIS

Wildlife Policy Research

Captive Breeding & Zoo Management

Research Laboratory

Herbarium

Wildlife Health Services

Conservation Genetics Laboratory

Campus Development

## Environmental Impact Assessment Cell

The Environmental Impact Assessment (EIA) Cell of WII continued to provide professional support in capacity building initiatives at WII, sister organizations, other institutions, professional bodies, and government and corporate organizations. The following are the specific tasks accomplished by EIA Cell in the reporting year.

Pragateesh

Pragateesh

**EIA studies under consultancy offers**

**Evaluation of the ecological and socio-economic consequences of setting up of proposed Mathwad Wildlife Sanctuary and Kathiwad Wildlife Sanctuary, Madhya Pradesh**

**Funding source:** Narmada Valley Development Authority (NVDA)

**Objectives:** The NVDA requested WII to take up the ecological assessment of the sites of two proposed wildlife sanctuaries *viz.* Mathwad and Kathiwad in Jhabua District of Madhya Pradesh for assessing their suitability as proposed PAs and for assessing the efficacy of the mitigation measures proposed for addressing the ecological impacts of the Sardar Sarovar Project. The following is the broad scope of work under the consultancy awarded by NVDA: (i) Evolve criteria for reviewing the location, size, site characteristics and conservation values for determining the suitability of the area proposed for designation as a protected area. (ii) Assess consequent impacts of setting up of a protected area on livelihood, marginalization and access to common properties of local dependent communities. (iii) Assess the impacts of anthropogenic pressures and other existing threats that may counter the goals and objectives of setting up of a PA. (iv) Assess impacts of surrounding landscape features, demographic profile, existing and proposed infrastructure development for evaluating ecological integrity of the area identified to be designated as a PA. (v) Review the effectiveness of the proposed PAs in mitigation of perceived impacts of Sardar Sarovar project. (vi) Assess the viability of such an area as a conservation unit for long-term conservation benefits. (vii) Suggest appropriate management interventions for enhancing effectiveness of PA for compensating project impacts, improve long-term conservation benefits.

**Placement of students for academic support in post graduate and doctoral research**

The EIA Cell of WII has been providing academic support to several universities within the country by providing opportunities to graduate and post graduate students for undertaking dissertation work and summer training. Shri Rishi Kumar Shukla, a masters student of the Indira Gandhi Academy of Environmental Education, Research and Ecoplanning, Jiwaji University, Gwalior sought placement in the EIA Cell of the institute to work for his dissertation on the topic "Monitoring of the changes in water quality of some seasonal

streams of Dehradun in response to visitor influence". The study focused on assessment of the water quality of two local streams and to identify the factors leading to the changes in the stream quality.

## Computer & GIS Cell

The computer facility of the Institute has a very impressive array of computer hardware and software. This facility has been considerably strengthened with inputs from the Institute's own resources and those from various collaborative projects. All the eight faculty departments and the library, administration and finance sections are equipped with a range of Pentiums systems. Major scientific activities of the Institute, including database management, graphic analysis, statistical operations, mapping and desktop publications are carried out on these machines.

The Institute has a heterogeneous computer hardware setup connected to Local Area Network (LAN). There are two Pentium II file servers; two Pentium III Internet/Intranet servers; two Itanium servers; four Unix based Sun workstations with ArcGIS software for Geographical Information System (GIS) and ERDAS Imagine for digital image processing of remotely sensed data; and 200 plus nodes. The LAN is based on the State-of-the-Art structured cabling with fibre optics as the backbone connecting all the office buildings. The computers are connected to LAN through network switches on UTP cable. The Institute's LAN with Wi-Fi connectivity is provided to Guest House, Old Hostel and New Hostel and office premises *viz.* Auditorium, Library, Board Room, Porta Cabin, Diploma Classroom and Office of Director, and Dean, Faculty of Wildlife Sciences.

The Institute has 512Kbps leased line internet connectivity with its own internet server hosting the Institute's website and mailing system. All the computers of the Institute are provided with internet and mailing services. The users are provided with individual email account on the Institute's server.

The Institute has established intranet services (http://intranet) to facilitate the users within the campus to disseminate information online *viz.* Institute's Rules and Procedures, Work Calendar, Computer AMC Call Management System, Map Management System, submission of tour programmes, Circulars, Search trainees database, Meteorological data, Shabdavali – online Hindi glossary, Newspaper Clip Management Services, Email, Internal phone directory and information compiled under e-Governance project.

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The Computer & GIS Cell conducted computer-training courses for the students, researchers and officer-trainees of the PG Diploma Course and Certificate Course in wildlife management. Inputs were given on concepts of computer, LAN/internet, software packages *viz.* MS Windows, MS-Office, SPSS, S-Plus and specialised software packages related to wildlife research. Hands on training were also given on Arc/Info and ERDAS Imagine software packages for Geographical Information System, Remote Sensing and Global Positioning System technology.

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Geographic Information System (GIS), Remote Sensing (RS) and Global Positioning System (GPS) 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 spatial database on the boundaries of all the national parks and wildlife sanctuaries in the country. Similarly, digitization of the division, range and beat boundaries of the 17 tiger range states in the country is also in progress.

**e-Governance project at WII:** The Ministry of Environment and Forests (MoEF) has initiated the e-Governance project "ENVISION" with the objective of applying principles of good governance to the management and regulation of use of environmental resources. The Institute has constituted e-Governance Committee under the Chairmanship of Dean, Faculty of Wildlife Sciences and e-Champions have been nominated within the Institute for the implementation of e-Governance project. Several meetings of this committee have been conducted. The following information has been compiled and made available on intranet/internet: (i) Database on all the research projects (completed and ongoing) of the Institute. The information includes name of the project, date of initiation/completion, name of Project Investigator and research scholars and summary of research findings. (ii) Searchable database of the Officer Trainees of 9-month PG Diploma Course and 3-month Certificate Course in Wildlife Management and students of M.Sc. courses in Wildlife Science. (iii) Dissertations of students of M.Sc. course of the Institute. (iv) Abstracts of Ph.D. thesis emanating from research projects of the Institute. (v) E-directory having contact addresses of PCCFs, CWLWs of all State Forest Departments. (vi) E-directory having contact addresses of WII employees. (vii) Leave management system of WII employees. (viii) Online Document Management System which is a database of Articles, Research Reports, Technical Reports, M.Sc. dissertations, Research Papers presented during various Workshops, Seminars etc. on Wildlife Conservation. (ix) Searchable database of agenda/minutes of Institute's committees *viz.* WII-Society, Governing Body, Finance Committee, Research Advisory Committee and Training, Research & Academic Council (TRAC).

## National Wildlife Database

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

During 2006-2007, the main thrust of the activities was on the collection, compilation, input of data and its validation. The Protected Area Database of the country was updated further. Species Database was corrected and updated by adding information on the distribution of mammalian species in

various protected areas. Trainees Database of the Institute has also been updated further, Bibliographic Database was updated by addition of current literatures published on Indian wildlife in the various issues of journals & periodicals received during the said period.

Website of the NWD has been modified and updated by incorporating the current information. The Cell assisted the GIS Cell in further development and updation of protected area atlas and protected areas location maps by providing information on various protected areas. More than two hundred fifty queries were received and outputs were provided in various formats.

## Wildlife Forensic

During the reporting period, Cell received 84 wildlife offences for identification of species from the seized biological products. Most of the parts reported under these cases were of shatoosh shawls, skins, hair, bones, claws, meat, ivory and its products, painting brushes and other finished products like shoes, waist belts, fishing flies, pendants etc.

After establishment of the ultra modern Wildlife Forensic DNA facility at the Institute, following works were initiated: (i) development of DNA profile data base of Indian species for better implementation of various Acts, (ii) undertake R/D work for developing and standardizing protocols for identifying species from various animal part, and (iii) to dealing of wildlife offences. Under research work, major emphasis was made on developing DNA profile of Indian species and known samples were sequenced for different regions of mtDNA. The obtained sequences were submitted to GenBank database of National Center for Biotechnological Information, USA.

In view of fairly large number of cases of hair, it was attempted to develop protocols for extracting DNA from such samples. Six different DNA extrcation protocols *viz.* Phenol chloroform method, Qaigen DNA easy kit, BioRobot, Geneclean kit, Alkali digestion, Chelex were tried for hair samples. Four different primers were used to amplify the DNA with PCR targeting cytochrome b ,16s r RNA, 12s r RNA and control region of the mitochondrial DNA.

Sarcoplasmic protein profiles was also done using SDS-PAGE and IEF for species identification of some bird, mammal and reptiles. Species specific bands were found. 26 cases were undertaken to identify the species from material sent to Forensic Cell based on DNA analysis under wildlife offences. Tissue reference samples of different species were provided by zoos at New Delhi, Hyderabad, and Mysore, and by BNHS for dealing wildlife offences.

Inputs were also provided to various officers, classes and others visitors to the Wildlife Forensic lab from IGNFA, SFS, RIMC, ITB Police Academy, Mussoorie, Institute of Forestry, Pokhra, Nepal and other Universities. WFC personnel have also appeared regularly in the court of law as "Expert Witness".

DNA sequences submitted to NCBI, USA

| NO. | Species | Gene | Assession No. |
|---|---|---|---|
| 1 | *Panthera tigris* | control region | EF392686 |
| 2 | *Panthera tigris* | cytochrome b | EF392684 |
| 3 | *Panthera tigris* | cytochrome b | EF394927 |
| 4 | *Panthera tigris* | 12S ribosomal RNA | EF392685 |
| 5 | *Panthera tigris* | 16S ribosomal RNA | EF392683 |
| 6 | *Panthera tigris* | 16S ribosomal RNA | EF394928 |
| 7 | *Panthera pardus* | 16S ribosomal RNA | EF202838 |
| 8 | *Hyaena hyaena* | 16S ribosomal RNA | EF202837 |
| 9 | *Hyaena hyaena* | cytochrome b | EF107524 |
| 10 | *Hyaena hyaena* | 16S ribosomal RNA | EF107510 |
| 11 | *Capricornis sumatraensis* | cytochrome b | EF202142 |
| 12 | *Capricornis sumatraensis* | cytochrome b gene, | DQ919163 |
| 13 | *Capricornis sumatraensis* | 16S ribosomal RNA | EF202141 |
| 14 | *Capricornis sumatraensis* | 16S ribosomal RNA | DQ888573 |
| 15 | *Bos gaurus* | 16S ribosomal RNA | EF219404 |
| 16 | *Bos gaurus* | 12S ribosomal RNA | EF219403 |
| 17 | *Moschus fuscus* | cytochrome b | DQ417658 |
| 18 | *Moschus fuscus* | 16S ribosomal RNA | DQ449627 |
| 19 | *Moschus fuscus* | 12S ribosomal RNA | EF219402 |
| 20 | *Gazella bennettii* | cytochrome b | EF079832 |
| 21 | *Gazella bennettii* | cytochrome b gene, | DQ919164 |
| 22 | *Gazella bennettii* | cytochrome b gene, | DQ919166 |
| 23 | *Gazella bennettii* | 16S ribosomal RNA | EF219406 |
| 24 | *Gazella bennettii* | 16S ribosomal RNA | DQ989297 |
| 25 | *Gazella bennettii* | 12S ribosomal RNA | EF133853 |
| 26 | *Antilope cervicapra* | cytochrome b | EF079831 |
| 27 | *Antilope cervicapra* | 16S ribosomal RNA | DQ989295 |
| 28 | *Capricornis sumatraensis* | 16S ribosomal RNA | DQ989294 |
| 29 | *Capricornis sumatraensis* | cytochrome b | EF079833 |
| 30 | *Capricornis sumatraensis* | cytochrome b gene, | DQ919165 |
| 31 | *Tetracerus quadricornis* | 16S ribosomal RNA | EF219405 |
| 32 | *Tragulus meminna* | cytochrome b | DQ676954 |
| 33 | *Tetracerus quadricornis* | 12S ribosomal RNA | EF175739 |
| 34 | *Axis axis* | cytochrome b | EF051260 |
| 35 | *Francolinus pondicerianus* | cytochrome b | DQ868945 |
| 36 | *Francolinus francolinus* | 16S ribosomal RNA | DQ868944 |

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## Audio Visual & Wildlife Extension

The Audio Visual Unit of the Institute caters to the need of various requirements of academic activities. The unit maintains 16mm films, video films, synchronized programme, CD/DVD, Conference system, Projection system, various audio-visual equipments, still cameras and video cameras with accessories and photo library.

During the reporting period, the unit screened 46 shows of nine-projector synchronized programme "We are Nature, Nature is our world". Photographic documentation of the various activities of the Institute was done. Computerized database is being prepared for the quick retrieval of these photographs. Computerized database has also been prepared for the video films. The Cell is now developing capacity in producing short films. During the reporting period a short film on Jhilmil Jheel was under process.

As part of the information dissemination programme, four issues of W.I.I. Newsletter were published. World Environment Day was celebrated in the Institute on June 5, 2006. The theme of celebration was 'Desert and Desertification' as declared by United Nation Education Programme. In view of this, a trip for the school children of WII family was organized to the Plantation Site of 127 Infantry Div. (Ecological) near Than village. A total of 63 children participated in the educational visit. The children were told about the effects of desertification and its remedies.

Wildlife Week was celebrated in the first week of October, 2006. Different activities like film shows, puppet shows, popular talks, drawing and painting competition were organized in different schools. The puppet shows were also organized for the under privileged children living in slums. An essay competition in Hindi was organized at the Institute for the WII staff. The programme concluded with a wildlife quiz contest for WII Staff.

In order to enhance conservation awareness amongst the school children, the WII in collaboration with the Friends of the Doon (FoD) conducted a 'Wildlife and Environment Quiz' programme. A total of 8 schools in Dehradun participated in the programme, which was conducted in two rounds. The final round of the quiz was held during the Wildlife Week on October 1, 2006 in which teams from Brightlands School, Doon School, Welham Girls and Convent of Jesus & Mary participated. Convent of Jesus & Mary, Brightlands School and Welham Girls School bagged the first, second and third prize respectively. Shri Samir Sinha, Director, Nanda Devi National Park gave the WII-FoD Rolling Trophy to Convent of Jesus & Mary School and distributed prizes to the winning teams.

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## Library & Documentation Centre

WII's Library and Documentation Centre was established in line with WII's mission as multidisciplinary information and learning resource centre on biodiversity conservation and management. The Library & Documentation Centre (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 world wide literature on biodiversity conservation and related fields. (iii) To serve the user readership through normal and special library & information services, like circulation, reference, photocopy, documentation, etc. (iv) To establish and maintain links with other national information systems in India and other countries to ensure free flow of information at national and international levels. (v) To serve as a training center for information personnel and users. (vi) To provide the above services to: (a) WII, (b) Protected areas all over the country, (c) Institutions engaged in nature conservation research in the country & abroad, (d) Universities & Colleges, (e) Individual scholars working in related areas, NGOs, etc., (vii) To bring out periodic publications on the following: (a) Current content of periodicals, (b) Research in progress, (c) List of unpublished research literature, covering dissertations, thesis etc., (d) Compilation of bibliographies, and (e) Compilation of abstracts.

The L&DC now holds approx. 25184 books, 19200 newspaper clippings, 7222 maps/toposheets and more than 5746 bound volumes of old and rare journals. The library also maintains good collection of scientific papers. More than 310 periodicals and approx. 300 online journals are subscribed. During the reporting year, 266 books, proceedings, thesis & reports, approx. 300 scientific papers and 1500 press clippings were collected.

The L&DC is fully computerized, using LIBSYS Library Management Software, UNESCO'S WINISIS Software, CD Server, Barcode and related technologies. For optimum resources use by researchers, students, officer trainees and other users, 12 computer terminals were inter-connected with Local Area Network (LAN). Being connected to the library facility, the users can access all in-house databases like books, reprints, Indian wildlife abstract, map/ toposheet collection, press clippings, specialized bibliographic databases on Musk Deer, etc. The users also have access to CD-ROM databases like Wildlife Worldwide 1935 -, E-CD and CAB Spectrum 1973 available on the LAN. The L&DC provides a variety of Library & Information Services to its user.

