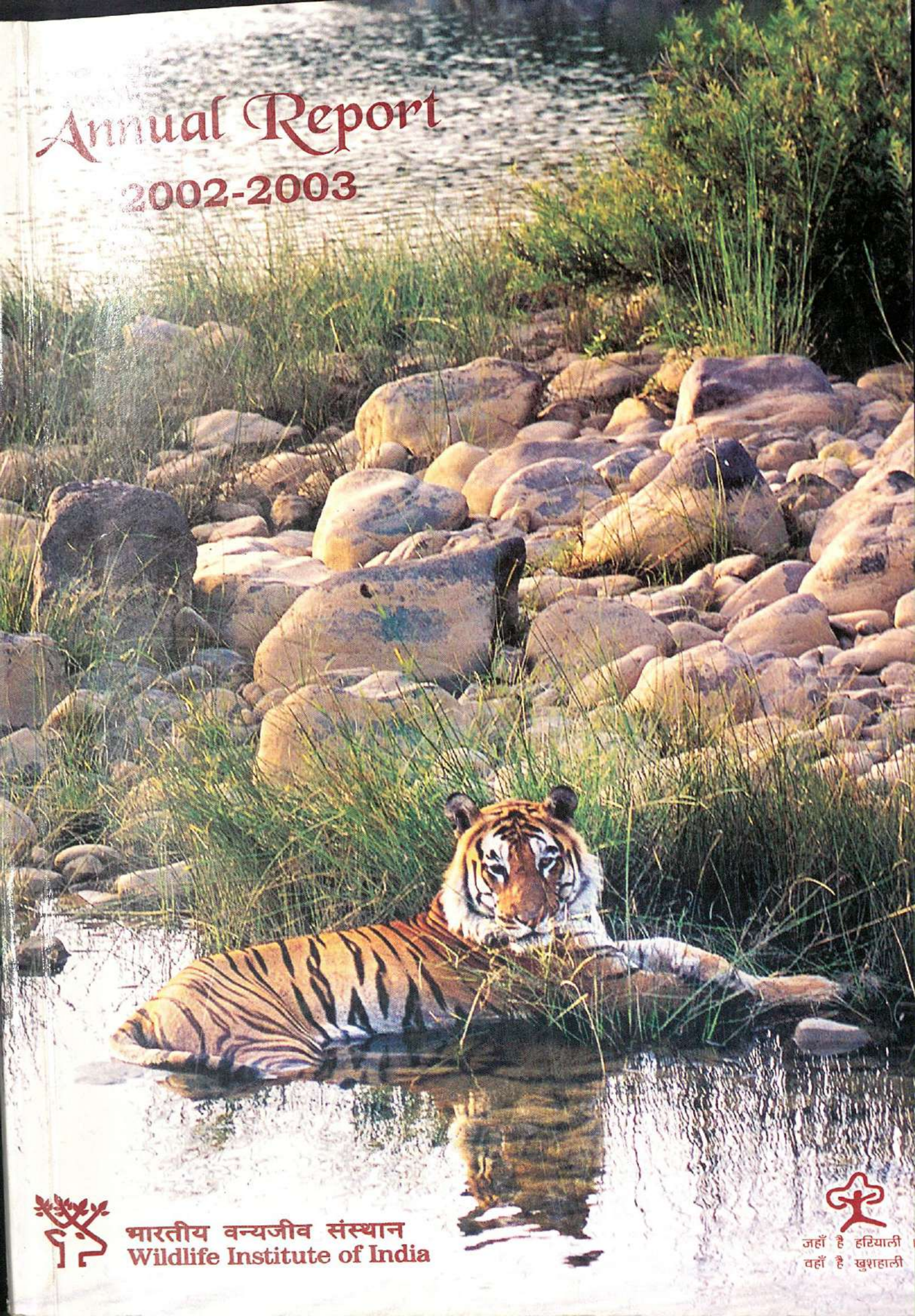
Annual Report

2002-2003



भारतीय वन्यजीव संस्थान
Wildlife Institute of India

जहाँ है हरियाली
वहाँ है खुशहाली

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Cover : Tiger in leisure in Panna National Park
Cover Photo Credit: Pushp K. Jain

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Director's Note

The Wildlife Institute of India is moving forward in the spheres of its mandated activities. The XXIII P.G. Diploma Course and XVIII Certificate Course in Wildlife Management were completed. The XXIV P.G. Diploma Course was initiated during the period under report besides a few short term courses on related subjects.

Field work on the project on "Strengthening Field Conservation through Ecological Studies, Capacity Building and Conservation Awareness in Ladakh Trans Himalaya: A Collaborative Initiative" was started. Collaboration with the USDA Forest Service continued as a major project. This was the eleventh year of scientific exchange and collaboration with this important federal agency of the USA. The Wildlife Institute of India continued to hold the Secretariat of the Indian National Committee for the IUCN. Triennium work plan was made and the Secretariat concentrated its focus on facilitating the two projects funded by IUCN and UNESCO. Six collaborative projects of WII-USFWS Phase II completed their tenure in December 2002. Two other projects are operational under separate agreements and will continue until December 2003.

The Wildlife Institute of India has been collaborating with the Foundation for Ecological Security, Uttaranchal Unit, which has been working on biodiversity conservation, ecological restoration of degraded areas and status survey of medicinal plants in higher altitudes of Gori Valley in Pithoragarh District. The Institute continued the implementation of "GOI – UNDP Olive Ridley Sea Turtle Conservation Programme". WII continued to provide advisory services to MoEF on matters related to environmental decision making and was represented on the Expert Committee for mining projects. The Institute was also involved in providing technical inputs in "Setting up of a Bird of Prey Conservation Breeding Centre" in the state of Rajasthan.

The Institute as a part of its wildlife forensics programme, developed protocols for identifying four species from derivates. Protocols were also standardized for identifying plucked and shed feathers of peafowl (Pavo cristatus) based on root morphology. A checklist of plants of Bhabhar Tract of Uttaranchal was prepared and the compilation of other relevant information is in progress. Work on the compilation of Medicinal Plants of Uttaranchal was also completed. During the reporting year, 60 scientific and technical papers and 23 reports were accredited to the Institute.

Various conservation-educational programmes were organized during wildlife week. Wildlife Film Festival was organised at IGNFA auditorium in association with Centre for Media Studies, Delhi and IGNFA for schools of Dehradun. International Day for Biological Diversity was observed. Students as well as WII staff participated in the programmes. On the occasion of the World Environment Day the Institute organized many activities such as Recycling and waste management in WII, preparation of newspaper bags by WII family and encouraging nearby shopkeepers to use eco-friendly newspaper bags and "Conservation of water and power in the campus and office" etc. The construction work of Seminar Hall cum Interpretation Centre was completed.

It will not be an exaggeration to claim that the year was professionally fruitful. I take this opportunity to thank the WII-Society and Governing Body for their guidance and assistance for the development of the Institute. I also take this opportunity to thank faculty members and staff as well as all our partners and collaborators for their work and co-operation.

