annual report
2008-09

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Director's Note

Year 2008-09 has been full of challenges for the Institute. For the first time in the history of tiger range countries, reintroduction of wild tiger from Ranthambore Tiger Reserve to Sariska Tiger Reserve was done. This exercise was watched by global media and the entire world conservation fraternity with interest. Successful translocation of tigers and its subsequent monitoring has given us confidence in undertaking active management of wildlife populations. It has also provided us with new insights into behaviour and ecology of tigers.

In keeping with multidisciplinary nature of wildlife management, the Institute carried out wide array of activities ranging from small anurans and spiders to turtles and bears account of which will be found in the Annual Report. Studies on habitat ecology also formed part of our research activity during the year.

Apart from the flagship academic programs of M. Sc. in wildlife sciences and training program for capacity building of officials of forest department of States, the Institute also conducted thematic training programmes for officers of other services like Indian Revenue Service Group 'A' and Brigadiers of Indian Army.

I compliment all the faculty members and staff of the Institute for their willing cooperation in managing the affairs of the Institute.

P.R. Sinha
Director

role & mandate

Introduction

Our Mission

Aims & Objectives

Introduction

The Wildlife Institute of India (WII) is an autonomous organization of Ministry of Environment & Forests. It is a premier training and research institution in the field of wildlife and protected area management in South Asia. Since its inception, WII has had the benefit of collaboration with international organizations such as UNDP, FAO, USFWS, IUCN, UNESCO. These collaborations have helped the Institute to build a competent faculty and staff through rigorous training and exposure to modern research and analytical techniques.

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

Our Mission

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

Aims and Objectives

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

V. Deepak

research reports

Completed

Ongoing

New Initiatives

Social Organization and dispersal in Asiatic Lions

Funding source: Grant-in-Aid
Investigators: Dr. Y.V. Jhala, Dr. Ravi Chellam, WCS-India and Shri Bharat J. Pathak, Forest Department, Gujarat
Researchers: V. Meena, Kausik Banerjee and Parabita Basu
Date of initiation: March, 2002
Date of completion: March, 2009

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

Progress: Satellite, GPS, and VHF telemetry were used on ten lions to estimate their ranging patterns, home range, habitat use, survival, and dispersal. Lions were individually identified using their vibrissae patterns and permanent body markings in a mark-recapture framework to estimate their density in various management and ecological zones of Gir Protected Area (PA) and Girnar Wildlife Sanctuary (WLS). Food habits of lions were ascertained by *ad libitum* observation of lion kills (n= 258) and from analysis of lion scats (n = 310). Data on demography was obtained by classifying lion sightings to gender and seven age categories.

Recruitment age group of lions formed the majority (60%) of the population in the Gir PA and Girnar WLS. Prime age male lions comprised only 37% of the Eastern lion population in Amreli and Bhavnagar districts. Group size (±se) of male lions was 1.4±0.5 (1-3, n=283) within the Gir PA, 1.2±0.18 (1-2, n=7) in the Girnar WLS and 1.5±0.1 (1-3, n= 29) in the eastern population. Female group size (±se) was 1.3± 0.53 (1-4, n= 291) within the Gir PA, 1.6±0.35 (1-4, n=12) in the Girnar WLS and 1.05±0.05 (1-2, n=18) in the eastern population. Male: Female ratio was female biased for the protected areas (76.4: 100 within the Gir PA, 87: 100 in the Girnar WLS) and male biased for the eastern agro-pastoral landscapes (161:100) which were sink habitats for lions. The average litter size was estimated to be 2.13± 0.83 (n= 32) within the Gir PA, 2.6± 0.3 (n=3) in the Girnar WLS and 2.57± 0.29 (n=7) in the eastern satellite belt.

The lion density (number of lions > 1.5 years per 100 km^2) within the Gir PA varied across different management zones with maximum in Gir east at 16±3 followed by Gir west at 12±2 and least in central Gir (National Park) at 8±3. Wild ungulate density (no. per km^2) was found to respond to a rainfall gradient and was highest in Gir West at 60±12 followed by central Gir at 52±11 and lastly with Gir east at 36±6. Thus high lion density in the eastern Gir was likely maintained by the contribution of higher livestock in the lions' diet. Lion density in the newly declared Girnar WLS was estimated at 5.6±0.7. Based on a population viability analysis parameterized by our data on lion demography in Girnar, inflow of immigrants is essential for the viability of the Girnar lion population. This could be achieved by conservation of the habitat matrix bordering the eastern and south-eastern sides of the Girnar WLS conducive for lion dispersal by declaring it as an eco-sensitive zone.

Within the Gir PA, male lions were not found to be associated with females and tend to move and feed independently. Mating occurred largely between January and June. A spurt was observed in recruitment every two years. Adult survival rates were high (0.92±0.07). Adult mortality (n=71) was mostly due to natural causes (66%). Cub mortality (n=15) was mostly due to infanticide (60%).

Within the Gir PA, the male lion ranges were small with the average (±se) 100% Minimum Convex Polygon home range of territorial males being 57.5±16.0 km^2 and that of dispersing sub-adults and ousted dispersing males being 395 (±15) km^2. Average 100% Minimum Convex Polygon home range of territorial lioness was estimated to be 31.5 (±5.5) km^2. Male home ranges showed maximum overlap (up to 67%) in core areas of female ranges. Thus, male home ranges seem to be determined by female core areas suggesting lack of spatial territoriality in the strictest sense. Average dispersal distance was 23 km indicating that lion

dispersal maybe restricted by the size of the PA. Lions spent majority of their time resting or sleeping (78±7%) and territorial males spent majority (63%) of their active time in advertising their territory. Lions outside the Gir PA have large ranges. Territorial males outside the PA ranged on the average 264±40.0 km^2 and ousted dispersing males ranged about 850 km^2. Some lions exhibited regular to and fro movement between the Gir PA and adjoining Agro-Pastoral landscapes following broad spatial patterns that were likely remaining corridor habitats. Compositional Analysis suggested that moist forests along the Riverine areas of Gir were the most preferred lion habitat within the home-ranges of adult lions ($^2_{(6\ df)}$ = 11.4, P = 0.08). Ecological Niche Factor Analysis (ENFA) suggested that lions in the Gir PA were fairly specialized (tolerance value: 0.36). Moist forests along the riverine areas were the most preferred lion habitat within the home-range of adult lions ($\chi 2$ (7 df) = 22.5, P < 0.05) while highly broken terrain and relatively arid areas of the protected areas were least preferred. Adult territorial lions spent a large proportion of their time in patrolling and advertising their territory. In the Eastern population outside the Gir PA, lions require patches of habitat as refuges during the day but not for night-time. They were observed to venture into nearby habitations at night. The role of remote large (>10 km^2) habitat patches as refugia for lions, especially breeding lionesses, is crucial to permit continued persistence of lion occupancy in human dominated landscapes outside of the PA.

The eight-year study gives good baseline data on the social organization, ranging patterns, demography, and habitat requirements of Asiatic lions surviving within and outside the Gir PA that have significant implications for management of this endangered carnivore.

Mapping of National Parks and Sanctuaries – Pilot project

Funding source: Ministry of Environment & Forests, Government of India

Principal Investigator: Dr. V.B. Mathur

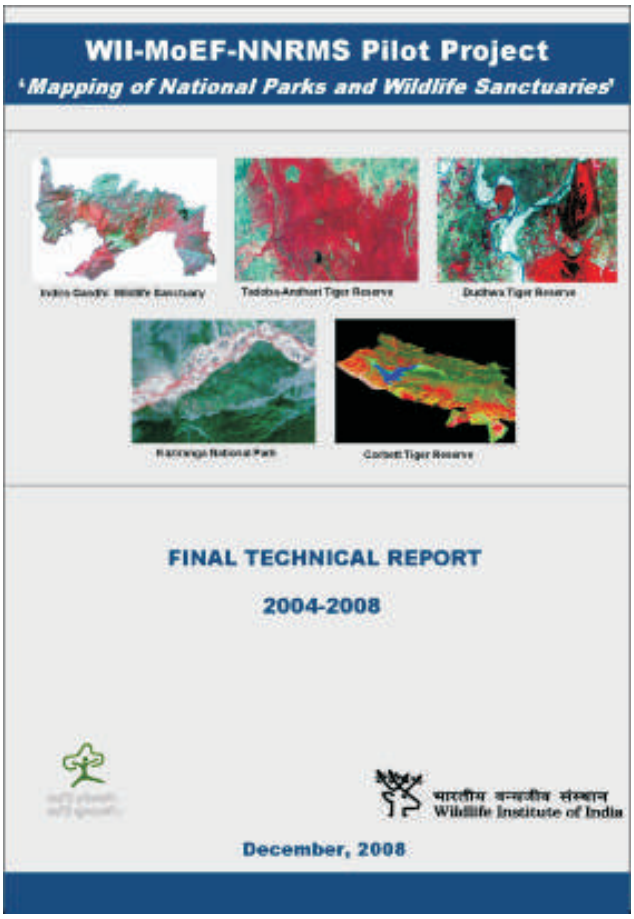
Co-principal Investigators: Dr. P.K. Mathur, WII; Dr. S.P.S. Kushwaha, IIRS; Dr. A. Khan, AMU; Dr. M.S.R. Murthy, NRSA; and Dr. V.K. Srivastava, NRSA

Researchers: Ambica Paliwal and Neha Midha

Date of initiation: April, 2004

Date of completion: December, 2008

Objectives: The pilot study aims to generate accurate, reliable and up to date baseline spatial information on forest types, 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 also 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: Data analysis, synthesis and writing of report were the primary activities during the reporting period. A 'dissemination workshop' was organized on December 22, 2008 which was attended by the site managers, scientists and researchers. Based on the suggestions/feedback received, technical report of the pilot project was finalized and submitted to the MoEF. A presentation on the salient findings of the project was made by Dr. V.B. Mathur in the meeting of the MoEF NNRMS Project Technical and Financial Committee held on February 27, 2009. The Final Technical Report was approved by the NNRMS Standing Committee on Bio-resources on March 13, 2009. The salient findings and outcomes along with the timely completion of the project were appreciated by the MoEF.

Outputs and outcomes: The project developed spatial databases for all project sites on 1:25,000 scale, which will be very useful for preparation of management plans. The present project now provides detailed information on the diversity and distribution of plant life along with information on the distribution and abundance of prominent ungulates and tiger. An insight on erosion dynamics of Sharda River influencing the prime habitat of endangered swamp deer in Kishanpur Wildlife Sanctuary was a significant output.

Milestone: Besides accomplishment of project objectives, the study provides information on land use, habitat fragmentation, river dynamics and their conservation implications for the complex and dynamic landscape. Two P.hD submitted.

All India coordinated project on the taxonomy (AICOPTAX) of orchids

Funding source: Ministry of Environment & Forests, Government of India

Investigator: Dr. G.S. Rawat

Researcher: Pankaj Kumar

Date of initiation: June, 2003

Date of completion: March, 2009

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

Progress: During the reporting period, works pertaining to objectives (i) to (iii) were completed in terms of field work, data analysis and documentation for the States of Uttarakhand and Jharkhand. In the State of Uttarakhand more than 130 species of orchids were located and their populations have been studied. In Jharkhand, a total of 70 species were collected, of these 31 species are being reported for the first time from the State. These species have very sparse and sporadic distribution in eastern India. Some of these species were reported from the State by the earlier researchers without any definite locality. Apart from the taxonomic work, ecological studies were also undertaken on the orchids in both the States.

Outputs and outcomes: Findings of the study were shared with the field staff of State Forest Departments. Field level workshops to train and educate the local people about the significance of orchids were held in Gori Valley, Uttarakhand. Orchid rich localities in both the States have been identified and appropriate actions for *in–situ* conservation have been suggested to the respective Forest Departments. Four papers have been published in peer reviewed journals. Detailed manuals for the field identification of orchids for both the States would be taken up during Phase – II of the AICOPTAX Project.

Milestone:

Geodorum attenuatum Griff. (Orchidaceae) has been added to the flora of India from Jharkhand.

Pankaj Kumar

Geospatial phyto-resource inventory in the outer fringe of Kedarnath Wildlife Sanctuary, Garhwal Himalaya

Funding source: Department of Biotechnology, Government of India

Project coordinator: Dr. P.S. Roy, NRSA, Hyderabad

Investigator: Dr. G.S. Rawat

Researcher: Gajendra Singh

Date of initiation: July, 2005

Date of completion: December, 2008

Objectives: The objectives of this collaborative project are to: (i) quantify the availability of major and minor non-timber forest products and their utilization by the local communities in the study area; (ii) study the factors influencing the abundance and distribution of key phyto-resources in various ecological zones; and (iii) generate a spatial database on the distribution and abundance of major phyto-resources for future monitoring and conservation planning.

Progress: Fieldwork pertaining to objectives (i) and (ii) above was completed in April 2008. Data on the abundance and distribution of major and minor forest products and their utilization by the local communities were analyzed during the reporting period and spatial database on these aspects were generated in collaboration with Indian Institute of Remote Sensing (IIRS) Dehradun. Further, the plant communities in the study area were classified using PC-ORD / TURBOVEG software. The final report has been submitted to NRSA for further compilation, publication and further dissemination.

Outputs and outcomes: Major findings of the study and information on the resource availability and use pattern were presented to the villagers and field staff of Uttarakhand Forest Department in a workshop held at Mandal during April 2008. Several issues pertaining to the management of forests and park–people interface were discussed and clarified. Several clusters of villages and *Van Panchayats* were identified for preparation of participatory management plans. Regeneration status of oaks *Quercus* species in various altitudinal zones has been documented. The high altitude oak *Quercus. semecarpifolia* exhibits poor regeneration due to excessive pressure by migratory livestock and tourism impacts during summer months. General profile and resource use maps for the study villages were prepared which will be useful for detailed participatory resource management plans.

Gajendra Singh

Gajendra Singh

Ecology, behaviour and interaction of highly dense population of sloth bear *Melursus ursinus* and human-sloth bear conflicts in Jessore Wildlife Sanctuary, Gujarat and Mount Abu Wildlife Sanctuary, Rajasthan (Phase-I)

Funding source: Grant-in-Aid
Investigators: Dr. N.P.S. Chauhan, WII and Prof. V.C. Soni, Saurashtra University
Researchers: Prakash Chandra Mardaraj and Vishal K. Parmar
Date of initiation: April, 2006
Date of completion: October, 2008

Objectives: There are two phases of the project. The objectives of Phase I of the project are to: (i) assess the human-sloth bear conflicts: nature and extent of problems and circumstances; and (ii) formulate recommendations for mitigation of human-sloth bear conflict.

Progress: During the reporting period, the Phase-I of the project was completed. In Mount Abu Wildlife Sanctuary (MWLS) and Jessore Wildlife Sanctuary (JWLS), in spite of the fact that there is increasing biotic pressure, encroachment on the forest land and continuous habitat degradation, the sloth bear population have become overabundant and showing an increasing population trend. More often sloth bear are going into the agriculture fields and human habitations and as a result, there is human-sloth bear conflict in form of human casualties and agricultural crop raiding.

Outputs and outcomes: Information on human-sloth bear conflicts was collected from the Forest Department, through survey of villages and by conducting interview of victims or their family member(s) in and around JWLS and MWLS. During the study period from July, 2007 to December, 2008, there were 31 human casualties in the vicinity of JWLS and 44 in MWLS. The data collected from the Forest Department revealed only 15 cases of human casualties from 2000 to 2008. Whereas, based on questionnaire survey of different villages in the two sanctuaries, there were 75 human casualties. Out of 75 incidences of human casualties in MWLS and JWLS, male mauling cases (67%) were more than female (24%) and children (9%).

In JWLS, there were less (41%) human casualties than those of MWLS (59%). In JWLS and MWLS, out of 75 human casualties, 62% cases occurred in forests, 29% in crop fields, and 6% in villages during 1997 to 2008. The victims were found engaged in different activities like defecation, walking, collection of NTFP, farming, cattle grazing and moving in vicinity of villages or houses at the time of bear attacks. Twenty out of the 25 surveyed villages were found to be affected from sloth bear - human conflict in JWLS.

In MWLS, out of 27 surveyed villages, 17 were more affected from sloth bear - human conflicts. There were a total 44 cases of human casualties. Incidences of male mauling were 30 (69%) higher than those of female 9 (20%) and children 5 (11%). There was marked monthly variation in occurrence of human casualties; number of attacks increased from April (n=1) to November (n=6).

Crop damage by sloth bear: The study on assessment of damage to agricultural crops was conducted in villages situated in and around MWLS. Information was collected using a semi-structured questionnaire from 27 villages through interviews of more than 150 respondents and also through group discussions. Crop depredation affected nearly half of the households in these villages in the vicinity of both the sanctuaries, but extent of damage varied considerably amongst villages with respect to crop grown.

Based on control and uncontrolled plot method, damage to crops was quite high in the villages of MWLS. In Oriya village, crop damage was extensive and maximum loss was 54.5%. Crop damage in Jawai and Bapuda villages was found to be 42.9% and 35.7% respectively. In Anadra and Wastanji villages, extent of damage was found up to 14.3%. Based on the information collected from 163 respondents of different villages, the extent of damage caused by sloth bear varied in different months depending on phenological stages of the crops.

Twenty five villages were surveyed in and around JWLS and 145 villagers interviewed. Maximum number of respondent (38%) indicated the occurrence of damage to maize crop, followed by the wheat (33%), jowar (14%), vegetables (11%), and minimum to castor (4%). The extent of damage to maize crop was highest. There was marked monthly variation in the extent of damage to different crops by the sloth bear.

The Ecology of Marine Turtles in the Lakshadweep Islands of India, with a focus on Hawksbill Turtle *Eretmochelys imbricata*

Funding source: Grant-in-Aid
Investigator: Shri B.C. Choudhury
Researcher: Sruthi Kumar
Date of initiation: September, 2006
Date of completion: September, 2008

Objectives: The objectives of the project were to: (i) document occurrence and nesting of all species of marine turtles on identified index islands; (ii) assess nesting habitat for suitability of nesting sites; (iii) identify and evaluate existing level of threats to turtle populations in the islands; (iv) conduct rapid surveys in the lagoon and reef areas of select islands in order to characterize current offshore distributions of sea turtles; (v) initiate metal-tagging of turtles encountered in the islands to track localized movements and determine nesting characteristics; (vi) track patterns of resource partitioning among the most commonly occurring species nesting on a preliminary basis; and (vii) examine and develop a protection and management programme for marine turtles in the Lakshadweep islands.

Progress: The field work for the project was initiated in December 2006 and continued during the reporting period. The habitat suitability surveys carried out along the beaches of selected islands to assess the extent of available nesting grounds for sea turtles in the area was extended to other islands, particularly to those which were highlighted by earlier reports to show greater nesting activity such as Kavaratti, Agatti, Kadmat, Amini, Suheli Valiakara, Suheli Cheriakara, Tinnakara, Parali 1 & 2. Agatti. These islands were also chosen to serve as index islands where a regular intensive nesting monitoring program to document the nesting and resource-partitioning of marine turtles were continued. Metal tagging of turtles using Inconel tags that was initiated during the 2007 summer monsoon season was continued till June 2008. Following the work carried out in onshore habitats, the project also included an offshore component to assess distribution patterns in the lagoon and reef waters surrounding the islands using boat transects SCUBA diving and questionnaires during the reporting year.

Outputs and Outcomes: The study documented three sympatric species of turtles in the Lakshadweep Islands which include the Green turtle *Chelonia mydas*, the Olive Ridley *Lepidochelys olivacea* and the critically endangered Hawksbill turtle *Eretmochelys imbricata*. Habitat and threat assessments in the nine islands surveyed revealed the following: beach armouring and the subsequent loss of nesting habitat remains the single greatest threat to nesting turtles in the Lakshadweep islands followed by developmental structures that extend up to the High tide line. Of the islands surveyed, Agatti has the largest extent of beach length available for nesting (8.3 km) but the nesting beaches are fragmented by beach armouring in several stretches. While natural vegetation has been largely replaced by coconut plantations in all inhabited islands, such plantations also occur in the uninhabited islands of Tinnakara and Suheli Cheriakara. Greater extent of armouring is seen in the highly developed islands of Kavaratti and Amini while the uninhabited islands of Tinnakara, Suheli and Parali remain completely unarmoured. A total of 32.3 km is available for nesting in all nine islands combined of which 27.8 km comprises areas devoid of any anthropogenic induced threats. Off-shore surveys revealed Kavaratti and Agatti lagoons to be important sea-turtles supporting habitats because of their sea grass and coral reef quality and availability of nesting beaches. Based on flipper tagging of 44 turtles (30 green, 11 olive ridley and 3 hawksbill) and six green turtles recovery, a inter nesting interval of 12-14 days and upto three nests a season by a female was estimated.

Comparative study of human-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
Researcher: Devendra Kumar
Date of initiation: December, 2005
Date of completion: December, 2008

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

Progress: *Vegetation composition and structure:* Field work was initiated in March 2006 and transects were laid in Mandi and Hamirpur districts to prepare land cover, landuse and habitat maps, quantify vegetation composition and structure, for collecting data on distribution and relative abundance of leopard based on direct sightings while walking on transects and outside transect areas in different habitats in different ranges. A total of 62 transects, 1 km each, have been laid in different habitats keeping in mind the altitude, slope characters, proximity from nearest habitation. 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. Four seasons data have already been collected walking on these transects. This data will be used for the quantification of vegetation components and structure. Density, frequency, relative frequency, cover have been recorded for trees, shrubs, grasses and herbs.

Nature and extent of man-leopard conflict: Leopard-human conflict has been reported from all over Himachal Pradesh, but it has attained alarming proportions in villages located in the vicinity of five forest divisions of Mandi district, namely, Mandi, Sunder Nagar, Joginder Nagar, Nachan and Karsog. In Mandi district, leopards were responsible for maximum human casualties *i.e.* 105; black bear caused nine casualties, wild boar attacked 11 persons and monkey injured nine persons during 1991-2005.

Information on human-leopard conflict was collected from five forest divisions of Mandi district, Himachal Pradesh. Data on human kill, 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 by leopards in Mandi district, out of which 32 casualties were in Mandi Forest Division (FD), 60 in Sunder Nagar FD, 31 in Joginder Nagar FD, six in Nachan FD and three in Karsog FD. Human killings and injury cases were very high in Mandi FD. 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%). Human casualties varied in different years. During 1992, 1993, 1998, 2001 and 2002, number of human casualties was 11, 12, 13, 12 and 16 respectively.

Livestock form 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. There may be large number of cattle-lifting cases in Himachal Pradesh, which perhaps could not be reported timely. Amongst livestock, sheep, goat, cow, bull, horse, mule and dog were predated upon by leopard, black bear and brown bear. A

total of 5,114 livestock killings by leopard were reported in Mandi district of Himachal Pradesh.

Food habits in relation to prey species availability: For the study on food habits of leopard, 289 scats were collected from the study areas Mandi and Hamirpur districts, during 2006 to 2008. Prey species were identified by analyzing the remains and through hair characteristics. Portions of other hard parts present in the scats were also identified. Fourteen prey species were identified, out of which 11 were mammal, one was reptile and others were bird. There was a predominance of goat, sheep, buffalo, cow, ox, dog, langur, wild pig, sambar, hare, rodent, birds and snakes in its diet. In Mandi district, wild prey contributed 53.96% and domestic livestock 60.89% to the diet of leopard. In Hamirpur district, wild prey contributed 46.15% and domestic livestock 52.88% to the diet of leopard. Among wild prey, rodents contributed 19.23% to the diet, followed by birds (12.50%), hare and wild pig (4.81% each) and porcupine (3.85%).

Devendra Kumar

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: Sajan John and B.M. Praveen Kumar
Date of initiation: November, 2005
Date of completion: December, 2008

Objectives: The project objectives are to: (i) prepare a checklist and status of protected marine flora and fauna in trade; and (ii) identify the hotspots and routes of protected marine life trade in India.

Progress and outcomes: This study was completed during the reporting year after a detailed survey of illegal trade of marine fauna in Andaman and Nicobar and Lakshadweep islands. With the completion of the survey on the mainland and island groups covering marine curios, shark fins, corals, holothurians and other species on trade the study concluded that religious temple sites all over the country and coastal tourism destinations are the major outlets of seashell based curio trade, the Tamil Nadu State contributing the most in trade.

Andhra Pradesh, Orissa, Kerala and Tamil Nadu along with Andaman & Nicobar Islands being the major states contributing to the shark fin trade in India, the study emphasises the need for making coastal fisherfolk aware about the protection regime for the marine fauna. Among all trade centres monitored, Kanyakumari in Tamil Nadu contribute the highest share of illegal trade of marine curios. In the west coast illegal trade of mollusk and coral are more in touristic areas of Goa, Gujarat, Karnataka and Kerala.

Demand for the derivatives of the protected marine species also contributes for their exploitation and trade. Lack of awareness amongst the people who are engaged in this trade is the major reason for this illegal trade. Strict protection measures, awareness education to local fishermen and alternative livelihoods to those who are involved in the illegal trade of marine protected species are some of the solutions to resolve this issue.

Milestones: This study report is only the second of its kind for the Indian coast after WWF-India sponsored shark fin trade report.

K. Sivakumar

K. Sivakumar

Preparation of management plan for the Gulf of Mannar Biosphere Reserve

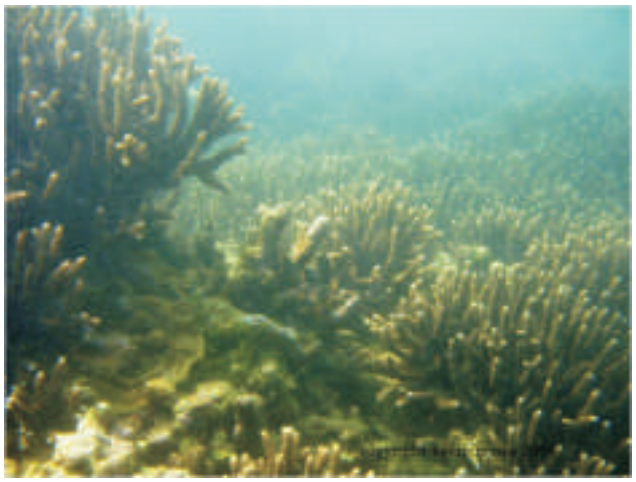
Funding source: Grant-in-Aid
Investigators: Shri B.C. Choudhury and Dr. K. Sivakumar
Researchers: B.M. Praveen Kumar, Kevin Mosses and S. Subburaman
Date of initiation: November 2005
Date of completion: September 2008

Objectives: To prepare the management plan for the Gulf of Mannar Marine National Park (GOMMNP) 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: During the reporting period, the draft Management Plan for GOMMNP prepared by the WII was accepted by the Gulf of Mannar Biosphere Reserve Trust (GOMBRT) and was recommended for approval by the Tamil Nadu Government. The Tamil Nadu Government has approved the Management Plan which now has three separate core zones in the Protected Area rather than a contiguous one which created hindrance for navigation and other legitimate fisheries activities. The Plan focuses on a protection, restoration, research and monitoring approaches.

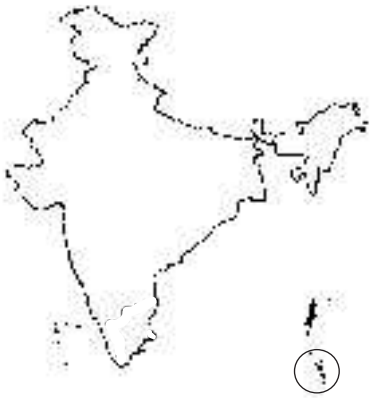
The draft Management Plan for the Biosphere Reserve prepared under this project was reviewed by the GOMBRT Governing Body and on their suggestions the scope of the eco-development action plan were extended to two other districts namely, Tirunelveli and Kanyakumari after conducting a dependency assessment of identified villages during this reporting year. The Gulf of Mannar Biosphere Reserve Management Plan prepared by the institute is the first of its kind for the south Asian region where a participatory approach of renewable resources utilization have been recommended and being experimented.

Milestones: The development of the first integrated Management Plan for a marine Biosphere Reserve in India.



Kevin Mosses

Assessment and Inventory of Herpetofaunal Diversity of Nicobar Islands, India



Funding source: Grant-in-Aid
Investigators: Shri B.C. Choudhury and Dr. Karthikeyan Vasudevan
Researcher: S. Harikrishnan
Date of initiation: February, 2005
Date of completion: March, 2009

Objectives: The project objectives are to: (i) record the species richness and status of herpetofauna in Nicobar Islands after the 2004 Tsunami and, to look at the relationship between island area and species richness; (ii) elucidate patterns in species co-occurrence of herpetofaunal assemblages.

Progress: From fieldwork conducted in eight islands, and through literature surveys, an inventory of the herpetofauna of Nicobar Islands was done. We recorded 35 species of lizards and snakes, and 10 species of frogs from eight islands. Thirteen species of reptiles and three species of frogs were recorded from the island of Car Nicobar. Thirteen species of reptiles and three species of frogs were recorded from Camorta. Fourteen species of reptiles and three species of frogs were recorded from Katchal. Twelve species of reptiles and three species of frogs were recorded from Nancowry Island. The islands in the southern group had maximum number of species of amphibians and reptiles. We recorded 9 species of frogs and 22 species of lizards and snakes from Great Nicobar, the largest island in the Nicobar archipelago. Kondul, Menchal and Pigeon are very small, uninhabited islands. Kondul supported nine species of reptiles and one species of frog. Kondul was the southernmost locality of Bay island forest lizard *Coryphophylax subcristatus*, which was recorded from six other islands. It does not occur in Great Nicobar or Pigeon. Menchal had seven species of reptiles and one species of frog. The smallest island, Pigeon, had only one species of lizard and no frogs or snakes.

Outputs and Outcomes: The total number of reptile species known from Nicobar Islands is now 55. These include 26 species of lizards, 23 species of snakes, 1 fresh water turtle, 4 sea turtles and 1 crocodile. There are 10 species of frogs known from Nicobar Islands. The existence of two species of lizards and five species of snakes require further confirmation. Further studies are required to reveal the full wealth of herpetofauna of these islands, particularly in Great Nicobar and adjacent islands.

Milestones: (i) The survey reported the snakes *Amphiesma nicobariense* and *Gongylosoma nicobarense* for the first time since their original description from these islands in the 19th century; and (ii) in the Nicobar Islands, it is likely that the lizard species are competitively structured, while the frog species are structured by stochastic extinction-colonization processes.

S. Harikrishnan

Monitoring changes in biological diversity after relocation of gujjars in Rajaji-Corbett conservation area

Funding source: Grant-in-Aid
Investigators: Dr. K. Vasudevan, Dr. V.P. Uniyal, Dr. B.S. Adhikari and Dr. K. Sivakumar
Date of initiation: November, 2003
Date of completion: January, 2009

Objective: Monitor the changes in biological diversity after relocation of gujjars in Rajaji-Corbett Conservation Area (RCCA).

Progress: The primary activity of the project in the year was compilation of data, analyses and writing of the final technical report. Another activity that was taken up based on the request made by the Park authorities was the compilation of all literature pertaining to Rajaji National Park and preparing a repository of both digital and photocopies of the literature.

Outputs and Outcomes: The different components of the project have submitted draft versions of the report which is being compiled in the form of a final technical report. The bibliography of Rajaji National Park was prepared and the report was submitted along with all the digital and hardcopy of the literature to Director, Rajaji National Park. This bibliography is also being uploaded in the WII intranet. This project has generated eleven M.Sc. dissertations and four peer-reviewed international publications have come out of the project so far.

Milestones: The study has been able to demonstrate the benefits that relocation of gujjars has brought to wildlife and their habitats in Rajaji National Park. It has established that though Chilla-Motichur corridor continues to degrade, it is being intensively used by wildlife.

Bivash Pandav

Bivash Pandav

Effect of management practices on Spider diversity in Terai Conservation Area

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

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

Progress: Ten major vegetation types were identified and two sampling sites per vegetation types were selected for spider sampling in Dudhwa National Park and Kishanpur Wildlife Sanctuary. Size of the sampled sites ranged from 1.8 to 13.3 km^2. Spiders were sampled along the 50 m transects using pitfall traps and semi-quantitative sampling. Ten transects were placed randomly within each vegetation type. Pitfall sampling was operated for 64 weeks and other semi-quantitative sampling performed on 64 occasions (once every week) at the same sampling sites. Semi-quantitative sampling involved aerial sampling (searching for upper layer spider in leaves, branches, tree trunks, and spaces in between, from knee height up to a maximum overhead arm's reach); ground collection (involved searching for ground layer spiders on hands and knees, exploring the leaf litter, logs, rocks, and plants below low knee level); beating (striking vegetation with stick and catching the falling spiders on a tray held horizontally below the vegetation); litter sampling (hand sorting of spiders from leaf litter collected in a litter collection tray); and sweep netting (for middle layer spiders up to 1 m).

V.P. Uniyal

Both family and genus richness were tested in their ability to predict the number of spider (Araneae) species independently of sampling detection, spatial auto-correlation, area, geographical location and type of habitat. Such a relationship could provide the basis for the establishment of cost effective and easy to monitor methods for measuring biodiversity, providing an alternative for the prioritization of sites for conservation.

Outputs and Outcomes: A total of 186 species belonging to 77 genera and 27 families were collected during the study period. Genus richness was found to have high predictive power and represents linear relationship with species richness, in subsequent test for influence of factors on taxonomic level, genus level data was only considered. Comparing regression lines of sites representing different detection (frequency of occurrence of species to individual) level for individual species was found significantly different ($n= 20$, $p<0.05$). This was to be expected as heterogeneity in the detection probabilities of different species capture, varying with local and regional species pool. Only genus alone is found to be reliable either for ranking sites according to taxa richness or for determining near-minimum sets of sites for conservation. The number of sites (13 sites; 65% of all sites sampled) necessary to include all genus is enough to protect, at most, 90% of species.

Milestone: The study found and recommends surrogacy at this higher taxonomic level as a promising approach for the prediction of spider species richness or evaluation and ranking of areas according to their conservation importance.

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

Funding source: Grant-in-Aid
Investigator: Dr. N.P.S. Chauhan
Researcher: Rajkishore Mohanta
Date of initiation: March, 2006
Date of completion: March, 2009

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

Progress: For preparation of land cover, landuse and habitat maps and quantification of vegetation composition and structure, a total of 39 transects have been walked in Kugti Wildlife Sanctuary covering alpine and sub-alpine areas. These transects were systematically monitored. Areas outside the transects were also covered randomly for collecting any direct or indirect evidence of brown bear with in the area. The data is being analysed for the quantification of vegetation components and structure. Data on density, frequency, relative frequency and cover have been recorded for trees, shrubs, grasses and herbs.

The Himalayan brown bear 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. There were 25 species of food plants found in agricultural land, 13 species in grassland and forest blanks, nine species in Mixed forest with conifers and broad leaf species, nine species in Himalayan moist temperate forest with conifers, 11 species in near water bodies, river and stream, 10 species in dry alpine scrub characterized by *Juniperus* species, six species in riverine forest, eight species in exposed rock with slope grasses and nine species in moist sub-alpine scrub with *Rhododendron* species. The mountainous areas from 3000m and above provided ideal habitat to brown bear. Bears preferred gentle to steep slopes. Out of twelve habitat categories, brown bear were found to use eleven habitats. Density of digging signs per hectare was found highest in moist sub-alpine scrub, followed by mixed forest, Himalayan moist temperate forests, grassland and forest blanks, dry alpine scrub, agricultural land, riverine forests, exposed rock and near water bodies, river and streams. The number of scats per hectare was highest in agricultural land. Bears extensively used *Indigofera heterantha, Rhododentron campanulatum* and *Sorbaria tomentosa* shrubs as shelter.

Impacts of biotic pressures on brown bear habitat: Data on biotic pressure in form of fuel wood, fodder collection and grazing have been recorded along transects. Data was recorded in form of cut trees, lopping, grazing, fire, presence-absence, activity and indirect evidences of human and livestock. Data is being analysed for assessing the biotic pressure on brown bear habitat. Bear distribution and habitat use patterns were greatly impacted by increasing biotic pressure.

Food habits: The study on food habits of brown bear is being done based on direct feeding observations and through scat analysis. Scat analysis shows that there is diversity in food habits of brown bear. Being an omnivorous, it feeds on both animal and vegetation material. One hundred and seventy six scats were analysed and food remains and other hard parts present in the scats were identified through reference

materials and hair characteristics. The brown bear diet comprised of higher portion of plant matter (79%) than animal matter (21%). During summer, monsoon and fall, frequency occurrence of plant matter was 72%, 77% and 91% respectively, and frequency occurrence of animal matter was 28%, 23% and 9% respectively. Twelve food items were recorded in scat analysis of brown bear which included, monocot, dicot, *Prunus persica, Prunus cornuta, Foeniculum vulgare* and the remains of goat, sheep and goral. Insects were also found in the scats. *Prunus cornuta* is found to be the most preferred food item as seeds were found in scats.

Human-brown bear conflicts: Brown bear predation on livestock especially sheep and goat has been a major problem, which causes considerable loss to nomadic herders. Annually 25,000 to 30,000 sheep and goat arrive for grazing in Kugti WLS and surrounding areas and graze from May to September. Information on nature and extent of livestock depredation by brown bear was gathered through questionnaire surveys and semi-structured interviews with shepherds. In 33% of encounters, brown bears were not found to be aggressive and stayed for sometime without seeming threatened. Interestingly, in 41.66% of incidences, bears avoided human presence and left the area after detection by graziers, but no case of attack was observed. An assessment of agricultural crop damage by bears was done using 2 x 2 m controlled and uncontrolled plots in crop fields located near to village and forests.

Socio-economic impacts of brown bear menace on rural community: Information on the total livestock present inside the sanctuary is being collected. Areas where livestock is present and areas, which are under severe biotic pressure, are being marked and data from each area is being collected. A total of 34 families have been interviewed out of 40 in upper Kugti village. Data was recorded on the dependency of local villagers on forests in terms of fuel wood collection, fodder collection, livestock holding, grazing in the forests etc. Data was also collected on the brown bear-human conflict in terms of livestock depredation and crop damage. In lower Kugti village, interviews on socio-economic is in progress. Data is being analyzed to asses the socio-economic impacts and brown bear-human conflicts.

Rajkishore Mohanta

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

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

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

Progress: During the reporting period data analysis and distribution mapping of the target species were carried out. All the field data were compiled and preliminary findings were obtained. Simultaneously, the final report is also being prepared. Dr. Philip McGowan, World Pheasant Association (WPA) visited WII for undertaking consultative process for taking forward the project. Discussions were held with concerned scientists and modalities were worked out to develop second phase of the project, with some additional components that would interest the implementing organizations.

Outputs and outcomes: Spatial database of target species have been developed. The distribution model developed for the pheasant species have provided a strong basis for mapping other *Galliformes* in the landscape scale, and for developing conservation action plan for these species. It was found that the current PA network is effective only for some species such as Peafowl and Red Junglefowl that are distributed in the Shivalik Range and a large proportion of *Galliformes* are distributed outside the current network, warranting enhanced protection. The project has identified two Key Areas for the long term conservation of *Galliformes* - (1) Pilang Valley in Garhwal region and (2) Namik Valley in Kumaon region.

K. Ramesh

Strikingly, most areas in Pithoragarh and Bageshwar districts are under the control of local community as 'Van Panchayats' (Forest villages) and any conservation measures or suggestions for allocating areas of long-term conservation of *Galliformes* here are most likely to be in the line of 'Community Reserve'. During the project, significant findings included recording of dark morph of Himalayan Monal in Tehri District, establishing eastern limit of distribution range of Western Tragopan, identification of substantial populations of Satyr Tragopan in Kumaon region, and documentation of altitudinal range shift of certain *Galliformes* species. Much of the information, both spatial and non-spatial, generated by the project, is likely to manifest in detail conservation action plan for *Galliformes* both at policy level and at site level.