During 2006-07, over 1,23,044 pages of photocopies were provided to the users. Approximately 47,000 documents were issued and consulted during 2006-07. Value Added Service was provided to 180 clients while Ready Reference Service to approx. 4,200 clients. Approximately 300 queries were attended from outside users and more than 7,500 bibliographic references were provided to the users. 30 documents were procured on Inter-Library Loan from nearby libraries.

**FACTS**

**Services provided**

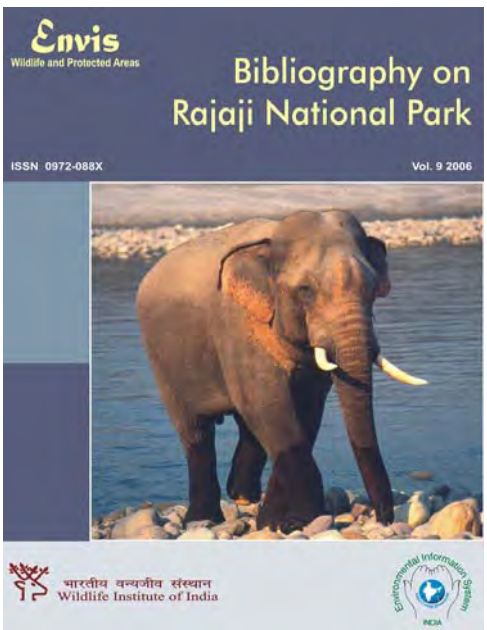
| No. | Services | Numbers |
|---|---|---|
| 1. | Photocopy exposure | 123044 |
| 2. | Documents issued/consulted | Approx. 47,000 |
| 3. | Value added service | Approx. 180 |
| 4. | Ready reference service | Approx. 4200 |
| 5. | Inter library loan | 30 |
| 6. | Document delivery | 65 (email + photocopy) |
| 7. | Document procurement request *(Articles requested from NISCAIRE [Formerly INSDOC] & other libraries)* | 15 |
| 8. | Articles added to WILD *(Indian Wildlife Abstract Service)* | 185 |
| 9. | Map/toposheets issue/ consulted | Approx. 2500 |

**Revenue Generation from services**

| No. | Services | Amount |
|---|---|---|
| 1. | Bibliographical/document delivery services | Rs. 2939.00 |
| 2. | Photocopying service | Rs. 2565.00 |
| 3. | WII publications | Rs. 79492.00 |

**Volume Added to Library Collection**

| No. | Types of document | Numbers |
|---|---|---|
| 1. | Books & Monographs | 266 |
| 2. | Journals (bound Volumes) | 51 |
| 3. | Newspaper clippings | 1500 |
| 4. | Reprints | 300 |
| 5. | Online journals | Approx. 300 |




## ENVIS centre 'Wildlife and Protected Areas'

The Ministry of Environment and Forests, Government of India established the 23rd Centre on Environment Information System in September, 1997 at Wildlife Institute of India. The thematic area of WII ENVIS Centre is 'Wildlife and Protected Areas'. The mission of ENVIS is to support and facilitate the diverse group of clientele from policy makers to researchers & industries and promote national and international level cooperation and exchange of environmental data and information through a nation-wide web enabled network. The goals of 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 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 'Bibliography on Rajaji National Park'. This bulletin contains comprehensive bibliography compiled for the first time for a protected area (India) in response to the long standing demand. It includes 742 references of research papers, thesis, dissertations, conference proceedings, reports, popular articles, monographs/ working plans and newspaper clippings on Rajaji National Park.

In recognition of the activities of the Institute's ENVIS Centre it was included as ENVIS-SDNP node on "Protected Area Management". A dedicated website (http://www.wii.gov.in/envis/sdnp/index.htm) was developed during the reporting period. It provides information on: (i) Emerging Issues; (ii) Convention and Treaties; (iii) Agenda 21 & PA Management; (iv) National Legislations and Policies. The final report of the ENVIS-SDNP project was submitted in March, 2007.

## Wildlife Policy Research Cell

The Wildlife Policy Research Cell (WPRC) was formally established in March 2000 with the following objectives: (i) Identify and assimilate wildlife conservation and management issues, practices and approaches at the regional, national and state level, (ii) Provide a forum to discuss and confront issues related to wildlife conservation, (iii) Create a learning resource centre related to wildlife conservation and management to facilitate policy making and disseminate information through best practice guides and occasional papers, (iv) Link up the above with capacity building and interpretive programmes, and (v) Recommend approaches for mitigation of PA-People-Wildlife Conflicts.

During 2006-2007, one Research Associate continued his work on "Assessment of human-wildlife conflict scenario in India based on media reports". Another Research Associate joined the Cell in September 2006. The WPRC took up the work of compiling repository of wildlife legislation in India, rules and regulations, international conventions and treaties, court judgments

pertaining to wildlife matters, and making this information available to the users at Intranet of WII. The above information has been compiled to a great extent, and uploading of the information is under progress.

## Captive Breeding & Zoo Management Cell

**Development and maintenance of studbooks for selected endangered faunal types in Indian zoos**
**Funding source:** Central Zoo Authority, New Delhi
**Investigator:** Shri Debashis Chakraborty
**Researcher:** Dr. Anupam Srivastav
**Date of initiation:** October 2006
**Date of completion:** October 2011

**Objectives:** (i) Update of studbooks of Asiatic Lion, Bengal Tiger, One Horned Rhinoceros and Lion Tailed Macaque; and (ii) Initiation of new studbooks for Tibetan Wolf, Gaur, Nilgiri Langur, Hoolock Gibbon, Red/Lesser Panda, Snow Leopard, Clouded Leopard, Dhole, Wild Ass, Bhutan Grey Peacock Pheasant and other species as would be mutually decided upon by the CZA and WII.

**Progress:** (i) Required hardware and software have been procured; (ii) Questionnaire was designed and sent to 64 zoos for collecting studbook data for the above 14 species; and (iii) Data has been received from 20 zoos during the reporting period.

## Research Laboratory

The laboratory extends technical inputs in teaching, training and analytical fields to research projects and ongoing training programmes of the Institute. The laboratory is equipped with various basic and modern equipment (Digital pH and Conductivity Meters, Spectrophotometer, Digital Balance, Digital Furnace, Hot Air Oven, Atomic Absorption Spectrophotometer (AAS), High Performance Liquid Chromatograph (HPLC), UV-Visible Spectrophotometer, Microwave Digester, Automatic Nitrogen Analyser, Automatic Fiber Analyser, Microscopes, Ultra pure Water Purification System etc.) required for the analysis of various physio-chemical parameters of plant, soil and water samples. Teaching classes followed by practical for various ongoing courses of the Institute, for the students from FRI University, HNB Garhwal University & University of Mumbai and Forest Officials from Bhutan & Pakistan were conducted at the laboratory on 'Instrumentation and Analytical Techniques'. This includes herbivore pellet and carnivore scat analysis, collection & preservation of biological materials, collection of meteorological data, age and sex determination of animals, osteology of mammals and analysis of plant, soil and water samples for various parameters.


Vinod Verma

Several research projects utilized the analytical facility of the laboratory for plant, water & soil samples, pellet/dung analysis and carnivore scat analysis. In total, 2885 samples were analyzed in the WII Laboratory. Of these, 754

were plant, soil and water samples (analyzed for ADF, NDF, lignin, cellulose, crude protein, Ca, Mg, Zn, Cu, Fe, Ni, Mn, EC, pH, Cl, $CO_3$, $HCO_3$, Cr, Hg, Pb, OC), 931 pellet and scat samples (for food habits studies) and 1200 tissue/ blood samples (for the determination of Diclophenac salt). During the year, the research laboratory has opened its analytical facility to other institutions/ NGOs on payment basis.

The laboratory staff provided technical inputs in field, which includes demonstration of various traps, camera traps, mist netting for birds, electric fence and radio telemetry to various training programs. The laboratory staff also collected meteorological data (rainfall, temperature, humidity, wind velocity and direction) in the WII campus, water and soil samples from Chilla, Rajaji National Park, soil-water samples from Banganga wetland, Uttarakhand, and water samples from WII for the analysis of various physio-chemical parameters. During the year 2006, the maximum temperature in WII campus was recorded 39°C in May 2006, minimum temperature was 3°C in January 2006 and the total rainfall was recorded 1028.6mm.

## Herbarium

*Vinod Verma*

During the reporting period, Herbarium received ca. 3000 plant specimens from different Protected Areas (Rajaji National Park, Jhilmil Jheel Conservation Reserve, Corbett Tiger Reserve, Askot Wildlife Sanctuary, Kufri Wildlife Sanctuary, Himachal Pradesh; Katerniaghat Wildlife Sanctuary, Dudhwa National Park, Parambikulam Wildlife Sanctuary, Kanha Tiger Reserve and Kalakad-Mundanthurai Wildlife Sanctuary).

Plants collected from Tehri Garhwal region by the students of Jawaharlal Nehru University and from Valley of Flowers by an NGO were also identified. The vegetation monitoring of WII campus is in progress. The visiting groups were introduced to the methods of plant identification from time to time by way of a plant-watch along the trails in the campus. Herbarium provided inputs in various project directly. The section has provided consultancy service to National Institute of Visually Handicapped (NIVH), Dehradun for developing campus landscape to help the visually challenged people for moving from one place to other in the campus without assistance. The work on developing medicinal plant garden at NIVH campus is underway. The Herbarium also provided teaching and training inputs to Certificate and Diploma courses and other courses run by the Institute. Input in field orientation and field identification techniques were also provided to the researchers of All India Tiger Monitoring Project.

## Wildlife Health Services

This is a regular activity of the Department of Wildlife Health Management of the Institute. Assistance is provided in the form of field assistance in immobilization, restraint and safe release/rehabilitation, trap, injured and strayed wild animal.

FaiyazA.Khudsar

On the request from DFO, Dehradun, WII provided technical assistance in management of leopard trapped in a snare at Military Hospital Dehradun on April 3, 2006. The leopard was successfully rescued following chemical immobilization and shifted to Malsi Deer Park.

A Leopard was trapped in a snare in a forest patch near Forest Research Institute, Dehradun on January 23, 2007. The animal was successfully rescued and rehabilitated at Asarodi Range of Rajaji National Park.

Dr. P.K. Malik and Dr. (Capt.) Parag Nigam coordinated participation of elephants in the Republic Day Parade 2007, New Delhi with Ministry of Defence and provided technical services to deal with any emergency and distress to participating elephants.

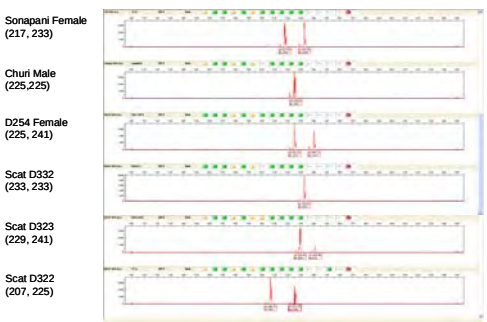
An adult Leopard was trapped in a snare in the forest adjoining Hurrawala village near Dehradun on March 20, 2007. The animal was successfully immobilized, rescued and brought to Lachhiwala range for first aid. The leopard however, escaped out of the cage and entered a junk yard at Lachhiwala range on March 22, 2007. The animal was again immobilized, successfully rescued and shifted to Malsi Range of Dehradun Forest Division for further treatment on March 23, 2007.

**Studies on impact of proposed Lanjigarh bauxite mining on biodiversity including wildlife and its habitat, Orissa,** *May 3 -6, 2006.* In pursuance to the recommendations of the Forest Advisory Committee (FAC), MoEF, GOI, Wildlife Institute of India was entrusted to carry out an evaluation of various impacts on biodiversity including wildlife and its habitat due to proposed mining of bauxite ore in Lanjigarh bauxite mines. The mining plan outlined diversion of 660.749 ha of forest land in two forest divisions of Kalahandi South Forest Division and Raygada Forest Division falling in the districts of Kalahandi and Raygada of Orissa respectively. Dr. Sushant Chowdhary and Dr. Bivash Pandav undertook the appraisal with the help of Orissa Forest Department and Orissa Mining Corporation Ltd. The field appraisal carried out through rapid assessment highlighted the wildlife and conservation values of Niyamgiri hills on which proposed mining site is located. The detail appraisal report was submitted to the FAC, MoEF, GOI.

**Site inspection for diversion/de-notification of forest land from Dalma Wildlife Sanctuary for Subarnarekha Multi-purpose Project, Jamshedpur,** *September 11-12, 2006.* On the recommendation of the Standing Committee of National Board for Wildlife (NBWL) an expert committee was constituted by the Government of Jharkhand to look into various elephant movement related issues arising due to commissioning of Subarnarekha Multipurpose Project passing through Dalma Wildlife Sanctuary and its adjoining areas. The expert committee comprised Shri P.K. Sen (Chairman), Director Tiger Conservation Program, WWF-India, Shri S.K. Patnaik, Retd. Chief Wildlife Warden, Orissa, Dr. Sushant Chowdhary, WII and Shri A.K. Singh (Member Secretary), PCCF, Biodiversity Conservation & Chief Wildlife Warden, Jharkhand. The site inspection of the canal passing through Dalma Wildlife Sanctuary and its

adjoining area was accomplished on September 11, 2006 after having discussions with Jharkhand Forest Department and Water Resources Department. Restoration of elephant corridors, creation of green belt along the southern boundary of Dalma Wildlife Sanctuary, providing proper movement passages across the canal, future human – elephant conflicts were the major issues among several other recommendations in the report submitted to the Government of Jharkhand.

## Conservation Genetics Laboratory




Protocols for amplification of DNA from scat samples of lions (*Panthera leo persica*) and tigers (*Panthera tigris*) were standardized and 13 micro-satellite loci were amplified. This component of the study aims at understanding the genetic diversity amongst Gir lions and understanding the meta-population structure and population genetics amongst the tigers of central India. Intensive scat collection from Kanha Tiger Reserve has also been undertaken for attempting population estimation through polymorphic micro-satellite loci and comparing it with mark-recapture estimates of camera trap data. DNA data from captured tigers (for telemetry study) is being used for kinship determination and estimating errors associated with scat amplified DNA analysis.

Work on the Indian canids is continuing. DNA from samples of golden jackal (*Canis aureus*) from Kutch, Bhal, and road kills from UP, Haryana, were extracted. Mitochondrial and micro-satellite analysis were conducted to understand phylogenetic relationship between different geographical populations. A short-term visitor grant (March 2007) was obtained from the Smithsonian Institution for training a Junior Research Fellow (JRF) on the "All India Tiger Estimation Project" at the Molecular Genetics Laboratory Facility, Department of Biological Conservation, Smithsonian Institution, Washington DC. The JRF was trained in molecular techniques and worked with Dr. Robert Fleischer and Dr. J. Maldonado on sequencing and analysis of genetic data.

## Campus Development

The work for maintenance of building, water proofing treatment with silicon paint, internal and external finishing work in Type IV, V, VI and Guest House have been completed.

Maintenance work in administrative, teaching and library blocks, providing and fixing scooter shed for Type I, II Houses, repair of various electrical services and supplying and installation of 1x320 KVA generator set at WII is being undertaken by CPWD.

Work is in progress for construction of 5 nos. Type IV quarters in block III, Surveying and geo-technical investigation of land and consultancy charges for construction of hostel/laboratory building/committee room etc.

During the reporting year, the nature trail of WII was re-designed along with upgradation of the trail.