(S. Singsit)

The Year at a Glance

REGULAR COURSES

- XXIII P.G. Diploma in Wildlife management, *September 1, 2001 to May 31, 2002.*
- XXIV P.G. Diploma Course in Wildlife Management, *September 1, 2002 to May 31, 2003.*
- XVIII-Certificate Course in Wildlife Management, *November 1, 2002 – January 31, 2003.*
- VIII M.Sc. (Wildlife Science) *July 2001-June 2003.*

SHORT COURSES, WORKSHOPS, SEMINARS, CONFERENCES AND MEETINGS

- National Workshop on 'Evolving Sustainable Livestock Grazing Policy Guidelines and Practices on the Indian Himalaya', *April 15-17, 2002.*
- Stakeholder Workshop on developing sustainable strategies for ecodevelopment programme in Rajaji National Park, Motichur FRH, *April 20, 2002.*
- Training course for EDC members on alternative livelihood, *May 3-8, 2002.*
- Vacation Training Programme on Bio-resources for School Children, Dehradun, *May 22- June 7, 2002.*
- Training Workshop for wildlife staff on "Population estimation of wild ungulates in the hills of North Bengal", *May 23-24, 2002.*
- VI Training Workshop on Ecotourism Product Development & Marketing, Spice Village, Thekkady, Periyar *July 28-August 3, 2002.*
- Workshop on Sustainable Livelihoods-Based Approach to Conservation, Shimla, *August 8-9, 2002.*
- Training Programme on 'Biodiversity Management, Monitoring, Ethno-biodiversity Patenting and Impact of World Trade Agreement' for the staff of the Integrated Watershed Development Project, *August 19-23, 2002.*
- Course on Wildlife Law, Man-Animal Conflict, Interpretation and Conservation Education, *August 19–28, 2002.*
- Terminal Workshop on WII-USFWS collaborative project 'Identify Potential Areas for Biodiversity Conservation in the Indian Himalaya', Dehradun, *September 4-5, 2002.*
- Workshop on "the relationships between large herbivores, habitats and humans in Rajaji-Corbett National Parks", Northern India, *September 9, 2002.*
- Training Workshop for enhancing technical capability of Elephant Managers in South India, Bandipur Tiger Reserve, Karnataka, *September 17-22, 2002.*
- Regional Training Workshops in Building Capacities for Power fencing, Bandipur Tiger Reserve, Karnataka, *September 23, 2002.*
- Training workshop on enhancing the technical capability of elephant managers in south India – training in chemical immobilization techniques, Bandipur Tiger Reserve, Karnataka. *September 24-27, 2002.*
- Workshop for Policy makers on Landscape level Planning for North Bengal Plains, Sukna (West Bengal), *November 18, 2002.*
- Stakeholder workshop on Sustainable Strategy of Ecodevelopment Programme at Jaldapara Wildlife Sanctuary, Nilpara (West Bengal), *November 19, 2002.*
- Gender Sensitization Training for the PA staff and community representatives of Jaldapara Wildlife Sanctuary, Nilpara (West Bengal), *November 20, 2002.*
- Workshop on Professional PA Management in UNESCO World Heritage Site, Nanda Devi National Park, Joshimath, Uttaranchal, *November 22-23, 2002.*

The Year at a Glance....

- Regional training workshop on building capacities for elephant management, Buxa Tiger Reserve, Rajabhatkhawa, West Bengal, *November 25–30, 2002.*
- Regional training workshop on chemical immobilization techniques for managing elephants in the wild and in captivity, Buxa Tiger Reserve, Rajabhatkhawa,West Bengal, *December 2-5, 2002.*
- Training Course on Environmental Impact Assessment (EIA), *December 9–14, 2002.*
- Terminal Workshop of the WII-USDA Forest Service Collaborative Project on 'Management of Forests in India for Biological Diversity and Forest Productivity – A New Perspective', Ramnagar (Nainital), *December 11-15, 2002.*
- Training Workshop on 'Monitoring of Wild Animals and Habitat in the Protected Areas of Bihar', Bhimbandh Wildlife Sanctuary, Bihar, *December 25-28, 2002.*
- XIII-Endangered Species and Zoo Management Course (Directors' Level), Arignar Anna Zoological Park, Chennai & Nehru Zoological Park, Hyderabad *January 6-15, 2003.*
- Course on Legal Issues in Wildlife Management, *January 13-17, 2003.*
- Training Programme on Biodiversity Conservation and Strategic Planning for Uttar Pradesh Forest Department, *January 20-25, 2003.*
- Training of Trainers Workshop (ToT) for 'Developing Environmental Safeguards in Identified Components of the World Bank funded Integrated Watershed Development (Hills–II), Shiwalik Project, Uttaranchal', *January 28–30, 2003.*
- Two-week Capsule Course in Wildlife Management for IFS Officers, *February 3-14, 2003.*
- Training Workshop for Spearhead Teams of HPFD on 'Planning for Biodiversity Conservation in and around PAs through Sustainable Livelihoods Based Approach', Chail, Himachal Pradesh, *February 10-12, 2003.*
- Sixth Special Short Term Course on Wildlife Protection, Law and Forensic Science *February 17-28, 2003.*
- Training workshop on Laboratory and Field research methods for Bhutanese forest officials, Dehradun *February 17–March 5, 2003.*
- Training Workshop on Enhancing Technical Capabilities of the Officers and Staff of the Elephant Ranges in Northeast India, *February 24-March 1, 2003.*
- Regional training workshop on Chemical Immobilization techniques for managing elephants in the wild and in captivity, Kaziranga National Park, Assam *March 3-6, 2003.*
- Training Course on Wetland Conservation and Management. *March 3-7, 2003.*
- National Seminar on the Conservation and Management of Marine Biodiversity, Kanyakumari, Tamil Nadu, *March 21-22, 2003.*
- Training Workshop on Wildlife Forensics and Law for the Staff of Gangotri National Park, Uttaranchal, *March 25-26, 2003.*

SEMINAR

XVI Annual Research Seminar (ARS) of WII, *October 23-24, 2002.*

MEETINGS

- XLII Governing Body Meeting, New Delhi, *May 7, 2002.*
- XLIII Governing Body Meeting, New Delhi, *December 3, 2002.*
- VIII Training, Research and Academic Council, Dehradun, *October 25, 2002.*
- IX Training, Research and Academic Council, Dehradun, *February 13, 2003.*
- X Annual General Meeting of WII-Society, New Delhi, *December 5, 2002.*

WII - A Profile

During the last century the rapidly diminishing natural resources and imminent environmental disasters were beginning to show in all spheres of human life. At the same time, the need for understanding the environmental issues was felt. The degradation of forested ecosystems was linked to increasing anthropogenic pressure, and measures were devised to conserve natural ecosystems. The creation of a network of protected areas was one of the prominent tools in achieving this objective. The shortage of trained manpower, however for collecting information on protected area management hinders the effectiveness of protected area planning and management. On the Indian front a need was felt for an organization which would conduct multi-disciplinary research, staying close to the realities on the ground, seek to find answers to the issues in biodiversity conservation, and accordingly press for an holistic approach to managing wildlife and its habitats across the country.