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

Funding source: Grant-in-Aid
Investigators: Dr. S.A. Hussain and Dr. Ruchi Badola
Researchers: Sangeeta Angom, Ngailian Vaiphei, Sanggai Leima Thounaojam and Chongpi Tuboi
Date of initiation: December, 2004
Date of completion: November, 2009

Objectives: The major objectives of the project are to: (i) monitor the extent and quality of habitat (phumdis) within the Keibul Lamjao National Park, Manipur; (ii) estimate the seasonal availability of browsing biomass for Sangai and associated grazers; (iii) 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) quantify the basic needs of the species in terms of food, space and cover for sustained reproduction; (v) determine the stocking rates of Sangai and associated grazers in the park; (vi) 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) explore the possibility of establishing a second home for Sangai in wild within Manipur State.

Progress: The project has four major components. The progress achieved in the field research and main findings for conservation genetics and socio-economic study have been summarized below. The results of the studies on biomass productivity *vis-a-vis* water quality and population status for 2008 are being analyzed.

(i) The study on conservation genetics: The phylogenetic variation in the mitochondrial DNA control region sequences for captive and wild population of Sangai and Hog deer were analysed to understand the phylogenetic evolutionary history and genetic variation of these species. DNA was isolated from 30 samples and sequenced the first 5 hypervariable fragment (HV1) of the mitochondrial DNA control region in 12 individuals using software such as clustal X for alignment, GeneDoc and Bioedit for editing the sequences, and Mega for phylogenetic reconstruction. Pooling these data with other published sequences of Eld's deer and Hog deer, the pattern of phylogenetic relationship was identified among the species. From the preliminary analysis, it appears that Sangai is genetically different from the sequences in the database as the bootstrap support is high (99). From the preliminary studies on Hog deer phylogenetics, it appears that the species is monophyletic.

(ii) Study on resource dependency of local people: The study revealed that 7327.1 tons year^{-1} of plant biomass is extracted from the Park as vegetable (44.4%), fodder (42.9%) and fuel (12.8%). The quantity of vegetable collected was highest in the western villages whereas fodder collected was highest in the southern villages. The extraction of fish was highest in the north with an average of 102.2 tons year^{-1}. The quantity of vegetable (p=0.048), fodder (p<0.0001) and fish (p=0.0008) extracted from the park varied significantly across villages but the quantity of fuel wood extracted did not vary (p=0.52). The plant species extracted by villagers overlapped with 43% of the food species of Sangai, which may affect food availability for Sangai. Eighty four percent of the local people felt that the Sangai is an important animal and 74.8% felt that it gives recognition to the State. Although 71% people agreed that the park is necessary for the conservation of Sangai only 35% suggested that regulation of resource extraction will lead to better management of the Park. Fourteen percent of the people felt that they have been deprived of their livelihood because of the creation of the park, 45% said that they will agitate if resource extraction is not allowed, while 25% said that they will buy these from the market.

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
Researcher: Kuldeep Singh Barwal
Date of initiation: December, 2004
Date of completion: June, 2010

Objectives: The objectives of the project are to: (i) prepare habitat maps of Ranthambore NP 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) study population status and socio-biology of pigs; (iv) 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 human-wild pigs conflict; (ix) 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: *Vegetation composition and structure:* A reconnaissance survey of the study area was carried out using Survey of India toposheets (scale 1:50,000). Based on this survey, 45 line transects, each of 1 km in length were laid covering different habitat types in proportion to availability of forest type by random sampling. Analysis of the data was carried out using various softwares as per the objectives of analysis.

Status, distribution and socio-biology: The status and distribution of wild pigs in Ranthambore National Park was studied. The group size varies from solitary animal up to 48 individuals, and it varies from season to season. They were found distributed all over the national park as well as in the peripheral areas. There was marked monthly variation in male: female: piglet ratio. 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.

Capture efforts for wild pigs in panel trap: Baits such as fermented gram, maize, jaggery and groundnuts were used in traps to capture wild pigs. One of the groups, that comprised of two mothers and five piglets were habituated easily. Although the piglets were not scared of entering the traps, the mothers were very cautious. Once these animals were trapped, they could be handled after immobilization using Ketamine HCL and Xylazine HCL. Investigations on the habitat use, ranging patterns, diurnal activity, health and other parameters are in progress.

Capturing of free ranging wild pigs: Wild pigs were habituated in free ranging condition at few selected sites. Baiting was done continuously at each site for 20-25 days prior to capturing them. Once the animals were habituated, one individual in the group was darted and radio-collared. Four animals were radio-collared including one sub-adult male and two adult females during April 2008 and four in January 2009. These animals are now periodically monitored and their locations are being recorded to study movement pattern and home range.

Food habits: 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 faecal samples have been collected and air dried. Out of these, 120 samples have been washed and analysed at macro level. It was found that plant material constituted major part as compared to animal matter. Among animal matter, hair of sambar, langur, rodents, nilgai; cuticle and mouth parts of some insects; and feathers of birds were found.

Crop damage assessment & socio-economic survey: 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 with severe crop damage problem have been surveyed. Some of the worst affected villages with wild pig problem are Indala, Khatuli, Padara, Mordungri, Jaitpur, Mai, Kushalpura, Chhan, Rawal, Baso, Shyampura and Bhadlav. Crop fields which are in the vicinity of forests are badly affected. Most affected crops were gram and wheat.

Pig-proof power fence: Power fence was constructed around crop fields in Jaitpur village. This fence provides effective protection against wild pigs and large ungulates such as sambar. The voltage was also found adequate in controlling the movement of large ungulates. However, the power fence lines faced some maintenance problems.

Kuldeep S. Barwal

Ecology of tigers *Panthera tigris L.* in Pench Tiger Reserve, 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, National Tiger Conservation Authority, New Delhi
Researchers: Aniruddha Majumder and Santanu Basu
Date of initiation: September, 2005
Date of completion: October, 2009

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

Progress: An-adult female tiger was radio-collared in March 2008 to gather information on ranging pattern, habitat use and food habits. Based on Very High Frequency (VHF) tracking using `Trangulation and Homing in' techniques, 310 locations of radio-collared tigress were collected during the reporting year. To gather information on prey availability of tigers, 37 line transects (74km) were walked. In total, 375 tiger scats were collected to study the food habits of tigers, of which 214 tiger scats were analysed for prey remains. A minimum of 20 hair were taken from each scat and examined under microscope. Identification of prey species was based on medullary and cuticle patterns of hair. Twenty four pairs of camera were deployed in the intensive study area (140 km^2) to collect data on population and dispersal pattern of tigers. Each pair of camera trap was placed in 2x2 km grid.

Outputs: The estimated minimum annual home range of radio-collared tigress was 23 km^2. The common langur was found to be the most abundant prey species in the study area (141.2 ±33.2 animals/km^2) followed by chital (83.9 ± 29.4 animals/km^2), sambar (12±4.7 animals/km^2), nilgai (4.2 ±1.9 animals/km^2) and wild pig (16.7±8 animals/km^2). In total 30 kills of tigers were collected. Analysis of kills revealed that chital was the major prey species of tiger in the study area (adult male 33.3%, adult female 16.7% and fawn 16.7%) followed by sambar (adult male 3.3.%, spike male 3.3%, adult female 6.7% and fawn 3.3%), nilgai (adult female 3.3%), wild pig (adult female 3.3.%) and gaur (brown bull 6.7%). Scat analysis (n=214) revealed that chital constituted major prey in terms of frequency of occurrence (55.1%), followed by sambar (33.64%), common langur (10.74%), wild pig (4.67%), porcupine (1.4%), cattle (0.93%) and nilgai (0.46%). In total, 14 tiger individuals were identified in the study area based on camera trapping and of which seven were recaptured.

Aniruddha Majumder

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

Funding source: Grant-in Aid
Investigators: Dr. Y.V. Jhala, Dr. A. Rahmani, BNHS, Dr. Ravi Sankaran, SACON
Researchers: I. P. Bopanna , Kamlesh Maurya and Sutirtha Dutta
Date of initiation : December, 2004
Date of completion: December, 2009

Objectives: The objectives of the project are to: (i) study the ecology and seasonal movement patterns of the Great Indian Bustard (GIB) *Choriotis nigriceps*, so as to develop an effective conservation strategy for the species in Kutch, (ii) monitor the wolf, hyena, and caracal populations and evaluate the role of different mortality factors and dispersal in their population dynamics, (iii) investigate the ecology of the Indian fox, (iv) monitor the visiting populations of lesser floricans and Houbara bustards and study the migratory pathways and wintering habitats of the lesser florican, (v) monitor the roosts and breeding status of vultures, (vi) sensitize the local communities to the conservation needs of their endangered and threatened fauna, and (vii) 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: Data on spatial distribution and habitat use by GIB was estimated by replicate seasonal ground surveys and questionnaire survey in over 2000 km^2 area of Abdasa, Mandvi, and Nakhtrana Tehsils of Kutch district. During the breeding season (May to July) the traditional leking and nesting grasslands were intensively surveyed and GIB locations recorded along with habitat variables by a GPS unit. This information will be analysed to determine habitat characteristics of male display sites and nest site selection. Fecal samples of GIB were collected for seasonal food habits study. Potential food items of GIB were quantified by transects and quadrates. Indices of abundance of GIB, Lesser Florican *Sypheotides indica* and Houbara Bustard *Chlamydotis undulata* were developed as number of birds seen per km. It was intended to calibrate the index by double sampling small areas with a total count of these birds. The possibility is being explored to identify individual GIB from DNA extracted from their fecal matter and shed feathers to conduct a population estimate for the species in a mark-recapture framework.

Density, ranging patterns, habitat use, survival and behavior of the Indian fox were addressed by intensive survey of breeding dens and by radio telemetry on six fox pairs. Breeding pair density was estimated to be 0.25 per km^2 recording a threefold increase from 2005 (0.1 per km^2). The average distance between two breeding pairs was 2.75±0.28 SE km. The average nearest distances of den from human habitation was found to be 2.14±0.11SE (0.4-3.71 km, N=55). In the arid landscape of Kutch the female fox needs lots of water for lactation and therefore the average distance of a den from waterholes was found to be 1.19±0.08 SE (0.23-2.40km, N=50). During 2008, the average litter size at emergence from den was estimated 4.17(±0.21SE, N=12) and this average was significantly larger than the litter size observed in 2005 (2.00±0.32SE, N=5) and 2007(2.67±0.37SE, N= 9, $F= 15.22$, $p<0.001$) due to good rainfall and more resource availability. The average breeding and non-breeding home range of a fox pair was 1.32 and 3.11 km^2 respectively.

Density, ranging patterns, habitat use, survival, food habits and behavior of the striped hyena were studied by intensive survey, radio telemetry on six hyenas, fecal analysis and observations at den sites. Hyenas were found to have home ranges between 80-130 km^2. The nucleus of the social activity was the natal den around which related female hyenas of various age groups interacted and shared responsibility of cub rearing. Breeding females were assisted by off-springs from previous litters in protecting and foraging for the pups. Food was brought to the natal den sites as well as regurgitated. Intensive observations of individually

identified (based on stripe patterns) hyenas is under way to gain a better understanding of the social organization of this little known large carnivores.

Before the ban on the veterinary NSAID drug Diclofenac there was a turnover of about 2000 vials per month in Kutch. The breeding White backed vulture *Gyps bengalensis* population in 2005 was at a decent number of over a hundred nests in the tehsils of Abdasa, Mandvi and Nakhtrana. Nesting success was also observed to be reasonably high at 72% in 2005. Number of vultures nesting steadily declined over the past years and in 2008-09 only 25 nests could be located after an extensive search of all past and potential nesting sites. Nesting success for the year 2008-09 was dramatically low at <25%. This is indeed surprising since the ban of Diclofenac should have reduced the prevalence of this lethal drug in vulture foods and should have resulted in enhanced nesting success. It is intended to investigate the continued illegal use of diclofenac for veterinary purposes during the current year.

Data is being collected through questionnaire survey and direct quantification of number of resident and nomadic livestock that utilize the semi-arid habitat of the intensive study area covering the grazing grounds of 12 villages. Data on stocking rates, grassland productivity, off take by livestock and wild ungulates will be used to quantify sustainability of current livestock rearing practices and possible alternative models.

Kamlesh Maurya

Panthera tigris genome: Implication in wildlife forensics

Funding source: Grant-in-Aid
Investigator: Dr. S. P. Goyal
Researchers: Sudhanshu Mishra and Imran Khan
Date of initiation: October, 2005
Date of completion: October, 2009

Objectives: Genotyping profile of population has been used to determine the source of origin in wildlife trade and to determine which tiger population is prone to poaching. The present study is aimed to develop multi locus genotype profile of tiger with the following objectives: (i) develop and establish protocols for identification of tiger from various seizures in the form of skin, nails, whiskers & bones based on DNA techniques; (ii) establish noninvasive genotyping of different population of tigers in India; (iii) determine source of origin of various tiger parts and products seized under wildlife offenses; and (iv) study genetic diversity in different tiger population of India.

Progress: More than 726 probable tiger scat samples were collected and received from different tiger populations during the reporting period. Information regarding GPS locations or place of collection provided by forest department or other sources was also recorded. All collected scat samples were dried and catalogued.

Outputs and outcomes: DNA was extracted successfully with a success rate of 90% from scat samples collected from different Tiger Reserves using QIAamp DNA Stool Mini Kit (Qiagen, Germany). DNA was extracted from scats (n=130) which were collected from Kalakad-Mundanthurai Tiger Reserve (KMTR) and Buxa Tiger Reserve (BTR). DNA extracted from scats were assigned for species identification using felid specific microsatellite loci with different amplicon size range viz., 98bp with leopard DNA and 85bp with tiger DNA. 34 out of 60 scat samples were found of tiger from KMTR. Of the 70 scat samples from BTR, 23 and 19 were of leopard and tiger respectively. PCR conditions were optimized with reference and scat DNA samples for a multiplex PCR for sex identification. 10 scat samples were of male tiger and 9 of female tiger in BTR. Conditions for polymorphism detection using microsatellite primers with reference DNA was standardised. We have been successful in amplifying 32 microsatellite loci with reference DNA samples and selected a panel of polymorphic microsatellite loci. A comparative study was also done to establish multiplex PCR for the amplification of more than one microsatellite loci in a single PCR reaction. We conclude that direct uniplex PCR has to be done with scat DNA samples because there was no consistent peak pattern with multiplex to uniplex PCR while the direct uniplex PCR generated a confident peak pattern where the amount of template is also more comparatively. The amplicon size range of 100bp-160bp showed the best range for amplification while amplification success rate of 32 microsatellite loci was assessed with scat DNA with respect to different amplicon size range. 17 selected polymorphic microsatellite loci were successfully amplified with confirmed tiger scat DNA samples and genotyped using Applied Biosystems ABI 3130 Genetic Analyzer.

Milestones: A multiplex PCR was optimized successfully for identifying sex from scat samples. 32 microsatellite loci developed from domestic cat, Sumatran tiger and Asiatic lion were screened with blood and scat DNA samples of Bengal tiger. We have been successful in assigning species and sex of scat samples from KMTR and BTR. For the first time, we compared PCR amplification of step wise multiplex PCR and uniplex PCR for genotyping. We have also established the best amplicon size range for the amplification of scat DNA.

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
Researcher: K.R. Saravanan
Date of initiation: November, 2005
Date of completion: December, 2009

Objectives: The objectives of the project are to: (i) 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 Protected Area 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) prepare a comprehensive report on the state of India's existing coastal and marine Protected Areas.

Progress and outcomes: A detailed habitat assessment survey of coastal and marine habitats in Indian mainland especially, Maharashtra, Karnataka, Gujarat, Goa and Kerala in the west coast, and Orissa, Tamil Nadu and West Bengal in the east coast was completed during the reporting year. Coastal and marine biodiversity rich habitats such as mangroves, estuaries, backwater, mudflats, sand dunes, sea turtle nesting beaches, lagoons within and outside the Coastal and Marine Protected Areas were taken into consideration for this study.

Following a prescribed methodology, a criteria was developed and applied to designate coastal biodiversity rich sites as Important Coastal and Marine Biodiversity Areas (ICMBA). This study intends to designate such possible sites of all the coastal states as priority conservation areas under this ICMBA criterion so as to bring the so far unidentified coastal and marine habitats as potential biodiversity rich habitats for future conservation.

K. Sivakumar

Preliminary review of Indian Marine Protected Areas (MPA) reveal that most of the MPAs are not managed with proper management plans, which is required to be prepared for all MPAs of India. In India, there are 27 Coastal and Marine Protected Areas. Of these, 18 are offshore, which are protecting or conserving exclusively marine life forms and these PAs are considered as exclusive MPAs. Of the 18 MPAs, 7 are in the status of Marine National Parks whereas the remaining are Wildlife Sanctuaries.

Milestones: Besides the existing 18 exclusive MPAs, five new offshore sites along the east and west coast of Indian mainland and one in Lakshadweep Island have been recognized as Important Coastal and Marine Biodiversity Areas, which have been recommended to be declared as MPAs. Several Important Coastal and Marine Biodiversity Areas (ICMBA) have also been identified all along the coastal region of India, which has the biodiversity value and potential to be considered as Community Reserves or Conservation Reserves or Biodiversity Heritage sites. A draft report of ICMBA for Kerala, Karnataka, Tamil Nadu, West Bengal and Gujarat has been prepared.

Study of bird species numbers and densities in the east and west Himalayas

Funding source: Grant-in-Aid and University of Chicago (NSF)

Investigators: Dr. Dhananjai Mohan and Shri Pratap Singh, WII and Dr. Trevor Price, University of Chicago, NSF

Researchers: Mousumi Ghosh and M. Selvan

Date of initiation: 2006

Date of completion: 2011

Objectives: The project objectives are to: (i) study patterns of altitudinal distributions of passerine birds and small non-passerines, (ii) assess densities and habitat associations of birds within different elevation zones (2300m, 3200m and 4000m) in the study area.

Progress: Field data were collected from April 1, to June 30, 2008 at the following field sites: (i) Eagle Nest and Pakke Tiger Reserve, Arunachal Pradesh; (ii) Neora Valley National Park and Buxa Tiger Reserve, West Bengal; (iii) Kanchendzonga National Park, and the Lachen valley, north and west Sikkim; (iv) Kolhu Chaur and Nauri Reserved Forest, Uttarakhand; (v) Manali Wildlife Sanctuary and Keylong, Himachal Pradesh; and (vi) Overa Wildlife Sanctuary, Jammu & Kashmir

Dr Trevor Price visited the study areas and was joined by the Indian counterparts and the researchers during the above period. At times the field work was conducted simultaneously at more than one site by smaller teams comprising PI(s) and/or researchers since the data collection had to be done during the brief breeding (summer) season across the length of the Himalayas.

Outputs and Outcomes: In both the west and the east Himalayas it appears that maximum species diversity is at about 1,000 m. This was similar to what is known about trees, which peak in diversity in Nepal at a slightly higher elevation. The decline in species numbers with elevation occurs at lower altitudes in the west, as expected from the lower tree-line. An important finding was substantial turnover between sites. For example there were about 33 species recorded in each grid in the lowest (Sachen-2300m) and second lowest (Tsokha-3200m) elevation site in Kanchendzonga NP, Sikkim in 2007, but only 8 of these species were held in common between the two sites. This has clear conservation implications: if one wishes to save biodiversity a string of smaller reserves along the elevational gradient is more valuable than one large one at a place. The number of species is strongly correlated with the total number of individuals (the total number of individuals is the total number of birds inferred to breeding on the grid, summed across all species).

Milestone: A mid elevation peak (*ca.* 1000m) was observed in both east and west Himalayas in bird species numbers and densities.

Dhananjai Mohan

Ecology of two endemic turtles of Western Ghats

Funding source: Grant-in-Aid
Investigator: Dr. K. Vasudevan
Researcher: V. Deepak
Date of initiation: January, 2006
Date of completion: January, 2010

Objectives: The objectives of the project are to: (i) estimate the population density of Travancore tortoise and cane turtle in a fragmented landscape; (ii) quantify the diet of these two species and describe the feeding ecology with respect to their role in seed dispersal; (iii) identify threats to the turtle population based on their habitat use, ranging pattern and food habits and recommend measures for their conservation; and (iv) 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: Sampling for cane turtles were carried out only in the evergreen forest where they are reported to survive. Time constrained searches were made in the forest floors in different localities within the study area. Usually when the cane turtles are handled they defecate. The feces of individual turtles were collected and dried under 40 w filament lamp. The dried material was then separated and examined using a 10X hand-held lens.

Transmitters were fixed on the two species of turtles following Boarman's protocol. Epoxy adhesive Hysol E-120 HP (Loctite Corp, U.S.A) was used to attach the transmitter on the turtle's carapace. The transmitters were enclosed in waterproofing with sleeved antenna (G3-1V type), weighed from 5.4 – 6.2 gms (AVM instrument Co, California, U.S.A) and constituted less than 5% of the turtle's body weight. In field the turtles were located using portable radio telemetry receiver (Model: LA12Q) and Hand Held Collapsible (HHC) Yagi antenna (AVM instrument Co, California, U.S.A). Four temperature loggers (Onset Computer Corporation, Bourne, MA) have been randomly placed in the study area and one near each individual turtle. The temperature loggers are launched and programmed to collect temperature data for every hour (BoxCar Pro 4.3 Onset Computer Corporation, Bourne, MA). The area where the study is being carried out is mapped manually with a hand held compass, clinometer and measuring tape, a 42 ha area was thus mapped for the cane turtle study. Individual tracking locations are collected every day in the mapped area.

K. Vasudevan

Outputs and Outcomes: Travancore tortoises were reported to feed on grass, fungi, bamboo shoots, fallen fruits, flowers, insects and frogs. Faeces collected from 24 tortoises contained at least one identifiable diet item. Ninety two percent had grass/bamboo blades, 92% other plant matter (leaves and stems), 83% insect remains, 63% sand, 42% seeds (*Grewia tilaefolia* & *Dillenia pentagyna*), 38% vertebrate remains (identified as skink scale, mammal hair and vertebral bone) and 13% mollusc, scorpion and crab remains. They also scavenged on carcasses of mammals such as sambar *Cervus unicolor*. Four tortoises with radio-transmitter (2 male and 2 females) spent about 40% of the time inactive under leaf litter, 21% in pangolin and termite hill burrows, 15% in *Lantana camara*-associated scrub, 6% under grass, 5% under fallen logs & rock cavities, 4% in the bamboo clump, 3 % in open and 2% inside tree hole

(February 2008 to April 2009). Three individuals stopped activity during the dry months, from November 2008 to March 2009 while a male stayed inside a termite hill burrow for 106 days. All individuals moved within 8- 9 ha area. The temperature data collected will be used to record the temperature used by the turtle across seasons. Thirty two cane turtles were marked out of the four sampled evergreen forest localities they were found in three of them. Radio tagging of cane turtle was completed on 28th March 2009 in Karian shola. Six individuals of cane turtles were also radio tagged and tracked in the project.

Milestone: Preliminary data analysis suggests that cane turtles are thermo-conformers (preferred temperature closely matching environmental temperature). They responded to daily fluctuations in temperature, they were more active on days with less temperature fluctuations compared to more fluctuation (>5°C). Rainfall influenced movement in cane turtles, which is when we also found them feeding and mating. They moved within a five to eight hectare area.

V. Deepak

Conservation of Red Junglefowl *Gallus gallus* in India

Funding source: Grant-in-Aid

Investigators: Dr. S. Sathyakumar (WII), Dr. Rahul Kaul (Wildlife Trust of India) and Dr. Rajiv S. Kalsi (MLN College, Yamuna Nagar)

Researchers: Merwyn Fernandes and Mukesh

Date of initiation: September, 2006

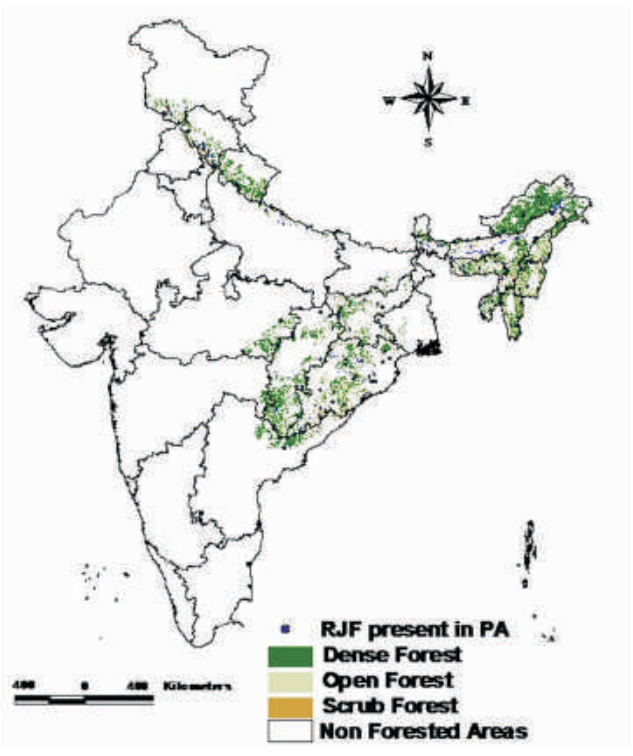
Date of completion: February, 2011

Objectives: The objectives of the project are to: (i) assess the status and distribution of Red Junglefowl (RJF) in India; (ii) identify pure RJF populations by molecular genetic studies; (iii) study social interactions between wild RJF and domestic fowl; and (iv) prepare conservation action plan for the identified pure RJF populations.

Progress: *RJF Distribution:* Field investigations continued during the reporting year in the States of Bihar, Haryana, Himachal Pradesh, Madhya Pradesh, Uttarakhand, and Uttar Pradesh to assess the RJF distribution, trait characters, relative abundance estimates and threats. There were two broad bases for which data was collected and interpreted, one at the national level and other at the local scale *i.e.,* within a particular Protected Area (PA) [National park (NP) and Wildlife Sanctuary (WS)] and Reserve Forest (RF). In order to obtain the distribution for a wide ranging species primary and secondary sources of information were sought. The primary source of information came through surveys that were conducted in the different RJF range states. The secondary source of information was mainly through literature review, questionnaires, personnel communication and from a network of NGO's and local villagers. Presence/absence information thus collected was mapped using GIS tools (Arc View and Arc map) to prepare the distribution for the species. The secondary source of information was verified during the surveys. Areas outside the historical distributional range such as the high altitude (>2,500 m) areas and wetlands were left outside the purview of the distributional map.

Field activities under Phase – II *i.e.,* assessment of status and distribution of RJF in different parts of its distribution range were carried out during the reporting period. Field surveys included trail/transect sampling for RJF abundance estimation, habitat evaluation, observations on trait characters and live trapping for blood sample collections. Field studies on trait characteristics, ecology and behaviour have also been carried out.

Screening of captive stock: Birds kept in enclosure were banded and blood samples were taken for DNA analysis. The captive stocks from Bihar, Haryana, Himachal Pradesh, Uttarakhand, Uttar Pradesh, and Tripura were sampled. The collected tissue samples were preserved as per the protocols proposed for preservation of samples for molecular studies. The samples are currently being analysed in the WII Forensic Laboratory. The analysis will seek to: (a) develop markers to identify populations which show physical traits of true RJF which shall be regarded as 'pure'; (b) compare 'pure' birds with samples drawn from other populations (wild and captive); (c) identify each population



genetically and create genetic maps of main populations in India; and (d) identify the geographical extents of 'pure' RJF populations in India.

Outputs and outcomes: *Red Junglefowl distribution in India:* Based on field surveys, questionnaires survey, literature reviews, informal interviews and databases, the present study reports RJF from 21 states in India namely; Jammu and Kashmir, Himachal Pradesh, Haryana, Punjab, Uttarakhand, Uttar Pradesh, Bihar, Jharkhand, Madhya Pradesh, Chhattisgarh, Orissa, Andhra Pradesh, West Bengal, Sikkim, Assam, Arunachal Pradesh, Nagaland, Manipur, Mizoram, Tripura and Meghalaya with an approximate distribution of 652,000 km^2, which, is in accordance with reports by earlier researchers. Within this distribution range the species is reported to be 'present' in 205 districts out of the 270 districts of India and in 31 NPs and 159 WSs. The earlier distribution as reported by Ali and Ripley is now disjoint, with a northern distribution that connects North India to the Northeastern states *via* Nepal and a central distribution that is disconnected to the north due to intense urbanisation and agriculture in Bihar and Uttar Pradesh and the discontinuity of forest in Bangladesh.

Molecular Genetics Work: The protocols for DNA isolation (blood/feathers/tissue) and PCR cycling conditions were standardised and further refined. A panel of 30 highly polymorphic microsatellite markers was identified and fluorescent labeled primers had been synthesised using the flanking regions of microsatellite marker. High molecular weight genomic DNA had been extracted from all the collected samples. DNA isolation from the blood was carried out using DNA Zol BD based protocol while Qiagen-DNeasy Tissue kit based protocol was used for DNA isolation from feathers and tissue. PCR cycling conditions for all the 30 loci had been standardised and more than 20 loci had been amplified with all the collected samples. The fragment analysis and PCR amplification with rest of 10 loci is underway. Some of loci might have produced RJF specific alleles and the cluster of such alleles will be utilised for the assessment of genetic purity of wild RJF as well as for the study of genetic relatedness/divergence between RJF and chicken. The allelic data as produced will also be utilised in structuring the RJF population genetically in RJF range states in India.

Milestones: Phase I of the project completed of 21 RJF range States. Approximately, 200 samples (including RJF & domestic chicken) have been collected and good quality and quantity of g-DNA have been isolated. PCR conditions have been standardised and 20 loci have been already genotyped.

Determining the offshore distribution and migration pattern of Olive Ridley sea turtles *Lepidochelys olivacea* along the east coast of India

Funding source: Director General of Hydrocarbon, Ministry of Petroleum & Natural Gas, Government of India

Investigators: Shri B.C. Choudhury, Dr. K. Sivakumar, Shri Anup K. Nayak, WII and Dr. C.S. Kar, Forest Department, Orissa

Researchers: Basudev Tripathy, R. Suresh Kumar, Subrata Kumar Behera, Satya Ranjan Behera and Sandeep R. Mishra

Date of initiation: October, 2006

Date of completion: December, 2009

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

Progress and outcomes: During the reporting period, 28 Olive Ridley turtles were attached with PPTTs (Platform Terminal Transmitters), of which, five were in Devi rookery, 11 in Rushikulya and 12 in Gahirmatha rookeries. During the reporting year, male Olive Ridleys were also fixed with PTTs for the first time. At the time of this report, most of the tagged turtles were moving towards south and eastern parts of Bay of Bengal. Five turtles had already reached the east coast off Sri Lanka. Oceanographic parameters such as sea depth, sea surface temperature, phytoplankton abundance and sea surface current are being used to develop a Habitat Suitability Model (HSM) of the Olive ridley sea turtle in the Bay of Bengal. It was found that migration pattern of turtle is possibly determined by sea surface temperature and chlorophyll concentration in the marine environment. Preliminary analysis shows that the migration routes and foraging habitat of these turtles are much generalized in nature and these are not very specialized species in terms of their habitat requirement. However, this needs to be further verified by monitoring with more PTTs tagged turtles proposed for the next year.

K. Sivakumar

The geomorphological changes of the Olive Ridley nesting beaches in Orissa as well as anthropogenic related changes due to developmental activities were also monitored. It was found that the highly dynamic beaches in structure were preferred for nesting. Both offshore distribution and congregation and onshore nesting activities of olive ridley turtles were monitored at all the three mass nesting sites during this reporting year. The off-shore turtle congregation normally took place near the nesting beaches but it significantly varied between sites. The off-shore congregation density was highest in Rushikulya, where the off-shore fishing activities were the lowest and the mass nesting was lowest in Devi where the off-shore fisheries intensity was highest.

Milestones: PTT tagging of male Olive Ridley turtles in the off-shore waters.

Evaluating effectiveness of interpretive facilities in enhancing conservation awareness in select Tiger Reserves in India

Funding source: Grant-in-Aid
Investigators: Smt. Bitapi C. Sinha and Dr. V.B. Mathur
Researcher: Jyotirmay Jena
Date of initiation: January, 2007
Date of completion: January, 2010

Objectives: The objectives of this study are to: (i) make an inventory of the interpretative facilities in the Tiger Reserves of the country; (ii) determine if the messages are delivered in an interpretative manner; (iii) find out if people are receiving the messages and are they feeling compelled to act differently as a result of it; and (iv) plan on how to make it more effective if the interpretative tools are not effective.

Progress: Based on preliminary survey of 18 Tiger Reserves, Tadoba Tiger Reserve of Maharashtra and Kanha Tiger Reserve of Madhya Pradesh (stratified sampling: cost of interpretation centre and number of visitors) were selected for present intensive study. A questionnaire survey was conducted to know the socio demographic profile of visitors and to measure the effectiveness of the interpretation centre by using selected assessment criteria of knowledge gain, attitude change and behavior modification which are the fundamental goals of interpretation. The forms of interpretative media which consist of Guide services Signage, Wildlife movies and publications were documented. To understand the local people's attitude towards tourism, conservation and role of local people in interpretative programmes, a survey of the community around the PA was conducted.

Bitapi C. Sinha

Outputs and outcomes: A total of 201 visitors (162 Male, 39 Female) were interviewed during the study period in Tadoba Tiger Reserve. Out of which 96% are domestic tourists and only 4% constituted foreign tourists. The tourists were asked to rate various park services (maintenance of the park, local transport, telecommunication, staff, access to wildlife viewing, friendliness of people, over all services in the park) on a 0 to 5 scale, where 0= no answer and 5= excellent.

Visitation to the Interpretation Centre (IC) at Tadoba is very low. Out of total 64 visitors to IC, 12 were students and belong to 21- 25 age group where as rest of 52 visitors were between 26-35 age group.

Questionnaire administered to find out the level of knowledge gain revealed that, out of 19 tourists (pre visit) only 6 could answer correctly. But from the 22 post visit, 12 answered correctly. Because of small sample size we couldn't analyze further, nor could conclude whether the higher rate of correct answer in post visit is due to exposure to interpretation. When asked to the tourists if they learned anything new from the centre, 65% answered in affirmative.

Most of the visitors were unaware about the centre. Even though there is a signage showing the interpretation centre, but it has been written in Marathi, which cannot be understood by many. Many of the tourists visit the interpretation centre after their visit to the park, or during noon when the park is closed. In total, 637 households of nine villages in and around the Tadoba Tiger Reserve were surveyed to find out their attitude towards conservation and to understand the role of local people in tourism and interpretative programmes. Additional data on socio economic and educational levels have been collected and data analysis is in progress.

The field work in Kanha Tiger Reserve was initiated in January 2009. A total of 128 visitor's survey has been done so far. The visitation to the interpretation centre is high in comparison to Tadoba tiger reserve. Hence to evaluate the effectiveness of interpretation centre in making conservation awareness, pre visit and post visit surveys are being conducted. Individual observation to find out the attraction and holding power of display panels are also going on. CCTV cameras have been installed to track the visitor behaviour inside the interpretation centre. In total four cameras have been installed in the new interpretation centre from February 2009. Data is being stored for further analysis. Survey in two villages (240 house holds) has been completed.

Jyotirmay Jena

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: Ashwini Kumar Upadhyay
Date of initiation: February, 2007
Date of completion: December, 2010

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

Progress: During the study period, field work was carried out in two phases: (i) May–August 2008, and (ii) November 2008 to March 2009. Data were collected on the relative abundance, age/sex composition, spatial distribution and habitat use by sympatric ungulates. The intensive study area (ISA) lies approximately north-east of Pangong Tso and has five species of wild ungulates. It is spread over *ca.* 500 km^2 and located close to the Line of Actual Control (LAC) with Tibet (People's Republic of China). This area is characterized by alpine arid environment and much of the study area is dry and desolate with less than 5% vegetation cover.

The trail monitoring method was followed to collect data on animal distribution, abundance and habitat use. The study area was stratified into survey blocks with transects and trails varying in length. A total of 503 km were monitored in 42 trails, spending 249.85 hrs of observation. Data based on direct sightings and indirect evidences of ungulate species were recorded along transects in the survey blocks. For each sighting, following parameters were recorded: (i) time of sighting; (ii) group size and composition (males, females, sub-adults, young/yearlings and unknown individuals); (iii) activity (feeding, resting, walking or flushing); (iv) altitude (in metres); (v) aspect (North, East, West, South, North-east, North-west, South-east, South-west) visual (ocular) estimation; (vi) slope (flat 0-16^0, gentle 16-25^0, steep 25-34^0, very steep 34-50^0; (vii) habitat type and vegetation structure; and (viii) GPS coordinates (latitude and longitude) at which the animal was sighted where ever possible.

At each location of animal sighting, vegetation and habitat parameters were quantified. Ground vegetation in different strata was recorded using random quadrates of $1m^2$. Following parameters of vegetation were collected from the quadrates: % cover of grasses, sedges, forbs, and shrubs, % area under rock or soil.

Ungulate distribution and habitat use were studied based on indirect evidences (*i.e.* dung/ pellets, hoof marks). Habitat types were defined based on the predominant landscape features and major vegetation type or physiognomic units. The following parameters were recorded systematically along each trail (at each side of belt transect): (i) landscape and vegetation types; (ii) altitude (in meters); (iii) aspect (using a compass); (iv) slope (in degrees); (v) latitude and longitude recorded using GPS; (vi) shrubs, grasses and sedges (percentage cover of species wise); (vii) ground cover (grass, herb, litter, bare ground and rock); and (viii) feeding signs on shrubs and grasses/herbs.

The transects were usually walked along valleys, hill slopes (contours) and ridgelines where possible. Vantage points were monitored to scan the slopes to record activity pattern of ungulates. Once an animal was sighted, the above parameters were recorded. Broad habitat types were categorized into following types: ridge lines, plateau, scree slopes, and valley bottoms (riverine, marshy).

Outputs & outcomes: Spatial distribution of chiru was ascertained based on data collected along trails during the

field visit in the months of June, July and August. In all, there were only eight sightings of chiru in the ISA. Mean group size was four individuals per group. This is much less than the sightings in 2007 when 45-50 individuals were recorded in the ISA. Chiru population in the Changchenmo valley used flat marsh meadows dominated by *Scirpus planifolius, Kobresia royleana, Kobresia pygmaea*, *Oxytropis humifusa* and *Potentilla anserina*, gentle slopes and hills around Changchenmo river, Kugrung river, Silung Burma and Silung Yogma n*ullahs* as evident from indirect evidences.

Wild yak were sighted in the Changchenmo valley near Kugrung river and slopes adjacent to Kongka La and near Marsmik La. A total of 215 individuals of wild yak were sighted (10 sightings) in Changchenmo valley. All the sightings were between 4,705 and 5,300 m asl, well within their established altitudinal range. The average herd size in the study area comes to 30.7±20.17 SE (with a range from 1 to 112). Wild yak were generally found on slopes, higher than areas occupied by chiru in the Changchenmo area.

Kiang is widely distributed in the study area but largely used valley bottoms and lower slopes with mean group size of 6.39 individuals per group. Blue sheep was sighted frequently close to Marsmik La. Group size ranged from 1 to 109 individuals (Mean Group Size 16.30 individuals). A total of 120 individuals of Argali were sighted (n= 20) in the valley-bottoms and ridge-tops and their mean group size was 7.1±1.48 SE.

G.S. Rawat

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

Funding source: Grant-in-Aid
Investigator: Dr. S. Sathyakumar
Researchers: Lalit Kumar Sharma and Samina Amin Charoo
Date of initiation: March 2007
Date of completion: February 2011

Objectives: The objectives of this study are to: (i) assess the bear–human conflicts and threats to black bear and its habitats at Dachigam National Park (DNP) and adjacent Reserved Forests, Protected Areas in the north west Himalayan landscape; (ii) evaluate whether the distribution and relative abundance of Asiatic black bear is influenced by the availability of major food plants found in DNP; and (iii) evaluate whether the activity, habitat utilization, and movement and ranging patterns of Asiatic black bear on a daily, seasonal and annual basis at DNP is influenced by the availability and distribution of major food plants of DNP.