# Governance

S. Wilson

Society

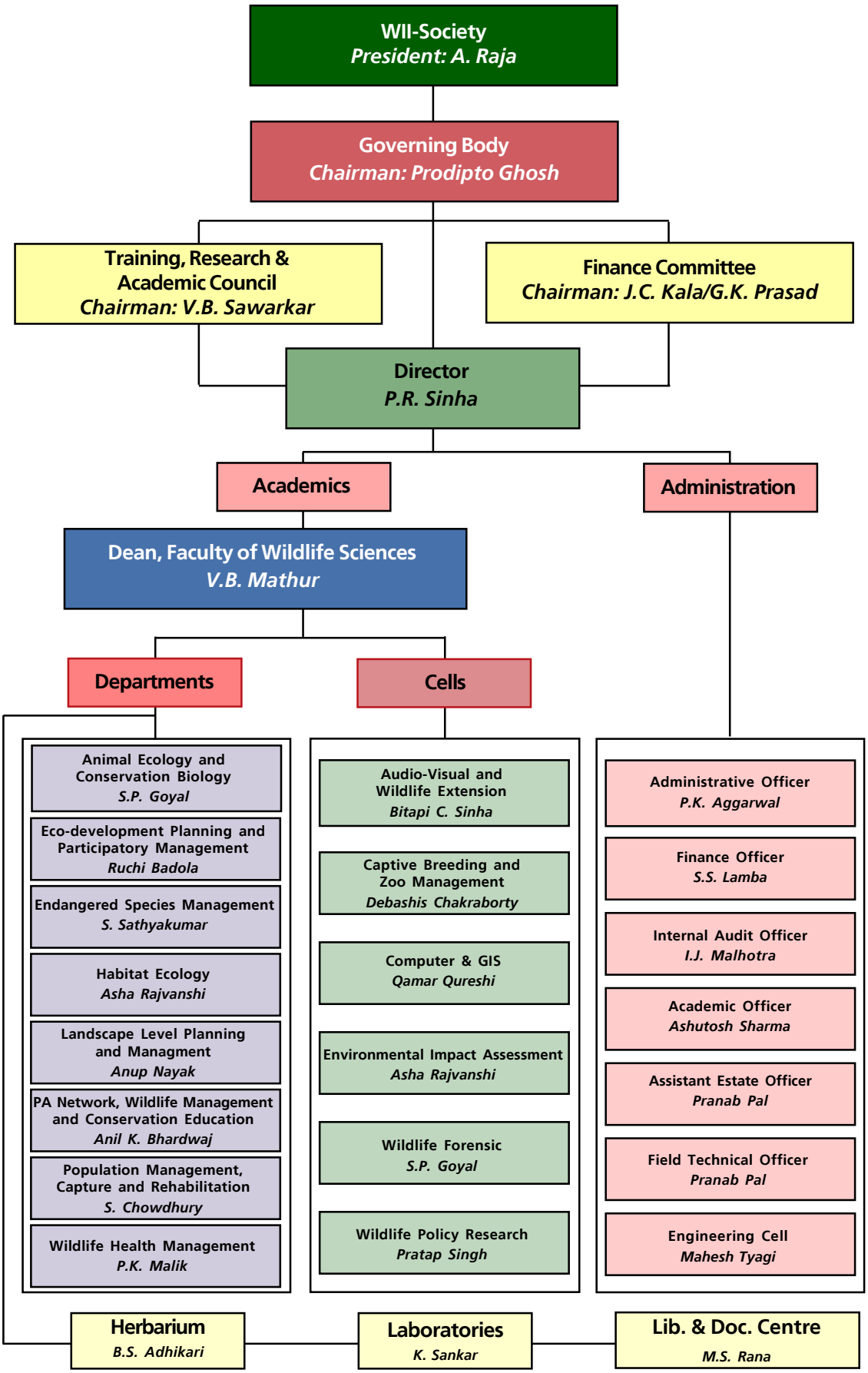
Governing Body

TRAC

Finance

Building

# Organizational Structure of WII



## The Society of Wildlife Institute of India

(According to Rules & Regulations of the WII-Society)

With the approval of the Competent Authority and in pursuance of Rule 4, (Sub-Rule i to XXII) of the Rules & Regulations of the Institute, the Wildlife Institute of India - Society has been reconstituted for a period of three years *w.e.f.* from June 21, 2005:

1. President,
   Hon'ble Union Minister for Environment & Forests
   Government of India, Ministry of Environment & Forests,
   Paryavaran Bhawan, 'B' Block, CGO Complex, Lodi Road,
   New Delhi – 110 003

2. Vice-President,
   Hon'ble Minister of State for Environment & Forests,
   Government of India, Ministry of Environment & Forests,
   Paryavaran Bhawan, 'B' Block, CGO Complex, Lodi Road
   New Delhi – 110 003

3. Shri Rameshwar Oraon
   Member of Parliament
   214, North Avenue,
   New Delhi - 110 001

4. Shri Bachi Singh Rawat
   Member of Parliament
   4, Lodhi Estate,
   New Delhi - 110 003

5. Shri Harish Rawat
   Member of Parliament
   12-A, Canning Lane,
   New Delhi.

Members

6 to 18 Minister in charge of the portfolio of Wildlife Conservation in and/or Forests on a regional rotational basis:

| | | |
|---|---|---|
| North-East India | - | Mizoram, Manipur, Nagaland |
| Eastern India | - | Orissa, West Bengal |
| Western Region | - | Maharashtra, Rajasthan |
| Southern India | - | Kerala, Tamil Nadu |
| Northern India | - | Himachal Pradesh, J&K |
| Central India | - | Madhya Pradesh |
| Permanent Invitee | - | Uttarakhand |

19. Shri S.K. Patnaik,
    Former CCF (Orissa),
    81, Fishery Lane, Buddheswari Colony,
    Bhubneshwar – 751 006

20. Shri A.S. Negi,
Former CWLW (Uttaranchal),
300, Model Colony, Araghar, Dehradun

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

22. Dr. S.K. Dutta,
Professor, Department of Zoology,
North-Orissa University,
Baripada, Mayur Ganj District (Orissa)

23. Dr. Reena Mathur,
D-279, Todarmal Marg, Bani Park,
Jaipur (Rajasthan)

24. Shri A.P. Dwivedi
Former PCCF, Madhya Pradesh,
B-267 Shahpura,
Bhopal (M.P.)

25. Shri S.K. Chakraborty,
No. 4, Dr. Satyananda Rai Road, Dally Gunj,
Kolkata – 700 029

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

27. Prof. P.C. Bhattacharjee,
Head, Department of Zoology,
Guwahati University,
Guwahati (Assam)

28. Prof. Madhav Gadgil,
Centre for Ecological Science, Indian Institute of Science,
Bangalore – 560 012

29 to 33 Representative of following organizations: Bombay Natural History Society, Mumbai. World Wide Fund for Nature-India, New Delhi, Wildlife Preservation Society of India, Dehradun, Centre for Environment Education, Ahmedabad, Friends of Doon, Dehradun

Members (Ex-officio)

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

35. Secretary to the Government of India,
Ministry of Finance, New Delhi

36. Secretary to the Government of India,
Ministry of Science and Technology, New Delhi

37. Secretary to the Government of India,
Ministry of Human Resource Development, New Delhi

38. Representative of the Planning Commission,
Government of India, New Delhi

39. A representative of the University Grants Commission,
New Delhi

40. The Chief Secretary,
Government of Uttaranchal, "Sachivalaya"
Dehradun-248 001

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

42. Addl. Director General of Forests (WL) & Director,
Wildlife Preservation, Ministry of Environment & Forests,
Paryavaran Bhavan, 'B' Block,CGO Complex, Lodi Road,
New Delhi - 110 003

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

44. Director General,
Indian Council of Forestry Research & Education,
P.O. New Forest,
Dehra Dun – 248 006

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

46. Director,
Botanical Survey of India,
CGO Complex, 3 MSO Building, Block F-5th & 6th Floor,
DF Block, Sector-I, Salt Lake City,
Kolkata (W.B.)
(The present membership tenure is valid upto 7.10.2005)

Members

47. Dr. V.B. Mathur,
Dean, Faculty of Wildlife Sciences,
Wildlife Institute of India,
Dehradun
(Faculty Member nominated vide DWII Notification No.DWII/580/2005 dated 25th January, 2006. Membership valid upto 20.06.2008).

48. Shri A.K. Bhardwaj,
Professor and Head of Office,
Wildlife Institute of India,
Dehradun
(Faculty Member nominated vide DWII Notification No.DWII/580/2005 dated 25th January, 2006. Membership valid upto 20.06.2008).

**Member-Secretary**

49. Director,
Wildlife Institute of India,
Dehradun

## Governing Body

The Institute has a Governing Body chaired by The Secretary (Ministry of Environment and Forests, Government of India). The current Governing Body composition includes official and non-official members for a period of three years *w.e.f.* 10th May, 2005:

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

Members

3. Shri S.K. Patnaik,
   Former CCF (Orissa),
   81, Fishery Lane, Buddheswari Colony,
   Bhubneshwar – 751 006

4. Shri A.S. Negi,
   Former CWLW (Uttaranchal),
   300, Model Colony, Araghar,
   Dehradun – 248 001

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

6. Dr. S.K. Dutta,
   Professor,
   North-Orissa University, Department of Zoology,
   Baripada, Mayur Ganj District, Orissa

7. Dr. Reena Mathur,
   Department of Zoology, University of Rajasthan,
   Jaipur, Rajasthan

8. One non-official member to be nominated

9. Financial Advisor &
   Joint Secretary to the Government of India,
   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

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

| | | |
|---|---|---|
| Southern Region | - | Andhra Pradesh |
| North-East Region | - | Arunachal Pradesh |
| Eastern Region | - | Jharkhand |
| Northern Region | - | Haryana |
| Western Region | - | Gujarat |
| Permanent Invitee | - | Uttarakhand |

17. Addl. Director General (WL) &
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,
Dehra Dun – 248 006

19. Chairman,
Training, Research and Academic Council (TRAC), WII,
464, Rasta Peth,
Near Power House,
Pune – 411 011

20. Dr. P.K. Malik
Wildlife Institute of India,
Post Box 18, Chandrabani,
Dehra Dun - 248 001
(Faculty Representative nominated vide DWII Notification No.12-1/84-WII dated 3rd February, 2004. Membership valid upto 2.2.2007).

Member-Secretary

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

## Training, Research & Academic Council (TRAC)

Training, Research and Academic Council (TRAC) - Reconstituted vide WII's Notification No.DWII/555/2001 (Part-II), dated February 21, 2005 for a period of three years w.e.f. date of issue of this notification (21.02.2005 to 20.02.2008)

1. Chairman,
Shri V.B. Sawarkar,
Former Director, WII
464, Rasta Peth, Near Power House,
Pune – 411 011 (Maharashtra)

Members

2. Professor R.K. Sinha,
Department of Zoology, Patna University,
Patna - 800 005 (Bihar)

3. Dr. Sher Ali,
Chief, Molecular Genetics Laboratory,
National Institute of Immunology,
Aruna Asaf Ali Marg,
New Delhi - 110 067

4. Dr. P.S. Roy,
Deputy Director, (RS & GIS Application Area)
National Remote Sensing Agency, (Dept. of Space, Govt. of India),
Balanagar,
Hyderabad - 500 037 (Andhra Pradesh)

Two representative from universities, who are members of WII-Society

5. Dr. P. C. Bhattacharjee,
Professor, Department of Zoology, Guwahati University,
Guwahati - 781 014 (Assam)

6. Dr. V.C. Soni,
Department of Biosciences, Saurashtra University,
University Campus, Kalavad Road,
Rajkot - 360 005 (Gujarat)

7. Shri R.P.S. Katwal, IFS,
Addl. Director General (Wildlife) & Director Wildlife Preservation,
Ministry of Environment & Forests,
Paryavaran Bhavan, B-Block, C.G.O. Complex, Lodi Road
New Delhi – 110 003

Members on Regional - Rotational Basis

8. Dr. C.M. Seth, IFS,
Chief Wildlife Warden, Govt. of Jammu & Kashmir,
Tourist Reception Centre,
Srinagar – 190 001 (Jammu & Kashmir)

9. Chief Wildlife Warden, Government of Haryana,
Van Bhawan, Forest Complex, C-18, Sector-6
Panchkula - 134 109 (Haryana)

10. Chief Conservator of Forests & Chief Wildlife Warden,
Government of Bihar,
4th Manzil, Vishweshraiah, Technology Bhawan, Beli Road,
Patna - 800 014 (Bihar)

11. PCCF (Wildlife) & Chief Wildlife Warden, Govt. Of Orissa ,
5th Floor, B.D.A. Apartment, "Prakruti Bhawan, Nilkantha Nagar,
Bhubaneswar - 751 012 (Orissa)

12. Addl. PCCF (Wildlife) & Chief Wildlife Warden,
Government of Chhattisgarh, Jail Road, Fafadih Chowk,
Raipur - 492 001 (Chhattisgarh)

13. Chief Conservator of Forests (Wl) & Chief Wildlife Warden,
Government of Gujarat, Dr. Jivajiraj Mehta Bhavan,
Block No. 14, 1st Floor, Old Sachivalaya,
Gandhinagar - 382 010 (Gujarat)

14. Conservator of Forests & Chief Wildlife Warden,
Forest Department (Wildlife), Secreatariat,
Daman & Diu, (Daman)

15. Chief Wildlife Warden, Government of Tamil Nadu,
6D, Panagal Building, No. 1, Jeenis Road, Saidapet,
Chennai - 600 015 (Tamil Nadu)

16. Chief Conservator of Forests (Wl) & Chief Wildlife Warden,
Forest Headquarters, Government of Kerala,
Vazhuthacaud, Thiruvananthapuram - 695 014 (Kerala)

17. Chief Conservator of Forests (Wl) & Chief Wildlife Warden,
Government of Assam,
P.O. Rehabari, Guwahati - 781 008 (Assam)

18. Chief Wildlife Warden, Government of Mizoram,
Environment & Forest Department,
Tuikhuahtlang, Aizawl (Mizoram)

19. PCCF (Wl) & Chief Wildlife Warden,
Government of Manipur, Sanjenthong,
Imphal (Manipur)

20. Chief Conservator of Forests (Wl) & Chief Wildlife Warden,
Government of Uttaranchal, 87-Rajpur Road, Dilaram Bazar,
Dehra Dun -248 001 (Uttarakhand)

Members

21. Dr. M. Sanjappa,
Director, Botanical Survey of India, (MoEF)
CGO Complex, 3 MSO Building, Block F-5th & 6th Floor,
DF Block, Sector-I, Salt Lake City
Kolkata – 700 064 (West Bengal)

22. Dr. J.R.B. Alfred,
Director, Zoological Survey of India,
Prani Vigyan Bhawan, M-Block, New Alipore,
Kolkata - 700 053 (West Bengal)

23. Shri B.R. Sharma, IFS
Member-Secretary, Central Zoo Authority,
Bikaner House, Annexe-Vi, Shahjahan Road,
New Delhi - 110 011

24. A representative Nominated by DG-ICFRE
Dy. Director General (Research)
Indian Council of Forestry Research & Education (ICFRE)
New Forest, Dehra Dun - 248 006

25. Dr. V.B. Mathur
Dean, Faculty of Wildlife Sciences,
Wildlife Institute of India, P.O. Box # 18, Chandrabani,
Dehra Dun - 248 001

Two senior most Head of Departments (in terms of Pay-Scale) – WII

26. Dr. P.K. Mathur
Professor & Head,
Department of Landscape Level Planning & Management
Wildlife Institute of India, P.O. Box # 18, Chandrabani,
Dehra Dun - 248 001

27. Shri A.K. Bhardwaj
Professor & Head of Office,
Wildlife Institute of India, P.O. Box # 18, Chandrabani,
Dehra Dun - 248 001

28. Research Coordinator
Wildlife Institute of India
P.O. Box # 18, Chandrabani
Dehra Dun - 248 001

29. Member Secretary,
Director,
Wildlife Institute of India,
P.O. Box # 18, Chandrabani,
Dehra Dun - 248 001

Special Invitees

30. The Head of Department,
Animal Ecology and Conservation Biology,
Wildlife Institute of India, P.O. Box # 18, Chandrabani,
Dehra Dun - 248 001

31. The Head of Department,
PA Network, Wildlife Management & Conservation Education,
Wildlife Institute of India, P.O. Box # 18, Chandrabani,
Dehra Dun - 248 001

32. The Head of Department,
Landscape Level Planning and Management,
Wildlife Institute of India, P.O. Box # 18, Chandrabani,
Dehra Dun - 248 001

33. The Head of Department,
Endangered Species Management,
Wildlife Institute of India, P.O. Box # 18, Chandrabani,
Dehra Dun - 248 001

34. The Head of Department,
Population Management, Capture & Rehabilitation,
Wildlife Institute of India, P.O. Box # 18, Chandrabani
Dehra Dun - 248 001

35. The Head of Department,
Habitat Ecology,
Wildlife Institute of India, P.O. Box # 18, Chandrabani,
Dehra Dun - 248 001

36. The Head of Department,
Wildlife Health Management,
Wildlife Institute of India, P.O. Box # 18, Chandrabani,
Dehra Dun - 248 001

37. The Head of Department,
Eco Development Planning and Participatory Management,
Wildlife Institute of India, P.O. Box # 18, Chandrabani,
Dehra Dun - 248 001

## Finance Committee

1 Shri J.C. Kala, IFS
Director General of Forests (WL)
Ministry of Environment & Forests,
CGO Complex, Paryavaran Bhavan, B-Block, Lodi Road,
New Delhi – 110 003

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# Publications

Peer Reviewed International Journals

Peer Reviewed National Journals

Book Chapters

Workshop/Seminar proceedings

Reports

Status Survey Report

Technical Reports

Papers presented

Abstracts Published

Contribution in Training Manuals

Popular articles

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Malik, P.K. and Nigam, P. (2006): **Biodiversity loss and Interface conflict: is there a connection to emerging zoonoses.** International symposium and 5th Annual conference on "New strategies for prevention and control of emerging and reemerging zoonoses- An integrated veterinary and medical approach" Himachal Pradesh Agricultural University, Palampur, October 12-14, 2006.