This led to the setting up of the Wildlife Institute of India (WII) at Dehradun in 1982, with a mandate to produce a cadre of wildlife managers and field biologists who could collect scientific information on wildlife and protected areas for effective management, and sensitize people at various strata for nature conservation. The task was not easy, but dedicated team effort and admirable support from the government converted this dream into reality. The apex body of the Institute is the WII-Society headed by the Union Minister for Environment and Forests. The actual functioning is, however, directed by the Governing Body, presided over by the Secretary, Ministry of Environment and Forests, Government of India. The Institute's research programme is approved and guided by the Training, Research and Academic Council (TRAC) which ensures that it conforms to the national conservation priorities.

From its formative years, the WII has collaborated with international organizations such as the United Nations Development Programme, Food and Agricultural Organization and United States Fish & Wildlife Service. These have enabled the Institute to build up a distinguished faculty through rigorous training and exposure to modern research techniques, and broaden its research, teaching and training base. The collaborations have also helped the Institute to equip itself with the most advanced laboratory and field equipment including the latest in computer hardware and software. On the home front, WII has an active association with the Indian Council for Forestry Research and Education, Indian Institute of Remote Sensing (Dehra Dun), SACON (Coimbatore), Bombay Natural History Society (Mumbai) and WWF-India (New Delhi), among others.

Various tools of public relations have been used by the Institute to develop its image from grass roots level to get it recognized in India and abroad, and make it a premier institution of its kind in South East Asia. Through working in bilateral co-operation with national and international agencies, the Institute's horizons have broadened. This has resulted in a strong infrastructure, equipped with detailed knowledge and the latest technology. In recognition of the Institute's potential, UNESCO has identified the WII as the regional training centre for south and south-east Asia, for professionals to be sent to the WII for training in wildlife management. The Institute also received the prestigious Rajiv Gandhi Wildlife Conservation Award for the year 1999.

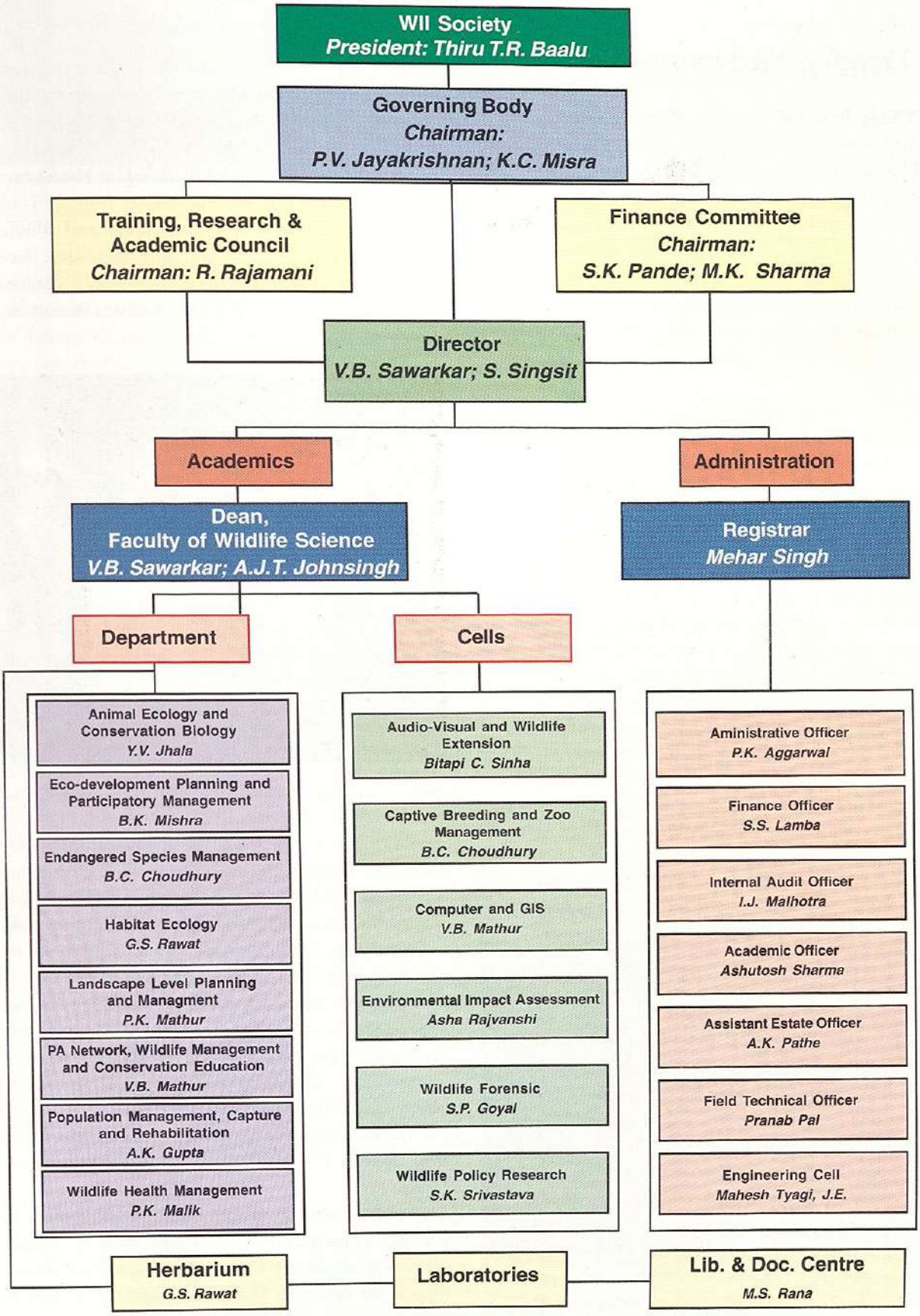
Aims and Objectives

- To build capacity and develop human resources in wildlife science
- To develop as a centre of excellence in wildlife science
- To provide consultancy and advisory services in wildlife conservation
- To advocate issues relevant to wildlife science and conservation.
- To develop as a regional centre for South Asia and South-East Asia for training and research in wildlife conservation.
- To develop as a Deemed University in wildlife science.

Our Mission

The WII's mission is to nurture the development of wildlife sciences, and promote its application in the field in a manner that accord with our economic and socio-cultural milieu.

Organizational Structure of WII



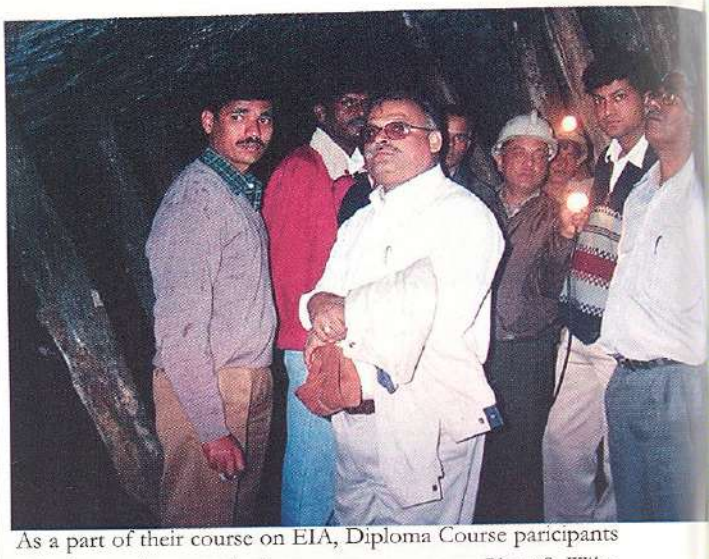
Training and Academics

Training Programmes

XXIII P.G. Diploma in Wildlife Management, *September 1, 2001 to May 31, 2002.* The XXIII P.G. Diploma Course commenced on September 1, 2001 for nine months with a total intake of eighteen officers with the ranks of DCFs/ACFs/Veterinary Doctors from different states within the country. All the departments of the Institute were involved in imparting training/teaching to the officer trainees, besides providing specialized inputs by the guest faculty from time to time.