Progress: Field work continued during the reporting year on Asiatic black bear distribution, status and habitat use based on direct and indirect evidences in the Intensive study area. In total, 13 transects representing different habitats, *viz.*, Riverine, Grasslands, Mixed forests, Oak plantations, Pine mixed forest, and *nullahs* with *Parrotiopsis* dominant tall shrub were laid in lower Dachigam area of DNP. These transects covered an altitudinal range of 1,600m to 2,700m and different aspect and slope categories. All transects were surveyed regularly during the reporting period. Data from transects, such as direct sighting observations, vegetation sampling, food availability and utilization of major food species by black bears during this period has been recorded. Phenology monitoring of major food plants on permanent plots on transects along with sign surveys (tracks, scats, feeding and other) was also carried out on regular basis.

Hair traps were placed in different locations of the study area to collect hair samples using barbed wire traps for standardization of technique for further use in the study. Each hair trap was baited (honey/fish feed) and placed in bear habitat preferably near transects and a camera trap placed near the hair trap station. A total of 23 such camera traps have been deployed in the study grids along with hair traps for black bear population estimation.

One adult female that was rescued by the Department of Wildlife Protection, J&K State was fitted with a GPS collar and released in Dachigam National Park during November 2008 to study the movement and ranging patterns of black bear.

Field and Questionnaire Surveys to assess the extent and magnitude of black bear – human conflicts were carried out in the Central and South Divisions of Kashmir during the reporting period. These surveys were carried out in the fringe villages around DNP. Data on human population, number of families, livestock population, bear attack on livestock, place, time and seasonality of attack, cropping patterns, productivity, family income and details of livestock holdings, and NTFP collection from each village were recorded.

Outputs and Outcomes: In total, 208 km of transect/trail sampling were carried out during the reporting period. In addition to the 98 plots laid on transects, 26 more permanent vegetation sampling plots on both the side of Dachigam *nullah* were laid at an interval of 500m. These plots were monitored regularly and the data on phenology such as growth phases (reproductive parts and vegetative parts) were also recorded for major food items of the black bear. A total of 283 scats were collected in the study area and analysed to understand food habits of black bears. Reference slides of plant species have been prepared in WII laboratory. Micro-histological analysis of scats was carried out and compared with reference slides of plant species available in the area. Camera trap data have been analyzed for abundance and encounter rate estimation.

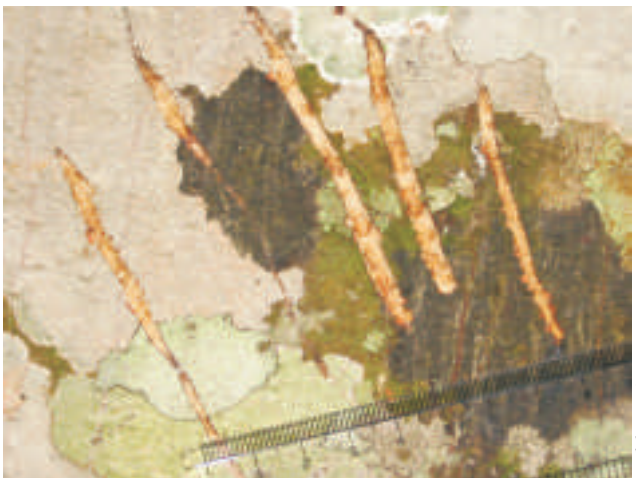
Milestone: The report on the Asiatic Black Bear-Human conflicts around DNP for the year 2007 was completed and submitted to Department of Wildlife Protection, J&K State for use in their adaptive management.

Status and distribution of Malayan sun bear *Helarctos malayanus* in North Eastern States, India

Funding source: Grant-in-Aid
Investigator: Dr. N.P.S. Chauhan
Researcher: Lalthanpuia
Date of initiation: April, 2007
Date of completion: October, 2009

Objectives: The project has the following objectives to: (i) assess the status and distribution of Malayan sun bear in Arunachal Pradesh, Nagaland and Mizoram; (ii) investigate habitat use by sun bear in these three States; (iii) assess the nature and extent of human-sun bear conflicts: human casualties and agricultural crop damage by sun bear in these States; (iv) identify 'conflict zones' and conservation threats for the survival of sun bear in these States; and (v) suggest conservation and management strategies for sun bear in these States.

Progress: A questionnaire survey was conducted in 81 fringe villages of different protected areas in Mizoram, Nagaland and Arunachal Pradesh. There are nine protected areas in Mizoram which include two national parks and seven wildlife sanctuaries. There are probabilities of low sun bear occurrences in 25 villages and medium in 25 villages. There are no reports of its occurrence in 16 villages. Amongst these, the status of sun bear occurrence seems to be low in eight villages situated adjacent to two protected areas and one reserve forest, whereas, the status seems to be high in 36 villages adjacent to four protected areas. From this limited data, it was not possible to reveal actual status of sun bear. From the 52 responses, maximum sightings were inside mixed forest (n=34), followed by crop field (n=8), bamboo forest (n=6), road (n=2), water body (n=1) and degraded lands (n=1). The respondents observed 28 bears walking, 16 feeding, 7 resting and one swimming. They were mostly sighted alone (n=44), two individuals (n=3), mother with cub(s) (n=5). Direct sightings of the bear were highest in the evening (n=24), followed by noon (n=17), morning (n-9) and night (n=2). Thirty seven respondents observed sun bear scats, 42 respondents observed claws, 47 respondents observed footprints, 31 respondents observed tree nest, 21 respondents observed log or tree cavity. Thus, the two months data confirm presence of sun bear in Mizoram, but status report and distribution map of sun bear will be developed only after completion of the study. Direct and indirect evidences of sun bear in some parts of the Namdapha Tiger Reserve, Arunachal Pradesh have been recorded.



Lalthanpuia

Assessing the potential role of *Coleoptera* (Insecta) as bio-indicators in Simbalbara Wildlife Sanctuary, Himachal Pradesh

Funding source : Ministry of Human Resource Development (HRDG-CSIR), Government of India

Investigator: Dr. V.P. Uniyal

Researcher: Vinay Bhargava

Date of initiation: April, 2007

Date of completion: October, 2010

Objectives: The objectives of the project are to: (i) study the diversity patterns of beetles (Coleoptera) in Simbalbara Wildlife Sanctuary, Himachal Pradesh; (ii) determine the bio-indicator families of Coleoptera and their taxonomy; (iii) assess the potential use of bio-indicator Coleopteran families as indicator to monitor human influence on forest ecosystem.

Progress: The objectives undertaken in this phase was (i) Taxonomic identification of the long-horned beetles (Coleoptera: Cerambycidae: Longicornia), (ii) Determine the spatial and temporal patterns in diversity patterns of borers or long-horned beetles and their natural enemies from the Sal (*Shorea robusta)* dominated forests of Simbalbara Wildlife Sanctuary, Himachal Pradesh, and (iii) Response and habitat association patterns of borers and their natural enemies to human disturbance, fire and other habitat variables.

Outputs and outcomes: A total of 65 sample plots in 13 transects were sampled in and around Simbalbara Wildlife Sanctuary; in which 52 species of borers and 19 families of their natural enemies were recorded. Teak mixed forest, mixed forest and bamboo mixed forest were the most species rich (Shannon H'=1.525, 1.495 and 1.468 respectively) while khair mixed forest, agriculture land, and pine mixed forest were least species rich (Shannon H'=1.027, 0.883 and 0.568). Natural enemies of borers were mostly found in mixed forest, teak mixed forest and bamboo mixed forest habitats (Shannon H'=1.224, 1.125 and 1.104 respectively). In all, 16 species of borers belonged to infestation history class I, 16 species to class II, and 20 species to class III. All the borer species showed peak in their abundance soon after one or two monsoon showers. The species to emerge first was *A. holosericea* during early April and the *X. smei* was recorded late September. Analysis of similarity (ANOSIM) using Bray-Curtis similarity measure showed maximum similarity in species composition of borers between Sal-teak (0.860), teak-mixed forest (0.834) and mixed forest-bamboo (0.860) habitats (average similarity=0.5947; $p<0.0001$); for their natural enemies 0.908, 0.863 and 0.718 in respective habitats. Indicator species analysis revealed 19 species most indicative of particular habitat condition.

In case of borers, variation in the species richness assemblage patterns in Sal control and fire plots as revealed by ANOVA was significant (F value = 10.116, P value = 0.00518, F_{crit} = 4.413); variation in the species richness assemblage patterns in Sal control and experiment plots as revealed by ANOVA was significant (F value = 5.774, P value = 0.0272, F_{crit} = 4.413); and assemblage patterns of borers and their enemies (predators and parasitoids) in response to human disturbance and fire. Variation in the species richness assemblage patterns in Eucalyptus control and experiment plots as revealed by ANOVA was significant (F value = 13.632, P value = 0.00162, F_{crit} = 4.413). The error graphs at 95% CI revealed that there is concomitant increase in the species richness and abundance of natural enemies in response to borers. Canonical correspondence analysis and multiple regression analysis revealed average GBH and average tree density as predominant variable defining species richness of borers while average shrub density and litter layer were the determining variable defining species richness of borers in habitat space. Non-metric multidimensional scaling ordinating species richness of borers in habitat space revealed clustering of mixed forest habitats segregating the agriculture land and pine sample plot; while that for natural enemies segregated all the habitats distinctly without any overlap, suggesting specialization of natural enemies to particular habitat only.

An exquisite pattern of habitat assemblage in co-occurrence, niche overlap and feeding guilds was attributed to the resource partitioning at micro-scale level as evidenced from distinct patterns in flight phenology and seasonal abundance; development time; species associations amongst trees and logs; and response to predators. For example, with a single Sal tree, three species of borers *viz. Hoplocerambyx spinicornis*, *Aeolesthes holosericea* and *Xystocercus globosa* occupy the heartwood, sapwood, and bark undersurface respectively. In general, all the borer species showed distinct increase and decrease in their abundance with the waning and waxing phase of moon.

Lastly management should identify ways and means to create and maintain diversity. For example, with no predator or parasite habitat present in a pure stand of forest, the pest insect could not possibly have it better. This approach can be used to reduce the costs and increase profitability, and sustaining our land resource base. Strategies to escalate the diversity and stability to a higher level, therefore includes stand diversification, plantation on rotation basis, forest-scaping, plantation intercropping and the integration of social and agro forestry.

Vinay Bhargava

Comparison of tiger *Panthera tigris* population estimated using non-invasive techniques of pugmark, camera trap and DNA based analysis of hair and scat in Ranthambhore Tiger Reserve. Phase-II: Estimation of tiger population

Funding source: Grant-in-Aid
Principal investigator: Dr. S.P. Goyal
Co-investigators: Dr. K. Sankar and Shri Q. Qureshi
Researchers: Randeep Singh and Lovleen Saxena
Date of initiation: April, 2007
Date of completion: May, 2010

Objectives: Phase-II of the project, is aimed to: (i) determine tiger population employing pugmark, camera trap (sight and resight) and non-invasive DNA based techniques using scat and remotely collected hair in intensive study area of *ca.* 150-200 km^2 of Ranthambhore Tiger Reserve (RTR), Rajasthan, and Panna Tiger Reserve, M.P.; and (ii) compare tiger estimates determined by various methods and seasons with respect to precision and accuracy and suggest appropriate protocols, which are practical, suitable at variety of scales and cost effective for estimating tiger numbers for dry tropical habitats.

Progress: Data was collected from April 2008 to February 2009 in different seasons *i.e.* summer, post-monsoon and in winter. The study area was divided into 1x1 km grids and a total of 224 grids were selected based on presence of tiger and indirect evidences (pugmarks and scats). It was sampled in consecutive four blocks by deploying 48 to 72 camera traps. A track plot was prepared at each camera trap station for collection of pugmark of identified individual based on stripe patterns. Each trapping station was operated and monitored for 15-20 days. A total 157 camera-trapping stations have track plots (TP) which were used for collection of the pugmark of identified individual based on stripe patterns in different season. Hind left or right pugmark was traced using tiger tracers, and was photographed. The pugmark cast using plaster of Paris was also prepared. A total 525 scats were collected in three different seasons for DNA based individual identification. In total, 120 scats of RTR tigers of two different season's *viz.* April-May and November 2008 were also taken for DNA isolation using Qiagen Stool Kit.

Outputs & outcomes: The intensive monitoring of 224 trapping stations in different seasons documented 525 tiger photographs of 37 individual tigers and intensive monitoring of 157 TP documented a 27 set of pugmark in summers, 35 set of pugmarks in post-monsoon and 75 set of pugmark in winters. The DNA was extracted and checked on 0.8% agarose gel to get a rough estimate of the quantity of DNA. Various primers suitable for obtaining multi-locus genotype for scats collected from RTR were screened. Primer Z3 and Z6 have shown 100 % success rate where as primer Z7 has shown 55% success with the 11 scat samples. Therefore, these primers Z3 & Z6 will be used in further analysis. Screenings of other primers are in progress.

Milestone: Sampling was done in four consecutive sampling blocks in different seasons. Use of blocks by tiger for their territory, food and shelter was analyzed, based on camera trap data (maximum number of photo-capture and individuals identified). It was found that sampling block "C" was heavily used by tigers as there were maximum tiger captures as well as maximum number of identified individual tigers. This may be due to presence of good prey base, water availability, and low disturbance by tourist and other people. Therefore, there is need to plan long-term strategies for continuous monitoring of tigers in this block.

Ecological assessment of timberline eco-tone in Western Himalaya with special reference to climate change and anthropogenic pressures

Funding source: Grant-in-Aid
Investigators: Dr. B.S. Adhikari and Dr. G.S. Rawat
Researchers: Sabuj Bhattacharyya, Ishwari Dutt Rai and Rupesh Ranjan Bharti
Date of initiation: May, 2007
Date of completion: May, 2011

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

Progress: The phenological study was conducted at five different sites with an altitudinal interval of 150m starting from 3000m (Chopta) to 3650m (Tungnath) covering different forest types in forested, timberline and alpine zone. The flower buds and leaf buds of *Rhododendron arboreum, R. campanulatum, R. barbatum, Abies spectabilis, Quercus semecarpifolia and Betula utilis* were selected to observe seasonal changes. The phenological data of *Betula utilis* at 3300 and 3400m suggests that the individuals of higher altitudes were adapted for short growing season. The leaf flushing was about 9-11 days later in the higher sites with early leaf drop. Individuals at and around 3,300m have an advantage of more moisture availability and temperature in the soil due to which the early growth was observed. However, the individuals in lower altitudes have less number of leaves with high leaf area than the higher site. Individuals of higher site compensate for short growing season by producing more number of leaves and longer duration of leaf fall to maximize resource availability. The bud breaks in *Abies spectabilis* delays about 9-11 days per 150m rise in altitude. The needle size increases positively from 3000 to 3300m indicates altitudinal adaptation and needles become shorter in length with altitude.

B.S. Adhikari

Outputs and outcomes: The relative abundance of pika was studied in 10 different habitat types in three different zones. To determine the population, relative abundance in each site, total observation effort of 12 hours per month (three sessions of four hour duration) at each site was spent. The number of individuals (encounter rate), size, their coat color, scar marks on body and ear was recorded to distinguish different individuals. Among different habitat types, relative abundance of Pika was comparatively higher at man-made wall habitat in alpine zone and broken slope habitat in sub-alpine throughout the study period than other habitat types. Highest relative abundance (7.7±0.3) of pika was at man-made wall during June and broken slope in sub-alpine zone during May. *Danthonia* grassland habitat in alpine zone and bouldary forest gap in sub-alpine zone have comparatively low relative abundance, but lowest relative abundance (1.4±0.6) was at alpine meadow habitat during October and November. The relative abundance of juveniles was consistently higher at broken slope in sub-alpine habitat and lowest at bouldary forest gap in sub-alpine zone in June and rocky alpine meadow during May. The results suggest that the amount of rock cover (escape cover) and availability of food, herbaceous species richness and altitude were important factors and linearly correlated with relative abundance of royle's pika population.

Ecology of leopard in Sariska Tiger Reserve, Rajasthan

Funding source: Grant-in-aid
Investigators: Dr. K. Sankar, Shri Qamar Qureshi and Dr. Y.V. Jhala
Researchers: Krishnendu Mondal and Shilpi Gupta
Date of initiation: September, 2007
Date of completion: September, 2012

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

Progress: On March 25, 2009 a sub-adult male leopard weighing 40kg was captured 30km away from Sariska Tiger Reserve by park officials. It was fitted with radio-collar and released near Kalighati waterhole in Core zone 1. Continuous monitoring of this animal is being done based on VHF (Very High Frequency) tracking. Information such as major vegetation type, terrain type, and distance to nearest water source, distance from the village, road and anthropogenic disturbances (lopping, cutting and grazing) on each animal location is being collected.

To assess the prey availability, 16 line transects were laid in an intensive study area of 80 km^2 and were walked thrice during the study period (174 km). Sambar (26.2 km^2) and nilgai density (49.4 km^2) in study area were found to be comparatively higher than the other dry deciduous areas of the country. To estimate the food habits, a total of 171 leopard scats were collected and analyzed for prey remains. A minimum of 20 hair were taken from each scat and they were examined under microscope. Identification of prey species was based on medullary and cuticular patterns of hair.

K. Sankar

Ten prey species were identified from leopard scats. Percent frequency of occurrence of sambar (43.5%) was found to be the highest in leopard scats followed by chital (23.8%), nilgai (12.3%), common langur (11.0%), hare (4.7%), cattle (4.1%), rodent (2.9%) and wild pig (5.2%). In terms of biomass consumed, sambar contributed the most (49.6%) to the diet of leopard, followed by nilgai (18.6%), chital (15.36%), cattle (6.11%), common langur (4.94%), hare (1.78%), wild pig (1.40%) and other animals (2.24%). Sambar was found to be the principal prey species of leopard in terms of number and biomass and sambar and chital contributed 70% to the diet of leopard.

A total of 64 pictures of 17 individuals (6 males, 11 females and 5 cubs) were captured by 40 cameras covering an area of 118.7 km^2 (minimum convex polygon) Each individual leopard was identified on the basis of unique pattern of rosette spots. The boundary strip width was estimated by the half of mean maximum distance moved (MMDM/2) model. The effective trapping area with MMDM/2 strip width. The estimated leopard density (D) in the study area of Sariska is 7.6/100 km^2 or 8 individuals per 100 km^2 (Mh model).

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

Funding source : Uttarakhand Forest Department (UKFD)
Investigators : Dr. G.S. Rawat and Dr. B.S. Adhikari
Advisor/Collaborator : Shri S. Chandola, UKFD
Researchers : Umesh Kumar Tiwari and Ninad V. Raut
Date of initiation : January, 2008
Date of completion : December, 2010

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

Progress: The field work for the survey and mapping of the region was initiated during second week of February 2008. Following is the progress of the work carried out so far: (i) Rapid Mapping Exercise (RME) has been completed in the following areas: (a) Eight forest ranges in Dehradun Forest Division *viz.,* Asarori, Malhan, Jhajhara, Lachhiwala, Rishikesh, Barkot, Thano and Malsi; (b) Three forest ranges in Upper Yamuna Forest Division *viz.,* Mugarsanti, Rawain and Yamanotri; and (c) Five forest ranges in Tons Forest Division *viz.,* Deota, Kothighad, Sandra, Singtur and Purola. (ii) Data analysis has been completed for Dehradun Forest Division; and (iii) Data entry is in progress for Tons and Upper Yamuna Forest Divisions.

Outputs and outcomes: It was found that all eight ranges of Dehradun FD are badly infested by *Lantana camara*. Most important medicinal plants recorded in the Division include *Phyllanthus emblica, Terminalia belerica, Terminalia chebula, Holarrhena antidysenterica, Woodfordia fruticosa, Vallaris solanacea, Asparagus adscendens, Baliospermum montanum, Curculigo orchioides* and *Plumbago zeylanica.* Most of the medicinal plants had patchy distribution. *Rauvolfia serpentina*, *Baliospermum montanum* were recorded only in shady and moist places under Sal forest. *Plumbago zeylanica, Vallaris solanacea, Adhatoda zeylanica* and *Boerhavia diffusa* were mostly found in dryer areas or open scrub forest with *Lantana*. In addition to transect in representative area, it is felt that intensive search for certain species such as *Rauvolfia serpentina* and *Centella asiatica, Celastrus paniculata* and *Tinospora cordifolia* would be required. Gola block in Rishikesh and Golatapper in Barkot range have characteristic swamp forests rich in plant species. Characteristic species include *Pterospermum acerifolium, Diospyros malabrica* (= *Diospyros embryoteris* Pers.), *Rauvolfia serpentina* and *Calamus tenuis*. These patches require more systematic inventory. *Adhatoda zeylanica* is fairly common having high densities in the eastern parts of the division, especially in open areas. Hence, open forests of Thano, Barkot, Lachiwala and Rishikesh can be considered for 20–25% harvest followed by replanting of this species. A rotational harvest plan for this species even in *Lantana* infested areas can be considered for sustainable management of NTFPs. Annual progress report giving status of medicinal and aromatic plants within Dehradun Forest Division has been submitted to UKFD for further conservation planning.

G.S. Rawat

An assessment of entomofauna for management and conservation of biodiversity in the Gangotri landscape

Funding source: Grant –in-aid
Investigator: Dr. V.P. Uniyal
Researcher: Manish Bhardwaj and Abesh Sanyal
Date of initiation: January, 2008
Date of completion: January, 2012

Objectives: The objectives of the project are to: (i) assess the ecological diversity and distribution patterns of Beetles (Coleoptera) and Butterflies (Lepidoptera) in different habitat types of Gangotri Landscape; (ii) determine the endemicity and rarity of butterflies and their host plants relationship; (iii) determine the status of beetles (Coleoptera) as pests in different anthropogenic pressures *viz.* grazing, herb collection, fire, tourism on assemblages of butterflies and beetles; and (iv) suggest and develop long-term management strategies for conservation of invertebrate diversity in the landscape.

Progress: Sampling was conducted in order to document insects in different orders in Bhagirathi Valley and Nelong Valley of Gangotri Landscape. Twelve sampling sites were selected falling in different altitudinal zones. Out of 29 insect orders mentioned in literature, following 13 orders *viz,* Ephemeroptera, Odonata, Mantodea, Dermaptera, Orthoptera, Hemiptera, Thysanoptera, Neuroptera, Coleoptera, Diptera, Trichoptera, Hymenoptera and Lepidoptera were documented at 12 different sites in Gangotri Landscape. In total, 29 transects were laid in different altitudinal zones of Gangotri National Park (NP) in order to record richness and abundance of butterflies.

Transects were selected systematically within a stratified stratum to ensure the independent sampling protocol and minimizing spatial autocorrelation. Transect of minimum 300-500 m were laid in different altitudinal zones to document butterfly species also called as Pollard walk method. Sweep net method was used to collect butterflies on transects. The butterflies were observed on either side of transects. The species which are difficult to be identified during flight were captured using sweep net and released, if identified in field. The species which were difficult to identify in field were captured and mounted for identification later.

An effort of 50 km on 29 transects, resulted in 27 species of butterflies. In total, 1609 individuals of 27 species, 18 genera and 5 families (*Viz,* Papilionidae, Pieridae, Lycaenidae Nymphalidae, and Hesperiidae) were documented over a period of 60 collecting/ sweep netting hrs in the Gangotri NP. Transects were laid in possible broad habitats of the park *viz,* Deodar forest, Deodar mix forest, Blue pine forest, Mix dry scrub land, Alpine meadows and Agriculture land. Twelve transects were laid in Gangotri valley, while 17 transects were laid in Nelong valley inside the park. Seventeen species were recorded from both valleys, of which, 18 species were common to both valleys.

Family Nymphalidae was most abundant with a number of 982 individuals followed by Pieridae, Papilionidae, Lycaenidae and Hesperiidae. Family Nymphalidae also shows high generic (10) and species (14) diversity followed by family Papilionidae, Pieridae and Lycaenidae (4 species each). Family Hesperiidae was documented with only one species.

Transects were laid in an altitude range of 2,800 m to 5,200 m. Analysis of preliminary data shows a decreasing trend of species richness along altitude in Gangotri NP.

A study on sympatric carnivores (tiger, leopard and wild dog) in Mudumalai Tiger Reserve, Tamil Nadu

Funding source: Grant –in-aid
Investigators: Dr. K. Sankar and Shri Qamar Qureshi
Researcher: T. Ramesh
Date of initiation: January, 2008
Date of completion: January, 2011

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

Progress: Prey species density estimation was done by laying 20 transects (107 km^2)in camera trapping grids. In addition, five vehicle based transects were being monitored every month, once in the morning and evening. The length of the vehicle transect ranges between 15 to 23 km. A total of 582 tiger scats, 309 leopard scats and 919 wild dog scats were collected till date to study the seasonal food habits of sympatric carnivores. These scats were washed, sun dried and processed for further analysis. Of these, 179 tiger scats and 108 leopard scats were analyzed for prey remains. In order to assess the population of sympatric carnivores, the study area (107 km^2) has been divided into 3x3 km grids and within each grid a pair of cameras have been deployed. Twenty grids covering an area of 180 km^2 were selected for camera trapping. Camera trapping has been carried out for two summer and one winter season in the study area to estimate the large carnivore population.

To study the distribution of sympatric carnivores and their prey species with specific reference to anthropogenic pressures, Theppakadu, Kargudi, Mudumalai, and Kapur villages were surveyed. Data on wood cutting, lopping, grazing, (0 to 4 scale:- 0: none, 4: more than 75%) livestock dung and minor forest produce collection are being collected from every 400m sampling point around 10m radius along the line transects. Also information on human-large carnivore conflict is being collected from the villages through a structured questionnaire.

Outputs & outcomes: Chital was found to be the most common prey species in the study area with a density of 55.3±6.28 animals/km^2 followed by common langur with 25.9±3.59 animals/km^2, gaur with 11.4±2.14 animals/km^2 and sambar with 2.8±.0.49 animals/km^2. The estimated mean biomass of potential prey species was 8365.02 kg/km^2.

The analysis of scats revealed the presence of 11 prey species in tiger scats and 10 prey species in leopard scats, with a high predominance of medium to large sized ungulates in both tiger and leopard diet. The dietary overlap between these predators was 82% in terms of percentage of frequency occurrence of prey remains in the diet. In terms of percentage of biomass consumed, the estimated dietary overlap between tiger and leopard was 72%. Sambar and wild pig were preferred by tiger.The index of selection by tiger at individual level was in the following order: sambar > wild pig > cattle > chital > gaur > common langur. In case of leopard, common langur, sambar, wild pig were preferred. The index of selection by leopard at individual level was in the following order: wild pig > sambar > common langur > cattle > chital > gaur.

Barcoding Anurans of India

Funding Source: Department of Biotechnology, Ministry of Science and Technology, Government of India

Investigators: Dr. Karthikeyan Vasudevan, WII, Dr. Ramesh K. Aggarwal, Centre for Cellular and Molecular Biology and Dr. Sushil K. Dutta, North Orissa University

Researcher: Prudhvi Raj

Date of initiation: January, 2008

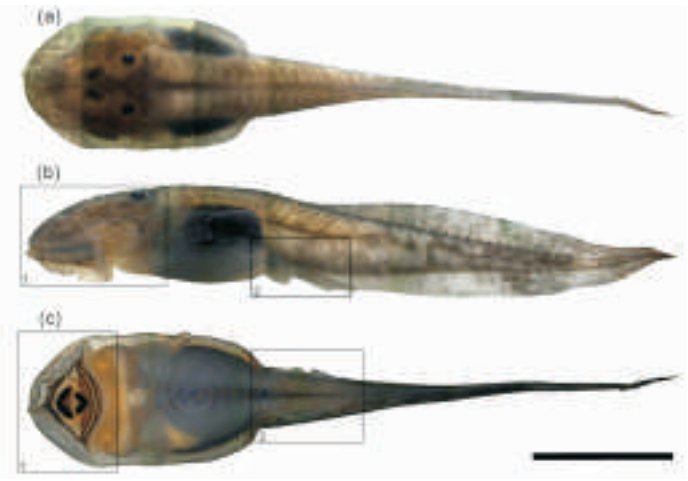
Date of completion: January, 2011

Objective: The project objectives are to: (i) document anuran diversity in 'hotspots' and in biogeographically important areas in India; (ii) create an interactive digital library of photographs, calls and DNA barcode of known amphibian species in India; (iii) check barcoding gaps and describe cryptic anuran species; and (iv) develop a web-enabled database providing the above information resource on frog taxa of India with retrievable DNA based/other descriptors.

Progress: Extensive field trips were made in Eastern Ghats, Western Himalayas, North east India and Rajasthan to document the aunarn diversity. A total of 179 new samples were collected from about 80 different localities for barcoding work. Along with samples, the field data were collected for multiple morphological and abiotic variables, in addition to photographing the species and collection of different life stages of the species. A conscious effort has been made to document larval stages of important anurans in India. Larvae at different stages of growth in five anuran species have been collected from the field or after rearing them. At CCMB, wet lab conditions have been standardized for DNA isolation, PCR amplification, and sequencing; literature was scanned for putative universal primer(s) for amplifying genomic sequences having barcoding utility, but with very limited success. Efforts were made to identify/develop new sets of primer pairs for multiple putatively informative domains of both organelle and nuclear genome.

Outputs and Outcomes: In total >90 primer pairs were designed targeting a number of informative domains; and these are being standardized using a panel of 24 frog species representing the known anuran diversity from India. This work is underway, but the efforts undertaken are not indicative of a barcode for anurans.

Milestone: The data obtained strongly suggests that the mtDNA regions (viz., Co-I, Co-II, Co-II, ND-1 etc.) conventionally projected to be suitable for anuran barcodes, are highly variable, making it difficult to design specific primer pair(s) that may work universally on a number of species. In addition to the above, descriptions of some novel taxa are also underway.



Developing spatial database on the mammal distributions and monitoring programme for large Carnivores, Prey populations and their Habitats in Khangchendzonga Biosphere Reserve

Funding source: Grant-in-Aid
Investigator: Dr. S. Sathyakumar
Researchers: Tapajit Bhattacharya, Tawqir Bashir and Kamal Pondyal
Date of initiation: January, 2008
Date of completion: December, 2011

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

Progress: Following the recruitment of two researchers in February, 2008 and designing of study in March 2008, reconnaissance surveys were carried out in April 2008 in different parts of the *Prek chu* catchment of Khangchendzonga Biosphere Reserve. Another researcher, joined this project during mid 2008. Trail sampling and scanning methods were used for collecting data on carnivores, ungulates and galliformes based on direct and indirect evidences. The study area was divided in to 2 x 2 km grids and camera traps have been placed along trails in every grid to obtain data on presence/absence, relative abundance and population of carnivores, ungulates and galliformes in the study area.

Outputs and Outcomes: Field surveys covering over 240 km effort were carried out in different parts of western region of Khangchendzonga BR such as Intakkholla (1,820m), Tingkongkholla (1,870m), Quapani (1,950m), Chung (2,150m), Sachen (2,300m), Jamathang (2,380m), Bakhting (2,440m), Barkhe (2,620m), Malingo Gare (2,710m), Bakhim (2,760m), Tsoka (3,010m), Ghunsa (3,150m), Yambong Valley (3,470m), Kasturi (3,570m), Phetang (3,620m), Jaireeni (3750m), Couckchurong (3,860m), Deorali (3,910m), Phedhi (3,960m), Dzongri (4030m), Thangsing (4,200m), Lachmipokhri (4,250m), Lampokhri (4310m), Lamune (4320m), Gomathang (4,360m), Base camp Rathong (4,380m), Somiti lake (4,450m), Yalk Tar (4,520m), Chamre (4,620m), Ballua Tar (4,710m) and Gochella (5,010m), covering three watersheds. Encounter rates for carnivores, ungulates and galliformes have been obtained for different habitats in the study area.

During the reporting period, scats of Leopards (snow & common), Asiatic black bear, Red fox, Jackal, Himalayan Yellow-throated Marten and Himalayan Weasel were encountered. Evidences of blue sheep, goral, serow, barking deer, musk deer, blood pheasant, Himalayan monal, satyr tragopan, kalij pheasant, snow partridge and hill partridge have been recorded. Dietary analysis of carnivore scats revealed that rodents formed high proportion when compared to the other prey items. Using camera traps, confirmation for many mammal species has been obtained.

Diversity of Spiders in Nanda Devi Biosphere Reserve

Funding source: Department of Science and Technology, Government of India

Investigator: Dr. V.P. Uniyal and Dr. K. Sivakumar

Researchers: Shazia Quasin

Date of initiation: January, 2008

Date of completion: December, 2011

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

Progress: Stratified random sampling methods were followed to capture spiders of the study area. For spider sampling square sampling plots were selected randomly along the altitudinal gradient in three different altitudinal zones *viz.,* low altitude (1800 m – 2500 m), mid altitude (2500 m – 3300 m) and high altitude (3300 m and above). Six different collection techniques *viz.,* pitfall trapping, vegetation beating, litter sampling, ground hand collection, aerial hand collection and sweep netting were employed. Initially 20 plots of 10m x 10m were laid in each of these zones. Both spider and vegetation sampling was done in these plots. Collected specimens of spiders were transferred to 70% alcohol.

A preliminary survey of the study area was conducted in September 2008 – March 2009. The areas surveyed included the Valley of Flowers National Park (3,250 m to 6,750 m), Lata Kharak (3,689 m) and few villages of Nanda Devi Biosphere Reserve (NDBR) *viz*., Reni, Lata, Peng, Suraithota, Tolma, Jugjug and Morinda. These areas were sampled both for spiders and vegetation. The vegetation of NDBR mainly comprises of temperate, sub alpine and alpine types. The alpine meadows of NDBR supports a variety of flowering plants such as *Potentilla sp., Geranium sp., Andcosace sp., Primula sp., Cyananthus sp., Gentiana sp.,* and *Morina sp etc.* The vegetation found at lower altitudes mainly includes shrubs such as *Berberis* sp., *Prinsepia utilis*, *Artemisia* sp., *Debregeasia* sp., *Rubus* sp., *Rubus ellipticus*, *Pyrus pashia*, *Reinwardtia* sp., and trees such as *Rhododendron arboreum*, *Hippophea* sp. The sampling plots were selected based on altitude along the altitudinal gradient. Spider samples were collected from all possible microhabitats. Twenty plots (10 m x 10 m) were laid from 1800 m (Govindghat) to 2600 m (Bhyundar) on the route to Valley of Flowers National Park. Sampling plots were also laid in the same way from Lata (2100 m) village up to Lata kharak (3689 m).

Identification has been done up to family level. Sixteen families of spiders have been recorded from the initial sampling in these areas. Family Araneidae (Orb web spiders) was most predominantly present in lower altitudes (1,800 m – 2,500 m) followed by Lycosidae (wolf spiders) and Linyphiidae (Hammock web spiders). However at mid altitude (2,500 m – 3,300 m) the families Lycosidae and Linyphiidae were more dominantly present and at higher altitudes (above 3,300 m) Linyphiidae was predominantly present. Genus and species are in the process of identification. It is expected that many new species will be recorded during the survey. In addition to this the study may provide an inventory of the spiders found in NDBR highlighting rare and endemic species found in this area.

An integrated approach to reduce the vulnerability of local community to environmental degradation in the Western Himalayas, India

Funding source: Grant –in-aid
Investigators: Dr. Ruchi Badola and Dr. S.A. Hussain
Researchers: Ashi Qureshi and Pariva Dobriyal
Date of initiation: February, 2008
Date of completion: February, 2012

Objectives: The objectives of the project are to: (i) study the patterns of interaction between the local livelihoods and natural ecosystems; (ii) identify the key drivers of land use and resource use changes that have taken place in the region and assess their implications for ecosystem integrity and vulnerability of the local people; (iii) identify ecosystem management actions and sustainable livelihood options that may reduce the vulnerability of communities to environmental degradation; and (iv) promote the integration of this approach into emerging policy frameworks for sustainable use of natural resources in the region.

Progress: Thirty plots were laid in 8 grids in the forested landscape in the Nanda Devi Biosphere Reserve. *Quercus dilatata* was the most abundant tree species with the density of 21.77 trees/ha while IVI value was 170.9188 followed by *Taxus baccata*, density of 6.90 trees/ha and IVI was 57.01565 while *Q. semecarpifolia* had the least abundance value of 8.32 trees/ha.

Among the three species *Q. semecarpiflolia* has the highest carbon content with the mean of 55.3791 $\pm$4.843 tons/ha followed by *Q. dilatata* which has stored 45.20279 $\pm$2.125057 tons/hectare of carbon while carbon storage value for *T. baccata* was least (16.1792 $\pm$0.706422 tons/ha). The above ground and below ground biomass values were 24.132 $\pm$ 2.607 tons/ha and 0.677774 $\pm$4.684789 tons/ha respectively. The total carbon stock for the sample plots was 41.819 $\pm$ 1.690 tons/ha.

The mean relative moisture content of the soil was 25.1% $\pm$ 0.451 while the volumetric water content was 34.9% $\pm$ 0.552. The volumetric water content is the ratio of the volume of water in a given volume of soil to the total soil volume. At saturation, the volumetric water content (expressed as %) will equal the percent pore space of the soil.

The findings of the present study are preliminary. We plan to extend the study into other parts of the Biosphere Reserve.

V.P. Uniyal

Ecological effects of road through sensitive habitats: Implications for wildlife conservation

Funding source: Grant –in-aid
Investigators: Dr. Asha Rajvanshi and Dr. V. B. Mathur
Researcher: A. Pragatheesh
Date of Initiation: April, 2008
Date of completion: March, 2011

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

Progress: To address the first objective, studies have already been initiated on National Highway NH-7 in the stretch between 597 and 652 km passing through Pench Mowgli Sanctuary of Pench Tiger Reserve.

During the study period, nineteen transects were laid on both sides of the road to assess the distribution and the usage of habitat by the wild animals. Road side counts were also made to assess the use of road verges and adjacent habitats by wild animals. Sampling plots were laid on the transects at every 100 metres to assess the habitat quality. Data on biotic pressure using intensity of lopping and wood cutting, presence of human and livestock trails and density of cattle dung were recorded in the existing transects. For monitoring the use of different underpasses, track plots were laid in ten different underpasses. Traffic volume and peaks were determined based on secondary records and round the clock continuous monitoring for 3 days every month. Observations on road kills and injured individuals of all species were collected daily during early morning and late evening hours. On encountering a road kill, information regarding the state of the road kills; location and habitat features were recorded.

Outputs and outcomes: Preliminary findings reveal that the road influence extends beyond 500m. A total of 32 kills representing species of mammals, birds, reptiles and rodents were recorded in 40 days' observation during July 15, 2008 to August 25, 2008. The highest number of kills were recorded of snakes (18) followed by those of birds (8). While the mortality of snakes was mostly recorded during the night time, the birds were most frequently hit during flight across open areas.

Work is in progress to characterize crossing zones and identify a range of impacts associated with road and measures to reduce these incidents of road kills.

A.Pragatheesh

A.Pragatheesh

Assessment of status of tiger and its prey species in Panna Tiger Reserve, Madhya Pradesh

Funding source: Madhya Pradesh Forest Department
Investigators: Dr. K. Ramesh and Dr. J.A. Johnson
Researchers: Raju Lal Gurjar, Priya J. Gawande, Ravi N. Parmar and Nimain Chandra Polei
Date of initiation: December, 2008
Date of completion: June, 2009

Objectives: The objectives of the project are to: (i) determine occupancy of tiger and its prey species; (ii) estimate abundance of tiger and prey species populations; and (iii) document the level of human disturbance in tiger habitats.

Progress: Reconnaissance survey and intensive field sampling were implemented during the interim period. Final report writing and submission is near completion. The sampling design and data collection protocols were broadly adopted from the Phase – I (Occupancy Survey) and Phase – II (Abundance Estimation) strategies employed by the All India Tiger Population Estimation and Monitoring Project. Habitat occupancy was established by sign surveys in all the Forest Beats, abundance of tiger and prey species was enumerated by camera trapping and line transect methods respectively, and habitat condition was assessed based on circular plot method. PRESENCE 2.3 software was used to estimate tiger occupancy. Intensity of space use at local scale by tiger and its prey species was computed by frequency of occurrence (i.e. number of segments with sign divided by total segments sampled). Camera trap results were catalogued location wise and analyzed descriptively. Prey abundance was estimated by mean encounter rate (i.e. number per km effort) using SPSS 15 and population density using DISTANCE 5.0 program. Disturbance data was analyzed descriptively, and compared with previous study to ascertain spatial and temporal change in the disturbance condition over the two study period.