Mishra, B.K., Badola, R., Bhardwaj, A.K. (2006): **Capacity building for sustaining Conservation and Development- an Indian experience"** In the international follow-up seminar sponsored by Swedish International Development Agency (SIDA) at Hanoi (Vietnam), November 25 to December 4, 2006.

Naim Akhtar and Chauhan, N.P.S. (2006): **Status and distribution of Asiatic black bear and conservation challenges in Pakke Tiger Reserve, Arunachal Pradesh, India.** 17th International Conference on Bear Research and Management, Kaurizawa, Japan, October 2-6, 2006.

Naim Akhtar and Chauhan, N.P.S. (2006): **Scope of sloth bear (*Melursus ursinus*) conservation in Chhattisgarh state, India.** Proceeding of 17th International Conference on Bear Research and Management, Kaurizawa, Japan, October 2-6, 2006.

Naim Akhtar and Chauhan, N.P.S. (2006): **Is trade in Bears a threat for conservations of bear in India - Case study in Chhattisgarh and Arunachal Pradesh.** 17th International Conference on Bear Research and Management held at Kaurizawa, Japan during October 2-6, 2006.

Nigam, P. and Malik, P.K. (2006): **Wildlife Investigations: Zoonotic concerns.** Paper presented at International symposium and 5th Annual conference on "New strategies for prevention and control of emerging and reemerging zoonoses - An integrated veterinary and medical approach" at Himachal Pradesh Agricultural University Palampur, October 12-14, 2006.

Rajvanshi, A. and V.B. Mathur (2006): **Capacity building for biodiversity inclusive impact assessment - The findings of the needs assessment survey in India.** Paper presented in the international conference "Mainstreaming Biodiversity in EIA and SEA for Improved Environmental Decision Making" organized by IAIA 2006 at Stavanger, Norway, May 23 – 26, 2006.

Rajvanshi, A. (2006): **Relevance of promoting biodiversity conservation EIA of energy projects.** Paper presented at workshop on World Environment Day at University of Petroleum and Energy Studies, Dehradun, June 5, 2006.

Rajvanshi, A. (2006): **Relevance of biodiversity conservation in the planning of hydropower projects.** An invited key note presentation at the All India Seminar on Environmental Consideration in Planning and Design of Power Projects organized by the Institution of Engineers, Dehradun, November 9, 2006.

Rajvanshi, A. (2006): **Retrofitting best practices for mitigating impacts of existing infrastructure in and around Protected Areas and other sensitive habitats.** Presentation made to the Secretary, MoEF, June 22, 2006.

Rajvanshi, A. (2006): **EIA- Process & Procedures.** Presentation in the Programme on -Environmental Legislation in India: Interpretation and implementation, organized by the Engineering Staff College, Hyderabad, April 26, 2006.

Rajvanshi, A. (2006): **Environmental clearance process as per MoEF.** Presentation in the Programme on -Environmental Legislation in India: Interpretation and implementation, organized by the Engineering Staff College, Hyderabad, April 26, 2006.

Rawat, G.S. (2006): **Priority ranking and management strategies for alien invasive species in wildlife protected areas of India**. Paper presented in Indo-US Workshop on the Management of Alien Invasive Species in Protected Areas. November 13-15, 2006.

Rawat, G.S. (2007): **Alpine meadows of Uttarakhand: Biodiversity and conservation issues.** Lead Paper in National Seminar on Biodiversity of Himalayan States with special reference to Uttarakhand. G.K.U. Haridwar, March 17–18, 2007.

Sahajpal, Vivek and Goyal, S.P (2006): **Microscopic hair characteristics: a tool for dealing wildlife offence cases in India.** Presented at the Annual meeting of the European Hair Research Society (EHRS), Imperial College, June 29 - July 1, 2006, London, U.K.

Sathyakumar, S. (2006): **Status and distribution of Asiatic Black Bear (*Ursus thibetanus*) and Himalayan Brown Bear *(Ursus arctos*) in India.** Paper presented at the International Workshop "To Understand Asian bears for their future - Present Status and Conservation" held during the 17th International Congress on Bear Research and Management, Japan, October 1-7, 2006.

Sathyakumar, S. (2006): **Alpine rangelands and wildlife conservation: Development of a policy framework for sustainable livestock grazing in the Himalaya.** Paper presented at the Regional Workshop on Policy Priorities for Sustainable Rangeland Management in Hindukush Himalaya**",** Kathmandu, Nepal, December 4-7, 2006**.**

Sathyakumar, S. (2006): **Biodiversity conservation and management initiatives in the north-western and Western Himalayan Regions of India: Lessons learnt and future prospects.** Paper presented at the Seminar on Biodiversity in Northwestern India: Status, Conservation and Future Prospects. M.L.N. College, Yamuna Nagar, Haryana, November 25, 2006.

Sathyakumar, S. (2006): **Status of mountain ungulates in Nanda Devi National Park: An assessment of changes over two decades.** Paper presented at the IV World Congress on Mountain Ungulates, Munnar, Kerala, September 12-15, 2006.

S. Sathyakumar and Mathur, V.B. (2006): **Conservation initiatives for snow leopard and associated wild species in the Indian Trans-Himalaya.** Paper presented in the National Workshop on Project Snow Leopard, Leh, July 10-11, 2006.

Sinha, Neha and Ruchi Badola (2006): **Sustaining livelihood of people relocated from Protected Areas.** Paper presented in The Ninth Biennial Conference of International Society for Ecological Economics, 'Ecological Sustainability & Human Well-Being', New Delhi, December 15-19, 2006.

Sneha Thapliyal, S.A. Hussain and Ruchi Badola (2006): **Valuing some ecosystem services of Corbett Tiger Reserve, India.** Paper presented in The Ninth Biennial Conference of International Society for Ecological Economics, 'Ecological Sustainability & Human Well-Being', New Delhi, December 15-19, 2006.

Swati, K., Sathyakumar, S., and Rawat, G.S. (2006): **Interaction between Himalayan Tahr (*Hemitragus jemlahicus*) and livestock at Kedarnath Wildlife Sanctuary, Uttaranchal, India.** Paper presented at the IV World Congress on Mountain Ungulates, Munnar, Kerala, September 12-15, 2006.

Upadhyay, A., Sathyakumar, S., Sankar, K., Rawat, G.S., and Fox, J.L. (2006): **Evaluating dietary overlap of Tibetan Argali (*Ovis ammon Hodgsoni*) with sheep and goats in Tso Kar Basin, Ladakh.** Poster presentation at the IV World Congress on Mountain Ungulates, Munnar, Kerala, September 12-15, 2006.

## Abstract published

Adhikari, B.S., M.M. Babu, P.L. Saklani and G.S. Rawat (2007): **Diversity and conservation of medicinal plants in Wildlife Institute of India (WII) campus, Dehradun.** In: "Biodiversity of Uttaranchal State", at Gurukula Kangri University, Haridwar and organized by Department of Zoology & Environmental Sciences during March 18-19, 2007. P 2.

Ambastha, K., S.A. Hussain and R. Badola (2006): **Economic and social considerations in conserving wetlands in high human density landscapes: A case study from the Indo-Gangetic flood plains.** The Ninth Biennial Conference of International Society for Ecological Economics, 'Ecological Sustainability & Human Well-Being', New Delhi, December 15-19, 2006.

Badola, R., S.A. Hussain and H.K. Gupta (2006): **Ecosystems in the service of sustaining livelihoods.** The Ninth Biennial Conference of International Society for Ecological Economics, 'Ecological Sustainability & Human Well-Being', New Delhi, December 15-19, 2006.

Badola, R. and S.A. Hussain (2006): **Role of mangrove forests in reducing the vulnerability of coastal communities.** The Ninth Biennial Conference of International Society for Ecological Economics, 'Ecological Sustainability & Human Well-Being', New Delhi, December 15-19, 2006.

Bargali, H.S., Naim Akhtar and Chauhan, N.P.S. (2006): **Habitat suitability index model for sloth bear in high conflict areas in North Bilaspur Forest**

**Division, Chhattisgarh, India.** Proceeding of Proceeding of 17th International Conference on Bear Research and Management, Kaurizawa, Japan, September 28, 2006 to October 11, 2006, p 118.

Bitapi C. Sinha (2006): **Developing a Nature Interpretation Facility for a protected area - a case study from Panna Tiger Reserve.** Proceedings of Interpreting World Heritage Conference 2006, Puerto Rico May 1-5, 2006

Chauhan, N.P.S. (2006): **Mitigation of men vs. sloth bear conflict in India.** Proceeding of '17th International Conference on Bear Research and Management', Kaurizawa, Japan. P 44.

Dhaila-Adhikari, S. and B.S. Adhikari (2007): **Sacred Grove: A folk - conservationist strategy.** In: "Biodiversity of Uttaranchal State", at Gurukula Kangri University, Haridwar and organized by Department of Zoology & Environmental Sciences during March 18-19, 2007. P 1.

Karthikeyan Vasudevan, A. Kumar, B. Noon and Ravi Chellam (2006): **Patterns in density and diversity of anurans in a fragmented rainforest landscape in the Western Ghats, India**. Abstracts of the Inaugural Conference of the Asian Chapter of the Association of Tropical Biology and Conservation: Averting biodiversity meltdown in the Asian tropics, Mammalapuram, India. pp. 86-88

Thapliyal, S., S.A. Hussain and R. Badola (2006): **Valuing some ecosystem services of Corbett Tiger Reserve, India.** The Ninth Biennial Conference of International Society for Ecological Economics, 'Ecological Sustainability & Human Well-Being', New Delhi, December 15-19, 2006.

Sinha, Satya P. and Sinha Bitapi (2006): **Human Large Felid Conflict Around Gir National Park, India.** In defenders of Wildlife Carnivores 2006, Florida Nov 12-15, 2006

Uniyal, V.P. (2007): **Abstract on Diversity patterns of Butterflies (*Lepidoptera*) in Protected Areas of Shivalik Landscape, Himachal Pradesh.** 2nd National Seminar on Bio-Diversity of Himalayan States, Department of Zoology and Environmental Sciences, Gurukul Kangri University, Haridwar, March 18-19, 2007.

## Contribution in Training Manuals

Nigam, P. (2006): **Wild animal immobilization and restraint. In: ICAR Summer Institute compendium on Recent Trends in Wildlife Health Management and Forensics**. IVRI Izatnagar, (UP). Pp 286-293.

## Popular articles

Pranab Pal (2006): **Rhinos are struggling for existence**. Bulletin of the R.M. Institute of Culture, Kolkata. Vol. LVII 8. Pp 376-379.

Sathyakumar, S. (2006): **Vanishing Tracks – the Magnificent Mountain Ungulates of the Western Himalaya".** Sanctuary – Asia, Vol. XXVI No.4, August 2006: 40-47

Tripathy, B. (2006): **Celebrating the year of turtle-2006.** Wildlife Institute of India Newsletter, July-September 2006, 13(3): 6-7.

# Awards

# Awards

## Global Millennium Ecosystem Assessment

The outcome of the United Nations Millennium Ecosystem Assessment (MEA), a 4-year international and multi-scale assessment was the publication of "Biodiversity and Human Well–being: A Synthesis Report", published by the Island Press. This publication was recognized as an outstanding scientific and intellectual achievement. Dr. V.B. Mathur and Dr. Asha Rajvanshi of the Institute were among the authors of the above MEA report recently awarded the 'Zayed International Prize for the Environment', considered to be the largest and most valuable environmental prize worldwide.

# Talks

From WII

To WII

# Talks

## From WII

Dr. V.P. Uniyal (April 5, 2006): Delivered a lecture on **"Pollinators of Himalayan Region"** at Navdanya farm at Ramgarh, Dehradun for 30 participants from farmers of forestry and agriculture background from different Indian States.

Dr. V.B. Mathur (April 9, 2006): **Role of protected area network in biodiversity conservation.** State Forest Service College, Dehradun

Dr. V.B. Mathur (April 10, 2006): **Management Effectiveness Evaluation of Protected Area Network in India.** IGNFA, Dehradun.

Dr. Asha Rajvanshi (May 9, 2006): **Environmental Impact Analysis for biodiversity conservation.** Advanced Forest Management Courses for IFS officers of 1989 batch organized by IGNFA, Dehradun.

Dr. (Capt.) Parag Nigam (May 11, & July 19, 2006): **Advances in Wild Animals Immobilization and Restraint.** Indira Gandhi National Forest Academy, Dehradun. Two-week Advance Forest Management course for the officers of 17th year of service (1989 IFS Batch).

Shri P.R. Sinha (May 15, 2006): **Group discussion on "Challenges in Wildlife Conservation- Tiger Crisis".** Officers of AFM course YoA 1989 at IGNFA, Dehradun.

Dr. V.B. Mathur (May 16, 2006): **Application of Remote Sensing and GIS in Wildlife Conservation.** Forest Survey of India, Dehradun

Dr. Ruchi Badola (May 31, 2006): Two week course on JFM and sustainable rural development for in service SFS officers, **Stakeholders in JFM**, SFS college, Dehradun.

Dr. Asha Rajvanshi (June 14, 2006): **Environmental Impact Assessment for biodiversity conservation.** Advanced Forest Management Courses for IFS officers of 1996 batch organized by IGNFA, Dehradun.

Dr. B.K. Mishra (June 16, 2006): **"Ecodevelopment in India and its implications for biodiversity conservation",** NNRMS Course. Indian Institute of Remote Sensing, Dehradun.

Dr. Ruchi Badola (June 20, 2006): Advanced Forest Management Course for IFS officers of 1996 batch **Gender issues in conservation**, IGNFA.

Dr. V.B. Mathur (July 3, 2006): **Management Effectiveness Evaluation of Protected Area Network in India.** IGNFA, Dehradun.

Dr. Ruchi Badola (July 3, 2006): Advanced Forest Management Course for IFS officers of 1985 batch **Integrating costs and benefits of ecosystem services in to Conservation**, IGNFA.