During the reporting period, a Management Plan Tour to Bandhavgarh was undertaken by the officer trainees from April 14-30, 2002. Prior to the conclusion of the course on May 31, 2002, the *viva voce* examination was held on May 27-28, followed by the valedictory function. All eighteen officer-trainees were awarded 'Diploma in Wildlife Management' on their successful completion of the course. In addition, various awards for outstanding performance in the course were also given. Shri Vivek Pandey of Uttaranchal won the Institute's Gold Medal and Wildlife Preservation Society Silver Medal for the 'Top Trainee'. He also shared the Institute's Prize for 'Top Trainee in Wildlife Biology' with Shri Jayant Somchand Solanki (Gujarat) and Smt. Shanti Priya Pandey (Andhra Pradesh). Shri Vishvadipsinh J. Rana of Gujarat and Shri V. Naganathan of Tamil Nadu were jointly awarded the Silver Medal for the 'Best All Round Wildlifer'. The Institute's prize for the 'Best Management Term Paper' was given to Shri Vishvadipsinh J. Rana. Shri V. Naganthan and Shri Kumar Vimal (West Bengal) were jointly awarded the N.R. Nair Memorial Silver Medal for 'Best Management Plan'. Shri M.C. Ghildiyal, IFS (Retd. PCCF, U.P.) was the Chief Guest at the function. He distributed the prizes and certificates among the officer trainees, and delivered the valedictory address. Shri S.C. Sharma, Addl. DG (WL) also addressed the gathering. Dr. P.K. Malik was the Course Director and Dr. K. Sivakumar the Associate Course Director.

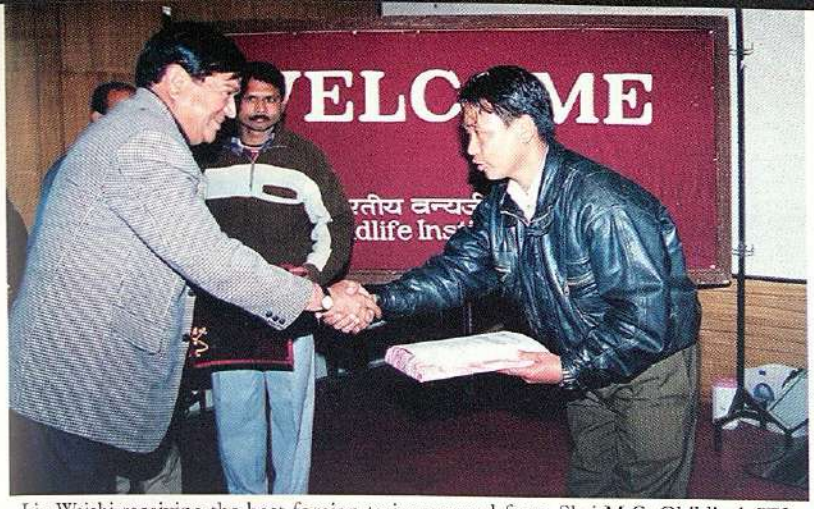
XXIV P.G. Diploma Course in Wildlife Management, *September 1, 2002 to May 31, 2003.* The nine-month XXIV P.G. Diploma Course commenced on September 1, 2002 with twenty officer trainees from different States within country and from Sri Lanka, Nepal and Bhutan. Three foreign nationals from Sri Lanka, Nepal and Bhutan were sponsored under the SAARC Wildlife Management Fellowship Scheme, two candidates from Sri Lanka sponsored by the PA Management and Wildlife Conservation Project and one candidate from Myanmar sponsored by the Smithsonian Institution, National Zoological Park, Conservation and Research Centre, Royal VA.



As a part of their course on EIA, Diploma Course paricipants visited an underground mine *Photo: S. Wilson*

The Diploma Course is being conducted in a modular pattern with seventeen modules. Emphasis is given on classroom interactions, small assignments, workshop/seminar, group discussion, case studies, practical and wildlife film shows. The following modules were also offered for lateral entrants: (i) Environment Impact Assessment and Social Impact Assessment from December 9-14, 2002, (ii) Wildlife Policy and Law in Wildlife Management from January 13-17, 2003, (iii) Wetlands and Coastal Zone Management from January 20-February 5, 2003, and (iv) Ecodevelopment for Biodiversity Conservation from March 3-14, 2003.

As a part of this course, the officers were taken to Corbett Tiger Reserve, for orientation in wildlife conservation during October 2002. In November, they were taken to Keoladeo National Park and



Liu Weishi receiving the best foreign trainee award from Shri M.C. Ghildiyal, IFS.
Photo: V. Verma

Sariska Tiger Reserve for learning field techniques in Wildlife Sciences. During the month of February 2003 the officer trainees were taken to Nalsarovar and Thol Sanctuaries, Gulf of Kutchh Marine National Park, Khijadia Bird Sanctuary, Wild Ass Sanctuary, Dhrangadhra, Gir National Park, Velavadar Wildlife Sanctuary, and Kanha National Park. During the tour, inputs on field problems in wildlife management in these PAs and the innovative ways adopted to tackle them were discussed. The trainees were also taken to Ahmedabad and Junagarh Zoos to gain knowledge on the management of animals in captivity. During the tour, the trainees were taken to GEER Foundation and Centre for Environment Education, Ahmedabad. During March 20-30, 2003 the officer trainees were taken to Panna Tiger Reserve as part of the management term paper exercise. The officers were given one topic each, dealing with various aspects of the management of Panna Tiger Reserve, and were required to collect primary and secondary data pertaining to their topics. The course is due to end on May 31, 2003.

XVIII Certificate Course in Wildlife Management, *November 1, 2002 – January 31, 2003.* The XVIII Certificate Course began with twenty-three officers of Range Forest Officer level or equivalent from different States within this country and abroad. Out of 23 officers, five were foreign nationals (two from Bhutan and one each from Cambodia, Nepal, and China). All five foreign candidates were sponsored by Global Tiger Forum, New Delhi. The re-structured course curriculum has ten components.