Outputs and Outcomes: During the reconnaissance survey, pugmarks of tiger were few and sparsely distributed in all the Ranges. The pattern of previous records obtained by the staff, empirical evidence obtained during reconnaissance survey and interactions with knowledgeable staff and local people pointed to appalling population status of tiger in Panna Tiger Reserve (PTR). It appeared that there was no resident individual whose home range was entirely within the limits of reserve boundary; neither there was any indication of females during the short survey period. Intensive sign surveys confirmed tiger presence in 15 out of 54 beats. The naive occupancy estimate (*i.e.* number of beats with sign/total number of beats) for the entire PTR was 0.3 (30% occupancy). Although bias corrected estimate was high (0.8, SE 0.4), lower detection probability with correspondingly high standard error suggested that even if the occupancy was widespread, it was rare and inconsistent. This relates to a pattern where the habitat is occasionally visited by tiger, which in the current context reflects that the population density plummeted, and that the remaining individual was ranging widely. The results obtained from reconnaissance survey and subsequent intensive field sampling clearly demonstrated that the tigers in PTR have lost ground in the early 2009. Only one male tiger was photographed in the intensive camera trap efforts of 1400 trap nights over 40 sampling locations. While still undertaking field work, habitat occupancy of tigers came to zero as no more photographs of tiger were obtained. However, evidence of tiger presence outside the reserve were recorded. It can be inferred that tiger had gone functionally extinct.

Funding source : WWF-International
Investigator : Dr. S.P. Goyal
Researcher : Abishek Harihar
Date of initiation : January, 2009
Date of completion : December, 2009

Objectives: The objectives of the project are to: (i) map probability of prey species within Geographic Information System (GIS) using occupancy models from pellet encounter data based on a hierarchical sampling design; (ii) construct spatially explicit tiger habitat model based on detection-nondetection data using landscape attributes and prey availability as explanatory variables; (iii) estimate the population size of tigers using photographic capture-recapture sampling within the identified tiger use areas; and (iv) model the viability of the sub-populations within the landscape under various management strategies.

Progress: Following a hierarchical sampling design, a total of 20 grids have been surveyed for the presence of tigers, other co-predators and their prey across the Rajaji National Park (RNP). Over 600 plots have been laid across the entire RNP to estimate the rate of occupancy of prey species. Streambed transects totalling an effort of ~165 km of walk RNP have been carried across RNP. Systematic camera trapping spread over 450 trap nights within the Chilla range of RNP and adhoc camera trapping in areas of tiger presence in west RNP have also been carried out.

Outputs & outcomes: With a total effort of 317 plots across the 148 km^2 of the Chilla range of RNP, the naive occupancy rate for chital *Axis axis* and sambar *Cervus unicolor* were estimated to be 0.63 and 0.79 respectively. The interpolated surfaces indicated a higher probability of occurrence of chital within the valley habitats, while, sambar were found more widely distributed. Evidences of domestic livestock (mainly buffalo *Bubalus bubalis* and cattle *Bos taurus*) ranging from the villages were found within the Chilla range. Using a hierarchial model for estimating density from photographic capture-recaptures of tigers, a density of 6.6 tigers per 100 km^2 within eastern RNP was estimated. Additional camera trapping in western RNP resulted in the capture of two female tigers.

Milestone: The results of this study provide an occupancy estimate for both chital and sambar in the Chilla range of RNP and this can be used as a basis for long-term monitoring and comparison across various study sites. The estimates of tiger density indicate an increase from 5.79 tigers per 100km^2 in 2007-08 to the current density of 6.6 tigers per 100 km^2 within eastern RNP.

Monitoring of re-introduced tigers in Sariska Tiger Reserve, Rajasthan

Funding source : Government of Rajasthan and Natinal Tiger Conservation Authority (NTCA), New Delhi

Investigator : Dr. K. Sankar

Researcher : Subhadeep Bhattacharjee

Date of initiation : February, 2009

Date of completion : February, 2011

Objectives: The objectives of the project are to: (i) collect information on the ranging, movement, home ranges of the re-introduced tigers and their dispersal pattern; (ii) collect information on the habitat use by the re-introduced tigers; (iii) gather information on the food habits of the re-introduced tigers; (iv) assess the population of the prey species; (v) prepare a habitat suitability map for tiger and its prey species; (vi) assess the effect of anthropogenic pressure on the distribution of the tigers; (vii) evaluate the response of the tigers and their prey species *w.r.t.* the removal of anthropogenic influence from the relocated villages; and (viii) suggest management recommendations for effective conservation of tigers in the Tiger Reserve.

Progress: Continuous monitoring through ground tracking of the radio-collared tigers (n=3) has been carried out. Minimum convex polygon method has been used to assess the area of usage by the tigers. During the month of June-July 2008, one tiger and one tigress were re-introduced and on February 25, 2009, another radio-collared tigress was airlifted and brought to Sariska Tiger Reserve from Ranthambhore Tiger Reserve. Thereafter the tigress was kept in one hectare enclosure for two days and on February 27, 2009 she was released into wild. A total of 101, 104 and 114 radio locations were recorded respectively for the first, second & third tigers during the period of reporting. The estimated home ranges of these three tigers during February-March 2009 were 78 km^2 (tiger), 39 km^2 (tigress 1) and 223 km^2 (tigress 2). Twenty tiger scats and 24 kills of tiger were collected to study the food habits.

Subhadeep Bhattacharjee

Conservation of the endangered Asiatic Wild Dog *Cuon alpinus* in Western Arunachal Pradesh: linking ecology, ethnics and economics to foster better coexistence

Funding source : Department of Science and Technology, Govt. of India

Investigators : Shri Gopi G.V. and Dr. Bilal Habib

Researchers : K. Muthamizh Selva and Salvado Lyngdoh

Date of initiation : February, 2009

Date of completion : February, 2012

Objectives: The objectives of the project are to: (i) estimate the abundance and population structure of Asiatic Wild Dog (dhole) and its prey species in Protected Areas of Western Arunachal Pradesh; (ii) examine the predation patterns of the dhole packs on the different prey species; (iii) determine range sizes and movement patterns of dhole packs; and (iv) quantify the current people–wild dog conflicts by assessing the live stock depredation by dholes and retaliatory killing by local people.

Progress: Asiatic wild dog or dhole population has been estimated to be less than 2,500 mature individuals in the wild. This has led the IUCN to declare dholes as vulnerable. There have been very few long-term studies in the peninsular India. But there are literally no studies carried out in other parts of the geographic range of this species especially in the Himalayas. This study plans to address this gap by studying the population, foraging, and community ecology of the dholes.

The project was initiated in February 2009 and the reconnaissance survey has been completed and intensive study site has been identified to implement the study.

Long-term monitoring of wildlife and their habitats in Antarctica

Funding sources: National Centre for Antarctic and Ocean Research (NCAOR), Ministry of Earth Sciences, Government of India and Wildlife Institute of India

Investigators: Dr. S. Sathyakumar and Dr. K. Sivakumar

Date of initiation: December, 2008

Date of completion: December, 2012

Objectives: This long-term wildlife monitoring programme is aimed to: (i) determine the status of identified indicator fauna (whales, seals, penguins and other birds) in the Southern Indian Ocean (along the sea journey) and in Larsemann Hills and *Maitri* regions of Antarctica; (ii) to conduct wildlife surveys along the coast of Larsemann Hills to identify areas with high wildlife values and along the Princess Astrid Coast (5-20°E & 69-72°N) to assess changes in the status of penguins and seals; and (iii) to evaluate and map the wildlife habitats, and identify threats to wildlife and their habitats

Progress and outcomes: Antarctica has a unique assemblage of flora and fauna that has been threatened in the recent past due to global warming and also of the increasing human activities. The Wildlife Institute of India had participated in the 14th, 15th and 16th Indian Scientific Expeditions to Antarctica (1994-95 to 1996-97) and had implemented a Monitoring Programme entitled "Developing a Long-term Monitoring Programme for Birds and Mammals in the Indian Ocean and Antarctica". During the 28th Indian Expedition to Antarctica, status and distribution pattern of oceanic birds and marine mammals in the southern Indian Ocean, Larsemann Hills and India Bay near *Maitri* in Antarctica were studied.

In the southern Indian Ocean, a total of 46 bird species were recorded between January and March 2009. The species composition and abundance of birds changed significantly along latitudinal gradient (R^2=0.531). Although, the number of bird species recorded in the different latitudinal zones were more or less similar (R^2=0.003), higher number of oceanic birds were recorded between 60°S and 70°S. In the 1,613 nm long total transects, a total of 5,727 birds were recorded and the density estimated at 21.9 birds/nm^2.

A total of nine species of marine mammals were recorded during the ship transects in the southern Indian ocean during the study period. Except for the Long-finned Pilot Whale that was sighted near Cape Town, South Africa, most of the whale sightings were recorded between 60°S and 70°S. The density of whales in the southern Indian ocean (along the ship route) was estimated at 0.09 whales/nm^2 (%CV=37.14). Of the nine species of whales, Killer whale density was the lowest (0.001/nm^2, CV=84.55) and Long-finned Pilot whale density was the highest (0.8/nm^2, CV=156.07). Density estimates for whales were associated with high CVs due to low number of sightings, clumped distribution of whales, and low sample sizes without replication. Although, the density of Hump-backed whale was low, its number of sightings was high when compared to other whales recorded during the study period.

At Larsemann Hills, six species of birds were recorded. These include: Adelie Penguin, Emperor Penguin, South Polar Skua, Snow Petrel, Wilson's Strom Petrel and Light mantled Sooty albatross were recorded. Of these, South Polar Skua and Strom Petrel were observed breeding in this group of islands. It was also observed that Adelie and

S. Sathyakumar

Emperor Penguins were using some of these islands for moulting especially Fisher and Stornes. Amongst mammals, weddel seal was the most abundant followed by Leopard, Crabeater and Ross seals, and also Killer whales. Of these, Weddel were observed with pups. The mean number of individuals (± SD) recorded per aerial sortie along the coast from Clements Bay to Stornes in Larsemann Hills were as follows: Adelie penguin - 24±21, Emperor penguin - 2±1, Weddel seal - 332±43, Leopard seal - 8±4, and Crabeater seal - 1±2. Observations on Elephant seals atDavis Research Base and on Adelie Penguins in the Rookery at Hop Island were also carried out.

At India Bay and *Maitri*, six species of birds were recorded. These include: Adelie Penguin, Emperor Penguin, South Polar Skua, Snow Petrel, Wilson's Strom Petrel and Southern Giant Petrel. Of these, Skua and Snow Petrel were observed breeding in the Schirmacher Oasis. We estimated the skua population at and around Maitri as six breeding pairs. Amongst mammals, weddel seal was the most abundant followed by Leopard and Crabeater seals along the Pinces Astrid Coast. The mean number of individuals (± SD) recorded during aerial surveys along the Princess Astrid Coast were as follows: Adelie penguin - 13±10, Emperor penguin - 23±19, Weddel seal - 73±59, Leopard seal - 19±14, and Crabeater seal - 19±11.

S. Sathyakumar

Bitapi C. Sinha

academic & training

XI M.Sc. in Wildlife Science

Status of Doctoral Research

XXIX PG Diploma Course

XXX PG Diploma Course

XXIV Certificate Course

Other Training Courses

XI M. Sc. (Wildlife Science), *July 2007 to July 2009*

The XI M. Sc. Course in Wildlife Science commenced in July 2007 for a duration of two years with nine students from different States including one from Nepal.

During the reporting period, the students were taken on High Altitude Techniques Tour to Kedarnath Musk Deer Sanctuary and Nanda Devi Biosphere Reserve (Techniques-II Tour) from April 29, to May 8, 2008 to get an exposure to the high altitude ecosystems and for understanding the ecology and conservation of species such as Snow Leopard, Himalayan Musk Deer, Himalayan Tahr and Pheasants in the Western Himalaya.

As part of third semester curriculum, they undertook the Conservation Practice & Management Tours to Parambikulam Wildlife Sanctuary, Indira Gandhi Wildlife Sanctuary & Gulf of Mannar Marine National Park in southern India and Kanha National Park in Madhya Pradesh from September 19 to October 12, 2008 and were exposed to various issues relating to biodiversity conservation and PA management practices. The theoretical examinations were held from November 17-21, 2008.

The fourth and final semester commenced in November, 2008. It was field based projects and all the students developed their field projects in consultation with their supervisors and completed the field work. The following is the list of dissertation topics:

Asif Hussain (2009): **Interaction between *Equus Kiang* and livestock in Hanley Valley of Changthang Wildlife Sanctuary Leh Ladakh.** Supervisors: Shri Qamar Qureshi and Dr. G.S. Rawat.

Chandan Jani (2009): **Species assemblage and differential basking habitat of freshwater turtles in a gradient of Mahanadi riverine ecosystem, Orissa.** Supervisors: Shri B.C. Choudhury and Dr. K. Sivakumar.

M. Muralidharan (2009): **Nest site selection and effect of Anthropogenic changes to the Rushikuliya Nest Beach, Orissa on Olive Ridley Turtles.** Supervisors: Dr. K. Sivakumar and Shri B.C. Choudhury.

Rekha Warrier (2009): **Resource tracking by three species of hornbills Rajaji National Park, Uttarakhand.** Supervisors: Dr. K. Ramesh and Dr. G.S. Rawat.

Suniti Bhushan Datta (2009): **Nutritional ecology of Asian elephants (*Elephas maximus*) in Chilla Range of Rajaji National Park, Uttarakhand, India.** Supervisors: Dr. S.P. Goyal and Dr. S. Sathyakumar.

Sahas Sharad Barve (2009): **Responses shown by bird communities to Teak (*Tectona grandis*) plantations in Sagar Forest Division, Karnataka.** Supervisors: Shri Dhananjai Mohan and Shri Qamar Qureshi.

Sartaj S. Ghuman (2009): **A study of vigilance behaviour study of Chital (*Axis axis*) in Pench Tiger Reserve, Madhya Pradesh.** Supervisor: Dr. K. Sankar and Co-supervisor: Dr. Y.V. Jhala.

Sumithra Shankaran (2009): **Social behaviour of Hoolock gibbons (*Hoolock hoolock*) in Gibbon Wildlife Sanctuary, Assam.** Supervisors: Dr. G.S. Rawat and Shri R. Suresh Kumar.

Sabita Malla (2009): **Estimating the status and impact of hunting on tiger prey in Bardia National Park, Nepal.** Supervisors: Dr. Y.V. Jhala and Shri Qamar Qureshi.

All faculty members provided teaching inputs at the HQ and also field inputs to the students, besides specialized inputs provided by the external guest faculty from time to time.

Dissertations of other institutions supervised by WII Faculty

Alam, Mahbub (2008): **Interpretation: A tool of Protected Area Management.** North South University, Dhaka, Bangladesh. Supervisor: Smt. Bitapi C. Sinha.

Devlin, L. (2008): **Assessment of ecosystem services of Loktak lake, Manipur.** Doon College of Agriculture Science and Technology, Dehradun. Supervisors: Dr. S.A. Hussain and Dr. R. Badola.

Kale, Riddhika (2009): **Estimation of tiger *(Panthera tigris)* and leopard *(Panthera pardus)* abundance in Mudumalai**

Tiger Reserve, Tamil Nadu. A.V.C. College. Supervisor: Shri Qamar Qureshi.

Neena Priyanka (2008): **Coastal habitat analysis and correlation of post-breeding migration and oceanographic factors of Olive ridley sea turtle.** TERI University, New Delhi. Supervisors: Shri B.C. Choudhury and Dr. K. Sivakumar.

Neha Awasthi (2008): **A study on attitudes of people towards ecosystem services of urban forests (FRI Campus).** Forest Research Institute University, Dehradun. Post Master Diploma in Natural Resource Management. Supervisors: Dr. R. Badola and Dr. B.K. Mishra.

Nishant Sinha (2008): **Enhancement of Spatial Decision Support System (SDSS): Olive Ridley Information System and Analysis (ORISA) using ArcIMS, Java and Spatial database.** TERI University, New Delhi. Supervisors: Shri B.C. Choudhury and Dr. K. Sivakumar.

Preeti S. Virkar (2008): **Documentation of baseline information of floral and faunal diversity in two selected fenced area of Dhanolti Reserve Forest, Mussoori Forest Division, Uttarakhand.** Department of Environmental Sciences, Pune University. Supervisor: Dr. V.P. Uniyal.

Rohini Mann (2008): **Monitoring changes in wildlife habitat in Rajaji National Park after relocation of gujjars.** Forest Research Institute University, Dehradun. Supervisor: Dr. K. Vasudevan.

Salvador, L. (2008): **Vegetation mapping and change detection of land use-land cover in and around Sariska Tiger Reserve, Rajasthan.** Forest Research Institute University, Dehradun. Supervisor: Dr. K. Sankar.

Satheeshbabu (2008): **Habitat and ecology of migratory birds in the Asan Conservation Reserve.** Bharathiyar University. Supervisors: Dr. K. Sivakumar and Dr. B.S. Adhikari.

Shivarta Gupta (2008). **Vegetation characteristic and carbon stored in forests of FRI Campus.** Forest Research Institute University, Post Master Diploma in Natural Resource Management. Supervisors: Dr. S.A. Hussain and Dr. R. Badola.

Snehalatha, V. (2008): **Prey selection and food habits of tiger and leopard in Mudumalai Tiger Reserve, Tamil Nadu.** Department of Ecology and Environmental Education, Pondicherry University, Puducherry. Supervisor: Dr. K. Sankar.

Utpal Smart (2008): **Microhabitat Description, Ethogram and Time Budget of *Vijayachelys silvatica* in Karian Shola National Park, Western Ghats, South India.** Pondicherry University. Supervisors: Dr. N. Parthasarathy and Dr. K. Vasudevan.

Internships/Term Paper

Bagchi, P. (2008): **Movement and ranging patterns of rhesus macaques in New Forest, Dehradun.** Term Paper Submitted to Forest Research University, Dehradun for the partial fulfillment of M.Sc. (Forestry). II Semester. Supervisor: Dr. S. Sathyakumar.

Bisht, S. (2008): **Feeding competition amongst adult female rhesus macaques in New Forest, Dehradun.** Term Paper Submitted to Forest Research University, Dehradun for the partial fulfillment of M.Sc. (Forestry). II Semester. Supervisor: Dr. S. Sathyakumar.

Burton, S.R. and Neel, M. (2008): **A study on trade of endangered mammals in India and creation of a spatial database using GIS.** A report submitted to Wildlife Institute of India. Supervisor: Dr. K. Sankar.

Kalle, R., Fransis, P. and Deepak, R. (2008): **A study on WII campus biodiversity.** Internship Report. WII, Dehra Dun. Supervisor: Dr. G.S. Rawat, Dr. K. Sankar, Dr. S. Sathyakumar, Dr. B.S. Adhikari and Dr. K. Ramesh.

Naha, D. (2008): **Breeding ecology of Red Junglefowl in New Forest, Dehradun.** Term Paper Submitted to Forest Research University, Dehradun for the partial fulfillment of M.Sc. (Forestry). II Semester. Supervisor: Dr. S. Sathyakumar.

Roy, M. (2008): **Interactions among adult and sub-adult male rhesus macaques (*Macaca mulatta*) in New Forest, Forest Research Institute, Dehradun.** Term Paper Submitted to Forest Research University, Dehradun for the partial fulfillment of M.Sc. (Forestry). II Semester. Supervisor: Dr. S. Sathyakumar.

Status of Doctoral Research in WII

Registered

Arindam Tomar (2008): **A study of the *gujjar* population relocated from the Rajaji National Park.** Forest Research Institute University, Dehradun. Supervisor: Dr. Ruchi Badola.

Singh, G. (2008): **Diversity of vascular plants in some parts of Kedarnath Wildlife Sanctuary, Western Himalaya.** Kumaun University, Nainital. Supervisor: Dr. G.S. Rawat.

Prakash Chandra Mardaraj (2009): **Ecology of sloth bear (*Melursus ursinus*) and its interaction with human beings in and around Mount Abu Wildlife Sanctuary, Rajasthan.** Saurashtra University, Rajkot. Supervisor: Dr. N.P.S. Chauhan.

Pratap Singh (2008): **Study of altitudinal and Geographical song variation and inter-specific interaction among *phylloscopus warblers* in the Himalayas.** FRI University, Dehradun. Supervisor: Dr. G.S. Rawat and Co- Supervisor: Dr. Trevor D. Price.

Thesis Submitted

Ambica Paliwal (2008): **Geospatial modelling of ungulate habitat relationships in Tadoba-Andhari Tiger Reserve, Maharashtra.** Saurashtra University, Rajkot. Supervisor: Dr. V.B. Mathur.

A.K. Bhardwaj (2008): **An assessment of ecodevelopment initiatives in Periyar Tiger Reserve.** Forest Research Institute University, Dehradun. Supervisor: Dr. Ruchi Badola.

Foziah Hamid (2009): **A study on waterfowl population and human use of Hokersar and Hygam wetlands of Kashmir valley for conservation planning.** Saurashtra University, Rajkot. Supervisor: Dr. S.A. Hussain.

Neha Midha (2008): **Land use, forest fragmentation, and river dynamics and their conservation implications on Dudhwa landscape**. Saurashtra University, Rajkot. Supervisor: Dr. P.K. Mathur.

Awarded

Areendran, G. (2008): **A study on vegetation ecology in Pench Tiger Reserve, Madhya Pradesh with reference to gaur (*Bos gaurus*) using remote sensing and GIS technologies.** Saurashtra University, Rajkot. Supervisor: Dr. K. Sankar.

Asghar Nawab (2008): **Ecology of otters in Corbett Tiger Reserve.** Forest Research Institute University, Dehra Dun. Supervisor: Dr. S.A. Hussain.

Dhananjai Mohan (2009): **Habitat selection of birds of New Forest, Dehradun, India.** Forest Research Institute University, Dehra Dun. Supervisor: Dr. A.J.T Johnsingh

Devendra Singh (2009): **Status and ecology of leopard (*Panthera pardus*) in relation to prey abundance, land use patterns and conflicts with human in Garhwal Himalayas.** Forest Research Institute University, Dehra Dun. Supervisor: Dr. S.P. Goyal

Jatinder Kaur (2008): **Impact of landuse changes on the habitat, behaviour and breeding ecology of the Indian sarus crane in the semi arid tracks of Rajasthan, India.** Forest Research Institute University, Dehradun. Supervisor: Shri B.C. Choudhury.

Panna Lal (2008): **Development of spatial database in geographical information system domain for Bandhavgarh Tiger Reserve and assessment of landuse/landcover changes**. Forest Research Institute University, Dehradun. Supervisors: Dr. V.B. Mathur, Co-supervisor: Shri Qamar Qureshi.

Rajinder Singh (2008): **Hair characterization of Schedule-I felids of Indian Wildlife (Protection) Act (1972) using morphometric, protein and DNA techniques: Implications in wildlife forensics.** Supervisors: Dr. Mukesh Kumar, Department of Forensic Science, Punjabi University, Patiala and Dr. S.P. Goyal.

Rathore, B.C. (2008): **Ecology of brown bear (*Ursus arctos*) with special reference to assessment of human-brown bear conflicts in Kugti Wildlife Sanctuary, Himachal Pradesh and mitigation strategies.** Saurashtra University, Rajkot. Supervisor: Dr. N.P.S. Chauhan.

Reeta Sharma (2008): **Molecular genetic analysis of Bengal tiger (*Panthera tigris tigris*) population and its implication in conservation and wildlife forensics" Unit of Evolutionary Biology/ Systematic Zoology.** Institute of Biochemistry and Biology, University of Potsdam, Germany. Supervisors: Prof. Ralph Tiedemann and Dr. S.P. Goyal.

D.Sc. Awarded

Rawat, G.S. (2008): **Alpine vegetation of Western Himalaya - Species diversity, community structure, dynamics, and aspects of conservation.** D.Sc. Degree in Botany awarded by Kumaon University, Nainital.

XXIX Post-Graduate Diploma Course in Wildlife Management *September 2007 to May 2008*

The Management Term Paper Exercise field tour was undertaken to Kaziranga National Park in April 2008. The officer trainees also participated in Management Planning Exercise at Periyar Tiger Reserve, Kerala from April 12 to May 8, 2008. This was followed by Management Plan writing. For the first time, the officer trainees prepared the Tiger Conservation Plan for Periyar Tiger Reserve as per the guidelines issued by the National Tiger Conservation Authority.

Bitapi C. Sinha

The Institute offered a two-month modular training programme in Management Planning for lateral entrants during April 1-May 30, 2008, which was dovetailed in the XXIX P.G. Diploma Course in Wildlife Management. The training programme aimed to provide basic knowledge and skills for preparation of integrated wildlife management plans for Protected Areas with special focus on understanding the relationships of different stakeholders and other process required for development of an implementable wildlife management plan. A total of five lateral entrants from three States (two each from Andhra Pradesh and Rajasthan and one from Madhya Pradesh) participated in this training programme. The entire training cost of lateral entrants was borne by this Institute.

The Viva-Voce examination was held on May 27, 2008. The valedictory function was organized on May 30, 2008. Dr. Devendra Pandey, IFS, Director General, Forest Survey of India, Dehradun, was the Chief Guest on the occasion. He presented the Diplomas and various awards to the officer trainees. All fifteen officer trainees were awarded 'Diploma in Wildlife Management' on successful completion of the course, of which, eight were awarded the Honours Diploma.

The Institute's Gold Medal for Top Trainee	Ms. M. Geethanjali
Wildlife Preservation Society Silver Medal for Second in Merit	Mr. Satender K. Sagar
Silver Medal for Best All Round Wildlifer	Ms. M. Geethanjali
N.R. Nair Memorial Silver Medal for Best Management Plan	Ms. Niranjita Mitra
Best Management Term Paper	Ms. M. Geethanjali
Top Trainee in Wildlife Biology	Mr. Satender K. Sagar
Best Foreign Trainee	Mr. Sonam Zangpo

XXX Post Graduate Diploma Course in Wildlife Management *September 2008 to May 2009*

The course commenced from September 1, 2008 with seven officer trainees of the rank of Deputy Conservator of Forests/Assistant Conservator of Forests and equivalent levels from different States within country. Among them, three are Indian trainees (one each from Andhra Pradesh, Haryana and Orissa). In addition, there are four foreign nationals from South Asian countries (two from Bhutan and one each from Nepal & Sri Lanka) under different sponsorships. One foreign national (Bhutan) has been sponsored by the Global Tiger Forum, New Delhi while remaining three (Bhutan, Nepal and Sri Lanka) were sponsored under SAARC Wildlife Management Fellowship Scheme respectively for the aforesaid training course.

The following modular based short-term training courses were also offered for the lateral entrants: (i) `Restraint and Immobilization of Wild Animals', November 3-7, 2008; (ii) Visitor Use Management & Interpretive Planning, November 17-22, 2008; (iii) `Ecodevelopment for Biodiversity Conservation', January 17-23, 2009; (iv) `Management on Wetlands and Coastal Habitat', January 27-31, 2009; and (v) `Environment Impact Assessment & Social Impact Assessment', March, 2-9, 2009.

As a part of the course, the following field visits were undertaken by the officer trainees: One-day field visit to Rajaji National Park (Chilla) in Uttarakhand on September 20, 2008 to study issues related to Chilla-Motichur corridor, study of animal behavior, familiarization with wildlife evidences and study of habitat & ecosystem succession.

Orientation tour was organized at Rajaji National Park (Chilla) from September 26-30, 2008. High Altitude Techniques tour was organized at Kedarnath Wildlife Sanctuary and Nanda Devi Biosphere Reserve in Uttarakhand from November 8-12, 2008. The objective of this 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. As part of the module on `Interpretive Planning & Visitor Use Management', the officer trainees and lateral entrants undertook an exercise at Asan Conservation Reserve on November 22, 2008.

The officer trainees were taken to Sariska Tiger Reserve in Rajasthan for Techniques Tour from November 23 to December 6, 2008. The techniques to estimate plant and animal abundance were demonstrated and practiced. The officer trainees as well as lateral entrants undertook a study tour to Corbett Tiger Reserve, Kalagarh (fringe villages) from January 15-17, 2009. The objective of this study tour was to expose the participants to various participatory tools and techniques of social information gathering for ecodevelopment planning besides issues of interface conflict and PA management practices. They also visited Rajaji National Park, Dholkhand on January 24, 2009 to familiarize with wildlife evidences, habitats, animal behavior, familiarization to the vegetation of Shivaliks and bird watching. Management Tour was completed in Several PAs/Wildlife Sanctuaries and Zoological Parks in Gujarat and Madhya Pradesh as well as in Malaysia and Singapore from February 2-19, and February 19-28, 2009 respectively. The objective of the tour was to study the range of wildlife management issues and the strategies being practiced by the Park Managers and to assess their relative strengths and weaknesses. During this tour, the officer trainees learnt about the values of the different areas, the management issues–the problems and present management practices & strategies to overcome them.

As part of the module `Environmental & Social Impact Assessment', the participants visited mine area at Maldevta on March 4, 2009. The objective of the visit was to understand the process of impact assessment studies. Visit to Vulture Conservation Breeding Centre, Pinjore in Haryana was organized on March 14, 2009 to study issues related to various aspects of Vulture Conservation Breeding Programme. Management Term Paper Exercise was undertaken in Dudhwa Tiger Reserve, Uttar Pradesh from March 15-21, 2009. The trainees were assigned specific topics before hand on various aspects of the resources and protected area management.

XXIV Certificate Course in Wildlife Management

November 2008 to January 2009

The course commenced on November 1, 2008 for the duration of three-months. In all, thirteen officer trainees of the rank of Range Forest Officers & equivalent joined the course. Among them, one each represented Assam, Arunachal Pradesh, Andaman & Nicobar Islands, Himachal Pradesh, Madhya Pradesh & Maharashtra and two from Sikkim. In addition, there were five foreign nationals from neighbouring Asian countries, of which, three foreign nationals (one each from Nepal, Bhutan and Indonesia) were sponsored by the Global Tiger Forum, New Delhi and two nationals from Pakistan were sponsored by WWF-Pakistan.

The officer trainees undertook the Orientation-cum-Techniques Tour at Rajaji National Park, Chilla (Uttarakhand) from November 26 to December 5, 2008. The Management Tour was conducted from January 2-21, 2009 in National Zoological Park (Delhi); Keoladeo National Park (Rajasthan); Chambal Wildlife Sanctuary, Panna National Park, Kanha Tiger Reserve, Pench Tiger Reserve in Madhya Pradesh and Tadoba Andhari Tiger Reserve in Maharashtra. This tour exposed the officer trainees to a variety of management practices across several Protected Areas/Wildlife Sanctuaries, Zoo and *ex-situ* conservation areas in the central and southern parts of the country.

The Viva-Voce examination was held on January 28, 2009. The Valedictory Function was organized on January 30, 2009. Shri S.C. Dey, Secretary General, Global Tiger Forum, New Delhi, was the Chief Guest on the occasion. He presented the Certificates and various awards to the officer trainees. All thirteen officer trainees were awarded 'Certificate in Wildlife Management' on successful completion of the course. Ten out of thirteen officer trainees obtained the "Honours Certificate" in this course.

The Wildlife Conservation Gold Medal for the Top Trainee	Mr. Alkab Hasan Mrs. Anita Bhardwaj
The Best Foreign Trainee	Ms. Uzma Noureen
Best All Round Wildlifer	Mr. Alok Kumar
Institute's Prize for Wildlife Management	Mr. Alkab Hasan

Two-week attachment training programme for the probationers of 58th batch of Indian Revenue Service (Customs & Central Excise) Group "A", Dehradun, *March 30-April 11, 2008.* On request from National Academy of Customs, Excise & Narcotics, Faridabad, a training programme for 58th batch of Indian Revenue Serice Group 'A' officers was organized by the Institute. The main objective of this course was to sensitize the Indian Revenue Service Probationers about the unique biodiversity of this country and the problems of illegal trade in wildlife and wildlife products. The course was attended by 53 probationers. The participants were exposed to different initiatives of biodiversity conservation in the country and the problems of illegal trade in wildlife. They were provided inputs about various legal instruments available to deal with the problem and appreciate the role of different enforcement agencies in controlling the problem of illegal wildlife trade. The officers were taken to Dudhwa National Park to provide them with first-hand information about the strategies being adopted to deal with the protection issues relating to wildlife at international borders.

Two-day training workshop on "Strengthening wildlife enforcement: Issues related to illegal wildlife trade and wildlife crime investigation", Dehradun, *May 13-14, 2008.* The training workshop was jointly organized by TRAFFIC-India in collaboration with Wildlife Institute of India. Eleven trainee officers from the Department of National Parks and Wildlife Conservation and Department of Forests, Govt. of Nepal participated in the workshop. The aim of the workshop was to provide training to officers about Wildlife Forensics and tools and techniques needed for strengthening conservation. Trans-border cooperation in curbing illegal wildlife trade was also discussed.

Training programme on wetland conservation and management for northern region, Srinagar, *June 16-20, 2008*. The training programme was sponsored by the Ministry of Environment and Forests, Government of India and was organised by the Wildlife Institute of India, Dehradun in association with the Department of Wildlife Protection, Government of Jammu & Kashmir. The major objectives of the training programme were to: (i) provide basic understanding to the participants about the wetland ecosystem process including problems and threats; and (ii) develop skills for conservation planning and management of wetlands. A total of 22 participants from the North Indian States *i.e.* Uttarakhand, Punjab, Himachal Pradesh, Haryana, Chandigarh and Jammu & Kashmir attended the programme. The programme was inaugurated by Ms. Meena Gupta, IAS, Secretary, Ministry of Environment and Forests, Government of India. During the training programme a panel discussion followed by an open house discussion was also held. The session was chaired by Shri B.S. Parsheera, IAS, Additional Secretary, Ministry of Environment & Forests, Government of India. Based on the discussions some major recommendations were proposed.

S. Wilson

Teacher's training course in environment education, Dehradun, *August 7-12, 2008*. This training course was conducted at the Institute in collaboration with the Friends of Doon Society, Dehradun. The objectives of the course were to: (i) help teachers understand the linkages between environmental and sustainable development; (ii) equip teachers to use a problem-solving, activity oriented,

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participatory approach suitable for their students; (iii) help teachers to acquire those values of responsible citizenship and care for the environment which will motivate them to take appropriate action where necessary to protect the environment; and (iv) help teachers to realize the necessity for continued updating of their knowledge and skills. A total of seven participants attended the course.

Teachers teaching environment education to classes' VII to XII participated in the program. The participants were given inputs on ecosystem & its functions; little creatures; waste accumulation and management; natural resources and their utilization; impact of human activities on environment; and healthy ecosystem.

Training course on mainstreaming biodiversity in impact assessment, Dehradun, *August 18–22, 2008.* The course was organized for the officers of the different institutes of Indian Council of Forestry Research & Education. The objectives of the course were to: (i) provide a theoretical rationale for mainstreaming biodiversity in impact assessment and improved decision-making; (ii) provide guidance on developing an IA framework for integrating biodiversity; (iii) stimulate the importance of integrating socio-economic issues and economic valuation principles in EA framework for biodiversity; (iv) evaluate experience by examining lessons from case studies; and (v) facilitate sharing and peer-based learning among IA professionals. The course inputs were largely provided by the two WII faculty members Dr. Asha Rajvanshi and Dr. V.B Mathur with some inputs from other faculty members and external resource persons. There were 24 participants in the course.

School in Herpetology, *September 1-14, 2008*. The course was conducted at the Wildlife Institute of India with the support of Science Engineering and Research Council, Department of Science and Technology, Government of India. The objectives of the course were to: (i) provide exposure to students, researchers and teachers is herpetology; (ii) train students, researchers and teachers in India and neighboring countries research methodology; and (iii) provide exposure to students, researchers and teachers to world experts in the subject area of herpetology.

This course targeted doctoral students and young faculty in Universities in India and neighbouring SAARC countries. The course was designed to assist the students pursue careers in Herpetology. In all 26 participants, comprising of 20 students from India, three from Sri Lanka, one from Bhutan, one from Nepal and one from Bangladesh were selected for the course. The Inaugural lecture was made by Mr. Romulus Whitaker, Founder of the Madras Crocodile Bank Trust, Chennai. The course was organised in five modules: (i) Systematics and Biogeography, (ii) Ecology and Behaviour, (iii) Reproductive and Developmental Biology, (iv) Conservation and Management, and (v) Scientific writing. The team of core faculty members comprised reputed scientists and academicians. The students were also trained in laboratory techniques such as preservation, curation, morphometry, behavioural observation of amphibian larvae and regeneration experiments. A field trip was organized to Kaudiyala, Rishikesh in a riverside camp. The participants were exposed to field techniques in herpetology and photo-documentation.

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One-week compulsory course on 'Wildlife Management: Issues, Concerns and Practices', Dehradun, *October 13-17, 2008*. The objectives of the course were to: (i) sensitize the participants about major current issues of Wildlife Conservation in India; (ii) apprise some of the current approaches needed and being adopted for effective Wildlife Management; and (iii) share latest experiences of WII in Wildlife Monitoring and PA Management/ Planning and provide a platform for exchange of experiences from different States. It was organised by Wildlife Institute of India and sponsored by Ministry of Environment and Forests, GoI. A total of nineteen officers participated in the course. The conceptual inputs in different sessions were provided by in-house faculty and a group of experienced outside resource persons. For exposing the participants to the field implementation of latest wildlife monitoring initiative, one-day field visit to the nearby Rajaji National Park was

organized.

Training workshop on endangered species and zoo management with special emphasis on 'Animal keeping in zoos', Dehradun, *October 13–22, 2008*. The major objective of the workshop was to expose participants to the current trends in scientific and ethical upkeep of wild animals in captivity. It was sponsored by Central Zoo Authority. In all, 29 middle level officers of Indian zoos participated in the training workshop. The course included both theory and practical demonstration of various management practices for efficient zoo management. Experts from different disciplines provided inputs on upkeep and management of wild animals in captivity. Field visits were organized to National Zoological Park, New Delhi and Bear Rescue Center, Agra.

Practical training in India for special Diploma Trainees of the Department of Wildlife Conservation (DWC), Sri Lanka, Dehradun, *November 2–16, 2008.* On the request of the Director General of Wildlife Conservation, Sri Lanka two-week practical training course was organized. Officer trainees were exposed to WII Administration and various Protected Areas Management Systems in India. The participants were taken to Rajaji National Park, Corbett Tiger Reserve and Kanha Tiger Reserve for field exposure. In all, there were 17 participants. A field visit to Asan Conservation Reserve was also conducted on November 5, 2008.

Training programme on 'Wildlife conservation: Issues and concerns' for representatives of Indian Army in the State Boards for Wildlife, Kanha Tiger Reserve, Madhya Pradesh, *December 4-6, 2008*. Twelve officers of Brigadier rank and three of Colonel Rank representing fifteen States mainly from the north, east and north-east India, along with Director, Policy (Ecology) from the army headquarters attended the course. The course methodology was designed to include lectures by eminent resource persons, panel discussions and field visits to expose the participants to the various aspects of wildlife

conservation in India.

Two-week special short term course in "Wildlife protection, law and forensic science", Dehradun, *March 16-27, 2009*. CITES, an international agreement between governments aim to ensure that international trade in wild plants and animals do not threaten their survival and it accords varying degrees of protection to more than 33,000 species of flora and fauna by listing them. WII has been regularly imparting training to the probationers of the Indian Revenue Service (Customs & Central Excise) on the international agreements and the legal implications of trade in wild plants and animals. The training module aimed at sensitizing the young officers towards wildlife trade in the country and their role in controlling it. The course was attended by 52 officers of 59th batch. Inputs were given on

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importance of plant taxonomy; trade in medicinal plants; and the role of wildlife forensic in dealing with wildlife cases. The officers were also taken to protected areas including Rajaji National Park and Dudhwa Tiger Reserve, where they had interaction with forest officers and frontline staff.