Dr. B.K. Mishra (July 20, 2006): **Social issues in biodiversity conservation and mechanisms of addressing.** Indian Institute of Remote Sensing, Dehradun.

Dr. Asha Rajvanshi (July 24, 2006): **Environmental Impact Assessment for biodiversity conservation.** Advanced Forest Management Courses for IFS officers of 1989 batch organized by IGNFA, Dehradun.

Dr. Ruchi Badola (July 27, 2006): Advanced Forest Management Course for IFS officers of 1989 batch, **Integrating costs and benefits of ecosystem services in to Conservation,** IGNFA, Dehradun.

Dr. (Capt.) Parag Nigam (August 1-2, 2006): **Immobilization Methods.** Indira Gandhi National Forest Academy, Dehradun. IFS Probationers of the 2004-2007 batch.

Shri A.K. Bhardwaj (August 2, 2006): **Biodiversity Conservation through Community Participation-experiences from Periyar.** Advance Forest Management Course for IFS officers, Batch 1985 organized by Indira Gandhi National Forest Academy, Dehradun.

Dr. Ruchi Badola (August 3, 2006): Advanced Forest Management Course for IFS officers of 1985 batch **Integrating costs and benefits of ecosystem services into Conservation**, IGNFA, Dehradun.

S.A. Hussain (August 8, 2006): **Wetlands and wildlife conservation.** National Level Training Course on Wetland Management organized by the MoEF at Wetland Training and Research Centre, Chandraput, Chilika.

Dr. (Capt.) Parag Nigam (August 21 & 22, 2006): (i) **Managing Wild animals in Distress; (ii) Monitoring Health of wild animals in PA's.** 10 week professional skill up-gradation course for IFS officers inducted into IFS from SFS cadre, IGNFA, Dehradun.

Dr. Y.V. Jhala (August 18, 2006): Presentations at IGNFA, Dehradun on **"Modern Advances in Wildlife Research & Conservation"** and **"Tiger Crisis – the Facts".**

Dr. B.S. Adhikari (August 22, 2006 and February 14, 2007): 'First and Second Certificate Courses' of Uttaranchal Forest Department Trainees at WII on the **plants of Himalayan region with special reference to Shiwaliks.**

Dr. Ruchi Badola (August 22, 2006): Advanced Forest Management Course for IFS officers of 1996 batch, **Gender issues in conservation**, IGNFA, Dehradun.

Dr. Asha Rajvanshi (August 28, 2006): **Environmental Impact Assessment for biodiversity conservation.** Advanced Forest Management Courses for IFS officers of 1996 batch organized by IGNFA, Dehradun.

Dr. Ruchi Badola (August 28, 2006): Professional Skill up gradation course for IFS officers, **Gender issues in participatory forest management**, IGNFA.

Dr. Ruchi Badola (August 29, 2006): Professional Skill up-gradation course for IFS officers, **Stakeholders analysis and economic evaluation of services**, IGNFA.

Dr. B.K. Mishra (August 30, 2006): **Community participation for implementing livelihoods needs and biodiversity conservation,** IFS Professional skill up gradation Course, Indira Gandhi National Forest Academy, Dehradun.

Dr. P.K. Malik (September 6, 2006): **Infrastructure Needs in Wildlife Health Management.** (ICAR summer Institute on 'Recent trends in wildlife health

management and forensics') Indian Veterinary Research Institute, Izatnagar, Bareilly.

Dr. (Capt.) Parag Nigam (September 6, 2006): **Rescue and rehabilitation of Wild Animals.** 3-week AFM course for the officers of 10th year of service (1996 IFS Batch), Indira Gandhi National Forest Academy, Dehradun.

Dr. B.K. Mishra (September 6, 2006): Indian Institute of Remote Sensing, Dehradun. **"Basic concepts in Ecodevelopment, contemporary issues and applications of GIS-RS techniques for identifying Mutual Impact Zone"**, M. Tech. Course.

Dr. Ruchi Badola (September 7, 2006): Advanced Forest Management Course for IFS officers of 1996 batch **Integrating costs and benefits of ecosystem services in to Conservation**, IGNFA.

Dr. Ruchi Badola (September 9, 2006): PG Diploma Course, **Stakeholders analysis for conflict resolution in Natural Resources Management**, IIRS.

Shri P.R. Sinha (September 9, 2006): **Delivered a talk on "Tiger Task Report & After: Tiger Conservation in India".** IFS Officer of 1985 batch at IGNFA, Dehradun.

Shri A.K. Bhardwaj (September 18, 2006): **"Biodiversity Conservation through Community Participation".** Advance Forest Management Course for IFS officers, Batch 1985 organized by Indira Gandhi National Forest Academy, Dehradun.

Dr. (Capt.) Parag Nigam (September 19, 2006): **Wild Animal Immobilization and Restraint.** (ICAR summer school on 'Recent trends in wildlife health management and forensics') **Indian Veterinary Research Institute, Izatnagar, Bareilly.**

Dr. Asha Rajvanshi (September 19, 2006): **Environmental Impact Assessment.** GISFM course at IIRS, Dehradun.

Dr. V.P. Uniyal (September 24, 2006): Lecture on **"Role of Pollinators in Biodiversity Conservation"** delivered to 18 graduate students from Germany at Navdanya farm Ramgarh, Dehradun.

Shri D. Chakraborty (September 25-29, 2006): **Zoological gardens, role in natural resource management.** Regular courses of FRI University (8 lecture sessions)

Dr. Asha Rajvanshi (September 29, 2006): **Integration of Biodiversity concerns and planning of mining projects.** Skill upgradation course for IFS officers organized by IGNFA, Dehradun.

Dr. Ruchi Badola (September 29, 2006): Geo-informatics Course in Forest Management, **Ecodevelopment and Forest Management**, Indian Institute of Remote Sensing, Dehradun.

Dr. Ruchi Badola (September 29, 2006): Advanced Forest Management Course for IFS officers of 1985 batch, **Integrating costs and benefits of ecosystem services in to conservation,** IGNFA.

Dr. Sushant Chowdhary (September 29, 2006): **(i) Elephant conservation issues in India including aspects of breeding biology and demography; and (ii) PA categories legality and role in endangered species and biodiversity**

**conservation.** Department of Zoology & Environmental Sciences, Gurukul Kangri University, Haridwar.

Dr. B.S. Adhikari (October 3, 2006): **"Origin of Himalaya and distribution of medicinal plants in different climatic zones of Uttarakhand",** at St. Mary's School, Dehradun.

Shri P.R. Sinha (October 13, 2006): **Delivered lecture and discussion on "Zoo Conservation Strategy".** IFS Compulsory Course on 'policy & legal issues in forestry' at IGNFA, Dehradun.

Shri P.R. Sinha (October 13, 2006): **Delivered lecture and discussion on Tiger Crisis and after Sariska".** IFS Compulsory Course on 'policy & legal issues in forestry' at IGNFA, Dehradun.

Shri A.K. Bhardwaj (November 8, 2006): **Biodiversity Conservation through Community Participation.** Advance Forest Management Course for IFS officers, Batch 1981-84 organized by Indira Gandhi National Forest Academy, Dehradun.

Dr. Ruchi Badola (November 8, 2006): Advanced Forest Management Course for IFS officers of 1981-1884 Batch, **Integrating costs and benefits of ecosystem services in to conservation**, IGNFA.

Dr. Asha Rajvanshi (November 8, 2006): **The relevance of Environmental Impact Assessment as a guiding tool for sustainable development.** 101st Induction Training Programme for IAS Officers at Lal Bahadur Shashtri National Administration Academy, Mussoorie.

Dr. Asha Rajvanshi (November 8, 2006): **The process of public hearing for EIA and the role of different stake holders.** 101st Induction Training Programme for IAS Officers at Lal Bahadur Shashtri National Administration Academy, Mussoorie.

Dr. (Capt.) Parag Nigam (November 9, 2006): **Management of Wild Animals in Distress.** Two week Promotion linked AFM course for the officers of 20 year of service (1981-84 IFS Batch), Indira Gandhi National Forest Academy, Dehradun.

Dr. Ruchi Badola (November 9, 2006): PG Diploma in Natural Resource Management, **Participatory Resource Management,** Forest Research Institute University.

Dr. Ruchi Badola (November 10, 2006): PG Diploma in Natural resources Management, **Evolution of Indian, Forest Policy and its implications for forest dependent communities**, Forest Research Institute University.

Shri A.K. Bhardwaj (November 10, 2006): **Linking Biodiversity Conservation & Livelihood Security.** Advance Forest Management Training Course, Batch 1996 organized by Indira Gandhi National Forest Academy, Dehradun.

Shri A.K. Bhardwaj and Dr. V.B. Mathur (November 15, 2006): **Linking Biodiversity Conservation and Livelihood Security.** Foundation Course Officers, Lal Bahadur Shastri National Academy of Administration, Mussoorie.

Shri P.R. Sinha (November 16, 2006): **Guest lecture on "Tiger Conservation in India: Crisis and Response".** IFS Officers of 1981-84 batch at IGNFA, Dehradun.

Dr. V.B. Mathur (November 29, 2006): **Application of Remote Sensing, GIS and GPS in preparation of Wildlife Management.** Forest Survey of India, Dehradun.

Shri A.K. Bhardwaj (December 4 to 15, 2006): **Community Participation & Biodiversity Conservation.** General Refresher Course for In-Service Officers organised by State Forest Staff College, FRI Dehradun.

Dr. Y.V. Jhala (December 20, 2006): Presentation to IGNFA probationers on **Monitoring** Carnivores**, Prey & their Habitat with emphasis on the Tiger in India**.

Dr. V.P. Uniyal (December 27, 2006): Lecture on **"Insects diversity of India"** delivered to 35 students of Uttaranchal and Himachal Pradesh at FRI organized by ATREE.

Dr. B.S. Adhikari (January 1, 2007): **"Forests of Western Himalaya",** organized by ATREE, Bangalore at Kendriya Vidyalaya, FRI under 'Winter vacation training programme on natural resources' for school children.

Dr. (Capt.) Parag Nigam (January 10, 2007): **Chemical immobilization as a tool in managing wild animals.** 3 week Special AFM course for the officers who had completed 10 year of service (1992-96 IFS Batch), Indira Gandhi National Forest Academy, Dehradun.

Shri A.K. Bhardwaj (January 16, 2007): **Nature Resource Planning and Management.** Post Graduate Diploma in Natural Resource Management Course students, FRI University, Dehradun.

Dr. Ruchi Badola (January 17, 2007): III Special Advanced Forest Management Training Course for Indian Forest Service Officers of 1992 to 1996, **Integrating costs and benefits of ecosystem services into conservation**, IGNFA.

Dr. B.K. Mishra (January 23, 2007): FRI University, Dehradun. **Conflict Management**, P.G. Diploma Course in Natural Resource Planning and Management.

Dr. Asha Rajvanshi (January 30, 2007): **Environmental Impact Assessment as a decision making tool for sustainable development for M.Sc., M.Phil. & Research students.** Maharishi Dayanand Saraswati University, Ajmer

Dr. Asha Rajvanshi (January 30, 2007): **The relevance of biodiversity in EIA. Training programme on Environmental Impact Assessment for M.Sc., M.Phil. and Research students.** Maharishi Dayanand Saraswati University, Ajmer.

Dr. Asha Rajvanshi (January 31, 2007): **Tools and techniques for promoting good practice in EIA. Training programme on Environmental Impact Assessment for M.Sc., M.Phil. and Research students.** Maharishi Dayanand Saraswati University, Ajmer.

Shri P.R. Sinha (February 12, 2007): Guest lecture on **"Tiger conservation issues in India".** IFS Officers – AFM YoA 1985 at IGNFA, Dehradun.

Shri A.K. Bhardwaj (February 19, 2007): **Ecotourism and livelihood: The Periyar Experience.** Two-week course on Joint Forest Management & Sustainable Rural Development for the State Forest Service Officers organised by State Forest Staff College, Dehradun.

Dr. Ruchi Badola (February 19–23, 2007): PG Diploma in Natural resources Management, **Natural Resource Economics**, Forest Research Institute University.

Dr. Ruchi Badola (February 23, 2007): **Ecodevelopment and its role in biodiversity Conservation**. Two week course on JFM and sustainable development for in-service SFS officers, SFS College, Dehradun.

Shri D. Chakraborty (February, 2007): ***Ex – situ* management, role in conservation of wild fauna.** State Forest Service College, Dehradun (4 lecture sessions).

Dr. K. Vasudevan (March 1-4, 2007): **"Phylogeography of the Indian subcontinent based on the distribution of extant amphibians and reptiles"** at the Lecture Workshop on Molecular Ecology, Sponsored by the Department of Biotechnology and the Indian Academy of Sciences, Coorg, India.

Dr. (Capt.) Parag Nigam (March 6, 2007): **Management of Elephants in captivity.** (Training program for Zoo Veterinarians) Indian Veterinary Research Institute, Izatnagar, Bareilly.

Shri A.K. Bhardwaj (March 23, 2007): **Ecodevelopment - A Journey of Change in Periyar.** Course for IFS Probationers 2005 batch organized by Indira Gandhi National Forest Academy, Dehradun.

Dr. V.P. Uniyal (March 24, 2007): Lecture on **"Insects and their role in biodiversity"** delivered to 25 farmers from different Indian states and South East Regions.

Dr. B.K. Mishra (March 26, 2007): FRI University, Dehradun. **Participatory Rural Appraisal**, P.G. Diploma Course in Natural Resource Planning and Management.

## To WII

**Dr. Mahesh Rangarajan, eminent political analyst** was invited as a guest speaker. He delivered a lecture titled "Making Conservation Work: Biodiversity, Science and Society in 21st Century India" on May 18, 2006.

**Dr. Trevor Price, Professor, Department of Ecology and Evolution, University of Chicago, USA** delivered a guest lecture on 'Evolution and Ecology of Himalayan Birds: Effects of the Breeding and Non-breeding Seasons' on June 13, 2006.

**Dr. Alan Rodgers, UNDP – GEF, Regional Coordinator for Eastern Africa Nairobi, Kenya** and former faculty member of the Wildlife Institute of India delivered a guest lecture on "Changing Conservation Paradigms in the 21st Century: A comparison of Africa and India" on June 27, 2006.

**Shri H.S. Panwar** delivered a lecture titled ' Eco-development and JFM - Need for integration in the forestry and wildlife sectors' on December 4, 2006.

**Mr. James Champion, grandson of Mr. F.W. Champion and grand nephew of Mr. H.G. Champion,** delivered a talk on "Retracing the steps of F.W. Champion" on December 12, 2006.

# Accounts

# Accounts

**AUDIT CERTIFICATE**

I have audited the attached Balance Sheet of Wildlife Institute of India (Wildlife Institute of India), Dehradun as on 31 st March 2007 and the Income and Expenditure Account, Receipt and Payment Account for the year ended on that date. Preparation of these financial statements is the responsibility of the Wildlife Institute of India's management. My responsibility is to express an opinion on these financial statements based on my audit.

I have conducted my audit in accordance with applicable rules and the auditing standards generally accepted in India. These standards require that I plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatements. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. I believe that my audit provides a reasonable basis for my opinion.

Based on our audit, I report that:

1. I have obtained all the information and explanations, which to the best of our knowledge and belief were necessary for the purposes of our audit;
2. Subject to the major observations given below and detailed observations in the Audit Report annexed herewith, I report that the Balance, Sheet and the Income and Expenditure Account/ Receipt and Payment Account dealt with by this report are properly drawn up and are in agreement with the basis of accounts.
   - Accrued interest to the extent of Rs 42.97 lakh was not accounted for in the Income & Expenditure Account.
   - Advance payment of Rs. 14.00 lakh made in March 2007 to NICSI, New Delhi had been included in the fixed assets instead of Current Assets As a result of which Fixed Assets were understated by Rs. 0.33 lakh and expenditure was overstated to the same extent.
   - An amount of Rs. 254.53 lakh was reflected under the head Corpus Fund at liabilities side in the Balance Sheet as on 31.3.07 whereas the correspondino figure was worked out to Rs. 263.481akh from the cash book of Corpus Fund.
   - Wildlife Institute of India, Dehradun depicted non-existent materials and supplies of Rs. 22.89 lakh as fixed assets (Para 1.1.2.2)
3. In my opinion and to the best of my information and according to the explanations given to me:
   (i) the accounts give the information required under the prescribed format of accounts;
   (ii) the said Balance Sheet, Income and Expenditure Account/ Receipts and Payment Account read together with the Accounting Policies and Notes thereon, and subject to the significant matters stated above and other matters mentioned in the Audit Report annexed herewith, give a true and fair view.
      a. In so far as it relates to the Balance Sheet of the state of affairs of the Wildlife Institute of India, Dehradun as on 31 st March 2007 ; and
      b. In so far as it relates to the Income and Expenditure Account of the deficit for the year ended on that date.