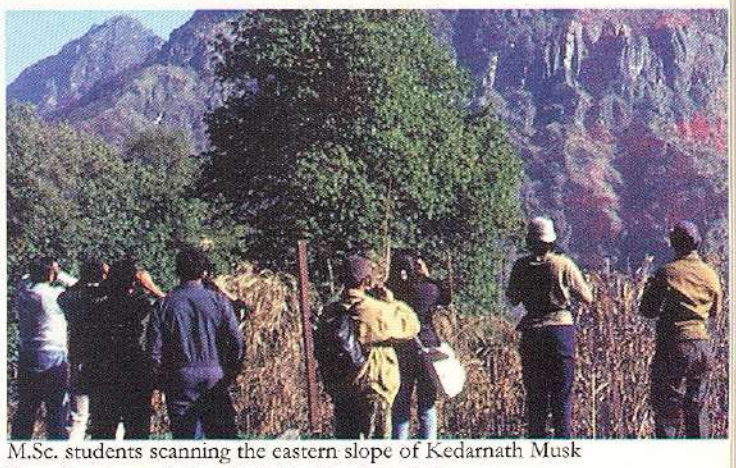
The following field tours/field visits were undertaken by the officer trainees: (i) Orientation-Cum-Techniques Tour to Rajaji National Park, (Beribada) from November 19-26, 2002, (ii) One day Field Visit to National Zoological Garden, Delhi from December 27-28, 2002, and (iii) Management Tour to Dudhwa Tiger Reserve, Kishanpur Wildlife Sanctuary, Kukrail Crocodile Breeding Centre, Lucknow (U.P.) and Kanha Tiger Reserve (M.P.).

The teaching work in the classroom was based on the course unit system. More emphasis was given to class interaction, small assignments, workshop/seminar, group discussions, case studies, practical and audio-visual shows. Examinations were held from January 22-24, 2003. After completion of theory papers, the *viva voce* exam was held on January 27, 2003. Shri Alok Saxena, IFS, Joint Director, Forest Survey of India, Dehradun was the external examiner for the *viva voce.*

The Valedictory Function was held on January 30, 2003. Shri M.C. Ghildiyal, IFS, Former Principal Chief Conservator of Forests (Wildlife) and Chief Wildlife Warden, Uttranchal (formerly U.P.) was invited as the Chief Guest. Shri Ajay Kumar came first and was awarded the "Wildlife Conservation Gold Medal". Shri Shekhar Jangley was awarded the Institute's Book Prize for the 'Best All Round Wildlifer' and Wildlife Management'. Shri Liu Weishi received the 'Best Foreign Trainee' award. The course concluded on January 31, 2003.

Academic Programmes

VIII M.Sc. (Wildlife Science)
During the reporting period, II and III Semester of



M.Sc. students scanning the eastern slope of Kedarnath Musk Deer Sanctuary during the high altitude techniques tour
Photo: B.S. Adhikari

the M.Sc. were completed. The VIII M.Sc. began in July 2001 and is due to end in July 2003. The students were exposed to Kedarnath Musk Deer WLS, Valley of Flowers NP, Nanda Devi Biosphere Reserve especially the Trans-Himalayan zone and Khirsu Forest Division from May 10 to 20, 2002 for their high altitude techniques tour, and a day trip to the Tehri Dam Submergence Zone during September, 2002.

The students visited different places in central India as part of their Conservation practice and wildlife management tour from October 2 to 22, 2002. The students visited Tadoba-Andheri Tiger Reserve, Pench Tiger Reserve, Nagzira Wildlife Sanctuary, Bhamragad Forest Division, Lok Biradari Prakalp-Hemelkhasa and Junnar Forest Division.

As part of the curriculum the students are required to do six months field work towards completion of their dissertation which commenced in mid-November 2002. The following is the list of dissertation topics submitted by the M.Sc. students:

Student's Name	Dissertation Topic	Supervisor(s)
1 Aaron Savio Lobo	Estimating sea snake diversity using trawlers catch along the coast of Goa	Dr. Bivash Pandav Dr. Karthik Vasudevan
2. Avinandan D.	Prey selection by tigers (*Panthera tigris*) in Sariska Tiger Reserve, Rajasthan	Dr. K. Sankar Shri Qamar Qureshi
3. Anirban Datta Roy	Crop raiding behaviour of elephants in north Bengal, with reference to habitat fragmentation and group structure	Dr. S. P. Goyal Dr. S. Sathyakumar
4. Ram Chandra Kandel	Evaluating effectiveness of Barandabhar forest corridor for Rhino in Nepal	Shri V.B. Sawarkar Dr. Y.V. Jhala
5. Prajna Pramita Panda	Density related behaviour of selected ungulates in four zoos in southern India	Shri B.C. Choudhury
6. Priya Balasubramanium	Regeneration patterns of rainforest trees in the fragmented forests of the Annamalai hills, southern Western Ghats	Shri Qamar Qureshi Dr. Ravi Chellam
7. Bindu Raghavan	Interaction between livestock and the Ladakh Uriyal (*Ovis orientalis vignei*) in the Chipskianchan-Potorche-Fotula area of western Ladakh	Dr. Y.V. Bhatnagar Shri Qamar Qureshi
8. Susaant	Dead wood, wildlife and PA management: A study on the extent of use of dead wood by wild animals	Dr. S. A. Hussain

Tirthan Wildlife Sanctuary, H.P. *Photo: V.P. Uniyal*

Status of Doctoral Research in WII (2002-03)

Sl. No.	Thesis Title	Name	University	Supervisors
Degree Awarded				
1.	An ecological study of sympatric hornbills and fruiting patterns in a tropical forest in Arunachal Pradesh	Dr. Aparajita Datta	Saurashtra University Rajkot, 2002	Dr. G.S. Rawat
2.	Feeding Ecology and habitat needs of wolves in the Bhal, Gujarat	Dr. Bharat Jethva	FRI (DU), Dehradun, 2003	Dr. Y.V. Jhala
Thesis Submitted, Award Awaited				
1	An Ecological Assessment of Forests Spatial Heterogeneity, Species Diversity and Grassland Burning Practices in *Terai* Conservation Area	Shri Harish Kumar	Saurashtra University, Rajkot, 2002	Dr. P.K. Mathur
2.	An ecological study of the vegetation and wildlife habitats in and around Rajaji–Corbett corridor area	Ms. Aparajita Hajra	FRI (DU), Dehradun 2002	Dr. G.S. Rawat (Supervisor) and Dr. A.K. Tiwari (Co-supervisor)
3.	A Scientometric study and bibliographical control of periodical literature on wild mammals with special reference to literature published in India	Shri Madan Singh Rana	Vardhaman Mahaveer Open University, Kota 2002	Dr. Pawan Kumar Gupta (Dy. Librarian, Rajasthan University Library, Jaipur) and Dr. Dinesh Kumar Gupta, (Reader & Head Dept. of Library & Information Science, Vardhman Mahaveer Open University, Kota)
Registered				
1.	Impact of Land use Changes on the Habitat, Behaviour and Breeding biology of the Indian Sarus Crane (*Grus antigone antigone*) in the semi-arid tract of Rajasthan, India	Ms. Jatinder Kaur	FRI (DU), Dehra Dun	Shri B.C. Choudhury
2.	Assessment of Hydrological Functional and Water Budget of Keoladeo National Park Watershed	Ms. Ritu Singh	FRI (DU), Dehra Dun	Shri B.C. Choudhury
3.	Assessment of sustainability of Aquatic Vegetation Resource for Wildlife in Keoladeo Ghana National Park	Ms. Shruti Sharma	FRI (DU), Dehra Dun	Shri B.C. Choudhury
4.	An Ecological study on pheasant of Great Himalayan National Park, Western Himalaya	Mr. K. Ramesh	FRI (DU), Dehra Dun	Dr. G. S. Rawat
5.	Ecology of Certain Rare Endemic Plant Taxa and Associated Communities in Agasthyamalai Ranges, Tamil Nadu	Ms. Jayanti Ray	FRI (DU), Dehra Dun	Dr. G. S. Rawat
6.	Analysis of landscape features in part of Kumaon Himalaya with special reference to woody vegetation	Mr. Neeraj Sharma	FRI (DU), Dehra Dun	Dr. G.S. Rawat (Supervisor) Dr. A.K. Tiwari (Co-supervisor)