Field course on plant taxonomy, *March 15-19, 2009*. The workshop was organized by WII and sponsored by Ministry of Environment and Forests, New Delhi. The main aim of the workshop was to orient the participants in the field of botany. Altogether 27 participants from 14 different organizations participated in the workshop. Two major treks were organized for the orientation-cum-botanical excursion. In the process, several rare, threatened and little known species such as *Turpinia nepalensis, Riccia fluitans, Symplocos ferruginea, Saurauia nepalensis* and *Magnolia kisopa* were located and recorded in the survey area.

B.S. Adhikari

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capacity building

Workshops, Seminars & Conferences

Organized

Participated

Course on ecological and economic evaluation approaches for mainstreaming biodiversity in EIA, Perth, Australia, *June 4-5, 2008*. This course was organized in response to the request from the International Association for Impact Assessment (IAIA) for conducting pre-meeting training courses in conjunction with its Annual Meeting during May 4-10, 2008. The two-day course was targeted for EIA professionals, conservation community, business groups, planners, corporate environmental managers, decision-makers and other professionals committed to more responsible project planning through better integration of biodiversity in business or planning decisions. The objectives were to: (i) provide a theoretical rationale for recognizing the importance of biodiversity in impact assessment; (ii) promote understanding of how humans value the functions and services that flow from biodiversity conservation and how decline in benefits from these services is reflected in economic terms? (iii) stimulate the importance of integrating economic valuation principles in EA framework for mainstreaming biodiversity in impact assessment; (iv) build capacity of participants to use economic techniques for valuing biodiversity and incorporating those values into the decision-making process; and (v) introduce regulatory and market-based mechanisms for integrating biodiversity into mitigation planning for biodiversity. Course inputs were provided by WII faculty members, Dr. Asha Rajvanshi and Dr. V.B Mathur. There were fourteen participants from eleven countries in the course.

Collaborative workshops on "Leadership and organization development for performance and results" & "Proposal writing and project management", Dehradun, *July 7-15, 2008*. 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, academicians 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 workshop on 'Leadership and organizational development for performance and results' focused on stakeholders analysis, role of social capital and team development and facilitation. Workshop on 'Project planning and proposal writing' focussed at equipping participants with a basic knowledge of project planning and proposal writing in order to prepare them for work on their team projects. Professor Radha Kumar, member of the UNITAR Board of Trustees & Director, Nelson Mandela Centre for Peace and Conflict Resolution, Jamia Millia Islamia University, Delhi attended the closing session and gave a talk on the reality of conflicts and their reasons. Forty senior civil servants from various ministries and departments of the Government of Afghanistan attended the workshops. A 'Friendship Dinner' was hosted by the UNITAR and the WII, which was attended by representatives of numerous research institutions in Dehradun. It provided an opportunity for the Afghan participants to establish contacts with their Indian colleagues.

IV-Internal Annual Research Seminar (IARS), *September 16-17, 2008*; **and XXII Annual Research Seminar (ARS) of WII,** Dehradun, *September 18-19, 2008*. The IARS was chaired by Shri V.B. Sawarkar, Chairman, Training Research & Academic Council (TRAC). During the IARS, 25 presentations were made in seven sessions. These included studies on large carnivores, vegetation and habitat, herpetofaunal studies, human and development aspects, avifaunal studies, molecular genetics and forensics, and studies on insects. The presentations were based on recently initiated and ongoing research studies and were made by M.Sc. students, research fellows and faculty members of the Institute. The presentations were evaluated by a panel of judges. The following were adjudged as the five best presentations made and the concerned were awarded book prizes, each worth Rs. 1500/-.

Book Awards for Best Presentations
IV Annual Internal Research Seminar

I	Sabuj Bhattacharya	Distribution, relative abundance and micro-habitat use of Royle's pika along sub-alpine - alpine ecotone in Kedarnath Wildlife Sanctuary, Western Himalaya
.II	Ashwini Upadhyay	Status, distribution and habitat use by wild ungulates in Changchenmo Valley, Eastern Ladakh.
III	Tapajit Bhattacharya	Distribution and relative abundance of carnivores, ungulates and galliformes in the western part of Khangchendzonga Biosphere Reserve, Sikkim: Preliminary observations.
IV	Vinay K. Bhargav	Effect of mixed forest stands on the biodiversity of borers (Coleoptera: Cerambycidae).
V	Krishnendu Mondal	Estimation of population and food habits of leopards in Sariska Tiger Reserve, Rajasthan.

Shri V.B. Sawarkar chaired the Annual Research Seminar. In total 26, presentations were made in seven sessions. These included studies on large carnivores, human aspects of wildlife conservation, vegetation and wildlife habitats, avifaunal studies, molecular genetics and forensic studies, studies on coastal and marine biodiversity, and studies on invertebrates.

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About 250 delegates and participants attended the ARS that included the Principal Chief Conservators of Forests (PCCFs), Chief Wildlife Wardens and other senior officials representing State Forest Departments, representatives of NGOs, scientists, conservationists, wildlife experts, faculty members, researchers, M.Sc. students and the Post Graduate Diploma course officer trainees of WII. A panel including eminent scientists, academicians, wildlife managers and conservationists judged the relevance and quality of research by the presentations made. The best five presentations made were given book awards, each worth Rs.1500/-.

Book Awards for Best Presentations
XXII Annual Research Seminar

I	Abishek Harihar	Responses of tiger *(Panthera tigris)*, co-predators and their prey to removal of anthropogenic influences in Rajaji National Park, Uttarakhand.
II	Ambica Paliwal	A GIS based approach for assessing habitat suitability for select ungulate species in Tadoba-Andhari Tiger Reserve.
III	Sruthi Kumar	Nesting Ecology of three sympatric species of marine turtles in the Lakshadweep Islands of India and distribution patterns in the offshore lagoon and reef habitats.
IV	Sangeeta Angom	Molecular phylogenetics of Sangai *Cervus eldi eldi* and Hog deer *Axis porcinus* based on mitochondrial control region DNA sequence: Preliminary findings.

V Upmanyu Hore	Diversity of spiders in Terai Conservation Area: Higher taxa surrogates and their efficiency in conservation.

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In the concluding session, the significant enhancement in quality of the presentations in terms of visuals, graphics, scientific content and incisive analysis was appreciated. It was acknowledged that while some completed projects may have very useful management implications, others that have contributed to scientific knowledge and conservation wisdom were no less valuable.

Course on ecological and economic evaluation approaches for mainstreaming biodiversity in environmental impact assessment', Al-Khobar, Saudi Arabia, *November 24-26, 2008*. This course was conducted in response to the request from Chairman, Environmental Technology and Management Association (ETMA), sponsored by Saudi Aramco, Govt. of Saudi Arabia The objectives of the course aimed to provide the participants: (i)

a clear understanding of the inter dependencies between economic development and biodiversity conservation; (ii) a theoretical rationale for promoting ecosystem approach in impact assessment of development projects; (iii) understanding importance of integrating economic valuation approaches in impact assessment framework for mainstreaming biodiversity; (iv) a sound understanding of best practice principles and approaches for mitigating impacts on biodiversity; and (v) applications of the learning from global best practice models to promote sustainable development. The course inputs were provided by WII faculty members, Dr. Asha Rajvanshi and Dr. V.B Mathur. There were seventeen participants in the course.

Outreach programme for IMA cadets, Dehradun, *November 28-29, 2008*. This programme was conducted by the Institute at Indian Military Academy, Dehradun. The theme of the programme was to provide knowledge to the cadets on first-hand experience of conservation issues under varied ecological, socio-economic, political and administrative situations in the country and to evince interest in biodiversity conservation issues including wildlife photography. Three external resource persons were invited to provide their inputs during the training programme apart from three faculty members of the Institute. More than 1200 cadets participated in this programme.

Training workshop for village communities, panchayat members and field staff on management planning of community reserves in Punjab, Hoshiarpur, *February 3-4, 2009*. The objectives of the workshop were to: (i) sensitize the participants about the importance of biodiversity of Punjab and role of Community Reserves in the State; (ii) apprise the participants about their role in planning and management of Community Reserves in the State; (iii) provide basic skills and attitudes among the participants for management of two community reserves in the State; and (iv) generate understanding about the planning process of these reserves.

The training programme was organised by the Institute in association with Punjab Forest and Wildlife Department for spearhead teams of Keshopur Chhamb and Lalwan Community Reserves. In all 45 participants attended the workshop. Each spearhead teams comprised of local staff of the area and the representatives of the village communities. In total, 45 participants joined this training programme. A field visit was made to Keshopur to have an interaction with the communities of the Reserve. This training programme has helped in formulating management plan for the Community Reserve.

Short course on capacity building in biodiversity conservation, Dehradun, *February 16-19, 2009*. The

Institute conducted the course for the village sarpanch and field staff of Askot Landscape in Pithoragarh Forest Division. Thirty participants attended the training programme. The major focus of the programme was to sensitize the village level people and the field staff, and to enhance their knowledge and skills to understand and apply participatory biodiversity conservation initiatives. The training programme had class room lectures, exercises, case studies and a field visit to Rajaji National Park. The status of biodiversity with special emphasis on Askot Landscape, various threats to biodiversity, the key principles of participatory biodiversity processes *viz.* ecodevelopment including the issues of levels of participation, situational analysis, livelihood improvement and micro-planning were covered in the training programme.

Training workshop on 'Management and conservation of world heritage Sites - Conservation for peace', Hiroshima, Japan, *March 30–April 4, 2008.* The United Nations Institute for Training and Research (UNITAR) organized this training workshop. The workshop was designed with the following specific objectives: (i) review the basics of the World Heritage regime and its implications for peace, incorporating available information, updates and current trends; (ii) elucidate the underlying principles of "values-based heritage management", with a particular focus on peace building and reconciliation; (iii) consider the role of heritage in war-torn, post-conflict or post-disaster situations; (iv) examine leading policies and strategies, identifying best practices and lessons learned; (v) create management plans for sites, using nomination dossier or periodical-reporting formats; and (vi) enhance peer learning and exchange among the participants. The workshop was attended by over 60 participants, resource persons and staff, representing 32 countries from Asia, Europe and North America. Dr. V.B. Mathur was invited as a resource person in this training workshop. He also participated in the Roundtable organized by UNITAR on "Conservation for Peace-Can World Heritage Sites contribute towards peace?" Dr. S. Sathyakumar also participated in this workshop and presented a paper "Nanda Devi World Heritage Site: Biodiversity conservation for over two decades and challenges for the future".

A two-day workshop on wildlife health management with focus on 'Tiger health & breeding', Bhopal, *May 3-4, 2008*. The workshop was organized at Van Vihar National Park" by the Madhya Pradesh Forest Department. The workshop was organized to address health issues of Tigers and was planned for exploring future strategies through breeding and furtherance towards re-introduction and other possible ways to conserve the species. Dr. P.K. Malik and Dr. Parag Nigam provided technical inputs in the workshop. The major areas of deliberations included necessity for species specific veterinary protocols, need for capacity building and enhancement of skill of frontline staff, veterinarian and managers, information management and dissemination, up-gradation of facilities & infrastructure and personnel management.

Conference theme –"The art and science of impact assessment" of the International Association of the Impact Assessment (IAIA), Perth, Australia, *May 4–10, 2008.* The conference provided EIA professionals with an opportunity to explore the compatibility of economic growth with conservation and sustainability and address the perspectives of global responsibility towards promoting good governance and corporate stewardship through best practices in impact assessment. Dr. Asha Rajvanshi and Dr. V.B. Mathur attended the 28th Annual Conference of the IAIA. Dr. Rajvanshi presented the paper "Integration of biodiversity in EIA: Impediments, opportunities and surprises" and Dr. V.B. Mathur presented the paper "Mainstreaming biodiversity in development planning". During the conference, WII Faculty also chaired the technical sessions at the conference. Dr. Asha chaired the session 'Retooling EIA for optimizing biodiversity conservation in development decisions'. Dr. V.B. Mathur chaired the session 'Mainstreaming biodiversity in environmental assessment: What have we learned?'

Training workshop to build capacity, Ho Chi Minh City, Vietnam, *May 7-14, 2008*. Dr. S.A. Hussain provided technical and intellectual inputs as a key trainer in the training workshop to build capacity of students from Vietnam, Cambodia and Myanmar to conserve the otters of the Lower Mekong. The objectives of the workshop were to improve otter research and conservation skills for students and young conservationists from Vietnam, Cambodia and Thailand; to increase knowledge and conservation of wild populations of otters in these countries through the implementation of a short-term supervised practical experience in all three countries on aspects of otter

conservation; and to establish a communication and collaborative network for otter conservation between universities and key protected areas, and network between the trainees and trainers from across the world.

Training was conducted by IUCN otter specialists from Sri Lanka, Thailand, India and the Netherlands and Carnivore and Pangolin Conservation Program staff.

2008 NAI international conference, Sokcho city, Korea, *May 11-15, 2008.* Bitapi C. Sinha participated in this International Conference. The Conference had nearly one hundred concurrent sessions. A day's field trip was also organized to the Seoraksan National Park. She presented a paper titled "Evaluating effectiveness of interpretive facilities in Tiger Reserves in India". Bitapi received the NAI scholarship for the third time in a row. Bitapi was also invited by the Suncheon University, Korea to be a guest speaker in the one-day Symposium on "Regional Culture and Utopian Society". She presented a paper titled "Empowering youths, living around protected areas, how to provide meaningful interpretation for enhanced visitor experience".

Brainstorming workshop to finalize the syllabus for Masters and Doctoral Programmes, Dehradun, *May 13, 2008.* Taking cognizance of increasing environmental problems in the country, the Doon University has established the school of Natural Resources to impart quality education in the field of environment and natural resource management and to conduct research in the related area. The workshop was organized by School of Environment and Natural Resources Management, Doon University. The workshop aimed at bringing about the convergence of experts with professional expertise in diverse areas of environment and natural resource management, to deliberate upon and to finalize the syllabus which is relevant to present day context of many environmental problems and also to this Himalayan State with unique ecosystem. Dr. Asha Rajvanshi was invited as one of the experts to provide her inputs in the development of the course curriculums of the School.

National workshop on research projects review and planning of Indian scientific expedition to Arctic and Antarctica, Goa, *May 21-22, 2008*. Dr. S. Sathyakumar participated in the national workshop which was organized by the National Centre for Antarctic and Ocean Research, Goa. He presented the WII's proposal "Long-term Monitoring of Wildlife and their Habitats in the Indian Ocean and Antarctica".

National conference on 'Climate change and impact on health', New Delhi, *May 22-23, 2008.* Dr. Pranab Pal participated in the conference, which was held at India International Centre, New Delhi. This conference was jointly organized by International Development Centre Foundation; Centre for Occupational and Environmental Health; Ministry of Earth Sciences; Department of Science and Technology; Council of Scientific and Industrial Research; and Central Pollution Control Board. The theme of the conference was "Global climatic changes due to the large scale environmental degradation". More than fifty participants shared their views and discussed various issues related to the theme. Dr. Pal presented a paper on "Establishing extension set-up for biodiversity conservation & ecosystem management in Kaziranga National Park, Assam".

NNRMS-MoEF-WII project meeting, NRSA, Hyderabad, *June 6, 2008.* The meeting aimed to explore possibility of using satellite data for generating baseline information on Survey of India's (SoI) toposheet attributes/features on 1:25,000 scale in absence of digitized toposheets by the SoI. The meeting was organized by the Project Coordinator in consultation with Dr. P.S. Roy, NRSA. Dr. P.K. Mathur attended the meeting as site coordinator of Dudhwa Tiger Reserve site and participated in discussion on the possibility of high resolution satellite

data so as to provide an alternate strategy to provide required information for digitized SoI toposheets on 1:25,000 scale.

Training workshop on biodiversity and climate change, Kushiro, Japan, *June 29 to July 4, 2008.* Dr. K. Sivakumar attended the training workshop, which was organized by the United Nations Training and Research at Kushiro, Japan.

Meeting of the State Board for Wildlife, Government of West Bengal, Kolkata, *June 30, 2008.* Dr. Sushant Chowdhury attended the VI meeting of the State Board for Wildlife, Government of West Bengal. The meeting was chaired by Shri Buddhadeb Bhattacharjee, Hon'ble Chief Minister and Chair of the Board. Besides confirmation of minutes of previous meeting and action taken on the recommendations there were four new agenda for discussion.

32nd Session of the UNESCO World Heritage Committee, Quebec City, Canada, *July 3-10, 2008.* Dr. V.B. Mathur participated as the member of the Indian delegation and provided inputs in matters relating to

natural world heritage sites in India.

Two-day training workshops on 'Role and potential of *Van Panchayats*/JFMCs for sustainable livelihood', Dehradun, *July 4-5, 2008.* The objectives of the workshop were to: (i) sensitize the important stakeholders on: (a) challenges and opportunities for forests based livelihood needs; (b) the accountability and responsibility for enforcing the Forest Conservation Act and other legal and non-legal bindings; (c) potential of national, rural employment guarantee programme for creation of productive employment; (d) role of NTFPs and micro-enterprises; (e) identification of constraints; and (f) mechanism for integration of various development programme and their implementation. It was organised by Amity School of Natural Resources and Sustainable Development, Amity University, Uttar Pradesh and Uttarakhand Forest Department. This workshop tried to discuss how forestry could be used through one *Van Panchayat* and JFM Committees for strengthening the livelihood opportunities to the local people. Shri A.K. Bhardwaj of the Institute attended the training workshop.

International Lions Club conference, Shamli, *July 6, 2008.* International Lions Club requested its members and non-members for submitting project proposals related to welfare of society. Dr. Pranab Pal submitted a project proposal on "Civic sense and pollution control". He attended this conference and presented a paper and received second best presentation award along with an appreciation certificate.

Meeting of the State Board for Wildlife, Government of Chhattisgarh, Raipur, *July 11, 2008.* Dr. Sushant Chowdhury attended the III meeting of the State Board for Wildlife, Government of Chhattisgarh. The meeting was chaired by Dr. Raman Singh, Hon'ble Chief Minister and Chair of the Board. Besides confirmation of minutes of previous meeting and action taken on the recommendations, seven new agendas were discussed.

First international workshop on 'Global experiments on savanna seedlings', South Africa, *July 11-15, 2008.* Dr. K. Sankar attended the workshop and presented a paper on `Case study on Sariska vegetation experiments' during the workshop.

Visit to the Department of Unit of Evolutionary Biology/Systematic Zoology, Institute of Biochemistry and Biology, University of Potsdam, Potsdam, Germany, *July 16-18, 2008.* Dr. S.P. Goyal was invited to deliver a talk on "Development of wildlife forensics in controlling illegal trade" and to attend Ph.D. defense of Ms. Reeta Sharma slatted on July 18, 2008. Dr. Goyal also got a chance to see working set-up of DNA facility of the Department. He got opportunity to interact with 14 Ph.D. students working in that lab.

Global young leaders programme, Beijing, China, *August 17-28, 2008.* Bitapi C. Sinha was nominated by the Clinton Global Initiative to participate in the global young leaders program titled "China anti-desertification and rural prosperity project". The programme was organized by the Global Institute for Tomorrow based at Hong Kong. Twenty two executives from various leading corporate houses and

agencies participated in the programme, which was meant for leadership development with hands-on learning experiences. During the course of the programme, participants were taken to Ningxia to learn about the Jinhu Eco-agriculture Tourism Company Ltd. popularly known as the Jinhu Enterprise. The enterprise is an outstanding example of the overall development of an area by involving the local communities in anti-desertification, ecotourism, and farmer's cooperative and women's association.

European Congress of Arachnology, University of Bern, Switzerland, *August 22–30, 2008.* The European Society of Arachnology annually conducts the Congress to promote research on spiders and facilitate exchange of the findings related to spider research between arachnologists. Dr. V.P. Uniyal attended the 24th Congress and presented a paper on "Effect of vegetation, micro-climate and space on spider assemblages in Terai Conservation Area (TCA)". The paper was an output of the ongoing four years research project

'Effect of management practices on spider diversity in TCA'.

7th International symposium on wild boar (*Sus scrofa*) and on sub-order *Suiformes*, Sopron, Hungary, *August 28-30, 2008.* Resource management, sustainable development, ecology and management of endangered species were the objectives of the symposium. It was organised by University of West Hungary, Faculty of Forestry, Institute of Wildlife Management and Vertebrate Zoology, Hungary. More than 100 participants from different countries attended the symposium. Dr. N.P.S. Chauhan participated in this symposium and presented three papers.

Third meeting of the State Board of Wildlife, Gujarat, Gandhinagar, *September 1, 2008.* This was the third meeting of the State Board for Wildlife, Gujarat as per the provisions/requirements of the Wildlife Protection Act (WPA), 1972. The meeting was convened by the PCCF (WL), and CWLW, Gujarat State. The meeting of the Board was chaired by the Hon'ble Chief Minister, Gujarat State. The Board reviewed the major activities of the Wildlife Wing, Forest Department in the field of wildlife conservation in Gujarat and considered a proposal relating to lion conservation in the Greater Gir and approved several different proposals seeking regularization/approval under Section 29 of the WPA submitted by the Chief Wildlife Warden and the Member Secretary. Dr. P.K. Mathur attended the meeting and provided inputs on various agenda items.

First meeting of the State Level Committee for declaration of critical wildlife habitats in Gujarat State, Gandhinagar, *September 21, 2008.* This was the first meeting convened by the PCCF (WL) and the CWLW, Gujarat State so as to decide about the critical wildlife habitats in the State as envisaged by the Wildlife (P) Act, 1972. Dr. P.K. Mathur attended the meeting as the Central government nominee and provided valuable inputs on the proposed/potential critical wildlife habitats with regard to different PAs in Gujarat during the meeting.

Workshop on 'People and tigers – shifting trajectories of ecology and co-existence', Periyar Tiger Reserve, *September 22-23, 2008.* The objectives of the workshop were to: (i) debate upon status and distribution of tiger and co-predators at national and regional level. (ii) discuss about the threats to Tiger Conservation and Techniques for investigation of wildlife crimes and related trade; (iii) discuss the emerging trends and recent advance in estimation techniques of tiger, co-predators, prey and their habitat; (iv) discuss on the issue of participatory management of Tiger Reserves, Role of Conservation Foundation, Eco-Tourism and livelihoods; and (v) discuss on the critical tiger habitats and conservation at the landscape level. The workshop was organised by Kerala Forest and Wildlife Department. The workshop comprised of presentations and discussion on the topics covered under above objectives. Scientists, Managers,

Public Representative and NGOs, participated in discussion and finally the workshop recommendations were evolved. Shri A.K. Bhardwaj and Dr. Y.V. Jhala of the Institute attended the workshop. Dr. Jhala presented a paper on "Evaluating the Status of Tigers, Co-Predators and Prey in India" presented at the symposium.

A two-week refresher course for field veterinarians, Ranchi, *September 24-25, 2008.* The refresher course was organized by College of Veterinary and Animal Sciences, Birsa Agricultural University, Ranchi, Jharkhand. Dr. Parag Nigam provided inputs on wildlife health management: needs and practices, management of wild animals in distress and captive elephant health management.

Sixth Meeting of the Steering Committee of the MoEF-WII-NNRMS Project, MoEF, New Delhi, *September 26, 2008.* The meeting aimed to review the progress of ongoing pilot project on mapping of national parks and wildlife sanctuaries using high resolution data (IRS P6 LISS IV) and advice so as to accomplish project objectives. It was organized by the Project Coordinator, MoEF-WII-NNRMS Project and the MoEF, GoI. Dr. P.K. Mathur attended the meeting as co-investigator and in-charge for the Dudhwa Tiger Reserve field site and provided the update on progress made.

National seminar on management of human-elephant conflict: striving for peaceful coexistence, Kolkata, *September 26-27, 2008.* The Wildlife Wing of West Bengal Forest Department organized a two days seminar to discuss the issues of human-elephant conflict in national and state perspectives. The seminar was inaugurated by the Hon'ble Minister (Forests) Shri Ananta Roy. Further, the technical sessions discussed the dimensions of human-elephant conflicts in several landscapes due to ecological, socio-economic, land use and policy changes. Managing elephant conflicts by sharing experiences, good practices & innovative tools were also discussed. Dr. Sushant Chowdhury from WII participated in this seminar and delivered two presentations titled "Impact of forest fragmentation and land use on human-elephant conflicts: a case study from Southern West Bengal" and "Chemical immobilization and translocation as tools for managing human-elephant conflict".

International Union for Conservation of Nature and Natural Resources (IUCN) World Conservation Congress in Barcelona, Spain, *October 4-14, 2008.* The IUCN organized this World Conservation Congress. Dr. V.B. Mathur, Project Coordinator, WII-UNESCO project

'Enhancing Our Heritage' was invited to participate in the workshop on 'State of World's Protected Areas: Evaluating Management Effectiveness' and share the lessons learnt in implementing the project in the three South Asian sites. During this workshop, the '*e-toolkit*' on evaluating management effectiveness, which was developed in partnership with the Wildlife Institute of India was launched. Dr. Mathur also presented a case study on 'India: World Heritage, Biodiversity and Climate Change' in the Alliances Workshop 'World Heritage as a contribution to the 2010 target'.

International conference on "Pathways to success: Integrating human dimension into fish and wildlife management", Estes Park, Colorado, USA, *September 28, 2008 to October 2, 2008.* International conference and training program was organized by Prof. Michael J. Manfredo and Prof. Jerry J. Vaske of Human Dimensions of Natural Resources, Colorado State University, USA. The aim of the conference was to address the issues that arise as people and wildlife struggle to co-exist in sustainable and healthy manner. The conference was attended by over 200 professionals working in this field around the world. Five special training sessions were organized during conference. Dr. S.P. Goyal made a presentation on the work undertaken on human-leopard conflict in Pauri Garhwal.

"*Panthera*" Wildlife Week Celebrations, Dehradun, *October 7, 2008.* Dr. S. Sathyakumar delivered a popular talk on "Endangered Species Conservation in the Himalayan Region: Issues and Challenges" as the Chief Guest at the FRI University on the eve of "*Panthera*" Wildlife Week Celebrations.

"Tiger, last and final call" seminar and consultative workshop for North and Central India, Delhi, *October 18-19, 2008.* The seminar and consultative workshop was organized by Sanctuary India. Dr. Y.V. Jhala attended this seminar and presented a paper on "Status of tigers and their conservation in Shivalik-Gangetic Plains & Central Indian

Landscapes, India".

Workshop on Asian elephant range-wide mapping and strategic conservation planning, Phnom Penh, Cambodia, *October 20-24, 2008.* The Asian Elephant Specialist Group (AsEGS), IUCN/ SSC, organized a five-day international workshop on two concurrent themes. The first theme of the workshop focused on the range-wide status review generating current map of all Asian elephant populations and compile complete database of various populations on the basis of population size, trends and threats looming on them. The second theme set was aimed to focus on "where to save the Asian elephants" and use that informed data to outline conservation strategy for Asian elephant throughout their ranges. In all 13 Asian elephant range States attended the workshop represented by government officials, researchers, NGOs and international experts totalling around 76. The participants used the Status Review of the first workshop to develop a draft outline conservation strategy for Asian Elephants, following a participatory process and agreement thereupon. The draft strategy identified a vision, goals, and objectives together with appropriate actions aimed at mitigating and eliminating threats to elephants. Dr. Sushant Chowdhury from WII participated in this workshop and facilitated mapping work along with six other Indian participants.

National seminar on recent envirotrends, Ambala, *November 16, 2008.* Dr. V.P. Uniyal attended UGC sponsored national seminar, which was organized by Department of Zoology, DAV College Ambala, Kurukshetra University, Haryana. He presented a paper on 'Sustainable development for conservation of biodiversity in Western Himalaya'.

Training workshop for biosphere reserve managers, Sunderbans Biosphere Reserve, West Bengal, *November 24-26, 2008*. Dr. S. Sathyakumar participated in the training workshop, which was organized by the Ministry of Environment & Forests, Government of India, West Bengal State Forest & Wildlife Department, and UNESCO-India World Heritage Site Programme at Sunderbans Biosphere Reserve, West Bengal. He presented a paper 'Evaluation of Biosphere Reserve: Findings and Way Forward' based on WII's evaluation of Biosphere Reserves in India.

Workshop on forestry for common people, Dehradun, *November 25-26, 2008.* The objectives of the workshop were to: (i) discuss various issues concerning forestry and common people; (ii) devise strategies how forestry practices would be made useful to the common people. It was organised by Forest Research Institute & Indian Council of Forestry Research and Education. This workshop broadly discussed the areas and issues of forestry where people can have role to play. It also tried to discuss how the science of forestry could be taken to the common man in this country. Basically, the discussion revolved around different field experiences, where the benefit of forestry has been extended to the local people and they have been involved in various practices. Shri A.K. Bhardwaj of the Institute attended the workshop.

Brainstorming workshop on Panna Tiger Reserve, Khajuraho, Madhya Pradesh, *December 9, 2008.* The objective of the workshop was to review protection strategies in the Panna Tiger Reserve. It was organised by Madhya Pradesh State Forests Department. The Principal Chief Conservator of Forests of Madhya Pradesh, Field Director of Panna Tiger Reserve, various Forest managers and scientists from reputed organizations attended the workshop. The important issues related to status of tiger population and approaches to recover the healthy population of tigers in Panna Tiger Reserve were discussed. Different protection strategies to improve the variability of tiger population in the Park have also been suggested. Shri Qamar Qureshi, Dr. K. Ramesh and Dr. J.A. Johnson of the Institute attended the workshop.

One-week compulsory training course on 'Linking participatory forestry and biodiversity conservation with poverty alleviation, Agartala, *December 15-19, 2008.* The objectives of the course were to: (i) expose the participants on various Forestry and biodiversity conservation initiative undertaken by Tripura Forest Department in the state; and (ii) expose the participants about the strategies adopted for linking above initiatives with the poverty alleviation of the local people. It was organised by Tripura Forest Development and Plantation Corporation Ltd. This was a compulsory training programme for IFS officers in which, the participants were initially exposed to the project initiative of the Tripura Forest Department in the area of forestry and biodiversity conservation and how these have been linked to the community livelihoods. The theory session were followed by a series of field visit to various sites where such programmes have implemented. Shri A.K. Bhardwaj of the Institute attended the training course.

International Congress of Environmental Research (ICER 08) BITS–Pilani, Goa, *December 18-20, 2008.* Dr. Pranab Pal, Field Technical Officer participated in ICER 08 held at Birla Institute of Technology and Science - Pilani, Goa. It was jointly organized by the BITS - Pilani and Journal

of Environmental Research and Development (JERAD). The theme of the conference was "Environmental Research, Planning and Management". More than 1200 participants from 25 countries shared their views and discussed various issues related to the theme. Dr. Pal presented a paper titled, "Impact of anthropogenic activities on natural resources of India" and chaired a session on Life Science.

Capacity building in management of wild animals in distress for Maharashtra State Forest Department, *December 24-26, 2008*. A training workshop on management of wild animals in distress was organized at Ranger's College, Chandrapur for officers, frontline staff, police personnel and veterinarians working in the Tadoba Andhari Tiger Reserve. Besides teaching inputs, field demonstration of immobilization, micro-chipping and biological sampling in two leopards was carried out for the participants. A total of 15 officers attended the workshop. Technical inputs were provided by Dr. Sushant Chowdhury, Dr. N.P.S. Chauhan and Dr. Parag Nigam. The workshop was

funded by Maharashtra State Forest Department.

Effective leadership and communication tools for environment management and conservation training course, Front Royal Virginia, USA, *January 4-14, 2009*. Dr. Pranab Pal, FTO participated in this training programme held at Smithsonian Institution (SI) Conservation and Research Centre, Front Royal Virginia, USA. The scholarship was provided by the Smithsonian Institution and International Tiger Project-WWF, Nepal. More than 15 participants from different countries attended the course. Dr. Pal also presented a paper during the course. He attended a symposium on "New threats and realities in the tropical extinction crisis" at SI National Museum. The training programme and symposium provided comprehensive overview of fundamental communication, programme management and strategic planning skills to become an effective environmental leader.

Workshop to prepare *ex-situ* & *in-situ* conservation action plan for amphibians, Mysore, *January 7-8, 2009*. The objectives of the workshop were to (i) prepare *ex-situ* and *in-situ* Conservation Action Plan for the Amphibians; and (ii) address concern over the decline of amphibians and measures to initiate ex-situ conservation action to prevent further extinctions of amphibians. It was organised by the Central Zoo Authority. The Central Zoo Authority organized this workshop in order to prepare *ex-situ* and *in-situ* Conservation Action Plans for the Amphibians of India in collaboration of Sri Chamarajendra Zoological Gardens, Mysore, Karnataka, India at Mysore. The workshop addressed the concern over rapid decline of amphibians and measures to initiate *ex-situ* conservation action to prevent further extinctions of amphibians, and thus ensure continuity of our natural systems. During the workshop Dr. K. Vasudevan, WII delivered lectures titled "Threat to the amphibians in India and neighbouring countries" and "Selection of zoos/sites/ species for conservation breeding programme" to the participants.

Workshop on mountain pastoralism and modernity in Asia, Kathmandu, Nepal, *January 7-9, 2009*. The workshop was organised by ICIMOD, Kathmandu, Nepal. Under the session Climate Change adaptation in Hindu Kush Himalaya rangelands Dr. B.S. Adhikari presented a paper on "Pastoral practices and implications of climate change in Indian Trans-Himalaya".

Training workshop on genetic analyzer sequencing & fragment analysis applications, Gurgaon, *January 7-12, 2009*. The workshop was held at the State-of-Art Genomics and Proteomics training facility at LabIndia Research and Development Laboratory, Gurgaon. Shri Sudhanshu Mishra participated in the workshop. The objective of the workshop was to provide training for DNA sequencing and fragment analysis

Workshop on biodiversity monitoring' for the frontline staff of Nanda Devi Biosphere Reserve, Uttarakhand, *January 26-29, 2009*. The workshop was organised by Forest Department of Uttarakhand and WII. Dr. B.S. Adhikari delivered a talk on "Decadal monitoring and changes in Nanda Devi National Park".

National Conference on Geoinformatics and Impact of Climate Change with specific reference to Mountain Ecosystem, FRI, Dehradun, *February 4-6, 2009*. The objective of the conference was to utilize the vast

potential of Remote Sensing, GIS and Communication Technology for the management of the Natural Resources, developmental and planning activities of the state of Uttarakhand. The conference was organised by Indian Society of Geomatics, hosted by Uttarakhand Space Application Centre and Forest Research Institute along with other partner institutions such as Space Applications Centre, Indian Space Research Organisation, Indian Institute of Remote Sensing, Forest Survey of India, Survey of India, Wadia Institute of Himalayan Geology, Govind Ballabh Pant Institute of Himalayan Environment and Development and Wildlife Institute of India. Understanding of the effect of climate change in tropical & mountain eco-system needs multiple sources of data. The geospatial technologies comprising tools such as high resolution Satellite Remote Sensing Data, Geographic Information System (GIS), Global Positioning System (GPS) and Digital Cartography has immense capability to understand the intricacies including prospects and problems of the Himalayan mountain system and to plan for their sustainable development and management. The Wildlife Institute of India organized a Technical Session on Natural Resources Management. The conference was attended by Dr. Gautam Talukdar, Shri Rajesh Thapa,\ Dr. Panna Lal and Dr. Manoj Agarwal.

National conference on "First global summit on sustainable development and biodiversity - 2008", Raipur, *February 7-9, 2009*. Dr. Pranab Pal attended this International Conference, which was jointly organized by Chhattisgarh Environment Conservation Board; Population Foundation of India; Jansatta; VRM Foundation; CTRD; and SID. The objective of the conference was to bring together scientists, foresters, policy makers, environmentalists and sociologists on a common platform to initiate meaningful dialogue on sustainable biodiversity conservation; climate change & global warming; environmental governance; and sustainable development. More than 50 participants from India as well as abroad attended the conference. Dr. Pal presented a paper in the conference.

Animal Record Keeping Software (ARKS) training workshop, Chandigarh, *February 10–15, 2009*. The major objective of the workshop was to provide hands on training to participants in ARKS. The workshop was organized by Central Zoo Authority (CZA), Delhi and International Species Information System, Minnesota, USA. The workshop was aimed at developing hands on skills on ARKS, being used by zoos globally. This forms a basic requisite for efficient management of zoo collections. Dr. Anupam Srivastav participated in the workshop.

Training workshop on ecosystem services - valuation and policies issues, New Delhi, *February 11-12, 2009.* The objectives of the workshop were to: (i) apprise the participants about the importance of evaluation of ecosystem services; (ii) discuss and deliberate on various methodologies for evaluation of ecosystem services; and (iii) discuss the existing policies of the State and the required modifications to have better appreciation of the ecosystem services in the planning process of the country. The workshop was organised by Tata Energy and Resources Institute (TERI). This two-day workshop discussed about the different methods which can be used for evaluation of ecosystem services from forest areas. It also provided a platform to debate the existing policies of the state and what needs to be done to modify the existing policies to have better appreciation of these services in overall planning of the country. Shri A.K. Bhardwaj from WII attended the workshop. Dr. Ruchi Badola was one of the resource persons for this workshop.

Workshop on brainstorming on exotic aquatic animals & quarantine, Lucknow, *February 14-15, 2009.* The objective of the workshop was to discuss the issues related to introduction of new candidate species for aquaculture. It was organised by National Bureau of Fish Genetic Resources (ICAR), Lucknow. Fishery Biologists, Scientists and Stakeholders from different parts of the country participated in the meeting. Dr. J.A. Johnson of the Institute attended the workshop and suggested the following action plan before introduction of new candidate species: (i) build up of a database on the distribution of already introduced exotic species in the wild; (ii) develop a strategy for the control and further expansion of exotic fishes in the wild; and (iii) the impact of exotic species on native population should be evaluated before introduction.

125th Anniversary conference "Conservation in globalising India"- 3 days conference of BNHS, Mumbai, *February 17-19, 2009.* The objective of the conference was to deliberate upon the existing conservation scenario in India and discuss about the emerging challenges. It was organised by Bombay Natural History Society and Indian Institute of Science. In this conference various speakers presented and discussed the emerging challenges of conservation in India. In different sessions the field functionaries made presentation on various aspects of conservation so as to evolve future possible strategies. Shri A.K. Bhardwaj of the Institute attended the conference.

Workshop on "Building capacity to conserve the otters in Cambodia", Phnom Phen, *February 24 to March 3, 2009*. It was organised by Conservation International, Cambodia. Dr. Ruchi Badola and Dr. S.A. Hussain attended the workshop. They provided technical and intellectual inputs as key trainers in the training workshop to build capacity of students from Cambodia, Vietnam,

Indonesia, Malaysia and Pakistan to conserve the otters.

Workshop-cum-training program on "Application of biodiversity informatics in forestry" Forest Research Institute University, Dehradun, *February 24-25, 2009.* Shri Dinesh Pundir and Smt. Alka Aggarwal were nominated by the Institute to attend this workshop. The workshop gave an overview to develop various biodiversity databases and other bioinformatics methods on computer. Presentations were made on Bioinformatics & its Application; Biotechnology & Bioinformatics - An Interface and Biodiversity Informatics Development. Hands-on Training was given on PHP & MySQL concept of data cleaning, data quality and other available biodiversity databases.

"Tiger, last and final call" seminar and consultative workshop for North-East, Bengal, Orissa and Andhra Pradesh, Kolkota, *February 19-20, 2009.* The seminar and consultative workshop for North-East, Bengal, Orissa and Andhra Pradesh was organized by Sanctuary India. Dr. Y.V. Jhala attended it and presented a paper on "Status of tigers and their conservation in Northeast and Eastern Ghat Landscapes, India" at the seminar.

Third meeting of the Himalayan University Consortium (HUC), Dehra Dun, *February 26-27, 2009.* The meeting aimed to review the running and proposed programs of the HUC (*i.e.* 'Afghan research capacity development' and 'Adaptation to global change' respectively), and proposed other initiatives for the coming two years. It was jointly organized by the WII, Dehra Dun and ICIMOD, Kathmandu, Nepal. HUC is a network of universities and academic/research oriented institutions with a keen interest in sustainable mountain development. The HUC members are institutes located in the Himalayas or in the countries of the Hindu Kush-Himalayas, while the associate members are institutes of excellence in mountain science located elsewhere in the world. All the participants affirmed their support and made specific commitments to contribute to the success of the HUC mission and vision. The meeting brought together 25 Vice-Chancellors and senior staff from four of the eight Himalayan countries, as well as associated experts from around the globe. Dr. P.K. Mathur represented WII in the meeting.