**Place: New Delhi**
**Date: 23-04-08**

**PRINCIPAL DIRECTOR OF AUDITS**
**(SCIENTIFIC DEPARTMENTS)**

**WILDLIFE INSTITUTE OF INDIA, DEHRADUN**
**Receipt & Payment Accounts for the financial year 2006-07**

**(A) GRANT-IN-AID**

| RECEIPTS | | | | PAYMENT | | | |
|---|---|---|---|---|---|---|---|
| **Particulars** | **Plan** | **Non-Plan** | **Total** | **Particulars** | **Plan** | **Non-Plan** | **Total** |
| To Opening Balance | | | | By Salaries & Allowance | 22,074,904.00 | 10,019,507.00 | 32,094,411.00 |
| Cash in Hand | 144,908.00 | | 144,908.00 | By Honorarium | 80,650.00 | | 80,650.00 |
| Cash in Bank | 2,344,030.00 | | 2,344,030.00 | By Fellowship | 858,997.00 | | 858,997.00 |
| To EMD Received | | 229,400.00 | 229,400.00 | By Wages | 1,067,031.00 | | 1,067,031.00 |
| To Recovery of Loans & Advance to Staff | | 850,479.00 | 850,479.00 | By Travel Expenses | 2,213,304.00 | | 2,213,304.00 |
| To Cable Charges | | 2,100.00 | 2,100.00 | By Postage & Telegram | 347,258.00 | | 347,258.00 |
| To Grant-in-Aid from MoEF | 109,800,000.00 | 10,000,000.00 | 119,800,000.00 | By Electricity & Water | 2,753,591.00 | | 2,753,591.00 |
| To Misc. Receipts | | 1,938,540.00 | 1,938,540.00 | By Conveyance Charges | 5,755.00 | | 5,755.00 |
| To EPF Contribution | | 4,979.00 | 4,979.00 | By Medical Expenses | 3,576,639.00 | | 3,576,639.00 |
| To GPF Contribution payable | | 7,500.00 | 7,500.00 | By Operational Expenditure | 5,802,694.00 | | 5,802,694.00 |
| To TDS | | 18,422.00 | 18,422.00 | By OTA | 676,837.00 | | 676,837.00 |
| To Security Deposits | | 1,000.00 | 1,000.00 | By POL for Vehicle | 2,575,226.00 | | 2,575,226.00 |
| | | | | By Repair and maintenance of Veh. | 1,397,423.00 | | 1,397,423.00 |
| | | | | By Publicaton | 542,756.00 | | 542,756.00 |
| | | | | By Stationery | 474,894.00 | | 474,894.00 |
| | | | | By Computer & Assessories | 5,466,389.00 | | 5,466,389.00 |
| | | | | By Sales Tax/Trade Tax/Professional Tax | | 6,103.00 | 6,103.00 |
| | | | | By Furniture & Fixtures | 764,924.00 | | 764,924.00 |
| | | | | By Journals & Periodicals | 3,172,938.00 | | 3,172,938.00 |
| | | | | By Advance for expenses to Staff | 350,195.00 | | 350,195.00 |
| | | | | By Lab Equipment | 3,169,633.00 | | 3,169,633.00 |
| | | | | By Library Book | 932,835.00 | | 932,835.00 |
| | | | | By Refund of Hostel Caution Money | | 17,500.00 | 17,500.00 |
| | | | | By Office Equipment | 421,615.00 | | 421,615.00 |
| | | | | By Training Equipment | 105,232.00 | | 105,232.00 |
| | | | | By AMC of Computers | 1,583,404.00 | | 1,583,404.00 |
| | | | | By Annual Research Seminar | 561,310.00 | | 561,310.00 |
| | | | | By Bonus | 315,966.00 | | 315,966.00 |
| | | | | By Estate Maintenance | 2,073,029.00 | | 2,073,029.00 |
| | | | | By Estate Security | 3,698,849.00 | | 3,698,849.00 |
| | | | | By Pension Contribution | 633,136.00 | | 633,136.00 |
| | | | | By Refund of Consultancy Charges | 1,011,338.00 | | 1,011,338.00 |
| | | | | By Legal Expenses | 163,643.00 | | 163,643.00 |
| | | | | By Library Expenses | 529,823.00 | | 529,823.00 |
| | | | | By LTC | 614,288.00 | | 614,288.00 |
| | | | | By M. Sc. Course Expenditure | 1,140,794.00 | | 1,140,794.00 |
| | | | | By Printing & binding | 254,163.00 | | 254,163.00 |
| | | | | By Transferred to Research Project A/c for Exp | 12,500,000.00 | | 12,500,000.00 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | By Sports Goods | 228,133.00 | | 228,133.00 |
| | | | | By Telephone & Tc | 636,672.00 | | 636,672.00 |
| | | | | By Transferred to Training Account for Exp | 6,297,637.00 | | 6,297,637.00 |
| | | | | By CGEGIS | | 1,135.00 | 1,135.00 |
| | | | | By Workshop/ Seminar | 1,817,907.00 | | 1,817,907.00 |
| | | | | By Corpus Fund | 2,003,626.00 | | 2,003,626.00 |
| | | | | By Advance to **CPWD/CCU** for Civil Works | 5,468,275.00 | | 5,468,275.00 |
| | | | | By Development of Forensic Lab | 1,627,674.00 | | 1,627,674.00 |
| | | | | By Govt. Contribution to Pension Fund | 5,000,000.00 | | 5,000,000.00 |
| | | | | By Lab Expneses | 2,729,318.00 | | 2,729,318.00 |
| | | | | By Sharing of cost of Kendriya Vidyalaya | 500,000.00 | | 500,000.00 |
| | | | | By Closing in Bank | 4,802,036.00 | | 4,802,036.00 |
| | | | | By Closing in Hand | 274,372.00 | | 274,372.00 |
| A' Total | 112,288,938.00 | 13,052,420.00 | 125,341,358.00 | A' Total | 115,297,113.00 | 10,044,245.00 | 125,341,358.00 |

**(B) RESEARCH PROJECT**

| RECEIPTS | | | | PAYMENT | | | |
|---|---|---|---|---|---|---|---|
| **Particulars** | **Plan** | **Non Plan** | **Total** | **Particulars** | **Plan** | **Non Plan** | **Total** |
| To Opening Balance Bank Balance | | 1,814,920.50 | 1,814,920.50 | To payment to sundry creditors | | 170,251.00 | 170,251.00 |
| *Cash in Hand* | | 3,560.00 | 3,560.00 | By Office Equipment (Research Project) | | 491,143.00 | 491,143.00 |
| To Misc. Receipts for Research Project | | 14,500,115.00 | 14,500,115.00 | By Camp Expenses (Research Project) | | 600,983.00 | 600,983.00 |
| To Advance for expenses | | 326,620.00 | 326,620.00 | By Contingencies/ Misc. (Research Project) | | 1,921,405.40 | 1,921,405.40 |
| | | | | By Fellowship & Wages (Research Project) | | 5,389,464.00 | 5,389,464.00 |
| | | | | By POL & Maintenance of Vehicle (Research Project) | | 2,114,780.25 | 2,114,780.25 |
| | | | | By Travel Expenses (Research Project) | | 2,172,010.00 | 2,172,010.00 |
| | | | | By Camp Equipment | | 2,278,535.00 | 2,278,535.00 |
| | | | | By Closing Balance | | | 0.00 |
| | | | | *Cash in Bank* | | *1,506,567.85* | *1,506,567.85* |
| | | | | *Cash in Hand* | | *76.00* | *76.00* |
| B' Total | 0.00 | 16,645,215.50 | 16,645,215.50 | B' Total | 0.00 | 16,645,215.50 | 16,645,215.50 |

**(C) TRAINING ACCOUNT**

| RECEIPTS | | | | PAYMENT | | | |
|---|---|---|---|---|---|---|---|
| **Particulars** | **Plan** | **Non Plan** | **Total** | **Particulars** | **Plan** | **Non Plan** | **Total** |
| To Opening in Bank | *0.00* | *7,925,451.99* | *7,925,451.99* | By Training Equipment | | 552,210.00 | 552,210.00 |
| To Interest for 2006-07 | | 249,651.00 | 249,651.00 | By Contingent & Misc. Expenses | | 3,571,563.00 | 3,571,563.00 |
| To Receipt for Training Exp | | 6,454,800.00 | 6,454,800.00 | By Honorarium (Training A/c) | | 183,580.00 | 183,580.00 |
| To Misc. Receipts (Training A/c) | | 2,491,887.00 | 2,491,887.00 | By Training Allowance | | 620,342.00 | 620,342.00 |
| To Encashment of FDR | | 8,985,149.00 | 8,985,149.00 | By Travelling Allowance | | 2,215,725.00 | 2,215,725.00 |
| To Advance for training Expenses | | 618,632.00 | 618632.00 | By Corpus Fund | | 13,591,632.00 | 13,591,632.00 |
| To Interest on FDR | | 458,275.00 | 458275.00 | By Sundry Creditors | | 234,338.00 | 234,338.00 |
| | | | | *By Closing in Bank* | | *6,214,455.99* | *6,214,455.99* |
| C' Total | 0.00 | 27,183,845.99 | 27,183,845.99 | C' Total | 0.00 | 27,183,845.99 | 27,183,845.99 |

**(D) CONSULTANCY PROJECTS**

| RECEIPTS | | | | PAYMENT | | | |
|---|---|---|---|---|---|---|---|
| **Particulars** | **Plan** | **Non Plan** | **Total** | **Particulars** | **Plan** | **Non Plan** | **Total** |
| To Opening Balance: Cash in hand | | 0 | 0 | | | | |
| *Cash in Bank* | | *2,920,150.67* | *2,920,150.67* | By Camp Equipment | | 2,252,299.00 | 2,252,299.00 |
| To Misc. Receipts | | 3,763,025.73 | 3,763,025.73 | By Camp Expenses | | 118,738.00 | 118,738.00 |
| To Receipts for Project during 2006-07 | | 29,908,000.00 | 29,908,000.00 | By Cont./ Misc. | | 2,621,861.00 | 2,621,861.00 |
| To EMD Received | | 1,000.00 | 1,000.00 | By Fellowship & Wages | | 6,794,584.00 | 6,794,584.00 |
| To Opening Balance Cash in Hand | | 361,934.00 | 361,934.00 | By Travel Expenses | | 1,620,123.00 | 1,620,123.00 |
| | | | | By POL & Maintenance of vehicle | | 2891753.00 | 2891753.00 |
| | | | | By Publication | | 359495.00 | 359495.00 |
| | | | | By GIS of office Data | | 2298115.00 | 2298115.00 |
| | | | | By WII Corpus Fund | | 6095388.00 | 6095388.00 |
| | | | | By Advance for expenses( Const. Projects) | | 427161.00 | 427161.00 |
| | | | | By Sundry Creditors | | 3917997.00 | 3917997.00 |
| | | | | By Bank Balance | | 7556596.40 | 7556596.40 |
| E' Total | 0.00 | 36,954,110.40 | 36,954,110.40 | E' Total | 0.00 | 36,954,110.40 | 36,954,110.40 |

**(D) PENSIONS**

| RECEIPTS | | | | PAYMENT | | | |
|---|---|---|---|---|---|---|---|
| **Particulars** | **Plan** | **Non Plan** | **Total** | **Particulars** | **Plan** | **Non Plan** | **Total** |
| To Opening Balance | | | | | | | |
| *Cash in Bank* | | *5,927,418.00* | *5,927,418.00* | By Investment in FDR (Pension Fund) | | 35,613,520.00 | 35,613,520.00 |
| To Investment in FDR | | 24,101,268.00 | 24,101,268.00 | By Commuted Value of Pension | | 158,595.00 | 158,595.00 |
| To Interest (Pension A/c) | | 467,455.00 | 467,455.00 | By Pension/ Family Pension | | 1,060,166.00 | 1,060,166.00 |
| To WII Contribution | | 6,479,935.00 | 6,479,935.00 | By Closing Balance | | | |
| | | | | Cash in Bank | | *143,795.00* | *143,795.00* |
| D' Total | 0.00 | 36,976,076.00 | 36,976,076.00 | D' Total | 0.00 | 36,976,076.00 | 36,976,076.00 |

**(E) GPF**

| RECEIPTS | | | | PAYMENT | | | |
|---|---|---|---|---|---|---|---|
| **Particulars** | **Plan** | **Non Plan** | **Total** | **Particulars** | **Plan** | **Non Plan** | **Total** |
| To Opening Balance | | | | | | | 0.00 |
| Cash in Bank | | *938,852.00* | *938,852.00* | | | | 0.00 |
| To GP Fund Contribution | | 5,416,108.00 | 5,416,108.00 | By Final Payment | | 813,110.00 | 813,110.00 |
| To Interest on Bank Deposit | | 254,920.00 | 254,920.00 | By Investment in FDR (GPF) | | 7,547,833.00 | 7,547,833.00 |
| To Encashment of FDR | | 7,407,520.00 | 7,407,520.00 | By Closing Balance | | 2,222,385.00 | 2,222,385.00 |
| | | | | By Advance/withdrawl | | 3,434,072.00 | 3,434,072.00 |
| F' Total | 0.00 | 14,017,400.00 | 14,017,400.00 | F' Total | 0.00 | 14,017,400.00 | 14,017,400.00 |
| A+B+C+D+E+F Grand Total | 112,288,938.00 | 144,829,067.89 | 257,118,005.89 | A+B+C+D+E+F Grand Total | 115,297,113.00 | 141,820,892.89 | 257,118,005.89 |

**(S.K. Khantwal)**
Finance Officer

**(P.R. Sinha)**
Director

**FINANCIAL STATEMENTS (NON-PROFIT ORGANISATION)**
**Wildlife Institute of India, Dehradun**
**BALANCE SHEET AS ON 31ST MARCH, 2007**

**Amount (Rs.)**

| CORPUS/CAPITAL FUND AND LIABILITIES | Schedule | Current Year | Previous Year |
|---|---|---|---|
| CORPUS/CAPITAL FUND | 1 | 249801203.00 | 263285645.55 |
| RESERVE AND SURPLUS | 2 | 0.00 | 0.00 |
| EARMARKED/ENDOWMENT FUND | 3 | 0.00 | 0.00 |
| SECURED LOAN AND BORROWINGS | 4 | 0.00 | 0.00 |
| UNSECURED LOAN AND BORROWINGS | 5 | 416356.00 | 415356.00 |
| DEFERRED CREDIT LIABILITIES | 6 | 0.00 | 0.00 |
| CURRENT LIABILITIES AND PROVISION | 7 | 113541898.00 | 90105729.08 |
| **TOTAL (A)** | | **363759457.00** | **353806730.63** |
| ASSETS | | | |
| FIXED ASSETS | 8 | 197268680.00 | 199503217.56 |
| INVESTMENTS-FROM EARMARKED/ENDOWMENT FUNDS | 9 | 0.00 | 0.00 |
| INVESTMENTS- OTHERS | 10 | 111010582.00 | 83082809.79 |
| CURRENT ASSETS, LOANS, ADVANCES ETC. | 11 | 55480195.00 | 71220703.28 |
| MISCELLANEOUS EXPENDITURE (to the extent not written off or adjusted) | | | |
| **TOTAL (B)** | | **363759457.00** | **353806730.63** |