External M.Sc. Dissertation - Summer Training

Sl. No.	Thesis Title	Name	University	Supervisors
1.	Vegetation Structure across Different Management Regimes of Sal Forest; Chandrabani, Doon Valley	Ms. Bhavana Sutaria	Department of Botany, Pune University, Pune – 411 007	Dr. G.S. Rawat and Dr. B.S. Adhikari
2.	Ungulate abundance, ranging and activity patterns of wolves	Mr. Joseph Vattakaven	Forest Research Institute, Deemed University, Dehradun	Dr. Y.V. Jhala
3.	Abundance, denning ecology, activity and movement patterns of jackals in the Bhal, Gujarat	Mr. Vinayak Patil	Forest Research Institute, Deemed University, Dehradun	Dr. Y.V. Jhala
4.	Grassland community structure and ungulate densities in the Daun grasslands of Kutch	Mr. Kartikeya Singh Chauhan	Indian Institute of Ecology and Environment, New Delhi	Dr. Y.V. Jhala
5.	GIS Applications in Wildlife Conservation : Bandhavgarh Tiger Reserve Spatial Database (Part I)	Ms. Subhashree Das	Forest Research Institute, Deemed University, Dehradun	Dr. V.B. Mathur
6.	GIS Applications in Wildlife Conservation : Bandhavgarh Tiger Reserve Spatial Database (Part II)	Mr. Swarn Shikher Pant	Forest Research Institute, Deemed University, Dehradun	Dr. V.B. Mathur

Short Courses, Workshops, Seminars, Conferences and Meetings

Organised by WII

National Workshop on 'Evolving Sustainable Livestock Grazing Policy Guidelines and Practices on the Indian Himalaya', *April 15-17, 2002.* The Institute organized this workshop as part of the WII-IUCN-HIMAL Programme and in collaboration with ICIMOD, Nepal. The objectives of the workshop were (i) to review the state of present knowledge on the conservation and management issues in the alpine pastures and Trans-Himalayan regions, (ii) to identify gaps for further research and forge alliances for such studies between research and conservation agencies, including the State Forest/Wildlife Departments, and (iii) to develop a consensus on the policy guidelines to be adopted for reconciling rangeland and wildlife conservation and management practices.

Over forty participants representing senior forest officials from the States of Uttaranchal, Himachal and Jammu & Kashmir; Scientists from GPHIED, Almora, Botanical Survey of India, Dehradun, National Conservation Foundation, Mysore, Kumaon University, Nainital, PG College, Rishikesh; Faculty and researchers from WII; NGO representatives deliberated in four working groups.

Stakeholder Workshop on developing sustainabile strategies for ecodevelopment programme in Rajaji National Park, Motichur FRH, *April 20, 2002.* This workshop was organized under the Building Partnership for Biodiversity Conservation (BPBC) Project. The objective of this workshop was to share experience of the project with different stakeholders and design a mechanism of co-ordination among the different stakeholders in and around Rajaji for conservation of the biodiversity of the park as well as compatible local development.

Altogether, forty participants representing seven stakeholder groups attended the workshop. The participants debated upon different issues and gave their recommendations for the required co-ordination mechanism for such initiatives around Rajaji. A sub-committee, which was proposed during this workshop, drafted the proposed structure of the PA level co-ordination committee subsequently.

Sharing of experience with the stakeholders in and around Rajaji National Park *Photo: V. Verma*

Training course for EDC Members on alternative livelihood, *May 3-8, 2002.* Under the Building Partnership for Biodiversity Conservation (BPBC) Project, two consecutive training courses each of three days' duration were organized in Candle and *Agarbathi* making for community representatives of Karach Mohalla and Rasoolpur villages. These training courses for alternative livelihoods were organized as a part of an enterprise development activity for the resource dependent communities of Rajaji so that their dependence on the park will eventually reduce. We trained forty villagers, who are now working to form self-help groups for adopting these alternative income generation schemes for livelihoods.

Vacation Training Programme on Bio-resources for School Children, Dehradun, *May 22- June 7, 2002.* The National Bio-resource Development Board (NBDB), Department of Biotechnology, Government of India, has taken an active role in creating better awareness on issues concerning biodiversity and bio-resources. The NBDB is

engaged in promoting deeper awareness among school children of the importance of the environment, biodiversity, biotechnology and the relationship of these to everyday life. In pursuance of this objective, the Wildlife Institute of India, Dehradun, and the Institute of Himalayan Bio-resources Technology, Palampur, jointly organized a vacation training programme. The goals of the programme were to introduce the subjects of biodiversity and bio-resources, and to enhance their understanding of environmental issues.

The objectives of the training programme were: (a) to inculcate among school students an appreciation of the importance of biological resources in this country, their use and management; (b) to create opportunities for students to have hands-on experience in the laboratory/field on the subject of bio-resources; (c) to study locally available bio-resources, their sustainable use and conservation and (d) to bring about interaction of students with leading experts in the field from a pool of core and visiting faculty. The target group was the school students studying in class XI. A total of twenty-two students were selected (fifteen students from six schools in Uttaranchal, and seven students from four schools in H.P.). The students were taught through classroom interaction, laboratory exercises, visit to institutions, project work, campus biodiversity watch programme, star watch programmes, and games and recreation.

The valedictory session was organised on the concluding day at WII. Dr. P.S. Roy, Dean, Indian Institute of Remote Sensing (IIRS), Dehradun delivered the valedictory address and gave away the certificates and prizes. Dr. S. Natesh, Adviser, Department of Biotechnology, Government of India was the Guest of Honour. Parents of participating students and school principals were also invited to this session. Certificates were awarded to all the students for successfully completing the course and book prizes were awarded to the winners.

Training Workshop for the wildlife staff in Population estimation of wild ungulates in the hills of North Bengal, *May 23-24, 2002.* Following the training workshop conducted by WII for the wildlife staff of North Bengal in Habitat Evaluation and Population Estimation techniques at Jaldapara WLS in January 2002, the West Bengal Forest Department organised a similar training workshop for the wildlife staff of the hills of North Bengal at Ghoom, near Darjeeling. The training was conducted for the wildlife staff working in the hill regions of North Bengal on abundance estimation and monitoring techniques for ungulates and pheasant. Over thirty wildlife staff from different NPs and WLSs of North Bengal participated in this training workshop that had a one-day formal session, and one day for field demonstration of techniques in the neighbouring Senchal WLS.