National symposium on emerging trends in biomedical sciences, Dehra Dun, *February 27-28, 2009***.** Dr. S.P. Goyal attended the symposium and delivered a talk titled 'Role of Wildlife Forensic in Conservation' at Sardar Bhagwan Singh Post Graduate Institute of Biomedical Sciences and Research, Dehra Dun.

First training programme on natural resource management & environment, New Delhi, *March 2-8, 2009*. It was organised by Indian Institute of Public Administration (IIPA), New Delhi. A total of 23 participants participated in the training programme. Dr. J.A. Johnson of the Institute attended the training.

Workshop on 'Impact assessment, biodiversity and the extractive industry', Beijing, China, *March 24–26, 2009.* The purpose of the workshop was to broaden and deepen understanding of issues related to biodiversity conservation and impact assessment. The workshop brings together representatives from government, industry, NGOs, research institutions and academia, from China and beyond. It aimed to build trust and encourage dialogue among all stakeholders. The main objectives were to: (i) introduce biodiversity challenges and responses in the extractive industries in China; (ii) provide the context for Environment, Social and Health Impact Assessments (ESHIA); (iii) share experiences on the development of biodiversity standards in ESHIA; (iv) show regulators the kinds of issues faced by industry in the ESHIA process and provide input on how to improve the ESHIA process in China; and (v) provide a forum for engagement of Chinese & international industry representatives, regulators and NGOs. Dr. Asha Rajvanshi presented the paper "Mainstreaming biodiversity in impact assessment using ecosystem and economic valuation approaches".She also chaired panel discussion on the theme: Managing biodiversity resources for addressing climate change impacts. Dr. V.B. Mathur presented the paper 'Best practice for integrating biodiversity in Impact Assessment'.

Vinod Verma

professional support

Collaborations

EIA

Computer & GIS

National Wildlife Database

Wildlife Forensic

Wildlife Extension & Audio Visual

Library and Documentation Centre

ENVIS

Wildlife Policy Research

Captive Breeding & Zoo Management

Research Laboratory

Herbarium

Wildlife Health Services

Conservation Genetics Laboratory

Campus Development

Collaborations

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 a project 'Enhancing Our Heritage: Monitoring and Managing for Success in World Natural Heritage Sites'. 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 Forest, Government of India has entrusted the responsibility of project implementation to the Wildlife Institute of India (WII) as a Regional Partner Institution.

The final report of seven-year (2001-2006) project 'Enhancing Our Heritage Toolkit: Assessing management effectiveness of world natural heritage sites' was released during the 32nd Session of the UNESCO World Heritage Committee in Quebec City, Canada, from July 2-10, 2008. A presentation on

the salient outcomes of the project activities in South Asia was made by Dr. V.B. Mathur.

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 Programme is to strengthen biodiversity conservation in protected areas by building replicable models at World Heritage Sites that emphasize law enforcement, promote habitat integrity and connectivity and improve the professional, social and political profile of the protected area management community and its civil society partners. The MoEF entrusted the responsibility of developing a framework proposal for identifying priorities, actions and activities and their time frame and budget requirement under this project jointly to the Wildlife Institute of India and the Ashoka Trust for Research in Ecology and Environment (ATREE), Bangalore. The WHBP proposal was discussed and finalized in consultation with representatives from 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.

During the reporting period the project "Building partnerships to support UNESCO's World Heritage Programme: India" became fully operational in all four pilot

sites *viz.* Keoladeo National Park, Rajasthan; Nanda Devi National Park, Uttarakhand; Kaziranga National Park, Assam; and Manas Wildlife Sanctuary, Assam. The responsibilities for implementation of the project activities in Keoladeo and Nanda Devi National Park were assigned to Wildlife Institute of India and to ATREE, Bangalore for Kaziranga and Manas. Based on an open competitive examination 50 children belonging to local communities and park staff in Keoladeo and Nanda Devi National Parks were selected for award of '*World Heritage Biodiversity Scholarship*' of Rs. 500/-month. Field equipment/ gear were provided to the park staff and livelihood enhancement activities were taken up at the project sites. The project activities were reviewed during the Project Steering Committee meetings chaired by the Additional Director General (WL). The project is coordinated by Dr. V.B. Mathur.

Re-introduction of Tigers

Rajasthan Forest Department, National Tiger Conservation Authority (NTCA) and Wildlife Institute of India

Triggered by the local extinction of tigers in Sariska Tiger Reserve, rebuilding its population through re-introduction has been initiated. Three adult tigers (two females and one male) have been re-introduced in Sariska till now. These animals have been fitted with radio collars with satellite connectivity and are being tracked on a daily basis. Tiger re-introduction is a unique initiative of its kind taken up for the first time in the country.

Evaluation and assessment of freshwater fish diversity of the river Ganges basin for conservation and management: A new perspective (NBFGR-WII-Patna University Collaborative Project)

Funding source: National Bureau for Fish Genetic Resources

Investigators: Dr. U.K. Sarkar, Shri A.K. Pathak, Shri Rajesh Dayal, Shri S.M. Srivastava, Shri S.K. Paul and Mrs. Reeta Chaturvedi from NBFGR, Dr. K. Sivakumar from WII and Dr. R.K. Sinha from Patna University

Researchers: SRFs from NBFGR

Date of initiation: January, 2006

Date of completion: December, 2009

Objectives: (i) Assessing and evaluating the current status of fish diversity (abundance, richness, assemblage, composition and distribution), biological aspects; (ii) To study the spatial dynamics of fish diversity and distribution over different temporal periods using GIS and Remote Sensing; (iii) Identification and mapping of potential sites of rich fish diversity and conservation importance; (iv) To study the habitat attributes of the selected sites of upper, middle and lower stretches of river Ganges and prepare habitat suitability index map/model for selected fish species; and (v) To prepare a list of fish species of the Ganges of high conservation significance.

Progress and outcomes: Over 450 million of people are directly or indirectly dependent on the River Ganga for their livelihood. River Ganga has suffered environmental degradation and it has almost lost its originality in terms of ecological balance due to several factors. The fish diversity of River Ganga basin is known to be highly threatened due to pollution, damming, indiscriminate fishing, extensive habitat alteration, siltation etc**.** This emphasizes an immediate need for initiating research on developing methods for identifying areas for conservation and restoration. Methods of prioritization of conservation areas for fish and riverine ecosystem are required to be developed soon for effective conservation. Keeping the above point in view, the project was initiated to generate primary information on the status and pattern of freshwater fish biodiversity and synthesize, analyze the same for developing conservation models in the river Ganga.

Germplasm exploration and evaluation was carried out for a

period of 50 days at different sampling points under fifteen representative areas across all the stretches of the River Ganga. Sampling was also carried out in the high altitude areas of River Ganga like Uttarkashi, Gangotri and surrounding areas in Uttarakhand state with the help of Wildlife Institute of India. Data on fish diversity and habitat of protected areas falling under study area like Gangotri National Park, Rajaji National Park, Jhilmil Conservation Reserve, Brijghat Narora stretch of river Ganga (Ramsar site); Turtle sanctuary, Varanasi; Vikramshila Gangetic Dolphin Sanctuary, Bihar were also recorded.

A total of 121 species belonging to 71 Genera and 30 families were recorded of which 53 are from upper stretches and 59 from middle stretches and 85 from lower stretches of Ganges. Among the above, Cyprinidae was the dominant group (39.3%) followed by Bagridae (8.0%) and Schilbeidae (5.6%). Among different species, *Salmostoma bacaila* contributes more with 17.65% followed by *Labeo rohita* (9.3%) and *Amblypharyncodon mola* (8.03%). The fish diversity in the protected areas of river Ganga shows the distribution of regional fish species with more relative abundance and a species diversity upto 42 and 41 species were recorded in Rajaji national park, Dehradun and Vikramshila Dolphin sanctuary, Bihar. Exotic fish species like *Cyprino carpio*, *Salmo gairdneri* in upper stretches and in middle stretches *Cyprino carpio, Oreochromis mosambicus* and in lower stretches *Cyprino carpio, Oreochromis mosambicus* were recorded. A South American ornamental fish *Pterygoplichthys anisitsi* belonging to family Loricariidae was recorded for the first time from Patna stretch (25^0 37' 19 N; 85^0 09' 30 E).

New range of distribution of some of the species were noticed in foot hills and lower stretches of the river. *Puntius sarana, Ompok pabda Aorichthys aor, Catla catla, Cirrhinus mrigala* and *Clupisoma garua* were recorded in foot hills. The species like *Panna microdon* and *Hyporhampus limbatus* which are of brackish water habitat found in the stretch of Patna. This shift in distribution may be due to climatic and environmental changes. A new morphotype of *Schizothorax richardsonii* has been recorded from Bhagirithi tributary of river Ganga midpoint of Uttarkashi and Gangotri (33^0 43' 79 N; 78^0 26' 79 E). In the sampling sites of Bihar, gravid fishes of the species like *Clupisoma garua, Aspidoparia morar, Aspidoparia jaya, Setipinna phasa* were recorded during winter months.

The fish species *Tenulosa ilisha* was recorded in plenty especially in juvenile stages in the stretches below Farakka (Bindugram, Ahiron, Raghunathganj, Lalgola, Khagra) in West Bengal. The above fish species are being caught with net having small mesh size (1000-10000 nos/ day). It is of significant biodiversity concern and the above stretch can be utilized for conservation planning of the above fish species. The status of the above fish species can be revised as there is plenty of availability of the species in the lower stretches.

Pangassius pangasius is another conservation important species which was recorded in selective range of West Bengal (Bhagirithi feeder canal, Bindugram, Taltala ghat). The fish species caught in juvenile stages which were in the range of 10-15 cm. The above area may be focused for further studies for conserving the fish species which has high commercial value.

Services

Consultancy Projects

Management Effectiveness Evaluation of Protected Area Network in India

In response to the directive from the Prime Minister's Office (PMO) to conduct an independent assessment of all National Parks and Wildlife Sanctuaries in India, the Ministry of Environment & Forests (MoEF), Government of India initiated the process of Management Effectiveness Evaluation (MEE) of Protected Area Network in India by adopting the IUCN-WCPA MEE Framework. A Central Coordination Committee under the chairmanship of Additional Director General (Wildlife) along with five Regional Expert Committee was constituted by the MoEF. Thirty National Parks and Wildlife Sanctuaries in the country were evaluated by the five Regional Expert Committees and the results of the evaluation were presented in the meeting held in New Delhi on 28th August, 2008 under the Chairmanship of Shri M.B. Lal, Additional Director General (Wildlife). Of the 30 PAs evaluated by the 5 MEE Regional Teams, 4 PAs were rated as Very Good, 23 PAs as

Good and 3 as satisfactory. The Wildlife Institute of India has been assigned the responsibility of technical back stopping of the MEE Process in India under which 30 PAs are to be independently evaluated every year. The task is being coordinated by Dr. V.B. Mathur, Dean, WII.

Environmental Impact Assessment (EIA)

The Environmental Impact Assessment Cell of WII continued to provide professional support in capacity building initiatives at WII, sister organizations, other institutions, professional bodies, and Government and Corporate organizations.

Advisory Support: WII continued to provide advisory services to MoEF on matters related to environmental decision making. Some of the members of the WII faculty are represented on the Environmental Appraisal Committees (EAC), MoEF, Government of India including the EAC for mining projects and for Thermal power and coal projects. The responsibilities in this capacity involve extensive review of EIA documentation, attendance at the Expert Committee Meetings at MoEF for environmental appraisal of projects, site appraisals of some projects and review of project specific Conservation Plans prepared as part of Environmental Management Plans (EMP). Dr. Asha Rajvanshi, Faculty-In Charge EIA Cell, WII continued to provide the advisory support as member of the Expert Committee (Thermal and Coal projects). As a member of the sub group of the Expert Committee for Thermal and Coal Projects, Dr. Rajvanshi undertook site appraisal of the proposed 4x660 MW coal based thermal power project at Bhavanapadu, in Srikakulam district, Andhra Pradesh and the site of the Hurilong Underground Mining project of the Central Coal Fields.

Consultancy work: The Wildlife Institute of India has been awarded consultancy assignments to assess the impacts of irrigation canal development under the two projects and to propose suitable mitigation measures for addressing their impacts on wildlife movement and on human well being.

Development of mitigative measures for wild animal movement across Madhya Ganga canal aligned through Hastinapur Wildlife Sanctuary

Funding Source: Madhya Ganga Canal Construction Division, Bijnore.

Madhya Ganga Canal Project Stage-2 is planned to utilize the monsoonal discharge of river Ganga by diverting to a canal system through an existing head regulator on left bank of Madhya Ganga Barrage in Distt. Bijnor, Uttar Pradesh. A length of 44.15 km of the proposed canal is aligned through Hastinapur Wildlife Santuary. The project report of Madhya Ganga (Stage-II) Canal was filed before the Central Empowered Committee (CEC) by the U.P. Irrigation Department, Lucknow seeking the permission for construction of main canal through Hastinapur Wildlife Sanctuary. The CEC has recommended to the Hon'ble Supreme Court that the use of forest area and the non-forest area falling within the Hastinapur Wildlife Sanctuary for the construction of Madhya Canal Project Stage-2 would be subject to development of mitigative measures to facilitate the free and frequent movement of the wild animal species across the canal. CEC also recommended that the Wildlife Institute of India (WII), Dehradun should provide the design specifications for the crossing over structures after careful review of the likely impacts on the movement patterns of the different species inhabiting the area along the canal.

Accordingly the consultancy task was assigned to WII with the following scope of work: (i) assess the habitat use by wild animal species in the area proposed for construction of main canal through Hastinapur Wildlife Sanctuary; and (ii) suggest mitigative measures to ensure wild animal movements across the canal specifically the location, number and design of 'crossing-over' structures.

The work under this consultancy offer is in progress. Professional inputs in the work are being jointly provided by Dr. Asha Rajvanshi, Professor and Head EIA Cell of the Wildlife Institute of India and Dr. A. K Bharadwaj, Head, Department of Protected Area Network, Wildlife Management & Conservation Education.

Environmental Impact Assessment Study on Flora and Fauna in the Narmada Canal Project (NCP) Areas in Rajasthan

Funding source: Govt. of Rajasthan

Narmada Water Dispute Tribunal (NWDT) gave its award in 1979 and the utilizable flow of Narmada water at Navagaon village district Narmada in Gujarat state is to be shared by 4 co-basin states including Rajasthan. The share of Rajasthan shall be drawn from the Sardar Sarovar dam in Gujarat State through Narmada Main Canal reaching Gujarat-Rajasthan border at km 458.318 at Village: Silu; Tehsil: Sanchor; District Jalore, Rajasthan. Following the discussions held on 16/3/2007 at Jaipur, the Government of Rajasthan (GoR) was directed to prepare and present an EIA report on biological component of command area. It was also suggested that, it would be desirable that Wildlife

Institute of India, Dehradun may be engaged for preparation of detailed EIA report on biological resources in the command area in Rajasthan.

Accordingly Govt. of Rajasthan assigned the task of '*Environmental Impact Assessment Study on Flora and Fauna in the Narmada Canal Project (NCP) Areas in Rajasthan*' to the Wildlife Institute of India with the following objectives: (i) to assess key floral and faunal attributes in the proposed command area of NCP in Rajasthan; (ii) to inventorize floral resources of medicinal and forage values; (iii) to identify impacts on key flora and fauna on account of construction of canals, water flows in canal system and drains, including those due to practicing irrigated agriculture; (iv) suggest mitigation/ management including monitoring plan to minimize adverse impacts on key floral and faunal attributes; and (v) In addition to the above, the consultants may submit recommendations on the management of the flora and fauna in the command area, falling in Jalore (*ca* 1600 km^2) and Barmer districts of Rajasthan (*ca* 800 km^2).

Professional support to other organizations

Professional support to the Indian Road Congress (2009–11)

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 continued to provide professional support through membership to Committee of Environment of Indian Road Congress and undertook (i) Review of guidelines for biodiversity sensitive planning of roads and highways; and (ii) Review of the manual on landscaping and tree. Dr. Asha Rajvanshi has been re-nominated as a member of the above Committee which has been reconstituted on 7th March 2009 for a period of three years.

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

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). The Quality Council of India invited Dr. Asha Rajvanshi to become a Member of the Technical Committee for providing advisory support in the development of various criteria for EIA consultant organizations for NRBT registration. In the reporting, Dr. Rajvanshi continued to provide professional support to QCI in the development of criteria for assessment of the EIA reports.

Professional Support to IAIA

IAIA (International Association for Impact Assessment is an interdisciplinary, non-profit professional society established in 1980. This professional body with over 2500 members representing EIA professional, practitioners, government officials, project planners, administrators, teachers and students from across the globe is the leading global authority for advancing innovations and communication of best practices in all forms of impact assessment. Dr. Asha Rajvanshi and Dr. V.B. Mathur have been members of this association for a long time. Dr. Rajvanshi continued to be the Chair of its Biodiversity section. In this capacity Dr. Rajvanshi coordinates activities of the biodiversity section. This includes organising section meetings, facilitating networking among section members, improving section's visibility at the IAIA annual meetings. As Section Chair, she also contributes to the development of the technical programme for the annual meetings of IAIA, collaborates with other sections of IAIA for joint initiatives and reports the status of section's, activities and programmes to IAIA Headquarters.

Computer & GIS

The computer facility of the Institute has a very wide array of computer hardware and software. This facility has been considerably strengthened with inputs largely from the Institute's own resources and some from collaborative projects.

Computers are now used in every sphere of the Institute's activities; office administration, complex data analysis, image processing and database handling in spatial and non-spatial domain. The Institute has a heterogeneous computer hardware setup connected to Local Area Network (LAN). There are six Intel Pentium III/Xeon/Itanium servers for Internet, Intranet, database management and library automation services; four Sun Solaris workstations; and 250 plus nodes.

The LAN is based on structured cabling with fibre optics as the backbone connecting all the office buildings. Wi-Fi connectivity is provided to Guest House, Old Hostel and New Hostel and office premises *viz.* Auditorium, Library, Board Room, Porta Cabin, Diploma/Certificate/M.Sc. classrooms and office of Director and Dean. The Institute has its own internet server hosting the institute's website and

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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 mail server.

Storage Area Network (SAN): It is a dedicated, reliable, scalable, high performance storage network. Block-level data is transported over the SAN between server and storage devices. The Institute established SAN system for the spatial and aspatial databases which has been growing rapidly and the demand of information dissemination from the Computer/GIS Cell is obvious within and outside the Institute. The SAN is based on fibre channel with the disk capacity of 2 TB (Terabyte) expandable to 50 TB to meet future requirements.

Intranet Services: 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; Online submission of IRS & ARS Abstracts; 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; e-directory of Institute's employees contact addresses, phone and email; access to online journals subscribed by Institute's library; Agenda/Minutes of WII Committees, resources of our students and trainees with options for online submission of class projects.

Upgradation of Internet Leased Line Connectivity: The Institute upgraded its internet leased line connectivity to dedicated 2Mbps through Bharat Sanchar Nigam Limited (BSNL).

Training: 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 ArcGIS, ERDAS Imagine and IDRISI software packages for Geographical Information System, Remote Sensing and Global Positioning System technology.

Application of GIS/RS/GPS in Research Projects: 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. The country level data on climate, vegetation, topography and animal distribution is in progress.

National Wildlife Database

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

Review of the Protected Area Network Report was the main thrust of the activities besides the regular updation of the databases by incorporating new information gathered during the said period. The PA Network report has been updated by incorporating latest information for various states. The Protected Area Database was updated further and presently there are 659 Protected Areas including 99 National Parks, 513 Wildlife Sanctuaries, 4 Community Reserves and 43 Conservation Reserves in the country, covering 158,085 km^2 which is 4.83% of the total geographical area of the country. Species Database was corrected and updated by adding information on the distribution of mammalian species in various protected areas. 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.

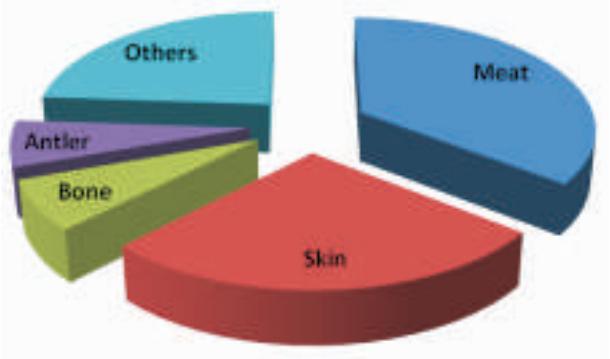
Trainees Database has been updated further and now there

are information on 556 Diploma and 432 Certificate officers trained in various courses including 148 foreign nationals. Website of the Database Cell has been modified and updated further by incorporating the latest information. More than 250 direct queries were received and outputs were provided in the various desired formats.

Wildlife Forensic

The objectives of the Cell are: (i) deal wildlife offences; (ii) undertake R/D work for developing and standardizing protocols for identifying species from parts and products of animal; development of DNA profile data base of Indian species for better implementation of various Acts; (iv) teaching and practical input through workshops and hands-on training; (v) sensitize issues among various enforcement agencies for proper evidence collection and crime scene examination through regular workshops; and (vi) establish repository of reference samples.

During the reporting period, Wildlife Forensic Cell received 197 wildlife offences cases for identification of species from various enforcement agencies. The various biological products received under the wildlife offence cases were of skins (70), meat (53), bone (14), antler (13) and other (47) mainly of bile, blood stain, brushes, claw/canine, feather,



hair, pod, photograph, pug mark, scat, shawl and ivory.

Of the cases received, 73 wildlife offence cases were analyzed/reported to different enforcement agencies based on standardized morphometry based (n=28) and DNA techniques (n= 45). Twenty one cases were not stored/forwarded properly, therefore, a simple protocol for proper sample collection was sent to the forwarding authority for future use. Few cases need development of suitable procedure for identification of species and were of research and development (R&D).

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Samples of meat, blood stain, small bones, pod, scat, skin, bile and hair were dealt with DNA techniques. A short fragment of mitochondrial DNA (mtDNA) gene of unknown case sample was amplified and compared with DNA sequence data of known reference samples for identification of species.

The Cell is also working on "FINS" (Forensically Informative Nucleotide Sequences). Preliminary data analysis reveled that there are some repeats in cytochrome b and 16s rRNA of mtDNA gene which are species specific. More then 35 sequences were submitted to National Center for Biotechnological Information, USA.

Develop data base on DNA profile and population genetic structure for use in Wildlife Forensics

Data on DNA profile and population genetics within the range of species distribution have immense value in identification of source of origin. Asian elephant (*Elephas maximus*) is the most endangered extant probiscidean. Population of the Asian elephant has been reduced in size due to the fragmentation by the actions of humans and poaching. We made the beginning for development of such data base of elephant based on dung samples which are very easy to collect. Dung samples sent from Jeypore and Dehing-Patkai WLS Assam were used for optimization of different DNA protocols. DNA extraction was standardized from the elephant dung sample. For mutlilocus genotyping, five unlabelled (*LA1, LA2, LA3, LA4, LA5*) polymorphic microsatellite loci, 12 new fluorescent labeled polymorphic loci (Fig. 3) for Asian elephants (*EMU03, EMU04, EMU06, EMU07, EMU09, EMU10, EMU11, EMU12, EMU13, EMU14, EMU15, EMU17*) (Kongrit et al., 2008) and one sex primer (SRY) were standardized for amplification from elephant dung DNA. Genotyping was done on Applied Biosystems 3130 Genetic Analyzer. Fig. 5 indicates genotype profile for a few loci.

Another work was undertaken to study genetic diversity of elephant across Teri Arc Landscape (TAL) located at the foothills of Himalayas in North Western India (Uttarakhand

state) and use information for forensic purposes. Mitochondrial DNA control region (650bp) adjacent to cytb b and tRNA gene were sequenced and used 12 dinucleotide nuclear microsatellite loci to assess the amount and distribution of genetic variation in 43 elephant tissue samples from TAL. Two haplotype were compared with earlier published data. The preliminary data analysis indicates a movement of elephants within TAL areas and whole population can be considered as one management significant unit (MSU). Data is under analysis.

First time, the Cell initiated to sequence close to whole mitochondrial gene (Cyt b, ND2, ND5, ND6, COI, COII, 12S, ATP8 and control region) of around 6026 bp from 45 tiger tissue samples of different geographic origin. New haplotype in different region were found. Further analysis of data is in progress. WFC has provided teaching and training input to visiting classes from Schools, colleges, State Forest Colleges, IGNFA and others. The staff assisted the court of law by appearing as "Expert Witness" for Ajmer, Rajasthan; Tis Hazari, Delhi; Faridabad, Haryana; Kandaghat, Himachal Pradesh; and Balaghat, Madhya Pradesh.

Wildlife Extension & Audio Visual

As part of the information dissemination programme, four issues of WII Newsletter were published. The Institute celebrated the World Environment Day on June 5, 2008 to renew its commitment to protect the environment from devastation. It was an opportunity to create awareness in younger generation and children. The World Environment Day slogan for 2008 was 'Kick the Habit! Towards a Low Carbon Economy' as declared by United Nations Environment Programme (UNEP). The World Environment Day highlighted resources and initiatives that promote low carbon economies and life-styles, such as improved energy efficiency, alternative energy sources, forest conservation and eco-friendly consumption. The following activities were organized by the Institute in collaboration with 127 Infantry Battalion (TA) Eco GARH RIF in the Bhal village of Aglar Watershed Area, Mussoorie: (i) Puppet Show for children & villagers in Bhal Village; (ii) Drawing & Painting Competition for school children; and (iii) Film Shows for school children and villagers. More than 300 children and villagers participated in these activities. External resource persons from NCERT, New Delhi and the Institute's staff organized the puppet show, which was based on conservation of trees.

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Wildlife Week was celebrated at the Institute in the first week of October, 2008. The following activities were organized during the Wildlife Week: (i) Drawing & Painting Competition and Puppet Show were organized at St. Mary's Secondary School, Dehradun; (ii) Drawing & Painting Competition and Puppet show were organized for the school children at Than village in collaboration with 127 Infantry Battalion (TA) Eco Garh Rif. More than 500 children participated in these activities.

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 thirteen schools in Dehradun participated in the programme, which was conducted during the Wildlife Week on October 1, 2008 in two rounds. The final round of the quiz was held on the same day in which teams from Brightlands School, Scholar's Home, Ann Mary School, Welham Girls School and Summer Valley School participated. Brightlands School (Akshay K. Sharma, Saumaric Satyavrat Dangwal & Atreyi Bhattacharya), Ann Mary School (Debayan Chakraborty, Arpita Choudhury & Sukriti Jolly) and Welham Girls School (Pooja Elangbam, Iva Dixit & Richa Gupta) bagged the first, second and third prize respectively. Shri S.K Mukherjee, former Director, WII, gave the WII-FoD Trophy to Brightlands School and distributed prizes to the winning teams.

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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 30 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 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.

Library & Documentation Centre

The Library and Documentation Centre plays a vital role in dissemination of information to target scientists of research and training organizations. WII Library and Documentation Centre was established in line with WII's mission as multidisciplinary information and learning resource centre on biodiversity conservation and management with the following objectives: (a) to serve as a repository of all wildlife related literature published in India; (b) to acquire, organize and disseminate all relevant world wide literature on biodiversity conservation and related fields; (c) to serve the user readership through normal and special library & information services, such as circulation, reference, photocopy and documentation; (d) 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; (e) to serve as a training center for information personnel and users; (f) to provide the above services to: (i) WII; (ii) Protected areas all over the country; (iii) Institutions engaged in nature conservation research in the country & abroad; (iv) Universities & Colleges; and (v) Individual scholars/NGOs working in related areas, and (g) to bring out periodic publications on the following: (i) Current content of periodicals; (ii) Research in progress; (iii) List of unpublished research literature, covering dissertations, thesis; (iv) Compilation of bibliographies; and (v) Compilation of abstracts.

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The L & DC now holds over 26,351 books, 22,345 newspaper clippings, 7,355 maps/toposheets and more than 6,398 bound volumes of old and rare journals. The library also maintains good collection of scientific paper number to 10,352. It subscribes to more than 200 periodicals and approx 350 online journals. During the reporting year, 542 books, proceedings, theses & reports, 150 scientific papers and 1,745 press clippings were added.

The L & DC is fully computerized, using LIBSYS Library Management Software, UNESCO'S WINISIS Software, CD Server, Barcode and related technologies. During the year 2008-09, an upgraded version Libsys 4 (release 5.0) has been installed. The upgraded version has the facility of WEB OPAC.

For optimum resources use by researchers, students, officer trainees and other users, 12 computer terminals are available in the library premises and the faculty desks have been inter-connected with LAN. Being connected to the library facility, the users have the privilege to access all in-house databases such as books, reprints, Indian wildlife abstract, map/toposheet collection, press clippings and specialized bibliographic databases. Users also have access to CD-ROM databases such as Wildlife Worldwide 1935 -, E-CD and CAB Spectrum 1973 available on the LAN.

During 2008-09, over 15,706 pages of photocopies were provided to the users. Approximately 47,300 documents were issued and consulted during 2008-09. Value Added Service was provided to 220 clients while Ready Reference Service was provided to about 4,102 clients. Approximately 400 queries were attended from outside users and more than 7,500 bibliographic references were provided to the users. 16 documents have been procured on Inter-Library Loan from nearby libraries.

I. Services provided during 2008-2009

No.	Services	Numbers
1.	Photocopy exposure	15,706
2.	Documents issued/consulted	47,300 approx.
3.	Value added service	220 approx.
4.	Ready reference service	4102 approx.
5.	Inter Library Loan	16 documents
6.	Document delivery	75 (email-photocopy)
7.	Document procurement request *(Articles requested from NISCAIRE [Formerly INSDOC] & other libraries)*	05
8.	Articles added to WILD	142 Articles

(Indian Wildlife Abstract Service)

9. Map/toposheets issue/consulted 2000 approx.

II- Revenue Generation from services during 2008-2009

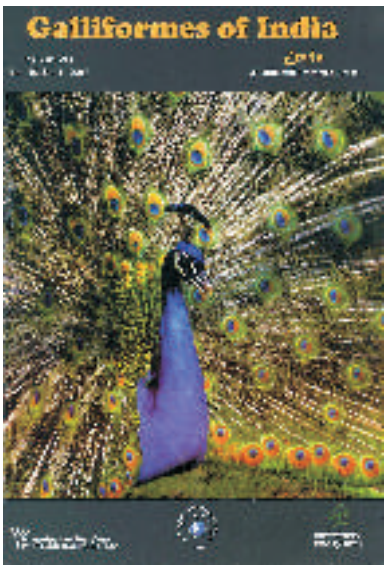
No.	Services	Amount (Rs.)
1.	Bibliographical/Document Delivery Services	Rs. 212.00
2.	Photocopying Service	Rs. 3630 .00
3.	WII Publications	Rs. 1,51,670.00

III - Volume Added to Library Collection during 2008-09

No.	Types of Document	Numbers
1.	Books & Monographs	542 books
2.	Journals (bound Volumes)	173
3.	Newspaper clippings	1745
4.	Reprints	150
5.	Online Journals	350 approx.

ENVIS Centre on '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 and 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 'Galliformes of India'. This ENVIS bulletin was released in a function jointly organized with INTACH, New Delhi.

The activities of the WII-ENVIS Centre were reviewed in a

meeting chaired by Shri R.H. Khawja, Additional Secretary, MoEF on 26th December, 2008 in FRI, Dehradun. The activities were highly appreciated during the review.

Wildlife Policy Research

A part time consultant worked in the Cell from April to December 2008. The consultant collected original Gazette notifications pertaining to Wildlife (Protection) Act 1972 from the Ministry of Environment and Forests New Delhi and the Law Ministry, New Delhi and the same were uploaded on the Wildlife Institute of India Intranet for easy accessibility. A searchable database programme was developed by the Computer Cell for hosting the above information on WII website. Some other relevant acts such as Indian Forest Act, 1927, Cattle Tresspass Act 1871, Forest Conservation Act (1980) with amendments, Environment Protection Act 1986, Biological Diversity Act 2002, Prevention of Cruelity to Animals Act 1960 and others have also been uploaded on WII Intranet. Policies related to Wildlife Conservation such as ecotourism policies of States have also been put together and linkages are provided for policy documents which already exist on the Internet.

Captive Breeding & Zoo Management

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

Funding Source: Central Zoo Authority, New Delhi
Investigator: Dr. Parag Nigam
Researcher: Dr. Anupam Srivastav
Date of initiation: November, 2006
Date of completion: November, 2011

Objectives: (i) Update of Studbooks of Asiatic lion, Bengal tiger, One horned rhinoceros and Lion tailed macaque; (ii) Initiate new studbooks for Tibetan Wolf, Gaur - Indian bison, Langur Nilgiri, Red/ Lesser Panda, Snow Leopard, Bhutan Grey Peacock Pheasant, Wild Dog (Dhole), Clouded leopard, Wild Ass and Hoolock gibbon; and (iii)

Maintenance of the above studbooks.

Progress: During the reporting period compilation of studbooks for Snow Leopard, Red Panda and Indian Wild Ass was the major activity.

Outputs and outcomes: Compilation of studbooks for Snow Leopard, Red Panda and Indian Wild Ass was done during the reporting period.

Research Laboratory

The Research 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 modern equipment such as Digital pH & Conductivity Meters, Spectrophotometer, Analytical Balance, Atomic Absorption Spectrophotometer (AAS), High Performance Liquid Chromatograph (HPLC), UV-Visible Spectrophotometer, Microwave Sample Digester, Automatic Nitrogen & Fiber Analyzer, Millipore Water Purification System and a fully automated field kit to analyze instant DO, EC, pH, turbidity, salinity of water bodies. Two 10 KVA on-line UPS were purchased during the year reporting to support all laboratory instrument.

Teaching classes followed by practical for various ongoing courses of the Institute, for the students from other Universities and Forest Officials from India and abroad were conducted in the laboratory for instrumentation and analytical techniques during the reporting year. This include analysis of herbivore pellet and carnivore scat samples, collection & preservation of biological materials, age and sex determination of ungulates, osteology of mammals and analysis of ecological samples for various parameters.

Various ongoing research projects utilized the laboratory facility for the analysis of ecological samples such as pellet, dung and carnivore scat. In total, 852 scats and pellet samples were analyzed. Apart from this 496 soil, water and plant samples were also received in the laboratory, in which 1,469 parameters were analyzed for ADF, NDF, lignin, cellulose, crude protein, Ca, Mg, Zn, Cu, Fe, Ni, Mn, EC, pH, Cl, CO_3, HCO_3, Cr, Hg, Ni, Pb, OC during the reporting year. One hundred forty one soil and plant samples were also analysed in the Laboratory for external students.

The laboratory staff provided technical inputs in field such as demonstration of rodent traps, camera traps, mist netting for birds, and assisted in radio-collaring of tigers in Ranthambore Tiger Reserve. The laboratory staff also collected meteorological data (rainfall, temperature, humidity, wind velocity and direction) in the WII campus. During the year 2008-09 the recorded maximum temperature was 39^0C on 19th May 2008 and minimum temperature was 1^0C recorded on 11th February 2009. Maximum rainfall was recorded on 31st July 2008 (155 mm). The total rainfall recorded was 1509.66 mm.

Herbarium

During the reporting period plant specimens (*ca.* 2200) were identified for various research projects, especially from Dachigam National Park, Jhilmil Jheel Conservation Reserve, Bandhvgarh National Park, Nilang Valley (Uttarakhand), Keshopur-Miani wetlands (Punjab), Dudhwa National Park and Grasses from South India. Inputs were provided in various regular courses at the Institute and visiting classes from time to time. The herbarium section is rendering help to the students and researchers from various agencies and Universities.

Wildlife Health Services

Emergency Services provided to State Wildlife Agencies Management of injured Leopard at Ladopur, *April 9, 2008.* A seriously injured leopard was rescued in comatose condition from Ladopur area of the Mussoorie Forest division. The animal was provided

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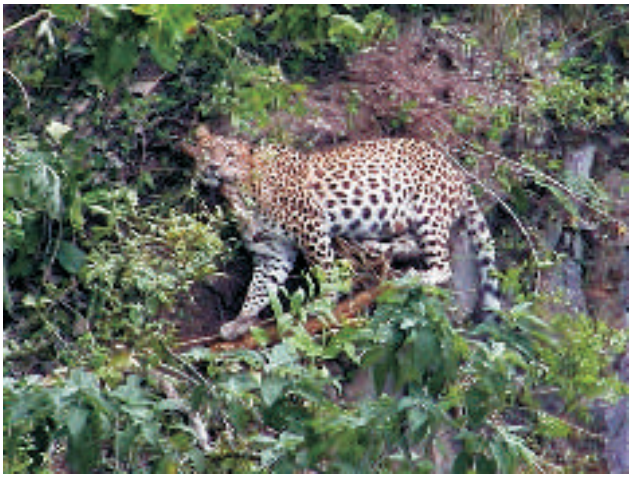
necessary treatment, stabilized and was successfully shifted to Pantnagar Veterinary College for onward treatment. The animal recovered fully and is now an exhibit in the Malsi Deer Park. Field visit was conducted by Dr. Sushant Chowdhury and Dr. Parag Nigam.

Management of Lame wild Tusker near Nalowala Beat of the Jhilmil Jheel Conservation Area (JJCA), Rasiabad, Haridwar Forest division, Uttarakhand, *August 2, 2008.* In respose to request from CWLW, Uttarakhand, Dr. Parag Nigam proceeded to Nalowala Beat of the Jhilmil Jheel Conservation Area (JJCA), Rasiabad, Haridwar FD on August 2, 2008 to provide assistance to Haridwar FD in managing lame wild tusker. The tusker was successfully immobilized and provided necessary treatment. The animal recovered. It was subsequently reported to be

moving normally in the forest.

Management of Leopard trapped in a snare at Galogi Power house, Mussoorie FD, *October 2, 2008***.** An adult Leopard was trapped in a snare in the steep slopes of the Mussoorie FD near Galogi power house. The animal was successfully immobilized, rescued, provided first aid and subsequently released at the same site. Dr. Parag Nigam carried out the field operation.



P. Nigam

Conservation Genetics Laboratory

The role of the Conservation Genetics Laboratory is to provide services to ongoing research projects of the Wildlife Institute of India that have conservation genetics components. Also basic conservation genetics related issues related to endangered Indian fauna and flora are addressed in the laboratory. Currently, the activities of the laboratory involve (i) genetic research on Avian Malaria, (ii) phylogeny and variability in wild canids with emphasis on the Golden Jackal (*Canis aureus*), and (iii) population structure of tigers (*Panthera tigris*) in the Satpura-Maikal Landscape, Central India.

Dr. Farah Ishtiaq has joined the C.G. laboratory on a Marie Curie post-doctoral fellowship, funded by the European Commission. She is carrying out her research on avian malaria genetics. Also underway is an attempt to study the genetic structure of Striped Hyena in Kutch, as this will complement the ongoing field study on the behavior and ecology of striped hyenas using radio telemetry. Studies on the genetic structure of different populations of the endangered Great Indian Bustard is being attempted to understand unique lineages and meta-population structure. Population genetics of Asiatic Lions in Gir as well as from the satellite lion populations of Savarkundla and Palitana is being carried out.

Current analysis of Golden Jackal samples has shown extreme genetic variability even from geographically close localities with several mitochondrial haplotypes. So far, mitochondrial Control Region sequence data have been obtained from 53 individuals and 17 individuals have been genotyped using six nuclear micro satellite markers. More polymorphic micro satellite markers are being screened for improving the resolution of genetic diversity. Laboratory work is in progress to understand the population genetic structure of tigers in the Central Indian landscape, in order to monitor metapopulation dynamics and evaluate barriers

to tiger dispersal in the region. The work will thus complement the ongoing telemetry and camera trapping study on tiger spatial ecology and behaviour in the Satpura-Maikal landscape, namely in Pench and Kanha Tiger Reserves. Preliminary data using micro satellite markers typed in seventeen samples indicate that individual identification of tigers is possible using only six polymorphic markers (Probability of sibling identity value of 0.0163 or one individual in sixty siblings has the chance of carrying the same signature STR genotype). The said markers assigned parentage correctly, albeit with poor LOD scores.