**(S.K. Khantwal)**
Finance Officer

**(P.R. Sinha)**
Director

**Financial Statement (Non-Profit Organization)**
**Wildlife Institute of India, Dehradun**
**SCHEDULES FORMING PART OF BALANCE SHEET FOR THE YEAR ENDED 31st MARCH 2007**

| | | | (Amt. Rs.) | |
|---|---|---|---|---|
| | | | Current Year | Previous Year |
| **SCHEDULE 1: CORPUS/ CAPITAL FUND** | | | | |
| Balance as at the begninig of the year | | | 259585645.55 | 267583923.79 |
| Add: Contribution towards Corpus/ Capital fund | | | 30850704.00 | 46254721.00 |
| Add/(Deduct) : Balance of net income (expenditure) transferred from | | | -66088341.55 | -54252999.24 |
| **Total** | **A** | | **224348008.00** | **259585645.55** |
| **Corpus Fund** | | | 25453195.00 | 3700000.00 |
| **Total** | **B** | | 25453195.00 | 3700000.00 |
| **TOTAL A+B** | | | **249801203.00** | **263285645.55** |
| **SCHEDULE 5 : UNSECURED LOANS AND BORROWINGS** | | | | |
| **(1) Central Govt.** | | | | |
| **(2) State Govt.(Specify)** | | | | |
| **(3) Financial Institutions** | | | | |
| **(4) Banks** | | | | |
| (i) Term Loans | | | | |
| (ii) Others (specify) | | | | |
| **(5) Other Institutions and Agencies** | | | | |
| **(6) Debentures and Bonds** | | | | |
| **(7) Fixed Deposits** | | | | |
| **(8) Others (Specify)** | | | | |
| Security Deposit | | | 378235.00 | 377235.00 |
| Loans | | | 38121.00 | 38121.00 |
| **TOTAL** | | | **416356.00** | **415356.00** |
| **SCHEDULE 7 : CURRENT LIABILITIES AND PROVISION** | | | | |
| **(A) CURRENT LIABILITIES** | | | | |
| **(1) Acceptances** | | | | |
| **(2) Sundry Creditors** | | | | |
| (1) For Goods | | | | |
| (2) For Others | | | | |
| (2.1) Payment outstanding for Research Project | | 49080.00 | | 8462896.00 |
| (2.2) Payment outstanding for Training A/C | | 34344.00 | | |
| (2.3) Payment outstanding for Cons Project | | 94948.00 | | |
| (2.4) Payment outstanding for Supply of items(2005-06) | | 2299558.00 | | |
| (2.5) Other Payments outstanding(Grant-in-aid) | | 20886009.00 | | |
| (2.6) Payment outstanding for Proj/Training | | 1143988 | | |
| **(3) Advances Received** | | 24507927.00 | 24507927.00 | |
| Hostel Caution Money | | | 137160.00 | 154660.00 |
| **(4) Interest accrued but not due on** | | | | |
| (1) Secured Loans/Borrowings | | | | |
| (2) Unsecured Loans/Borrowings | | | | |

| | | |
|---|---|---|
| **(5) Statuary Liabilities** | | |
| (1) Overdue | | |
| (2) Others (Specify) | | |
| Pension Fund | 62004985.03 | 56276356.03 |
| GP Fund | 26111421.05 | 24687575.05 |
| **(6) Others (Specify)** | | |
| EMD Received | 744468.00 | 515068.00 |
| **TOTAL (A)** | **113505961.08** | **90096555.08** |
| | | |
| **(B) Provisions** | | |
| | | |
| **(1) For Taxation** | | |
| Income Tax Salary | 0.00 | 0.00 |
| TDS | 21189.00 | 2767.00 |
| TDS (Training A/c) | 304.00 | 304.00 |
| **(2) Gratuity** | | |
| **(3) Superannuation/ Pension** | | |
| **(4) Accumulated Leave Encashment** | | |
| **(5) Trade Warranties/ Claims** | | |
| **(6) Others (Specify)** | | |
| Income Tax from Pensioners | | |
| Employee Contribution EPF | | |
| CM Relief Fund | | |
| CGEGIS | -1135.00 | |
| Cable | 2100.00 | |
| HDFC | | |
| GPF | 7500.00 | |
| SP & FB Fund | | |
| Car/Scooter Adv. (Transferrable) | | |
| Sale Tax/Trade Tax/Prof.Tax/ Com. Tax | 0.00 | 6103.00 |
| EPF Contribution (Training A/c) | | |
| House Licence Fee (Consultancy A/c) | | |
| EPF Subscription | 4979.00 | |
| EMD Const. Project | 1000.00 | |
| **TOTAL (B)** | **35937.00** | **9174.00** |
| | | |
| **TOTAL ( A+ B)** | **113541898.08** | **90105729.08** |

**SCHEDULE 8 : FIXED ASSETS**

| Pariculars | Gross Block | | | | | Depreciation | | | | Net E |
|---|---|---|---|---|---|---|---|---|---|---|
| | 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 |
| | | 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 |
| Land | 6607214.58 | 0.00 | 0.00 | 0.00 | 6607214.58 | 0.00 | 0.00 | 0.00 | 0.00 | 6607214.58 |
| Trees | 2432709.00 | 0.00 | 0.00 | 0.00 | 2432709.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2432709.00 |
| **TOTAL** | **12478203.58** | **0.00** | **0.00** | **0.00** | **12478203.58** | **0.00** | **0.00** | | **0.00** | **12478203.58** |
| **BUILDINGS** | | | | | | | | | | |
| **BLOCK: 10%** | | | | | | | | | | |
| Architectural & Supervision Fee | 5880608.96 | 0.00 | 0.00 | 0.00 | 5880608.96 | 588060.90 | 0.00 | 0.00 | 588060.90 | 5292548.06 |
| Auditorium | 8806035.20 | 0.00 | 0.00 | 0.00 | 8806035.20 | 880603.52 | 0.00 | 0.00 | 880603.52 | 7925431.68 |
| Boundary Fencing | 536647.47 | 0.00 | 0.00 | 0.00 | 536647.47 | 53664.75 | 0.00 | 0.00 | 53664.75 | 482982.72 |
| Boundary Wall | 948852.25 | 0.00 | 0.00 | 0.00 | 948852.25 | 94885.23 | 0.00 | 0.00 | 94885.23 | 853967.03 |
| Building Complex | 89399768.06 | 0.00 | 7451277.00 | 0.00 | 96851045.06 | 8939976.81 | 372563.85 | 0.00 | 9312540.66 | 87538504.40 |
| Campus Development | 7158427.83 | 0.00 | 2164000.00 | 0.00 | 9322427.83 | 715842.78 | 108200.00 | 0.00 | 824042.78 | 8498385.05 |
| Materials and Supplies | 2543302.36 | 0.00 | 0.00 | 0.00 | 2543302.36 | 254330.24 | 0.00 | 0.00 | 254330.24 | 2288972.12 |
| Tennis Court | 348292.14 | 0.00 | 0.00 | 0.00 | 348292.14 | 34829.21 | 0.00 | 0.00 | 34829.21 | 313462.93 |
| Sports Complex | 220694.22 | 0.00 | 0.00 | 0.00 | 220694.22 | 22069.42 | 0.00 | 0.00 | 22069.42 | 198624.80 |
| **BLOCK: 20%** | | | | | | | 0.00 | | | 0.00 |
| Road & Culvert | 936722.05 | 0.00 | 0.00 | 0.00 | 936722.05 | 187344.41 | 0.00 | 0.00 | 187344.41 | 749377.64 |
| Staff Quarters | 1300692.99 | 0.00 | 0.00 | 0.00 | 1300692.99 | 260138.60 | 0.00 | 0.00 | 260138.60 | 1040554.39 |
| **TOTAL** | **118080043.53** | **0.00** | **9615277.00** | **0.00** | **127695320.53** | **12031745.86** | **480763.85** | | **12512509.71** | **115182810.82** |
| **PLANT MACHINERY & EQUIPMENT** | | | | | | | | | | |
| **BLOCK: 20%** | | | | | | | | | | |
| Vehicle | 2325382.04 | 0.00 | 0.00 | 0.00 | 2325382.04 | 465076.41 | 0.00 | 0.00 | 465076.41 | 1860305.63 |
| Development of Forensic Laboratory | 5238647.52 | 608642.00 | 1019032.00 | 0.00 | 6866321.52 | 1047729.50 | 223631.60 | 0.00 | 1271361.10 | 5594960.42 |
| Training Equipment | 11264405.56 | 105232.00 | 0.00 | 0.00 | 11369637.56 | 2252881.11 | 21046.40 | 0.00 | 2273927.51 | 9095710.05 |
| **BLOCK: 25%** | | | | | | | 0.00 | | 0.00 | |
| AC Plant | 2765972.04 | 0.00 | 0.00 | 0.00 | 2765972.04 | 691493.01 | 0.00 | 0.00 | 691493.01 | 2074479.03 |
| Camp Equipment (project) | 751959.60 | 0.00 | 0.00 | 0.00 | 751959.60 | 187989.90 | 0.00 | 0.00 | 187989.90 | 563969.70 |
| DG Set | 623423.46 | 0.00 | 0.00 | 0.00 | 623423.46 | 155855.87 | 0.00 | 0.00 | 155855.87 | 467567.60 |
| EPABX | 324632.81 | 0.00 | 0.00 | 0.00 | 324632.81 | 81158.20 | 0.00 | 0.00 | 81158.20 | 243474.61 |
| Lab Equipment | 7803814.27 | 1047322.00 | 2122311.00 | 0.00 | 10973447.27 | 1950953.57 | 527119.38 | 0.00 | 2478072.94 | 8495374.33 |
| Office Equipment | 5892316.12 | 316890.00 | 104725.00 | 0.00 | 6313931.12 | 1473079.03 | 92313.13 | 0.00 | 1565392.16 | 4748538.97 |
| Training Equipment | 1010179.84 | 552210.00 | 0.00 | 0.00 | 1562389.84 | 252544.96 | 138052.50 | 0.00 | 390597.46 | 1171792.38 |
| Office Equipment (Project) | 36720.00 | 0.00 | 0.00 | 0.00 | 36720.00 | 9180.00 | 0.00 | 0.00 | 9180.00 | 27540.00 |
| Camp Equipment (Conslt. Project) | 11107627.31 | 2252299.00 | 0.00 | 0.00 | 13359926.31 | 2776906.83 | 563074.75 | 0.00 | 3339981.58 | 10019944.73 |
| Office Equipment (Research Project) | 2765750.86 | 368290.00 | 122853.00 | 0.00 | 3256893.86 | 691437.72 | 107429.13 | 0.00 | 798866.84 | 2458027.02 |
| Camp Equipment (Research Project) | 2350702.78 | 270845.00 | 2007690.00 | 0.00 | 4629237.78 | 587675.70 | 318672.50 | 0.00 | 906348.20 | 3722889.59 |
| **TOTAL** | **54261534.21** | **5521730.00** | **5376611.00** | **0.00** | **65159875.21** | **12623961.80** | **1991339.38** | **0.00** | **14615301.17** | **50544574.04** |
| **FURNITURE, FIXTURES** | | | | | | | | | | |
| **BLOCK : 15%** | | | | | | | | | | |
| Furnitures & Fixtures | 10481346.39 | 732279.00 | 32645.00 | 0.00 | 11246270.39 | 1572201.96 | 134325.60 | 0.00 | 1706527.56 | 9539742.83 |
| Furniture & Fixture | 11523.88 | 0.00 | 0.00 | 0.00 | 11523.88 | 1728.58 | 0.00 | 0.00 | 1728.58 | 9795.30 |
| **TOTAL** | **10492870.27** | **732279.00** | **32645.00** | **0.00** | **11257794.27** | **1573930.54** | **134325.60** | **0.00** | **1708256.14** | **9549538.13** |

| Pariculars | Gross Block | | | | | Depreciation | | | | Net B |
|---|---|---|---|---|---|---|---|---|---|---|
| | 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 |
| | | Upto 30-Sep | After 30-Sep | | | | | | | |
| **OFFICE EQUIPMENT** | | | | | | | | | | |
| **BLOCK : 20%** | | | | | | | | | | |
| Office Equipment (Training A/c) | 11827.20 | 0.00 | 0.00 | 0.00 | 11827.20 | 2365.44 | 0.00 | 0.00 | 2365.44 | 9461.76 |
| Office Equipment (Conslt. Project) | 162668.81 | 0.00 | 0.00 | 0.00 | 162668.81 | 40667.20 | 0.00 | 0.00 | 40667.20 | 122001.61 |
| **TOTAL** | **174496.01** | **0.00** | **0.00** | **0.00** | **174496.01** | **43032.64** | **0.00** | **0.00** | **43032.64** | **131463.37** |
| **COMPUTER/PERIPHERALS** | | | | | | | | | | |
| **BLOCK : 20%** | | | | | | | | | | |
| Computer and Peripherals | 2395128.58 | 0.00 | 0.00 | 0.00 | 2395128.58 | 479025.72 | 0.00 | 0.00 | 479025.72 | 1916102.86 |
| **BLOCK : 60%** | | | | | | | | | | |
| Computer & Accessories | 1620941.25 | 2346855.00 | 3119534.00 | 0.00 | 7087330.25 | 972564.75 | 2343973.20 | 0.00 | 3316537.95 | 3770792.30 |
| **TOTAL** | **4016069.83** | **2346855.00** | **3119534.00** | **0.00** | **9482458.83** | **1451590.47** | **2343973.20** | **0.00** | **3795563.67** | **5686895.16** |
| **LIBRARY BOOKS** | | | | | | | | | | |
| **BLOCK : 100%** | | | | | | | | | | |
| Journals & Periodicals | 0.00 | 3172938.00 | 0.00 | 0.00 | 3172938.00 | 0.00 | 317293.80 | 0.00 | 317293.80 | 2855644.20 |
| Library Books | 0.00 | 932835.00 | 0.00 | 0.00 | 932835.00 | 0.00 | 93283.50 | 0.00 | 93283.50 | 839551.50 |
| **TOTAL** | **0.00** | **4105773.00** | **0.00** | **0.00** | **4105773.00** | **0.00** | **410577.30** | **0.00** | **410577.30** | **3695195.70** |
| | | | | | | | | | | |
| **GRAND TOTAL** | **199503217.43** | **12706637.00** | **18144067.00** | **0.00** | **230353921.43** | **27724261.30** | **5360979.33** | **0.00** | **33085240.63** | **197268680.80** |

| | | |
|---|---|---|
| **SCHEDULE :10 INVESTMENT - OTHERS** | | |
| **(1) In the Govt. Securities** | | |
| **(2) Other approved Securities** | | |
| **(3) Shares** | | |
| **(4) Debentures and Bonds** | | |
| Investment in RBI Bond (GPF) | 7416000.00 | 7416000.00 |
| Investment in RBI Bond (Pension) | 19308000.00 | 19308000.00 |
| **(5) Subsidiaries and Joint Ventures** | | |
| **(6) Others (Specify)** | | |
| Investment in FDR (Pension Fund) | 42553190.00 | 31040938.00 |
| FDR (GPF) | 16473035.79 | 16332722.79 |
| Account No. 1 FDR | | |
| Training FDR | 0.00 | 8985149.00 |
| FDR Corpus Fund | 25260356.00 | 0.00 |
| **TOTAL** | **111010581.79** | **83082809.79** |
| **SCHEDULE :11 CURRENT ASSETS, LOANS, ADVANCES ETC.** | | |
| **(A) CURRENT ASSETS** | | |
| **(1) Inventories** | | |
| Closing Stock of Steel & Cement | 131274.90 | 131274.90 |
| Advance for Research Projects | | |
| Grant-in-Aid accrued but not received | 20000000.00 | 9800000.00 |
| Closing Balance of WII Publication | 1086471.00 | 1086471.00 |
| **(2) Sundry Debtors** | | |
| (1) Debts Outstanding for a period exceeding six months | | |
| (2) Others (Specify) | | |
| **(3) Cash balances in hand (including cheques/drafts and imprest)** | | |
| Grant-in-Aid A/c | 274372.00 | 144908.00 |
| Research Project A/c | 76.00 | 3560.00 |
| Training A/c | | |
| Consultancy A/c | 0.00 | 361934.00 |
| Pension Fund A/c | | |
| GPF A/c | | |
| **(4) Bank Balances** | | |
| (1) With Scheduled Banks | | |
| Grant-in-Aid A/c | 4802036.00 | 2344030.23 |
| Research Project A/c | 1506567.85 | 1814920.50 |
| Training A/c | 6214455.99 | 7925451.36 |
| Consultancy A/c | 7556596.00 | 2920150.00 |
| Pension Fund A/c | 143795.00 | 5927418.03 |
| GPF A/c | 2222385.26 | 938852.26 |
| Corpus fund No 4032 | 192839.00 | 3700000.00 |
| (2) With Non-Scheduled Banks | | |
| **(5) Post Office-Savings Accounts** | | |
| **TOTAL (A)** | **44130869.00** | **37098970.28** |