Consultative meeting-cum-workshop for developing BPBC Phase II proposal, Dehradun, *June 24, 2002.* A consultative meeting-cum-workshop was organized at WII under the Building Partnership for Biodiversity Conservation (BPBC) Project, which was attended by 32 participants representing the spearhead team, community representatives and secretaries of EDCs. The objectives of the workshop were: (i) to discuss the project progress up to now; (ii) to find out the impact of the programme and the lessons learnt; (iii) to identify areas/issues which could not be addressed adequately under the programme, and device future strategies for phase II of the project. They gathered to discuss the project progress up to now, find out the impact of the programme, lessons learnt and areas which could not be adequately addressed under the programmes and devise the future strategy for Phase-II of the project. Based on deliberations at this meeting, the Phase II proposal of the BPBC Project is being developed.

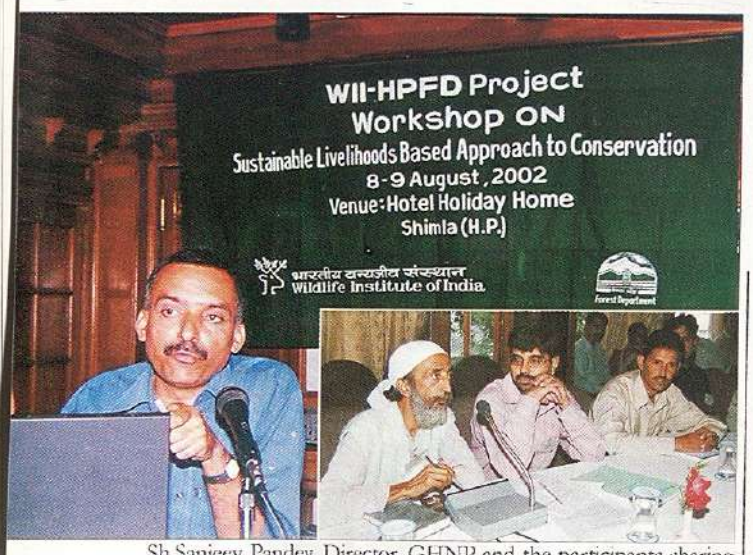
VI Training Workshop on Ecotourism Product Development & Marketing, Spice Village, Thekkady, Periyar *July 28-August 3, 2002.* It was organized by WII in collaboration with Spice Village, Thekkady, Periyar. The objectives of the workshop were: (i) to improve understanding about natural and cultural assets and tourism products in Periyar Tiger Reserve and South India; (ii) to develop skills for preparing business plans including the ability to identify markets, develop products and determine pricing and marketing strategies; and (iii) to provide an opportunity for sharing experience in ecotourism across various sectors in Southern India. In all 28 (twenty-eight) participants from Forest Department\ Forest Corporation, Tourism Development

Agencies, Private Sector and NGOs participated in the workshop.

Workshop on Sustainable Livelihoods (SL) Based Approach to Conservation, Shimla, *August 8-9, 2002.* The Himachal Pradesh Forest Department has entrusted a short-term consultancy assignment to WII. The assignment envisages the formulation of the following two conservation projects: Project-I: Conservation of flora and fauna in the Great Himalayan Conservation Landscape. Project-II: Conservation of endangered wildlife in Himachal Pradesh. The objectives of the workshop were: (i) to acquaint people with the sustainable livelihoods based approach to conservation, concepts, principles, framework, methods and specific case study, (ii) to understand links between different approaches, and (iii) to facilitate the development of a framework/ strategy for future conservation projects.

The workshop had altogether forty-four participants. This included thirteen senior officials of HPFD, 15 participating faculty members from WII, sixteen resource persons and representatives of local NGOs.

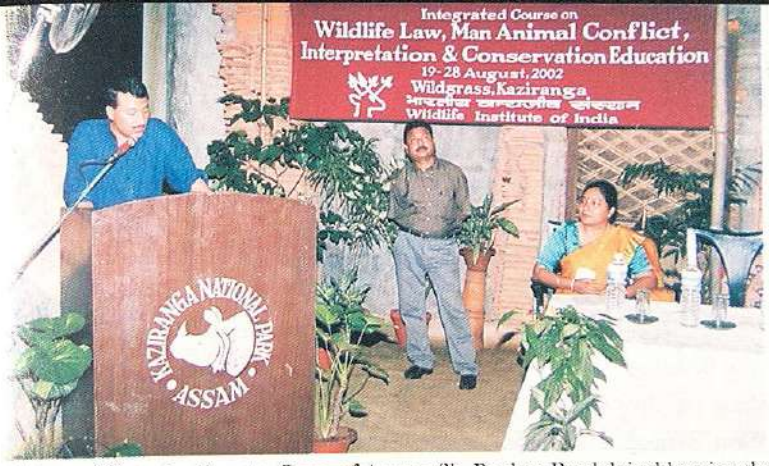
The workshop highlighted the fact that livelihood dependence of rural communities on forest resources is well established. Within these communities, the poor are more dependent on natural (forest) resources for their livelihood needs. The poorest amongst these poor, usually women, because of work burden, illiteracy, cast factor, health condition, remoteness of their villages and small land holdings have n other livelihood options. Efforts to reduce pove need to be properly targeted to reduce dependen upon natural/forest resources. The workshop wa le to highlight the concepts, principles and strategies evant to SL Based Approach. The participants we full agreement that the Institute should make us this new approach while formulating th two conservation projects. Specific deliberati on various themes, (a) policy, legal and adminis tive issues; (b) capacity building; (c) plannin and implementation issues, and (d) researc and monitoring issues were held, to decide the path ead after the workshop.



Sh.Sanjeev Pandey, Director, GHNP and the participants sharing their views during the workshop *Photo: V. Verma*

Training Programme on 'Biodiversity Management, Monitoring, Ethno-biodiversity Patenting and Impact of World Trade Agreement' for the staff of the Integrated Watershed Development Project, *August 19-23, 2002.* Twelve officers, representing Forest, Agriculture, Veterinary and Wildlife Departments of the States of Uttaranchal, Himachal Pradesh, Haryana, Punjab, and Jammu & Kashmir participated in the above-mentioned training programme organised by WII. The objective of the programme was to provide an overview of the national and international legislations for the conservation of biodiversity and their implications on the management of bio-resources in India. Information on Conservation of Biological Diversity, World Trade Agreement, Trade Related Intellectual Property Rights, Biological Diversity Act, Protection of Traditional Knowledge Systems and Biodiversity Monitoring was provided to the participants by the Institute's faculty and external resource persons.

Course on Wildlife Law, Man-Animal Conflict Interpretation and Conservation Education *August 19–28, 2002.* This integrated course was th first of its kind organized specifically for the nor eastern states including Sikkim and West Bengal as the two states also share the ecological niches with seven sisters. The course had seventeen participa s (Armed Forces-four, West Bengal-three, Assam-th , Kaziranga National Park-seven). The objectives of e course were: (i) to enhance awareness d understanding of environmental issues, (ii) to acqu nt them with policy and the law at State, National nd International levels concerning wildlife and biodiversity



Minister of State for Forests, Govt. of Assam, Sh. Pradyut Bordoloi addressing the gathering at the valedictory function *Photo: A.V. Library*

conservation, (iii) to equip them to take legal protection measures in an effective manner, (iv) to appreciate the need for resolving man-animal conflict, (v) to understand the value of nature interpretation, environmental education and awareness, and (vi) to provide them with the basic ability to pass on acquired skills and knowledge to others.