An analysis of genotyped eight individuals (four tissue and four scats) was carried out to assess micro satellite peak consistency at all twelve loci. The most common error encountered was allele drop-out, even with good quality tissue DNA samples. A novel primer for inexpensive identification of tiger samples from faecal DNA extracts was designed from mitochondrial cytochrome *b* sequences. Restriction Enzyme digestion of the PCR products so obtained is the basis of identifying tigers from other co-predators.

Campus development

Maintenance work in Old Hostel, New Hostel block, providing false ceiling and aluminum partition in library block and office building, repair of various electrical services, supplying and installation of 800 KVA transformer and electrical re-wiring work in administrative block has been completed. Supplying and installation of 1x320 KVA generator set are nearing completion.

Construction of five no. Type IV quarters in block III is nearing completion.

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visitors

- Newly recruited Scientists from Indian Council of Forestry Research and Education, Dehradun, April 9, 2008.
- Students accompanied by their teachers from Bombay Scottish School, Mumbai, May 5, 2008.
- Students of M.Sc. (Forestry) of 2nd Semester accompanied by their faculty, May 7, 2008.
- Students of B. Tech in Environmental Engineering accompanied by one faculty member from Department of Environmental Science & Engineering, Indian School of Mines University, Dhanbad, May 16, 2008.
- Graduates from the University of Texas, USA accompanied by Dr. David Eaton, Prof., LBJ School of Public Affairs, Austin, Texas, May 22, 2008.
- Class XII students from Police Academy, Jalandhar, May 27, 2008.
- B.Sc. (Forestry) students accompanied by teachers from Birsa Agricultural University, Faculty of Forestry, Ranchi, June 5, 2008.
- Students of Class VIII to X accompanied by their staff members from National Museum of Natural History, Ministry of Environment & Forests, New Delhi, June 9, 2008.
- Participants (University faculty in Botany, Environmental Science & Forestry) undergoing the ISRO sponsored NNRMS Course accompanied by Dr. I.J. Singh from IIRS, Dehradun, June 9, 2008.
- Students from DAV Public School, Jalandhar, Punjab, June 16, 2008.
- Students (Class XI) participating in the 4th Vacation Program of Natural Resources organized by the Aravali Foundation for Education, New Delhi in collaboration with the National Bureau of Fish Genetic Resources National Museum of Natural Resources, Lucknow, June 26, 2008.
- Officer trainees from SFS College, New Forest, Dehra Dun, June 27, 2008.
- In-service SFS officers undergoing a Two-Week Refresher Course at SFS College, Dehradun, July 10, 2008.
- Participants of SAARC countries undergoing a two-week training module on 'Enhancing livelihood opportunities of forest dependent communities through NTFP management and its value addition' from Indira Gandhi National Forest Academy, Dehradun, July 18, 2008.
- Range Forest Officer trainees and a faculty member from SFS College, Burnihat, July 31, 2008.
- Cadets accompanied by their two masters from Rashtriya Bhartiya Sainya College, Dehra Dun Cantt, July 31, 2008.
- IFS Probationers (2008 Batch), Indira Gandhi National Forest Academy, Dehradun, August 14, 2008.
- In-service SFS Officers of the General Refresher Course at SFS College, Dehradun accompanied by their faculty members, August 21, 2008.
- SFS officer trainees of 2007-09 batch from SFS College, Dehradun, August 25, 2008.
- IFS officers (1987 Batch), of an Advanced Forest Management Course at Indira Gandhi National Forest Academy, Dehradun, August 28, 2008.
- Officers participating in a two-week Management Development Programme for senior officers of the Govt. of Nepal at Indian Institute of Public Administration, New Delhi, September 3, 2008.
- Students from DAV, Ambala under DNA Clubs Programme, September 12, 2008.
- B.Sc. Forestry students and faculty from Kathmandu Forestry College, Kathmandu, Nepal, September 16, 2008.
- Officer trainees (2007-09 batch) undergoing P.G. Diploma & M.Tech. Course at Indian Institute of Remote Sensing, Dehradun, September 15, 2008.
- B.Sc. Forestry (3rd year) students and their faculty and eight supporting staff from Tribhuvan University, Institute of Forestry, Pokhra, Nepal, September 17, 2008.
- B.Sc. (Forestry) students, one staff member and a supervisor from the Forest College & Research Institute, Tamil Nadu Agricultural University, Mettupalayam, September 23, 2008.

- B.Sc. Forestry (3rd year) students accompanied by their two faculty and six supporting staff from Tribhuvan University, Institute of Forestry, Hetauda Campus, Nepal, September 23, 2008.
- IFS Officers (10 years of service) and as part of Advanced Forest Management Course at Indira Gandhi National Forest Academy, Dehradun, September 25, 2008.
- B.V.Sc. & A.H. students from College of Veterinary Science and Animal Husbandry, Jabalpur, October 7, 2008.
- IFS Officers of the 1958-61 batch of a two-day workshop at Indira Gandhi National Forest Academy, Dehradun, October 13, 2008.
- Forest Guards trainees (19th Batch) from F.T.C., Sundernagar, October 16, 2008.
- Trainees of the Forester Training Course (2008-09) from Training Circle, Pinjore, Haryana, October 16, 2008.
- Students of M.Sc. Environmental Sciences from Mohan Lal Sukhadia University, Udaipur, October 21, 2008.
- Students from Woodstock School, Mussoorie, November 6, 2008.
- P.G. students of the P.G. Dept of Environmental Sciences and M. Tech. in Environmental Science & Engg. from Sambalpur University, Jyoti Vihar, Orissa, November 6, 2008.
- Trainees of Forest Rangers Training 2008 (2nd Semester) from Forestry Training Academy, Haldwani, November 7, 2008.
- Participants of the two-week refresher course for in-service SFS Officers at SFS College, Dehradun, November 7, 2008.
- Forest Guards from Corbett Wildlife Training Centre on November 11, 2008.
- Students of B.Sc. (Hons.) and B.Sc. (Life Sciences) from Department of Zoology, Zakir Hussain College, University of Delhi, November 21, 2008.
- Students of Class XII from CARMAN Residential & Day School, Dehradun, November 25, 2008.
- Forest Range Officer trainees (2008-09) from State Forest Service College, Coimbatore, November 25, 2008.
- B.Sc. (Botany) students from Fergusson College, Pune, November 28, 2008.
- Participants of Navdanya Biodiversity Conservation Farm, Dehradun, December 2, 2008.
- Zoology & Life Science students from Deptt. of Zoology, Hansraj College, University of Delhi, December 8, 2008.
- Students of PG DFM of Indian Institute of Forest Management, Bhopal, December 12, 2008.
- B.Sc. (Forestry) students from University of Agricultural Sciences, College of Forestry, Bangalore, December 15, 2008.
- Students of PG Diploma in Biodiversity from Jijamata Mahavidyalaya, Buldana, Maharashtra, December 18, 2008.
- Officers promoted into IFS of a 10-Week Professional Skill Up-gradation Course from Indira Gandhi National Forest Academy, Dehradun, December 31, 2008.
- Scientists accompanied by two senior faculty members from the Indian Institute of Public Administration, New Delhi, January 1, 2009.
- Officers of Professional Skill Up-gradation course from the Indira Gandhi National Forest Academy, Dehradun, January 2, 2009.
- M.Sc. (Bio Tech) & B.Sc. (Bio Tech) students from the Alpine Institute of Management & Technology, Dehradun, January 2, 2009.
- M.Sc. students accompanied by a Professor from the Department of Botany, Nagaland University, Lumami, January 15, 2009.
- IFS Probationers of 2007 batch from Indira Gandhi National Forest Academy, Dehradun, January 16, 2009.
- M.Sc. (Final) students accompanied by a Professor from Department of Zoology, Jai Narain Vyas University, Jodhpur, January 19, 2009.
- B.Sc. students and three staff members from the University of Agricultural Sciences, Dharwad, College of Forestry, Sirsi, Karnataka, January 27, 2009.
- M.Sc. (Bio-Tech) students and teachers from the Beehive (PG) College, Selaqui, Dehradun, February 5, 2009.
- SFS probationers from SFS College, Dehradun, February 5-6, 2009.
- Cadets and their masters from the Rashtriya Bhartiya Sainya College, Dehradun Cantt, February 6, 2009.
- IFS officers (1999 batch) as part of training at Indira Gandhi National Forest Academy, Dehradun, February 12, 2009.
- In-service Foresters as part of training in Kashmir Forester's Training Course (KFC) and their faculty & staff from Forest Department, J&K, Soil Conservation

Training School, Miransahib, Jammu (J&K), February 13, 2009.

- M.Sc. (Botany) students and teachers from Pt. L.M.S. Govt. P.G. College, Rishikesh, February 24, 2009.
- B.Sc. (Forestry) students and teachers from Allahabad Agricultural Institute–(DU), Allahabad, February 27, 2009.
- B.Sc. (Forestry) students and teachers from ASPEE College of Horticulture & Forestry, Navsari Agricultural University, Savsari, March 9, 2009.
- M.Sc. (Geoinformatics) students and professors from TERI University, Vasant Kunj, New Delhi, March 18, 2009.
- Students of Class IX and teachers from Mayo College, Ajmer, March 24, 2009.
- Students and a faculty member from Capt. Vishwa Vidhyalaya, Ahmedabad, March 26, 2009.
- B.Sc. (Forestry) students and teachers from Department of Forestry, College of Agriculture, Orissa University of Agriculture & Technology, Bhubaneswar, March 27, 2009.

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governance

Society

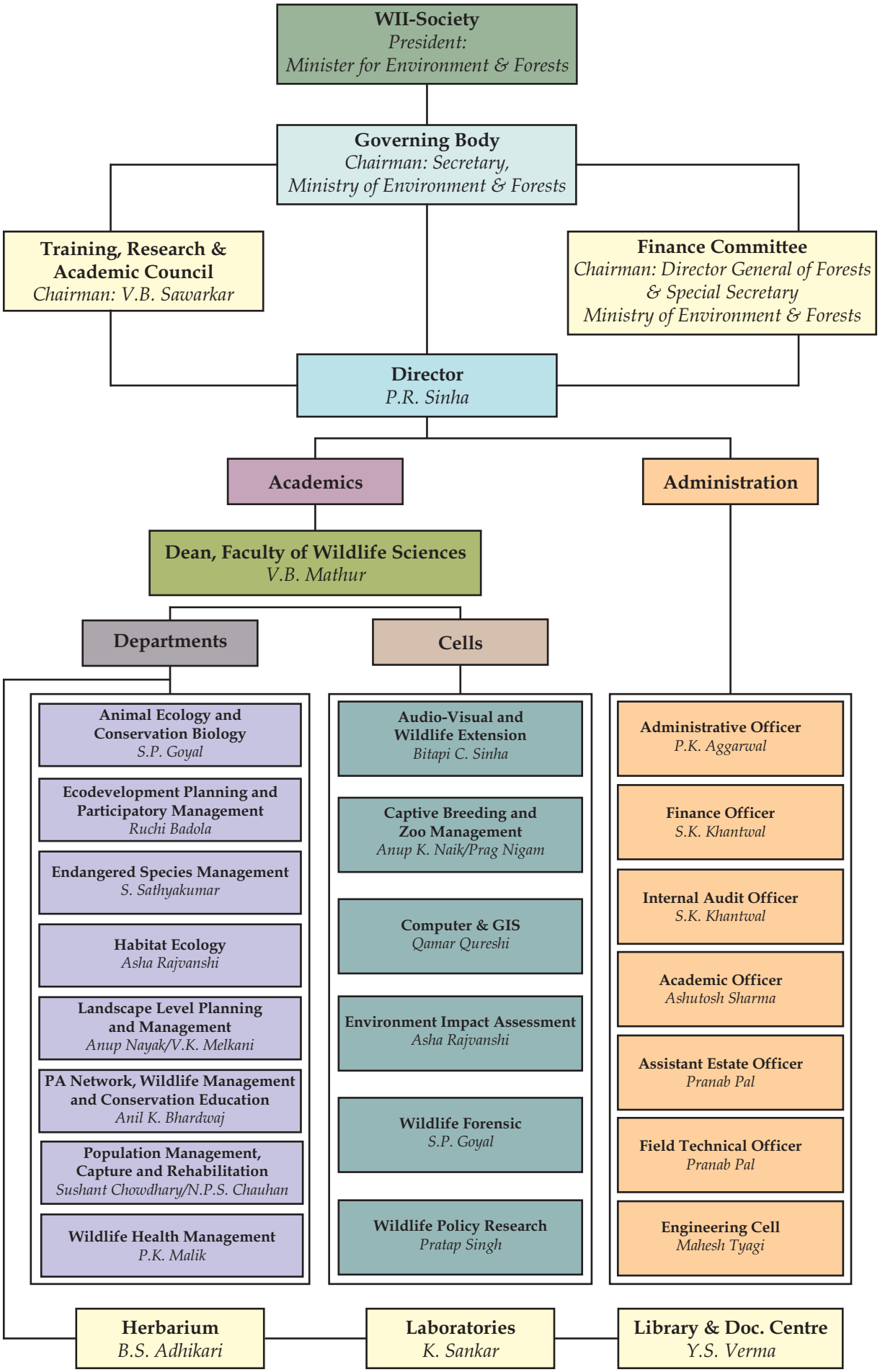
Governing Body

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 as under:

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

Members

3. Shri Harish Rawat
   Member of Parliament (Rajya Sabha)
   12-A, Canning Lane,
   New Delhi.

4. Shri Rameshwar Oraon
   Member of Parliament (Lok Sabha)
   214, North Avenue,
   New Delhi - 110 001

5. Shri Bachi Singh Rawat
   Member of Parliament (Lok Sabha)
   4, Lodhi Estate,
   New Delhi - 110 003

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

Non-official Members

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

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

21. Dr. Erach Bharucha,
    Director,
    Bharti Vidyapeeth Institute of Environment Education and Research (Bharti 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,
    Department of Zoology,
    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,
    Former PCCF, Karnataka
    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. Shri Govind Patel,
    Plot No. 279, Sector No.1-C
    Gandhinagar, Gujarat

Members

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 ,
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, North Block
New Delhi

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

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

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

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

40. The Chief Secretary,
Government of Uttarakhand, "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. Director,
Wildlife Preservation, Govt. of India
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.)

Members

47. Dr. V.B. Mathur,
Dean, Faculty of Wildlife Sciences,
Wildlife Institute of India,
Dehradun

48. Shri A.K. Bhardwaj,
Scientist-F,
Wildlife Institute of India,
Dehradun

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 as under:

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,
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19. Chairman,
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20. Dean, FWS
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    (Faculty Representative WII)

Member Secretary

21. Director,
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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)

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24. A representative Nominated by DG-ICFRE
Dy. Director General (Research)
Indian Council of Forestry Research & Education
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Two senior most Head of Departments (in terms of Pay-Scale) – WII

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27. Shri A.K. Bhardwaj
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publications

Peer Reviewed International Journals

Peer Reviewed National Journals

Peer Reviewed International Report

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Vinod Verma

resource lectures

WII Faculty as Resource Speakers

Resource Speakers at WII

WII Faculty as Resource Speakers

Dr. V.B. Mathur (April 15, 2008): **Management Effectiveness Evaluation (MEE) of protected areas in India: Recent experiences.** Advance Forest Management Course, 1987, Indira Gandhi National Forest Academy, Dehradun.

Dr. Asha Rajvanshi (April 16, 2008): **EIA: Context and concepts.** Indira Gandhi National Forest Academy, Dehradun.

Dr. Y.V. Jhala (April 17, 2008): **Estimating tiger population status in India.** Indira Gandhi National Forest Academy, Dehradun.

Dr. V.P. Uniyal (May 1, 2009): **Insect's taxonomy, diversity and importance as indicator for biodiversity monitoring.** M.Sc. Forestry, Forest Research Institute University, Dehradun.

Dr. V.B. Mathur (May 12, 2008): **Management Effectiveness Evaluation (MEE) of protected areas in India: Recent experiences.** Advance Forest Management Course, 1991, Indira Gandhi National Forest Academy, Dehradun.

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Dr. Y.V. Jhala (May 15, 2008): **Preparation of tiger management plans.** Indira Gandhi National Forest Academy, Dehradun.

Dr. V.B. Mathur (May 29, 2008): **Application of remote sensing & geographic information system (GIS) in wildlife management.** Training Course for Indian Forest Service Officers, FSI, Dehradun.

Dr. Asha Rajvanshi (June 4, 2008): **Framework for integrating biodiversity in EIA of mining projects.** Engineering Staff College, Hyderabad.

Dr. Asha Rajvanshi (June 4, 2008): **Integrating biodiversity issues in EIA of mining projects: Best practices.** Engineering Staff College, Hyderabad.

Dr. Ruchi Badola (June 6, 2008): **Ecodevelopment planning.** Participants of the NNRMS Course for University Faculty, Indian Institute of Remote Sensing, Dehradun.

Dr. Parag Nigam (June 9-20, 2008): **Management of problem causing wild animals.** 2 week AFM course for the officers in 21st year of service (1987 IFS Batch) was organized by the Indira Gandhi National Forest Academy, Dehradun.

Dr. V.B. Mathur (July 10, 2008): **Role of remote sensing & GIS in EIA.** Training course for Indian Forest Service Officers, Indian Institute of Remote Sensing, Dehradun.

Dr. S.A. Hussain (July 11, 2008): **Wetland management.** Two weeks refresher course for in-service SFS Officers.

Shri A.K. Bhardwaj (July 14, 2008): **Ecotourism, principles and role in conservation.** State Forest Service College, Dehradun.

Shri A.K. Bhardwaj (July 14, 2008): **Managing protected areas through community participation.** Indira Gandhi National Forest Academy, Dehradun.

Shri A.K. Bhardwaj (July 15, 2008): **Protect planning, evaluation and analysis.** State Forest Service College, Dehradun.

Dr. B.K. Mishra (July 17, 2008): **Ecodevelopment: Planning and monitoring.** Regular course for SFS probationer. State Forest College, Dehradun.

Dr. V.B. Mathur (July 21, 2008): **Management Effectiveness Evaluation (MEE) of protected areas in India: Recent experiences.** Advance Forest Management Course, 1991, Indira Gandhi National Forest Academy, Dehradun.

Shri A.K. Bhardwaj (July 23, 2008): **Participatory management of protected areas: Emerging lessons conservation.** Indira Gandhi National Forest Academy, Dehradun.

Dr. Asha Rajvanshi (July 29, 2008): **Mainstreaming biodiversity in EIA of mining project**. Centre for Science and Environment (CSE), New Delhi.

Dr. Dhananjai Mohan (July 2008): **Birds and watching them.** Indian Military Academy, Dehradun.

Dr. Ruchi Badola (July-August 2008): Lectures (20) on **'Environmental economics'**. SFS course trainees III semester 2007-9. State Forest Service College, Dehradun.

Dr. K. Sankar (August 4, 2008): **Tiger reintroduction.** Indira Gandhi National Forest Academy, Dehradun.

Dr. Dhananjai Mohan (August 15, 2008): **Introductory tour.** IFS probationers of 2008 batch, Indira Gandhi National Forest Academy, Dehradun.

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Dr. Ruchi Badola (August 18, 2008): **Integrating costs and benefits of ecosystem services into conservation.** Participants of the Advanced Forest Management Training course for IFS officers of 1987 batch. Indira Gandhi National Forest Academy, Dehradun.

Dr. V.B. Mathur (August 20, 2008): **Management Effectiveness Evaluation (MEE) of protected areas in India: Recent experiences.** Advance Forest Management Course, 1987, Indira Gandhi National Forest Academy, Dehradun.

Dr. Ruchi Badola (August 21, 2008): **Ecological economics**. Participants of two-week General Refresher Course for in-service SFS Officers. State Forest Service College, Dehradun.

Dr. K. Sankar (August 21, 2008): **Tiger re-introduction in Sariska Tiger Reserve, Rajasthan.** State Forest Service College, Dehradun.

Shri A.K. Bhardwaj (August 25, 2008): **Role of ecotourism in conservation.** SFS Course. State Forest Service College, Dehradun.

Dr. K. Sankar (August 25, 2008): **(i) Ungulate conservation in India; and (ii) Tiger re-introduction in Sariska Tiger Reserve, Rajasthan.** M.Sc. Wildlife Science Course at AVC, College, Tamil Nadu.

Dr. Dhananjai Mohan (August 26, 2008): **About Asan Barrage.** Visit with officer trainees of 2007-09, SFS Course. State Forest Service College, Dehradun.

Dr. S.A. Hussain (August 28, 2008): **Wetland management.** State Forest Service College, Dehradun.

Dr. B.K. Mishra (September 3, 2008): **Ecodevelopment planning in India including India ecodevelopment project - present and future prospects.** P.G. Diploma and M. Tech Course. Indian Institute of Remote Sensing, Dehradun.

Dr. Ruchi Badola (September 4, 2008): **Stakeholder analysis and SWOT analysis.** Participants of the P.G. Diploma Course and M.Tech students. Indian Institute of Remote Sensing, Dehradun.

Dr. V.B. Mathur (September 9, 2008): **Management Effectiveness Evaluation (MEE) of protected areas in India: Recent experiences.** Advance Forest Management Course, 1991, Indira Gandhi National Forest Academy, Dehradun.

Dr. Ruchi Badola (September 10, 2009): **Valuation of eco-system services.** Participants of the Advanced Forest Management Training course for IFS officers of 1998 batch. Indira Gandhi National Forest Academy, Dehradun.

Dr. V.B. Mathur (September 12, 2008): **Conservation in changing world - Challenges, opportunities and way forward.** Seminar on Environmental Issues, Lal Bahadur Shastri National Academy of Administration, Mussoorie.

Shri A.K. Bhardwaj (September 12, 2008): **Linking biodiversity conservation with livelihood security of local people-Important lesson and issues for future sustainability.** Lal Bahadur Shastri National Academy of Administration, Mussoorie.

Dr. Y.V. Jhala (September 12, 2008): **Conservation of tigers in India: Need, problems and way ahead.** Lal Bahadur Sharstri Academy of Administration, Mussoorie.

Dr. Dhananjai Mohan (September 13, 2008): **Bird watching.** Trip for Advance Forest Management Training Course for IFS officers of 1998 batch.

Dr. Asha Rajvanshi (September 15, 2008): **Environmental Impact Assessment.** Indian Institute of Remote Sensing, Dehradun.

Shri A.K. Bhardwaj (September 15, 2008): **Ecodevelopment–A case study in Periyar Tiger Reserve.** Indian Institute of Remote Sensing, Dehradun.

Dr. Ruchi Badola (September 16, 2008): **Ecological economics.** Participants of the P.G. Diploma Course and M.Tech students (2008-09 batch). Indian Institute of Remote Sensing, Dehradun.

Dr. B.K. Mishra (September 19, 2008): **Wildlife Management in relation to soil and water conservation.** $5^{1}/_{2}$ month course for State and Central Govt. officers. Central Soil and Water Conservation Research and Training Institute, Dehradun

Dr. V.B. Mathur (September 23, 2008): **Strategic Environmental Assessment (SEA): A tool for integrated sustainability appraisal.** One-week training programme for IAS officers, Amity, New Delhi.

Shri A.K. Bhardwaj (September 27, 2008): **Enhancing community participation and integrating better management practices - A case study from Kerala.** WWF, New Delhi.

Dr. Asha Rajvanshi (October 7, 2008): **The relevance of Environmental Impact Assessment as a guiding tool for sustainable development.** Lal Bahadur Shastri National Academy of Administration (LBSNA), Mussoorie.

Dr. Asha Rajvanshi (October 7, 2008): "**EIA and Public Hearing for Projects" Consultations in EIA.** Lal Bahadur Shastri National Academy of Administration, Mussoorie.

Dr. Ruchi Badola (October 20, 2008): **Van Panchayat Committees.** Post Master Diploma in Natural Resources Management, Forest Research Institute University, Dehradun.

Dhananjai Mohan (October 20-22, 2008): **Migration & Habitat analysis of Flora & Fauna.** Forest Research Institute University, Dehradun.

Dr. K. Ramesh (October 25, 2008): **Pheasants.** Lal Bahadur Shastri National Academy of Administration, Mussoorie.

Shri R. Suresh Kumar (October 25, 2008): **The status and conservation of sea turtles in India.** Lal Bahadur Shastri National Academy of Administration, Mussoorie.

Shri A.K. Bhardwaj (November 3, 2008): **Ecotourism and Wildlife Management.** Corbett Tiger Reserve, Ramnagar.

Dr. Dhananjai Mohan (November 3-7, 2008): **Nature guide refresher course.** Forest Department, Uttarakhand.

Dr. K. Sankar (November 3-11, 2008): W**ildlife techniques tour for IFS Probationers.** Sariska Tiger Reserve, Rajasthan.

Dr. S.A. Hussain (November 3, 2008): **Wetland management.** Two weeks refresher course for SFS officers.

Dr. V.P. Uniyal (November 4, 2008): **Identification and conservation of butterflies**. Nature Guides Refreshers Course in Asan Conservation Reserve.

Dr. Y.V. Jhala (November 7, 2008): **Career prospects in wildlife science and management.** St. Joseph's Academy, Dehradun.

Dr. Ruchi Badola (November 11, 2008): **Environmental economics.** Participants of two-week General Refresher Course for in service SFS Officers. State Forest Service College, Dehradun.

Shri A.K. Bhardwaj (November 11, 2008): **Ecotourism.** State Forest Service College, Dehradun.

Dr. Bilal Habib (November 11, 2008): **Carnivores.** Lal Bahadur Shastri National Academy of Administration, Mussoorie.

Dr. P.K. Mathur (November 19, 2008): **Landscape management approach to conservation.** Indira Gandhi National Forest Academy, Dehradun.

Dr. Sushant Chowdhury (November, 19, 2008): **Protected area profile in India (National Parks, Sanctuaries, Biosphere Reserves and Zoos) and gene pool and conservation, ecology, behaviour, demography and breeding biology of Asian elephants.** Gurukul Kangri University, Haridwar.

Dr. Dhananjai Mohan (November 26, 2008): **Ecology of birds in New Forest.** SFSC, Dehradun.

Dr. K. Ramesh (November 27, 2008): **GIS and landscape ecology.** For participants of thematic workshop on Avian Biology, organized by Gurukul Kangri University, Haridwar and sponsored by Department of Science and Technology at WII.

Dr. V.B. Mathur (December 10, 2008): **Management Effectiveness Evaluation (MEE) of Protected Areas in India: Recent Experiences.** Advance Forest Management Course, 1986, Indira Gandhi National Forest Academy, Dehradun.

Shri A.K. Bhardwaj (December 11, 2008): **Project formulation and monitoring.** State Forest Service College, Dehradun.

Dr. B.K. Mishra (December 11, 2008): **Project design-monitoring and evaluation of ecodevelopment projects.** ToT workshop for Forest Officers. State Forest Service College, Dehradun.

Dr. Parag Nigam (December 16, 2008): **Immobilization and restraint tool in wildlife practice.** Centre of advanced studies in animal nutrition, Indian Veterinary Research Institute, Izatnagar.

Dr. Dhananjai Mohan (December 17, 2008): **Bird watching & botanisation.** Introductory tour of 2008-10 batch probationers, Indira Gandhi National Forest Academy, Dehradun.

Dr. Sushant Chowdhury (December 24-26, 2008): **Dimensions of wildlife conflicts in India, case studies of managing wild ungulates and mega-herbivores and legalities related to wild animal rescue and rehabilitation.** Training workshop lectures provided at Chandrapur, Maharashtra.

Dr. V.B. Mathur (December 29, 2008): **Protected area management in India: Issues and challenges.** Skill upgradation Course, Indira Gandhi National Forest Academy, Dehradun.

Shri A.K. Bhardwaj (December 31, 2008): **Periyar Tiger Reserve: A success story of ecodevelopment.** Indira Gandhi National Forest Academy, Dehradun.

Dr. K. Sankar (January 1, 2009): **Gaur conservation in India.** Professional skill up-gradation course, Indira Gandhi National Forest Academy, Dehradun.

Shri A.K. Bhardwaj (January 5, 2009): **Project formulation and evaluation.** State Forest Service College, Dehradun.

Shri A.K. Bhardwaj (January 9, 2008): **Challenges and opportunities of sustainable management of wasteland at the landscape level in context of PAs.** Amity School of Natural Resources and Sustainable Development, Amity University, Uttar Pradesh.

Dr. S.A. Hussain (January 12-16, 2009): **Subjects related to herpetology, carnivore biology, aquatic mammals, and wetland ecology and conservation.** Forest Research Institute University, Dehradun.

Dr. V.B. Mathur (January 13, 2009): **Management Effectiveness Evaluation (MEE) of protected areas in India: Recent experiences.** Training course for Indian Forest Service officers 1989-90 Batch, Indira Gandhi National Forest Academy, Dehradun.

Shri A.K. Bhardwaj (January 13, 2009): **Community participation in PAs network.** Indira Gandhi National Forest Academy, Dehradun.

Dr. B.S. Adhikari (January 14-19, 2009): **Himalayan forest ecosystems and their dynamics.** Forest Research Institute University, Dehradun.

Dr. Parag Nigam (January 16, 2008): **Immobilization and restraint tool in wild animal management.** IFS probationers (07-09) during the visit of the class.

Dr. J.A. Johnson (January 19, 2009): **Freshwater fish diversity and ecology.** M.Sc. Forestry, Forest Research Institute, University, Dehradun.

Dr. Dhananjai Mohan (January 21, 2009): **NWFPs of animal origin.** Forest Research Institute University, Dehradun.

Dr. Asha Rajvanshi (January 22, 2009): **The role of EIA in meeting millennium development goals.** Indira Gandhi National Forest Academy, Dehradun.

Dr. V.P. Uniyal (January 27-28, 2008): **Insects Diversity of Nanda Devi Biosphere Reserve (NDBR).** UNESCO consultation workshop for frontline staff of NDBR, Gopeshwer, Chamoli.

Dr. Ruchi Badola (January 27-30, 2009): **Ecodevelopment planning.** Forest Research Institute University, Dehradun.

Shri A.K. Bhardwaj (February 3-13, 2009): **Various topics on the module "Natural resource planning and management"** (4 Sessions). Forest Research Institute University, Dehradun.

Dr. Asha Rajvanshi (February 6, 2009): **Relevance of including biodiversity in impact assessment.** Indira Gandhi National Forest Academy, Dehradun.

Dr. Ruchi Badola (February 3-13, 2009): **Natural resource planning and management.** Forest Research Institute University, Dehradun.

Dr. B.K. Mishra (February 10 and 13, 2009): (i) **Interface resource conflict and strategies for managing biodiversity; and (ii) Participatory tools and techniques for micro-planning.** PG Diploma Course in Natural Resource Management. Forest Research Institute University, Dehradun.

Dr. Y.V. Jhala (February 10, 2009): **Methodology and outcome of the all India tiger population and status evaluation exercise.** Indira Gandhi National Forest Academy, Dehradun.

Dr. Y.V. Jhala (February 11, 2009): **The status of tigers, co-predators, prey and their habitat in India.** Indira Gandhi National Forest Academy, Dehradun.

Dr. K. Sankar (February 12, 2009): **Tiger re-introduction in Sariska Tiger Reserve, Rajasthan.** Indira Gandhi National Forest Academy, Dehradun.

Dr. Dhananjai Mohan (February 12, 2009): **Biodiversity assessment & legislation.** Indira Gandhi National Forest Academy, Dehradun.

Dr. Dhananjai Mohan (February 18, 2009): **Birds as ecosystem indicator.** Indira Gandhi National Forest Academy, Dehradun.

Dr. Ruchi Badola (February 20, 2009): **Environmental economics.** State Forest Service College, Dehradun.

Dr. B.K. Mishra (February 23 and 26, 2009): (i) **Linkages between conservation and development; and (ii) Conflicts in natural resource management and conflict resolution mechanisms.** Forest Research Institute University, Dehradun.

Shri A.K. Bhardwaj (February 24, 2008): **Ecodevelopment.** State Forest Service College, Dehradun.

Dr. Gautam Talukdar (February 24-25, 2009): **Biodiversity and geoinformatics**. National Workshop on Biodiversity Informatics, Forest Research Institute University, Dehradun.

Shri R. Suresh Kumar (February 24-26, 2009): **Collation of studies on Olive Ridleys & Gaps in Research.** IUCN–Dhamra consultative technical workshop held in Bhubaneswar, Orissa.

Dr. Dhananjai Mohan (February 25, 2009): **Bird watching.** Indian Military Academy, Dehradun.

Dr. Y.V. Jhala (March 5, 2009): **Conservation of tigers in India: Need, problems and way ahead.** Indira Gandhi National Forest Academy, Dehradun.

Dr. Ruchi Badola (March 11, 2009): **The science of ecosystem services.** Course for senior IFS officers on Ecosystem Services - Valuation and Policy, TERI, New Delhi.

Shri S.K. Gupta (March 28, 2009): **Scientific evidence in wildlife justice.** "Biologik09" organized by Beehive PG College and ONGC, Dehradun at ONGC Auditorium.

Resource Speakers at WII

Dr. Rajesh Gopal, Member Secretary, National Tiger Conservation Authority (April 9, 2008). **Preparation of Tiger Conservation Plan & related aspects' to the participants of the 'Wildlife Management Planning.**

Dr. Liana Joseph, visiting scientist from Australia (April 10, 2008). **Conservation planning: making good management decisions.**

Dr Trevor Price, Professor, University of Chicago and collaborator in the project 'Bird species numbers and densities in East and West Himalayas' with WII (June 30, 2008). **Bird species richness in East and West Himalayas: Preliminary findings.**

Dr. Michael Fors, Director of Strategy, Analytics and Operations for the New Premium Mobile Experiences Division at Microsoft Corporation, USA (July 11, 2008). **Leadership and Team Development.**

Dr. Harish Kumar, Scientist and Project Manager e-governance, ICFRE (August 14, 2008). **Experiences of e-governance at ICFRE.**

Dr. H.S. Singh, CCF, Gujarat Forest Research Institute. (January 23, 2009) **Conservation of Lions in Gir Landscape.**

accounts

Separate Audit Report of the Comptroller and Auditor General of India on the Accounts of Wildlife Institute of India for the year ended 31 March 2009

We have audited the attached Balance Sheet of Wildlife Institute of India, Dehradun (WII) as on 31 March 2009, the Income & Expenditure Account and the Receipts & Payment Account for the year ended on that date under Section 19(2) of the Comptroller & Auditor General's (Duties, Powers & Conditions of Service) Act, 1971 read with Section 38G of the Wildlife (Protection) Act, 1972. These financial statements are the responsibility of the WII's management. Our responsibility is to express an opinion on these financial statements based on our audit.

2. This Separate Audit Report contains the comments of the Comptroller and Auditor General of India (CAG) on the accounting treatment only with regard to classification, conformity with the best accounting practices, accounting standards and disclosure norms, etc. Audit observations on financial transactions with regard to compliance with the Law, Rules & Regulations (Propriety and Regularity) and efficiency-cum-performance aspects, etc., if any, are reported through Inspection Reports/CAG's Audit Reports separately.

3. We have conducted our audit in accordance with auditing standards generally accepted in India. These standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatements. An audit includes examining, on a test basis, evidences supporting the amounts and disclosure in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of financial statements. We believe that our audit provides a reasonable basis for our opinion.

4. Based on our audit, we report that:

(i) We have obtained all the information and explanations, which to the best of our knowledge and belief were necessary for the purpose of our audit;

(ii) The Balance Sheet, Income & Expenditure Account and Receipt & Payment Account dealt with by this report have been drawn up in the format approved by the Ministry of Finance.

(iii) In our opinion, proper books of accounts and other relevant records have been maintained by the Wildlife Institute of India as required under Section 38G of the Wildlife (Protection) Act, 1972 in so far as it appears from our examination of such books.

(iv) We further report that:

A. Balance Sheet

1. Current Assets, Loans and Advances (Schedule 11)

TDS ofRs. 2,49,865 deducted by the Bank, has not been accounted. The amount deducted towards TDS is required to be reflected in Schedule 11 (Current Assets) as claims receivable. This has resulted in under-statement of Current Assets by Rs. 249865/-

Liability

2. Accrued income (Pre-receipted bill issued but not received) amounting to Rs 730970/- for the year 2006-07 was booked twice. This has

resulted in increase of capital fund by Rs 730970/-

3. During the year 2007-08 Rs 730790/- was shown under "Pre-receipted bill issued but not received" in respect of consultancy projects. The said amount has however been not reflected in the separate Account maintained for the consultancy project in schedule No 3 (earmarked/ endowment fund) of Balance Sheet.

B Income & Expenditure A/c

Overstatement of Income

1. Funds amounting to Rs 2886503 received for consultancy projects/outside funded projects during the financial year, were wrongly shown under the head "Other income" (Schedule 18) of income & expenditure Account. The funds received for expenditure on specific purpose/project should be booked under earmarked/ endowment fund (Schedule 3). This resulted in overstatement of income to the extent ofRs 28.87 lakh .

C. Grants in aid

Out of the grants in aid of Rs. 16.20 crore received during the year, the organization utilized a sum of Rs. 16.20 crore as on 31st March 2009.

D. Management letter: Deficiencies which have not been included in the Audit Report have been brought to the notice of the Director, WII through a management letter issued separately for remedial/corrective action.

(v) Subject to our observations in the preceding paragraphs, we report that the Balance Sheet, Income & Expenditure Account and Receipt & Payment Account dealt with by this report are in agreement with the books of accounts.

(vi) In our opinion and to the best of aliI' information and according to the explanations given to us, the said financial statements read together with the Accounting Policies and Notes on Accounts, and subject to the significant matters stated above and other matters mentioned in Annexure to this Audit Report give a true and fair view in conformity with accounting principles generally accepted in India.

A. In so far as it relates to the Balance Sheet, of the state of affairs of the Wildlife Institute of India as at 31 March 2009; and

B. In so far as it relates to Income & Expenditure Account of the surplus for the year ended on that date.

For and on behalf of the C&AG of India

Principal Director of Audit (SD)

Place: New Delhi
Date: 23/10/09

Annexure

(i) Adequacy of Internal Audit System:

Internal audit in the WII is to be done by the Internal Audit Officer. However at present no internal audit is being conducted as the Internal Audit Officer is looking after the responsibilities of the Finance Officer since August 2007.

(ii) Adequacy of Internal Control System:

There is scope of some improvement in the internal control system of the Wildlife Institute of India as the following deficiency was noticed:

Assets Register is required to be maintained and the progressive total of assets is to be tallied with figures of fixed assets shown in the Balance Sheet to verify the value of assets. On scrutiny of register maintained for the year 2008-09, it was observed that complete particulars of assets procured were not mentioned in various cases. In the absence of proper Assets Register, the total value of fixed assets amounting to Rs. 1936.59 lakh shown in the Balance Sheet could not be verified in Audit.

(iii) System of Physical Verification of Assets

The physical verification of assets had not been carried .out for the years 2006-07 and 2008-09. In the absence of physical verification of assets the availability of fixed assets amounting to Rs.1936.59 lakh as shown in the Balance Sheet at the close of financial year 2008-09 could not be verified in Audit. The Institute stated (August 2009) that the physical verification of fixed assets is in process.