| | | |
|---|---|---|
| **(B) LOANS, ADVANCES AND OTHER ASSETS** | | |
| **(1) Loans** | | |
| (1) Staff | | |
| Loan & Advances to Staff | 883364.00 | 1733843.00 |
| Advance for expenses to Staff | 1512453.00 | 1162258.00 |
| Advance for expenses (Research Projects) | 1105467.00 | 1432087.00 |
| Advance for expenses (Conslt. Project) | 427161.00 | |
| (2) Other entities engaged in activities /objectives similar to | | |
| (3) Others (Specify) | | |
| Adv. for civil work to CPWD | 4852998.00 | 9000000.00 |
| Loan to Other A/c | | |
| **(2) Advances and other amounts recoverable in cash or in kind or** | | |
| (1) On Capital Accounts | | |
| (2) Prepayments | | |
| (3) Others (Specify) | | |
| Advance for Training Expenses | 948538.00 | 1567170.00 |
| **(3) Income Accrued** | | |
| (1) On Investments from Earmarked / Endowment Funds | | |
| (2) On Investments -Others | | |
| (3) On Loans and Advances | | |
| (4) Others (Specify) | | |
| Training Cost Accrued But not Received | 888375.00 | 928375.00 |
| Amount sanctioned but not received(Consultancy project) | 0.00 | 18298000.00 |
| Pre-receipted bill issued but not received | 730970.00 | |
| **(4) Claims Receivable** | | |
| **TOTAL (B)** | **11349326.00** | **34121733.00** |
| **TOTAL (A+B)** | **55480195.00** | **71220703.28** |

**(S.K. Khantwal)**
Finance Officer

**(P.R. Sinha)**
Director

**FINANCIAL STATEMENT (NON-PROFIT ORGANISATION)**
**Wildlife Institute of India,Chandrabani Dehradun**
**INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR 2006-07**

Amount (Rs.)

| | Schedule | Current Year | Previous Year |
|---|---|---|---|
| **INCOME** | | | |
| Income from Sales/Services | 12 | 0.00 | 0.00 |
| Grants/Subsidies | 13 | 99149296.00 | 52399279.00 |
| Fees/Subscriptions | 14 | 9637657.00 | 11844762.00 |
| Income from Investments (Income on Investment from earmarked/endowment Funds transferred to Funds) | 15 | 0.00 | 0.00 |
| Income from Royalty, Publication etc | 16 | 1938540.00 | -2422671.00 |
| Interest Earned | 17 | 707926.00 | 1963382.00 |
| Other Income | 18 | 29873140.73 | 46330701.00 |
| Increase/decrease in stock of finished goods and works-in-progress | 19 | 0.00 | 1086471.00 |
| **TOTAL (A)** | | 141306559.73 | 111201924.00 |
| **EXPENDITRUE** | | | |
| Establishment Expenses | 20 | 84471658.00 | 61940620.00 |
| Other Administrative Expenses | 21 | 89838002.65 | 61257063.00 |
| Expenditure on Grants, Subsidies etc. | 22 | 0.00 | 0.00 |
| Interest | 23 | 0.00 | 0.00 |
| Depreciation (Net Total at the year end - corresponding to Schedule 8) | | 33085240.63 | 42257240.24 |
| **Total (B)** | | 207394901.28 | 165454923.24 |
| Balance being excess of Income over Expenditure (A-B) | | -66088341.55 | 0.00 |
| **BALANCE BEING SURPLUS (DEFICIT) CARRIED TO CORPUS/CAPITAL FUND** | | -66088341.55 | 0.00 |

**(S.K. Khantwal)**
Finance Officer

**(P.R. Sinha)**
Director

**FORM OF FINANCIAL STATEMENT (NON-PROFIT ORGANISATION)**
**Wildlife Institute of India, Dehradun**
**SCHEDULE FORMING PART OF INCOME AND EXPENDITURE ACCOUNT FOR 2006-2007**

| | | | Amount (Rs.) | |
|---|---|---|---|---|
| | | | Current Year | Previous Year |
| **SCHEDULE :13 GRANTS/SUBSIDIES** | | | | |
| **(1) Central Government** | | | | |
| Grant -in- Aid from MoEF | 139800000 | | | |
| Less Received for 2005-06 | 9800000 | 130000000 | | |
| Amt capitalized (-) | | 30850704 | | |
| Total | | 99149296 | 99149296.00 | 52399279.00 |
| **(2) State Government (s)** | | | | |
| **(3) Government Agencies** | | | | |
| **(4) Institutions/Welfare Bodies** | | | | |
| **(5) International Organisations** | | | | |
| **(6) Others (Specify)** | | | | |
| WII Contribution (Pension A/c) | | | | |
| **TOTAL** | | | **99149296.00** | **52399279.00** |
| **SCHEDULE :14 FEES/ SUBSCRIPTIONS** | | | | |
| **(1) Entrance Fees** | | | | |
| M.Sc.Course Fee | | | 0.00 | 71900.00 |
| **(2) Annual Fees/ Subscriptions** | | | | |
| **(3) Seminar/ Program Fees** | | | | |
| Seminar/ Workshop Fees | | | 0.00 | 530000.00 |
| **(4) Consultancy Fees** | | | | |
| Consultancy refund | | | 0.00 | 8711.00 |
| **(5) Others (Specify)** | | | | |
| Other Receipt (Training) | | | | |
| Receipt for Training courses | 6454800 | | | |
| Less : For 2005-06 | 40000 | | **6414800.00** | 4160714.00 |
| Pre-receipted bill issued but not received | | | **730970.00** | |
| Misc. Receipts (Training A/c) | | | 2491887.00 | 73437.00 |
| Receipt for Training Cost | | | | **7000000.00** |
| **TOTAL** | | | **9637657.00** | **11844762.00** |
| **SCHEDULE :16 INCOME FROM ROYALTY, PUBLICATION ETC.** | | | | |
| **(1) Income from Royalty** | | | | |
| **(2) Income from Publications** | | | | |
| **(3) Others (Specify)** | | | | |
| Misc. Receipts | | | 1938540.00 | -2793182.00 |
| Instt. Charges (WII Receipts) | | | | |
| House Licence Fee | | | 0.00 | 228627.00 |
| Bus Charges | | | 0.00 | 100684.00 |
| Lab Testing Charges | | | 0.00 | 41200.00 |
| **TOTAL** | | | **1938540.00** | **-2422671.00** |

| | | |
|---|---|---|
| **SCHEDULE :17 INTEREST EARNED** | | |
| **(1) On Term Deposits** | | |
| (1) With Scheduled Banks | | |
| Int. on Bank Deposit | 0.00 | 390515.00 |
| Interest on FDR | | |
| Interest on Investment | | |
| (2) With Non-Scheduled Banks | | |
| (3) With Institutions | | |
| (4) Others (Specify) | | |
| Int. on Investment(Training) | 458275.00 | |
| Interest ( Training) | 249651.00 | 1572867.00 |
| **(2) On Savings Account** | | |
| (1) With Scheduled Banks | | |
| Int. on Savings Account | | |
| (2) With Non-Scheduled Banks | | |
| (3) Post Office Savings Account | | |
| (4) Others (Specify) | | |
| **(3) On Loans** | | |
| (1) Employees/Staff | | |
| (2) Others | | |
| **(4) Interest on Debtors and Other Receivables** | | |
| **TOTAL** | **707926.00** | **1963382.00** |
| **SCHEDULE :18 OTHER INCOME** | | |
| **(1) Profit on Sale/Disposal of Assets** | | |
| (1) Owned Assets | | |
| (2) Assets acquired out of grants, or received free of cost | | |
| **(2) Export Incentives realized** | | |
| **(3) Fees for Misc. Services** | | |
| **(4) Others (Specify)** | | |
| Misc. Receipts | | |
| Consultancy Project Received during the year | 11610000.00 | |
| EMD Forfeited | | |
| Research Project | | |
| Rent | 0.00 | 254137.00 |
| WII Products | 0.00 | 163133.00 |
| Misc. Receipts (Penal Int. on Car Advance) | 0.00 | 3243.00 |
| Misc. Receipts (Consultancy A/c) | 3763025.73 | 679802.00 |
| Receipt for Project | 0.00 | 36102112.00 |
| Misc. Receipts for Research Project | 14500115.00 | 9128274.00 |
| **TOTAL** | **29873140.73** | **46330701.00** |
| **SCHEDULE :19 INCREASE/DECREASE IN STOCK OF FINISHED GOODS** | | |
| **(1) Closing Stock** | | |
| (1) Finished Goods | | |
| Closing Balance of WII Publication | 0.00 | 1086471.00 |
| (2) Work-in-progress | | |
| **(2) Less : Opening Stock** | | |
| (1) Finished Goods | | |
| (2) Work-in-progress | | |
| **TOTAL** | **0.00** | **1086471.00** |

| | | |
|---|---|---|
| **SCHEDULE :20 ESTABLISHMENT EXPENSES** | | |
| **(1) Salaries and Wages** | | |
| Fellowship | 858997.00 | 231638.00 |
| Honorarium | 80650.00 | 46080.00 |
| Medical | 3576639.00 | 3137135.00 |
| Salaries & Allowances | 32094411.00 | 26985158.00 |
| Stipend | | 103704.00 |
| Fellowship & Wages (Project) | | |
| Wages | 1067031.00 | 947627.00 |
| Salary & Allowances | | 98150.00 |
| Fellowship & Wages (Consl. Project) | 6794584.00 | 1353864.00 |
| Travel Exp. (Consl. Project) | 1620123.00 | 1568246.00 |
| Travel Exp. (Research Project) | 2172010.00 | 829164.00 |
| Fellowship & Wages (Research Project) | 5389464.00 | 4254007.00 |
| Salary & Wages | | |
| **(2) Allowances and Bonus** | | |
| Bonus | 315966.00 | 308278.00 |
| OTA | 676837.00 | 538258.00 |
| LTC | 614288.00 | 458800.00 |
| Corpus Fund (Training) | 13591632.00 | 2078668.00 |
| Honorarium (Training A/c) | 183580.00 | 46700.00 |
| Travelling Expenses | 2215725.00 | 846810.00 |
| **(3) Others (Specify)** | | |
| Transfer to Project A/C | 12500000.00 | 8000000.00 |
| **(4) Contribution to Other Fund (Specify)** | | |
| Leave Salary and Pension Contr. To LIC | | |
| **(5) Staff Welfare Expenses** | | |
| Uniforms | 0.00 | 97916.00 |
| Employer Contribution to EPF(Training) | 0.00 | 10000.00 |
| **(6) Expenses on Employees Retirement and Terminal Benefits** | | |
| Final Payment | 0.00 | 729340.00 |
| Leave Encashment | 0.00 | 417081.00 |
| Leave Salary and Pension Contribution | | |
| **(7) Others (Specify)** | | |
| Camp Expenses (Conslt. Project) | 118738.00 | 8240943.00 |
| Camp Expenses (Research Project) | 600983.00 | 613053.00 |
| **TOTAL** | **84471658.00** | **61940620.00** |
| **SCHEDULE :21 OTHER ADMINISTRATIVE EXPENSES** | | |
| AMC of Computers (1583404-1345258 for 2005-06) | 238146.00 | 2109366.00 |
| Annual Research Seminar | 561310.00 | 456813.00 |
| Auditors Remuneration | | |
| Consultancy Charges | 1011338.00 | |
| Consultancy project Exp. | | |
| Cont./Misc. (Conslt. Project) | 2621861.00 | 5438999.00 |
| Contingencies/Misc. (Project) | | |
| Contingencies/Misc. (Research Project) | 1921405.40 | 1588241.00 |
| Contingencies & Misc.Exp. | | 3128057.00 |
| Conveyance Charges | 5755.00 | 7772.00 |
| Cont./Misc.(Training Account) | 3571563.00 | |
| Electricity and Water Charges | 2753591.00 | 3890482.00 |
| Entertainment Charges | | 177452.00 |
| EPF Contribution | | 76787.00 |
| Estate Maintenance | 2073029.00 | 1926241.00 |
| Estate Security | 3698849.00 | 4102757.00 |
| Exihibition & Museum | | |
| GIS of Office Data (Conslt. Project) | 2298115.00 | |
| Govt. Contribution to Pension Fund | 5000000.00 | 5000000.00 |
| IUCN Contribution | | 70000.00 |
| Lab Chemicals | | 478700.00 |
| Lab Expenses (2729318-176169 for 2005-06) | 2553149.00 | 507071.00 |
| Legal Expenses | 163643.00 | 384357.00 |
| Library Expenses | 529823.00 | 26482.00 |

| | | |
|---|---|---|
| Misc Receipts transferred to Corpus Fund | 2003626.00 | |
| Misc Receipts transferred to Corpus Fund(Conslt. Project) | 6095388.00 | |
| M.Sc. Course Expenditure | 1140794.00 | 689882.00 |
| Misc./Cont payments o/s | | 3961938.00 |
| Newspaper & Magazine | | 41676.00 |
| Operational Expenses(5802694-140953 for 2005-06) | 5661741.00 | 3933755.00 |
| Pension & EPF Expenses | | |
| Pension Contribution | 633136.00 | 1267032.00 |
| POL & Maintenance of Vehicle (Project) | | |
| POL & Maintenance of Vehicle (Research Project) | 2114780.25 | 1291602.00 |
| POL & Maintenance of Vehicle (Conslt. Project) | 2891753.00 | |
| POL for Vehicles | 2575226.00 | 2009765.00 |
| Postage & Telegrams | 347258.00 | 221484.00 |
| Printing & Binding | 254163.00 | 293163.00 |
| Publication | 542756.00 | 287480.00 |
| Publicity & Advertisement | | 556437.00 |
| Publication(Conslt. Project) | 359495.00 | |
| Repair & Maintenance of Vehicles | 1397423.00 | 1160962.00 |
| Sharing of cost of Kendriya Vidyalaya | 500000.00 | 1055360.00 |
| Sports Goods | 228133.00 | 171310.00 |
| Stationery | 474894.00 | 2485134.00 |
| Training Allowance | 620342.00 | 1110885.00 |
| Telephone & TC | 636672.00 | 703550.00 |
| Training Cost Expenditure | 6297637.00 | 7000000.00 |
| Travel Exp. | 2213304.00 | 2999149.00 |
| Workshop/Seminar | 1817907.00 | 646922.00 |
| Payment Outstadning for Proj/Training as on 31.3.2007 | 1143988.00 | |
| Other payments outstanding for Grant-in-aid (A/C No 1) | 20886009.00 | |
| **TOTAL** | **89838002.65** | **61257063.00** |

**(S.K. Khantwal)**
Finance Officer

**(P.R. Sinha)**
Director

**Wildlife Institute of India**
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**Dehradun - 248 001 (Uttarakhand)**
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