WILDLIFE INSTITUTE OF INDIA
Receipts & Payment Accounts for financial year 2008-09

RECEIPTS				PAYMENT			
Particulars	**Plan**	**Non Plan**	**Total**	**Particulars**	**Plan**	**Non Plan**	**Total**
(A) GRANT-IN-AID							
To Opening Balance				By Salaries & Allowance	50,563,219.00	11,000,000.00	61,563,219.00
Cash in Hand	**215,106.00**	0	**215,106.00**	By Honorarium	65,550.00		65,550.00
Cash in Bank	**3,913,684.00**	0	**3,913,684.00**	By Fellowship	431,643.00		431,643.00
To Internal Loan	879,353.00		879,353.00	By Wages	983,533.00		983,533.00
To Grant -In-Aid From MoEF	151,000,000.00	11,000,000.00	162,000,000.00	By Travel Expenses	2,658,475.00		2,658,475.00
To Recovery & Advance to staff				By Postage & Telegram	239,783.00		239,783.00
(Loan & Advance)		363,107.00	363,107.00				
To Interests on Loan & Advance to Staff		154,691.00	154,691.00	By Electricity & Water	4,231,632.00		4,231,632.00
To Grants for Other Projects	7,188,423.00		7,188,423.00	By Conveyance Charges	12,862.00		12,862.00
To Hostel Caution Money		40,550.00	40,550.00	By Medical Expenses	3,473,745.00		3,473,745.00
To TDS		38,721.00	38,721.00	By Operational Expenditure	1,539,912.00		1,539,912.00
To CGEGIS		195.00	195.00	By OTA	630,588.00		630,588.00
To Bank Loans of Staff		400.00	400.00	By POL for Vehicle/DG Set	3,296,657.00		3,296,657.00
To Rent		422,638.00	422,638.00	By Repair and maintenance of Veh.	1,702,507.00		1,702,507.00
To Bus Charges		90,749.00	90,749.00	By Publicaton, Film etc.	1,083,904.00		1,083,904.00
To WII Product		105,834.00	105,834.00	By Stationery & Computer Consumables	1,393,395.00		1,393,395.00
To Interest on Bank Deposit		1,039,247.00	1,039,247.00	By Repair & Maintenance of Equipment & Furniture	218,042.00		218,042.00
To Misc. Receipts		142,505.00	142,505.00	By Computer & Assessories	823,935.00		823,935.00
M.Sc. Course Fee	212,987.00		212,987.00	By Furniture & Fixtures	140,400.00		140,400.00
			0.00	By Journals & Periodicals	4,894,846.00		4,894,846.00
			0.00	By Lab Expenses (Research Lab)	1,116,771.00		1,116,771.00
			0.00	By Lab Equipment (Research Lab)	513,570.00		513,570.00
			0.00	By Office Equipment	186,315.00		186,315.00
			0.00	By Training Equipment	128,939.00		128,939.00
			0.00	By Library Book	906,777.00		906,777.00
			0.00	By GPF	1,536.00		1,536.00
			0.00	By EMD RELEASE		17,305.00	17,305.00
			0.00	By AMC of Computers	1,030,164.00		1,030,164.00

			0.00	By Annual Research Seminar	514,459.00		514,459.00
			0.00	By Bonus	496,178.00		496,178.00
			0.00	By Estate Maintenance/Management	2,305,875.00		2,305,875.00
			0.00	By Estate Security	4,711,585.00		4,711,585.00
			0.00	By Leave Salary & Pension Cont.	1,419,171.00		1,419,171.00
			0.00	By Legal Expenses	882,109.00		882,109.00
			0.00	By LTC	450,547.00		450,547.00
			0.00	By LTC Advance	301,126.00		301,126.00
			0.00	By M. Sc. Course Expenditure	940,066.00		940,066.00
			0.00	By Advance for Exp (FA/TA M.SC)	431,287.00		431,287.00
			0.00	By Printing & binding	154,925.00		154,925.00
			0.00	By Sports Goods	298,275.00		298,275.00
			0.00	By Telephone & Tc	605,445.00		605,445.00
			0.00	By Transferred to Trg A/c for Exp	5,000,000.00		5,000,000.00
			0.00	By Workshop/ Seminar	219,387.00		219,387.00
			0.00	By Adv to CPWD for Civil Works	14,000,278.00		14,000,278.00
			0.00	By Lab Equipment(Forensic Lab)	1,049,943.00		1,049,943.00
			0.00	By Lab Expenses (Forensic Lab)	1,654,362.00		1,654,362.00
			0.00	By Govt. Cont to Pension Fund	5,000,000.00		5,000,000.00
			0.00	By Sharing of cost of K. V.	2,300,000.00		2,300,000.00
			0.00	Travel Advance (Research Project)	3,931.00		3,931.00
			0.00	By Office Eqpt (Research Project)	2,025,839.00		2,025,839.00
			0.00	By Camp Exp. (Research Project)	3,624,184.00		3,624,184.00
			0.00	By Fellowship & Wages (Research Project)	9,368,867.00		9,368,867.00
			0.00	By POL & Maintenance of Vehicle (Research Project)	3,258,690.00		3,258,690.00
			0.00	By Travel Exp. (Research Project)	2347414.00		2,347,414.00
			0.00	By Camp Eqpt (Research Project)	2930940.00		2,930,940.00
			0.00	**By Closing in Bank**		**17023965.00**	**17,023,965.00**
			0.00	**By Closing in Hand**		**203337.00**	**203,337.00**
A' Total	**163,409,553.00**	**13,398,637.00**	**176,808,190.00**	**A' Total**	**148,563,583.00**	**28,244,607.00**	**176,808,190.00**

(B) TRAINING ACCOUNT

RECEIPTS				PAYMENT			
Particulars	**Plan**	**Non Plan**	**Total**	**Particulars**	**Plan**	**Non Plan**	**Total**
To Opening Balance in Bank		**7,005,060.00**	*7,005,060.00*	By Camp Equipment		194,978.00	194,978.00
Grant Received		5,000,000.00	5,000,000.00	By Office Equipment		18,280.00	18,280.00
Interest Received		191,117.00	191,117.00	By Sports Items		19,000.00	19,000.00
Other Receipts		1,301,218.00	1,301,218.00	By Contingencies		379,492.00	379,492.00
				By Training Allowance		623,799.00	623,799.00
				By Travelling Expenses		1,149,933.00	1,149,933.00
				TA/DA & Honorarium Guest Faculty		437,091.00	437,091.00
				Stationery Items		102,248.00	102,248.00
				POL & Maintenance of Vehicle		455,465.00	455,465.00
				Boarding & Lodging		1,674,274.00	1,674,274.00
				By Advance for Expenses (FA)		573,904.00	573,904.00
				By Advance for Expenses (TA)		28,000.00	28,000.00
				By Closing in Bank		**7,840,931.00**	**7,840,931.00**
B' Total	**0.00**	**13,497,395.00**	**13,497,395.00**	**B' Total**	**0.00**	**13,497,395.00**	**13,497,395.00**

(C) PENSIONS

RECEIPTS				PAYMENT			
Particulars	**Plan**	**Non Plan**	**Total**	**Particulars**	**Plan**	**Non Plan**	**Total**
To Opening Balance in Bank		**117,947.00**	**117,947.00**	By Investment in FDR (Pension Fund)		5,000,000.00	5,000,000.00
To Interest (Pension A/c)		13,367.00	13,367.00	By Commuted Value of Pension		255,653.00	255,653.00
To WII Contribution		8,818,691.00	8,818,691.00	By Pension/ Family Pension		1,358,215.00	1,358,215.00
				By Closing in Bank		**2336137.00**	**2,336,137.00**
C' Total	**0.00**	**8,950,005.00**	**8,950,005.00**	**C' Total**		**8,950,005.00**	**8,950,005.00**

(D) GPF

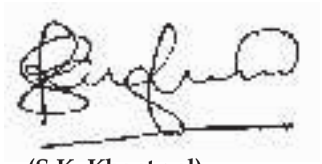
RECEIPTS				PAYMENT			
Particulars	**Plan**	**Non Plan**	**Total**	**Particulars**	**Plan**	**Non Plan**	**Total**
To Opening Balance (Bank)		**2,378,258.00**	**2,378,258.00**	By Final Payment		1,360,874.00	1,360,874.00
To Opening Balance (Cash)		**7,080.00**	**7,080.00**	By Advance/withdrawl		3,838,912.00	3,838,912.00
To GP Fund Contribution		7,434,353.00	7,434,353.00	**By Closing in Bank**		**4,700,181.00**	**4,700,181.00**
To Interest on Bank Deposit		80,276.00	80,276.00				
D' Total	**0.00**	**9,899,967.00**	**9,899,967.00**	**D' Total**		**9,899,967.00**	**9,899,967.00**

(E) CORPUS FUND

RECEIPTS				PAYMENT			
Particulars	**Plan**	**Non Plan**	**Total**	**Particulars**	**Plan**	**Non Plan**	**Total**
To Opening Balance in Bank		**2378302.00**	**2378302.00**	By Investment in FDR (GPF)		2,169,526.00	2,169,526.00
Misc Receipts		173,044.00	173,044.00	**By Closing in Bank**		**392789.00**	**392,789.00**
Interests on Saving A/c		10,969.00	*10,969.00*				
E' Total	**0.00**	**2,562,315.00**	**2,562,315.00**	**E' Total**		**2,562,315.00**	**2,562,315.00**

(F) CONSULTANCY PROJECTS

RECEIPTS				PAYMENT			
Particulars	**Plan**	**Non Plan**	**Total**	**Particulars**	**Plan**	**Non Plan**	**Total**
To Opening Balance in Bank		12,652,041.00	12,652,041.00	By Camp Equipment		661,824.00	661,824.00
Grant Received		12,031,227.00	12,031,227.00	By Office Equipment		50,930.00	50,930.00
Interest Earned on Saving A/c		257,257.00	257,257.00	By Camp Expenses		3,000.00	3,000.00
				By Contingenciges/Misc		1,617,822.00	1,617,822.00
				By Fellowship & Wages		1,397,868.00	1,397,868.00
				By Travel Expenses		1993693	1,993,693.00
				By POL & Maintenance of vehicle		508202	508,202.00
				By GIS of office Data		189561	189,561.00
				By Advance for Expenses (FA)		877814	877,814.00
				By Advance for expences(Travel)		149900	149,900.00
				By Boarding & Lodging		1434029	1,434,029.00
				By Corpus Fund		132932	132,932.00
				By Amount Transf to A/c No. 60		246076	246,076.00
				By Closing in Bank		**15676874**	**15,676,874.00**
F' Total	**0.00**	**24,940,525.00**	**24,940,525.00**	**F' Total**		**24,940,525.00**	**24,940,525.00**
Grand Total (A+B+C+D+E+F)	**163,409,553.00**	**73,248,844.00**	**236,658,397.00**	**Grand Total (A+B+C+D+E+F)**	**148,563,583.00**	**88,094,814.00**	**236,658,397.00**



(S.K. Khantwal)
Finance Officer

(P.R. Sinha)
Director

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATION)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
BALANCE SHEET AS ON 31 MARCH 2009

(Amt. Rs.)

CORPUS /CAPITAL FUND AND LIABILITIES	Schedule	Current Year	Previous Year
CORPUS /CAPITAL FUND	**1**	269466187.00	279156087.00
RESERVE AND SURPLUS	**2**	0.00	0.00
EARMARKED/ENDOWMENT FUND	**3**	15676874.00	0.00
SECURED LOAN AND BORROWINGS	**4**	0.00	0.00
UNSECURED LOAN AND BORROWINGS	**5**	1097956.00	416356.00
DEFERRED CREDIT LIABILITIES	**6**	0.00	0.00
CURRENT LIABILITIES AND PROVISION	**7**	129395953.00	107041395.00
TOTAL (A)		**415636970.00**	**386613838.00**
ASSETS			
FIXED ASSETS	**8**	193659258.00	199591680.00
INVESTMENTS- FROM EARMARKED / ENDOWMENT FUNDS	**9**	0.00	0.00
INVESTMENTS- OTHERS	**10**	139319182.00	130148016.00
CURENT ASSETS, LOANS, ADVANCES ETC.	**11**	82658530.00	56874142.00
MISCELLANEOUS EXPENDITURE (to the extent not written off or adjusted)			
TOTAL (B)		**415636970.00**	**386613838.00**

(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 31 MARCH 2009

		(Amt. Rs.)	
SCHEDULE 1: CORPUS/ CAPITAL FUND		**Current Year**	**Previous Year**
Balance as at the beginning of the year		245408141.00	224348008.00
Add: Contribution towards Corpus/ Capital fund		31996375.00	36999763.00
Less : Fixed/Current Assets & Pre Receipted Bill of Consultancy Project (9255802+12652046+1144285+730970)		-23783103.00	0.00
Add/(Deduct) : Balance of net income (expenditure) transferred from		-20760500.00	-15939630.00
TOTAL	**A**	**232860913.00**	**245408141.00**
Corpus Fund			
Opening Balance		33747946.00	25453195.00
Received during the year		184013.00	4690837.00
Add Accrued Interest		2673315.00	2709288.00
Add Previous year balance which is not accounted for		0.00	894626.00
Total	**B**	**36605274.00**	**33747946.00**
Total A+B		**269466187.00**	**279156087.00**
SCHEDULE 3 : EARMARKED/ ENDOWMENT FUNDS			
a) Opening Balance of the Funds		**12652041.00**	0.00
b) **Addition to the Funds:**			
i. Grants received		12031227.00	0.00
ii. Income from investment made on accounts of funds			
iii Interests received		257257.00	0.00
Total		**12288484.00**	0.00
TOTAL (a+b)		**24940525.00**	**0.00**
c) **Utilisation/Expendition towards objectives of funds**			
i. Capital Expenditure			
Fixed Assets			
Camp Equipment		661824.00	0.00
Office Equipment		50930.00	0.00
Others		0.00	0.00
TOTAL		**712754.00**	0.00

ii. Revenue Expenditure		
Camp Expenses	3000.00	0.00
Contingencies/Misc	1617822.00	0.00
Fellowship and Wages	1397868.00	0.00
Travel Expenses	1993693.00	0.00
POL & Maint. Of Vehicle	508202.00	0.00
GIS & Office Data	189561.00	0.00
Advances for Expenses (FA)	877814.00	0.00
Advances for Expenses (TA)	149900.00	0.00
Boarding & Lodging	1434029.00	0.00
Transferred to Corpus Funds	132932.00	0.00
Amount Transferred to others accounts	246076.00	0.00
TOTAL	**8550897.00**	0.00
TOTAL (c)	**9263651.00**	0.00
NET BALANCE AS AT THE YEAR -END (a+b-c)	**15676874.00**	0.00
TOTAL	**15676874.00**	0.00

SCHEDULE 5 : UNSECURED LOANS AND BORROWINGS		
(1) Central Govt.	0.00	
(2) State Govt.(Specify)	0.00	
(3) Financial Institutions	0.00	
(4) Banks		
(i) Term Loans	0.00	
(ii) Others (specify)	0.00	
(5) Other Institutions and Agencies	0.00	
(6) Debentures and Bonds	0.00	
(7) Fixed Deposits		
(8) Others (Specify)		
Security Deposit	**350525.00**	378235.00
Loans	**747431.00**	38121.00
TOTAL	**1097956.00**	**416356.00**

SCHEDULE 7 : CURRENT LIABILITIES AND PROVISION		
(A) CURRENT LIABILITIES		
(1) Acceptances		
(2) Sundry Creditors		
(1) For Goods		
(2) For Others		
Payment outstanding for Research Project (2007-08) (33114+67475)	100589.00	1225099.00
Payment outstanding for Research Project (2008-09) (133513+ 155193)	288706.00	0.00
Payment outstanding for Training A/C	0.00	1030.00
Payment outstanding for Cons Project	0.00	59884.00
Payment outstanding for Supply of items(2005-06)	15932.00	100346.00
Payment outstanding for 2006-07	0.00	500000.00
Other Payments outstanding(Grant-in-aid) (07-08) (280473+339757)	620230.00	3095350.00
Other Payments outstanding(Grant-in-aid) (08-09) (3034878 + 5092486)	8127364.00	0.00
(3) Advances Received		
Hostel Caution Money	68260.00	27710.00
(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	85623271.00	73597061.00
GP Fund	33788003.00	27684597.00
(6) Others (Specify)		
EMD Received	691853.00	709158.00
TOTAL (A)	**129324208.00**	**107000235.00**
(B) Provisions		
(1) For Taxation		
TDS	**64553.00**	25832.00
TDS (Training A/c)	**304.00**	304.00
(2) Gratuity		
(3) Superannuation/ Pension		
(4) Accumulated Leave Encashment		
(5) Trade Warranties/ Claims		
(6) Others (Specify)		
Cable		
GPF	**924.00**	2460.00
Bank Loans	**400.00**	
Car/Scooter Adv. (Transferrable)		
Sale Tax/Trade Tax/Prof.Tax/ Com. Tax		
EPF Subscription	**5564.00**	5564.00
EMD Const. Project	0.00	7000.00
TOTAL (B)	**71745.00**	**41160.00**
TOTAL (A+ B)	**129395953.00**	**107041395.00**

SCHEDULE 8: FIXED ASSETS

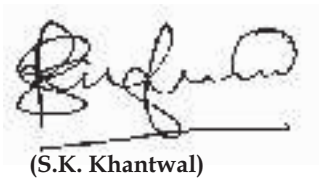
Pariculars	Gross Block					DEPRECIATION				NET BLOCK	
	Cost as at the beginning of the year	Addition during the year		Deduction during the year	Cost as at the end of the year	As at the beginning of the year	For the year	Deduction during the year	At the end of the year	As at the current year-end	As at the Previous year-end
		Upto 30-Sep	After 30-Sep								
LAND											
BLOCK: 0%											
Avenue Plantations	3438280.00	0.00	0.00	0.00	3438280.00	0.00	0.00	0.00	0.00	3438280.00	**3438280.00**
Land	6607214.58	0.00	0.00	0.00	6607214.58	0.00	0.00	0.00	0.00	6607214.58	**6607214.58**
Trees	2432709.00	0.00	0.00	0.00	2432709.00	0.00	0.00	0.00	0.00	2432709.00	**2432709.00**
TOTAL	**12478203.58**	**0.00**	**0.00**	**0.00**	**12478203.58**	**0.00**	**0.00**	**0.00**	**0.00**	**12478203.58**	**12478203.58**
BUILDINGS											
BLOCK: 10%											
Architectural & Supervision Fee	4763293.25	0.00	0.00	0.00	4763293.25	529254.81	476329.33	0.00	476329.33	4286963.93	**4763293.25**
Auditorium	7132888.51		0.00	0.00	7132888.51	792543.17	713288.85	0.00	713288.85	6419599.66	**7132888.51**
Boundary Fencing	434684.45	0.00	0.00	0.00	434684.45	48298.27	43468.45	0.00	43468.45	391216.01	**434684.45**
Boundary Wall	768570.33	0.00	0.00	0.00	768570.33	85396.70	76857.03	0.00	76857.03	691713.29	**768570.33**
Building Complex	90508184.06	0.00	9037404.00	0.00	99545588.06	9370878.34	9502688.61	0.00	9502688.61	90042899.46	**90508184.06**
Campus Development	10748901.95	0.00	1381516.00	0.00	12130417.95	1013015.10	1143965.99	0.00	1143965.99	10986451.95	**10748901.95**
Materials and Supplies	2060074.91	0.00	0.00	0.00	2060074.91	228897.21	206007.49	0.00	206007.49	1854067.42	**2060074.91**
Tennis Court	282116.64	0.00	0.00	0.00	282116.64	31346.29	28211.66	0.00	28211.66	253904.97	**282116.64**
Sports Complex	178762.32	0.00	0.00	0.00	178762.32	19862.48	17876.23	0.00	17876.23	160886.09	**178762.32**
BLOCK: 20%							0.00		0.00		
Road & Culvert	599502.11	0.00	0.00	0.00	599502.11	149875.53	119900.42	0.00	119900.42	479601.69	**599502.11**
Staff Quarters	1309372.41	0.00	5476000.00	0.00	6785372.41	261102.98	809474.48	0.00	809474.48	5975897.93	**1309372.41**
TOTAL	**118786350.94**	**0.00**	**15894920.00**	**0.00**	**134681270.94**	**12530470.88**	**13138068.55**	**0.00**	**13138068.55**	**121543202.40**	**118786350.94**
PLANT MACHINERY & EQUIPMENT											
BLOCK: 20%											
Vehicle	1488244.50	0.00	0.00	0.00	1488244.50	372061.13	297648.90	0.00	297648.90	1190595.60	**1488244.50**
Development of Forensic Laboratory	6008489.84	**510351.00**	539592.00	0.00	7058432.84	1366598.58	1357727.37	0.00	1357727.37	5700705.47	**6008489.84**
Training Equipment	1394732.50	**127139.00**	1800.00	0.00	1523671.50	293849.37	304554.30	0.00	304554.30	1219117.20	**1394732.50**
BLOCK: 25%											
AC Plant	1555859.27	0.00	0.00	0.00	1555859.27	518619.76	388964.82	0.00	388964.82	1166894.45	**1555859.27**
Camp Equipment (project)	422977.27	0.00	0.00	0.00	422977.27	140992.43	105744.32	0.00	105744.32	317232.95	**422977.27**
DG Set	350675.70	0.00	2338504.00	0.00	2689179.70	116891.90	379981.93	0.00	379981.93	2309197.78	**350675.70**
EPABX	298621.58	0.00	0.00	0.00	298621.58	95540.53	74655.40	0.00	74655.40	223966.19	**298621.58**
Lab Equipment	7145180.62	**155073.00**	358497.00	0.00	7658750.62	2294178.71	1869875.53	0.00	1869875.53	5788875.09	**7145180.62**
Office Equipment	4171556.10	**59575.00**	126740.00	0.00	4357871.10	1330044.87	1073625.27	0.00	1073625.27	3284245.82	**4171556.10**

Training Equipment (Training A/c)	6863834.82	0.00	194978.00	0.00	7058812.82	2205498.35	1740330.96	0.00	1740330.96	5318481.87	**6863834.82**
Office Equipment (Project)	20655.00	0.00	0.00	0.00	20655.00	6885.00	5163.75	0.00	5163.75	15491.25	**20655.00**
Office Equipment (Research Project)	2329772.71	**821166.00**	1204673.00	0.00	4355611.71	582443.18	938318.80	0.00	938318.80	3417292.91	**2329772.71**
Camp Equipment (Research Project)	5229664.69	**970386.00**	1960554.00	0.00	8160604.69	930722.40	1795081.92	0.00	1795081.92	6365522.77	**5229664.69**
TOTAL	**37280264.59**	**2643690.00**	**6725338.00**	**0.00**	**46649292.59**	**10254326.21**	**10331673.26**	**0.00**	**10331673.26**	**36317619.33**	**37280264.59**
FURNITURE, FIXTURES											
BLOCK : 15%											
Furinitures & Fixtures	8340730.59	**140400.00**	0.00	0.00	8481130.59	1412401.61	1272169.59	0.00	1272169.59	7208961.00	**8340730.59**
Furniture & Fixture	8326.05	0.00	0.00	0.00	8326.05	1469.25	1248.91	0.00	1248.91	7077.14	**8326.05**
TOTAL	**8349056.64**	**140400.00**	**0.00**	**0.00**	**8489456.64**	**1413870.86**	**1273418.50**	**0.00**	**1273418.50**	**7216038.14**	**8349056.64**
OFFICE EQUIPMENT					0.00						
BLOCK : 20%					0.00						
Office Equipment (Training A/c)	197303.00	0.00	0.00	0.00	197303.00	49325.76	39460.60	0.00	39460.60	157842.40	**197303.00**
TOTAL	**197303.00**	**0.00**	**0.00**	**0.00**	**197303.00**	**49325.76**	**39460.60**	**0.00**	**39460.60**	**157842.40**	**197303.00**
COMPUTER/PERIPHERALS											
BLOCK : 20%											
Computer and Periphrals	1532882.29	0.00	0.00	0.00	1532882.29	383220.57	306576.46	0.00	306576.46	1226305.83	**1532882.29**
BLOCK : 60%					0.00						
Computer & Accessories	3570150.72	**22024.00**	820191.00	0.00	4412365.72	4131710.58	2401362.13	0.00	2401362.13	2011003.59	**3570150.72**
TOTAL	**5103033.01**	**22024.00**	**820191.00**	**0.00**	**5945248.01**	**4514931.15**	**2707938.59**	**0.00**	**2707938.59**	**3237309.42**	**5103033.01**
LIBRARY BOOKS											
BLOCK : 10%											
Journals & Periodicals	6925914.73	**1442651.00**	3567765.00	0.00	11936330.73	701326.47	1015244.82	0.00	1015244.82	10921085.91	**6925914.73**
Correction during the year for Journals & Periodicals already included in Fixed Assets against advance payment during 2006-07 and shown as current Assets during 07-08.		**-167381.00**	0.00	0.00	-167381.00	0.00	0.00	0.00	0.00	-167381.00	**-167381.00**
Library Books	1215752.30	**5550.00**	901227.00	0.00	2122529.30	129798.20	167191.58	0.00	167191.58	1955337.72	**1215752.30**
TOTAL	**8141667.03**	**1280820.00**	4468992.00	**0.00**	**13891479.03**	**831124.67**	**1182436.40**	**0.00**	**1182436.40**	**12709042.63**	**8141667.03**
GRAND TOTAL	**190335878.79**	**4086934.00**	**27909441.00**	**0.00**	**222332253.79**	**29594049.53**	**28672995.89**	**0.00**	**28672995.89**	**193659257.90**	**190335878.79**

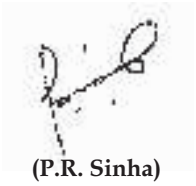
* Last year value of Fixed Assets was Rs. 199591680.46, which has now been revised to Rs. 190335878.79 due to exclusion of Fixed Assets for Consultancy Projects as per observations/directions of audit (C&AG).

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) Subsidaries and Joint Ventures		
(6) Others (Specify)		
Investment in FDR (Pension Fund)	59183272.00	48853190.00
Interest Accrued in FDR (Pension Fund)	0.00	5317924.00
Investment in FDR (GPF)	19872740.00	16540888.00
Interest Accrued in FDR (GPF)	0.00	1342370.00
FDR Corpus Fund	33539170.00	28660356.00
Interest Accrued in FDR (Corpus Fund)	0.00	2709288.00
TOTAL	**139319182.00**	**130148016.00**
SCHEDULE :11 CURRENT ASSETS, LOANS, ADVANCES ETC.		
(A) CURRENT ASSETS		
(1) Inventories		
Closing Stock of Steel & Cement	131275.00	131275.00
Advance paid for Journals (Grant in Aid)	106281.00	99439.00
Closing Balance of WII Publication	1005445.00	1086471.00
CGEGIS	45.00	240.00
(2) Sundry Debtors		
(1) Debts Outstanding for a period exceeding six months	104926.00	227338.00
(2) Others (Specify)		
(3) Cash balances in hand (including cheques/drafts and imprest)		
Grant-in-Aid A/c	203337.00	215106.00
Training A/c	0.00	0.00
Consultancy A/c	0.00	0.00
Pension Fund A/c	0.00	0.00
GPF A/c	0.00	7080.00
(4) Bank Balances		
(1) With Scheduled Banks		
Grant-in-Aid A/c	17023965.00	3913684.00
Training A/c	7840931.00	7005060.00
Consultancy A/c	0.00	12652046.00
Pension Fund A/c	2336137.00	117947.00
GPF A/c	4700181.00	2378259.00
Corpus fund No 4032	392789.00	2378302.00
Endowment/Earmarked Funds	15676874.00	0.00
TOTAL (A)	**49522186.00**	**30212247.00**

(B) LOANS, ADVANCES AND OTHER ASSETS		
(1) Loans		
(1) Staff		
Loan & Advances to Staff	1174023.00	1537130.00
Advance for expenses to Staff (289885+757377+506287+301126)	1854675.00	1492851.00
Advance for Expenses to Staff (Training A/c) (573904+28000)	601904.00	1385602.00
Advance for expenses (Res. Projects) (2571274+498071+199757+186836)	3455938.00	3131204.00
Advance for expenses (Conslt. Project)	0.00	1144285.00
(2) Other entities engaged in activities /objectives similar to		
(3) Others (Specify)		
Adv for civil work to CPWD	10272485.00	14505631.00
Loan to Other A/c To A/c No. 4032	15774.00	15774.00
Loan to A/c No. 60	0.00	170043.00
Advance paid to firms for Training A/c	0.00	158000.00
(2) Advances and other amounts recoverable in cash or in kind or		
(1) On Capital Accounts	0.00	0.00
(2) Prepayments	0.00	0.00
(3) Others (Specify)	0.00	0.00
Advance for Training Expenses	0.00	0.00
(3) Income Accrued		
(1) On Investments from Earmarked / Endowment Funds		
(2) On Invesments -Others		
Interest Accrued in FDR (Pension Fund)	4795862.00	0.00
Interest Accrued in FDR (GPF)	1799082.00	0.00
Interest Accrued in FDR (Corpus Fund)	2673315.00	0.00
(3) On Loans and Advances		
(4) Others (Specify)		
Training Cost Accrued But not Received	838375.00	838375.00
Pre-receipted bill issued but not received	0.00	730970.00
(4) Expenses payable towards capital/fixed Assets		
(1) Research Projects for 2007-08	67475.00	798855.00
(1) Research Projects for 2008-09	155193.00	0.00
(2) Grant in Aid A/c 2007-08	339757.00	753175.00
(2) Grant in Aid A/c 2008-09	5092486.00	
TOTAL (B)	**33136344.00**	**26661895.00**
TOTAL (A+B)	**82658530.00**	**56874142.00**



(S.K. Khantwal)
Finance Officer



(P.R. Sinha)
Director

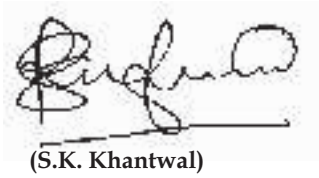
FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)

Wildlife Institute of India, Dehradun

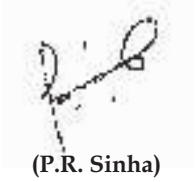
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2008-09

(Amt. Rs.)

	Schedule	Current Year	Previous Year
INCOME			
Income from Sales/Services	12	0.00	0.00
Grants/Subsidies	13	130003625.00	83000237.00
Fees/Subscriptions	14	6514205.00	9519148.00
Income from Investments (Income on Invest from earmarked/endowment Funds transferred to Funds)	15	0.00	0.00
Income from Royalty, Publication etc	16	761726.00	1035550.00
Interest Earned	17	1385055.00	1496053.00
Other Income	18	7188423.00	22337348.00
Increase/decrease in stock of Finished goods and works-in-progress	19	0.00	0.00
TOTAL (A)		**145853034.00**	**117388336.00**
EXPENDITRUE			
Establishment Expenses (Plan & Non Plan)	20	80070199.00	56262329.00
Other Administrative Expenses (Plan & Non Plan)	21	57870339.00	43678676.00
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)		28672996.00	33386961.00
Total (B)		**166613534.00**	**133327966.00**
Balance being excess of Income over Expenditure (A-B)		**-20760500.00**	**-15939630.00**
BALANCE BEING SURPLUS (DEFICIT) CARRIED TO CORPUS/CAPITAL FUND		**-20760500.00**	**-15939630.00**



(S.K. Khantwal)
Finance Officer



(P.R. Sinha)
Director

Financial Statement (Non-Profit Organization)

Wildlife Institute of India, Dehradun

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2008-09

	(Amt. Rs.)	
	Current Year	**Previous Year**
SCHEDULE :13 GRANTS/SUBSIDIES		
(1) Central Government		
Grant -in- Aid from MoEF	162000000.00	140000000.00
Less Received for 2007-08	0.00	-20000000.00
Amt capitalized (-)	-31996375.00	-36999763.00
Total	130003625.00	83000237.00
(2) State Governments (s)		
(3) Government Agencies	0.00	0.00
(4) Institutions/Welfare Bodies	0.00	0.00
(5) International Organisations	0.00	0.00
(6) Others (Specify)		
WII Contribution (Pension A/c)	0.00	0.00
TOTAL	**130003625.00**	**83000237.00**
SCHEDULE :14 FEES/ SUBSCRIPTIONS		
(1) Entrance Fees		
M.Sc.CourseM.Sc.Course Fee	212987.00	202700.00
(2) Annual Fees/ Subscriptions	0.00	0.00
(3) Seminar/ Program Fees		
Seminar/ Workshop Fees	0.00	44903.00
(4) Consultancy Fees		
Consultancy refund	0.00	171335.00
(5) Others (Specify)		
Other Receipt (Training)	1301218.00	4714033.00
Receipt for Training courses	5000000.00	1630179.00
Pre-receipted bill issued but not received	0.00	730970.00
Misc. Receipts (Training A/c)	0.00	2025028.00
Receipt for Training Cost		
TOTAL	**6514205.00**	**9519148.00**
SCHEDULE :16 INCOME FROM ROYALTY, PUBLICATION ETC.		
(1) Income from Royalty		
(2) Income from Publications		
(3) Others (Specify)		
Misc. Receipts	142505.00	228293.00
WII Products	105834.00	164544.00
House Licence Fee	422638.00	546916.00
Bus Charges	90749.00	95797.00
TOTAL	**761726.00**	**1035550.00**

SCHEDULE :17 INTEREST EARNED		
(1) On Term Deposits		
(1) With Scheduled Banks	0.00	
Int. on Bank Deposit	0.00	0.00
Interest on FDR	0.00	0.00
Interest on Investment	0.00	0.00
(2) With Non-Scheduled Banks	0.00	0.00
(3) With Institutions	0.00	0.00
(4) Others (Specify)	0.00	0.00
Int. on Investment(Training)	0.00	0.00
Interest (Training)	0.00	0.00
(2) On Savings Account		
(1) With Scheduled Banks		
Int. on Savings Account	1039247.00	661191.00
Interest on Saving A/c (Training A/c)	191117.00	233784.00
Interest on Saving A/c (Research Project)	0.00	123612.00
Interest Earned on Consultancy A/c	0.00	191790.00
(2) With Non-Scheduled Banks		
(3) Post Office Savings Account		
(4) Others (Specify)		
(3) On Loans		
(1) Interest on Loan & Advance	154691.00	285676.00
(2) Others		
(4) Interest on Debtors and Other Receivables		
TOTAL	**1385055.00**	**1496053.00**
SCHEDULE :18 OTHER INCOME		
(1) Profit on Sale/Disposal of Assets		
(1) Owned Assets		0.00
(2) Assets acquired out of grants, or received free of cost		0.00
(2) Export Incentives realized		0.00
(3) Fees for Misc. Services		0.00
(4) Others (Specify)		
Misc. Receipts	0.00	0.00
Consultancy Project Received during the year	0.00	21192566.00
EMD Forfeited	0.00	0.00
Misc. Receipts & (Consultancy A/c)	0.00	246517.00
Receipt for Project	7188423.00	898265.00
TOTAL	**7188423.00**	**22337348.00**
SCHEDULE :19 INCREASE/DECREASE IN STOCK OF FINISHED GOODS		
(1) Closing Stock		
(1) Finished Goods		
Closing Stock of WII Publication	0.00	0.00
(2) Work-in-progress	0.00	0.00
(2) Less : Opening Stock		
(1) Finished Goods	0.00	0.00
(2) Work-in-progress	0.00	0.00
TOTAL	**0.00**	**0.00**

	(Amt. Rs.)			
	Current Year		Previous Year	
	Plan	Non Plan	Plan	Non Plan
SCHEDULE :20 ESTABLISHMENT EXPENSES				
(1) Salaries and Wages			859058.00	
Fellowship	431643.00		67809.00	
Honorarium	65550.00		3142397.00	
Medical	3473745.00		26894996.00	10000000.00
Salaries & Allowances	50144359.00	11000000.00	172800.00	
Stipend	194400.00		1091033.00	
Wages	983533.00		0.00	5091558.00
Fellowship & Wages (Consl. Project)	0.00		5217735.00	
Fellowship & Wages (Research Project)	9368867.00			
(2) Allowances and Bonus			315867.00	
Bonus	496178.00		674377.00	
OTA	630588.00		428195.00	
LTC	450447.00		0.00	
Corps Fund (Training)	0.00		0.00	191132.00
Honorarium (Training A/c)		437091.00		
(3) Others (Specify)				
Trans to Consultancy A/C	0.00			93119.00
(4) Contribution to Other Fund (Specify)				
Leave Salary and Pension Contr.	1419171.00		1408934.00	
(5) Staff Welfare Expenses				
Uniforms	0.00			
(6) Expenses on Employees Retirement and Terminal Benefits				
Final Payment				
Leave Encashment & Gratuity	319844.00		0.00	
Leave Salary and Pension Contribution	0.00		0.00	
(7) Others (Specify)				
Camp Expenses (Consl. Project)				108020.00
Camp Expenses (Research Project)	654783.00		505299.00	
TOTAL	**68633108.00**	**11437091.00**	**40778500.00**	**15483829.00**
SCHEDULE :21 OTHER ADMINISTRATIVE EXPENSES				
AMC of Computers (1030164 -66845-84414)	878905.00		1123523.00	
Annual Research Seminar	514459.00		589524.00	
Cont./Misc. (Conslt. Project)	0.00		0.00	2708605.00
Contingencies/Misc. (Research Project) (2969401-393130-36400)	2539871.00		2061833.00	
Conveyance Charges	12862.00		4607.00	
Cont./Misc.(Training Account)		3010616.00	0.00	2006809.00
Electricity and Water Charges	4231632.00		3382360.00	
Estate Maintenance	2533251.00		1458905.00	
Estate Security (4711585 - 355236)	4356349.00		5209203.00	
GIS of Office Data (Conslt. Project)	0.00		0.00	1351490.00
Govt. Contribution to Pension Fund	5000000.00		5000000.00	
Lab Expenses (Research lab) (1116771 -434764)	682007.00		1019286.00	
Lab Expenses (Forensic Lab) (1654362 -450679)	1203683.00		2566036.00	
Legal Expenses	882109.00		275550.00	
M.Sc. Course Expenditure	745666.00		826885.00	
Operational Expenses (1539912 - 197547)	1342365.00		2811073.00	
Cable Charges	0.00		0.00	2100.00
Pension Contribution	99016.00		54693.00	
POL & Maintenance of Vehicle (Research Project)	3337612.00		2116188.00	
POL & Maintenance of Vehicle (Conslt. Project)	0.00		0	3409356.00
POL & Maintenance of Vehicle (Training A/c)		613465.00	0	389922.00
POL for Vehicles/DG Set (3296657 - 182360)	3114297.00		2828985.00	
Postage & Telegrams	239783.00		320051.00	

Printing & Binding		154925.00		30941.00	
Publication	(1083904 - 315328)	768576.00		144871.00	
Publication(Conslt. Project)		0.00		0.00	501909.00
Repair & Maintenance of Vehicles	(1702507 - 55842)	1646665.00		1195236.00	
Repair & Maintenance furniture & Fixture		218042.00		376751.00	
Sharing of cost of Kendriya Vidyalaya	(2300000-500000)	1800000.00		1107280.00	
Sports Goods		298275.00		93866.00	
Stationery	(1393395 -3101)	1390294.00		1960614.00	
Sales Tax/Trade Tax Expenses		0.00		0.00	124959.00
Training Allowance		0.00	623799.00	0.00	598996.00
Telephone & TC		605445.00		669976.00	
Training Cost Expenditure		5000000.00		4714033.00	
Travel Exp. (Grant in Aid)		2751688.00		2674020.00	
Travel Exp. (Consl. Project)		0.00		0.00	2189530.00
Travel Exp. (Research Project)		2247885.00		1210031.00	
Travelling Expenses (Training A/c)		0.00	1699933.00	0	1099879.00
Workshop/Seminar		219387.00		412813.00	
Payment outstanding for Grant-in-Aid, Research Projects/Training etc. (133513+ 3034878)		3168391.00		2829333.00	
Less : Committed liability of Consultancy Project		-59884.00			
Less : Cancellation of Supply Order of Training Account for 2007-08		-1030.00			
Less: Payment towards capital expenditure for 2008-09		0.00		-17648700.00	
Less: Payment towards Computers & Accessories for 2008-09		0.00		-1866415.00	
Less: Payments towards equipment of Research Project (2008-09)		0.00		-258231.00	
TOTAL		**51922526.00**	**5947813.00**	**29295121.00**	**14383555.00**

(S.K. Khantwal)
Finance Officer

(P.R. Sinha)
Director