The ten-day course began by helping the participants to identify legal issues, causes leading to man-animal conflict, finding their own definition of interpretation and environmental education, and the scope for incorporating it within the parameters defined by their job description. Wildlife Institute of India gives strong emphasis on practical training. The participants were taken to Kaziranga National Park and the Gibbon Wildlife Sanctuary. This provided opportunities for participants to learn and practice a number of approaches used to present ideas and information, enabling them to acquire the skills and confidence necessary for effective communication. The Institute's faculty members and external resource persons provided inputs.

The Hon. Minister of State (Independent) for Forests, Government of Assam Sh. Pradyut Bordoloi, Chief Wildlife Warden of Assam Forest Department, Shri S. Doley, Sh. N.K. Vasu, Director, Kaziranga National Park and a host of other dignitaries were present during the Valedictory Function. The Hon. Minister gave away the certificates to the participants.

Terminal Workshop on WII-USFWS collaborative project 'Identify Potential Areas for Biodiversity Conservation in the Indian Himalaya', Dehradun, *September 4-5, 2002.* The terminal workshop was organized by the Wildlife Institute of India. Scientists and Protected Area Managers from three Himalayan States: Uttaranchal, Himachal Pradesh, and Jammu & Kashmir participated in the workshop in which scientific findings and recommendations from the project were shared among the participants.

Workshop on the relationships between large herbivores, habitats and humans in Rajaji-Corbett National Parks, Northern India, *September 9, 2002.* The objective was to disseminate the findings of the project to the Forest Department through a one-day workshop. It was organised by the Wildlife Institute of India/US Fish and Wildlife Service. Nearly forty eminent people related to the project, including Shri Nav Prabhat, Hon. Minister for Environment and Forests, Government of Uttaranchal participated in the workshop. Executive summary and recommendations of the project in the form of a twenty-page document was distributed to all the participants.

Training Workshop for enhancing technical capability of Elephant Managers in South India, Bandipur Tiger Reserve, Karnataka, *September 17-22, 2002.* This Training of Trainers was organized for the field managers in the ranks of DCF, ACF & ROs. In all, twenty officers from the four Southern states of Andhra Pradesh, Karnataka, Kerala and Tamil Nadu participated in the workshop. The resource persons included four WII faculty members besides the Director, Project Elephant, MoEF, Delhi. The topics covered included: overview of elephants, elephant ecology and morphology, elephant census and monitoring, elephant protection and legal implications, elephant management and conservation issues, human-elephant conflict, ecodevelopment and JFM, camp management and veterinary care.

Regional Training Workshops in Building Capacities for Power Fencing, Bandipur Tiger Reserve, Karnataka, *September 23, 2002.* Under Project Elephant, Ministry of Environment and Forests, a programme for enhancing the technical capabilities of the state officers and field staff of Elephant reserves in India has been started. The programme organizes three workshops, namely, Training of Trainers' workshop in elephant

management techniques, Training in Power Fencing, and Training in Chemical Immobilization at Bandipur Tiger Reserve, Buxa Tiger Reserve and Kaziranga National Park respectively.

On behalf of Project Elephant, MoEF, the Wildlife Institute of India and the Wildlife Wing of the Karnataka Forest Department and the West Bengal Forest Department organized the Regional training workshop in building the capacity for Power Fencing at Bandipur Tiger Reserve on September 23, 2002, and Buxa Tiger Reserve on December 1, 2002. At these two places, there were thirty and eighteen participants respectively at the levels of DCFs, ACFs, Forest rangers, Foresters, Forest guards and representatives from other organizations. The trainees were exposed to power fencing system technology and its use as management tool for elephant population, use and efficacy of power fences and mitigation of human-elephant conflict. The trainees were also exposed to field situations, different types of power fence equipment and were given hands-on training on the use, construction and maintenance of power fencing.

XVI Annual Research Seminar of WII, *October 23-24, 2002.* Shri R. Rajamani, Chairman TRAC, chaired the seminar. A total of 33 papers were presented by the researchers, post graduate interns, collaborators and faculty members of the Institute. About 250 delegates from all over the country and few delegates from foreign countries attended the ARS.

About 250 external delegates: 50 from Govt. & Academic Institutions, 20 from State Forest Departments, 20 from NGOs, about 20 eminent Scientists, Conservationists & Wildlife experts and 5 from media and other agencies attended the ARS. About 115 internal participants (faculty members, researchers, post graduate interns and course trainees) from the Institute also attended the ARS.

The following were adjudged as the top five presentations:

Name	Presentation Topic
K.S. Gopi Sundar	An assessment of habitat use assessment of habitat use and territory quality of Sarus Crane *Grus antigone* in Etawah-Mainpuri, U.P.
Smitha Badrinarayanan	Litter beetle communities in forests and coffee plantations of Chickmagalur district.
Rashid Raza	Diversity and rarity in floral and avifaunal assemblages in the Western Himalaya: A conceptual outline of processes and mechanisms.
Dr. Dinesh K.Sharma	Establishment and achievements of conservation genetics facility at WII.
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A Special Book Award - "WPSI Wildlife Conservation Research Award" by Wildlife Protection Society of India.

Sandeep Sharma	Counting tigers in single stride - PUGMARK 1.0

All the researchers were given book awards worth Rs. 1000/- each.

TRAC Chairman Sh. R. Rajamani congratulating the researchers.
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Workshop for Policy makers on Landscape level Planning for North Bengal Plains, Sukna (West Bengal), *November 18, 2002.* Under the GOI-UNDP Jaldapara Project a workshop was organized for the senior forest and wildlife officials of the West Bengal Forest Department to increase awareness of landscape level planning and gaining policy support for such initiatives. Altogether 19 participants comprising of two Chief Conservator of Forests, four Conservator

Minister of State for Forests, Govt. of Assam, Sh. Pradyut Bordoloi addressing the gathering at the valedictory function *Photo: A.V. Library*

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Deliberations during the WII-USDA Terminal workshop *Photo: V.Verma*

administrator, representatives of FERRO, American Embassy. New Delhi, professional foresters from sister forestry institutions (ICFRE, IGNFA, FSI and SFS); and senior field managers representing field states: Madhya Pradesh, Maharashtra, Meghalaya, Tamil Nadu and Uttar Pradesh, involved WII's faculty members and researchers, and other invitees.

The workshop, organized at the time of the project conclusion, was focused largely on using the concept and approaches of managing large forested landscape/conservation areas for the conservation of biological diversity. The research team, including collaborators, shared the project output, findings and management recommendations for four field demonstration sites, that is, Anamalai Conservation Area (ACA), Garo Hills Conservation Area (GCA), Satpura Conservation Area (SCA), and *Terai* Conservation Area (TCA) with the workshop participants. The research team also prepared and disseminated the project final report-cum-field guide in six volumes at the time of the workshop. Subsequent to the workshop, a field visit to Corbett Tiger Reserve on December 13 and 14, 2002 was also organized.

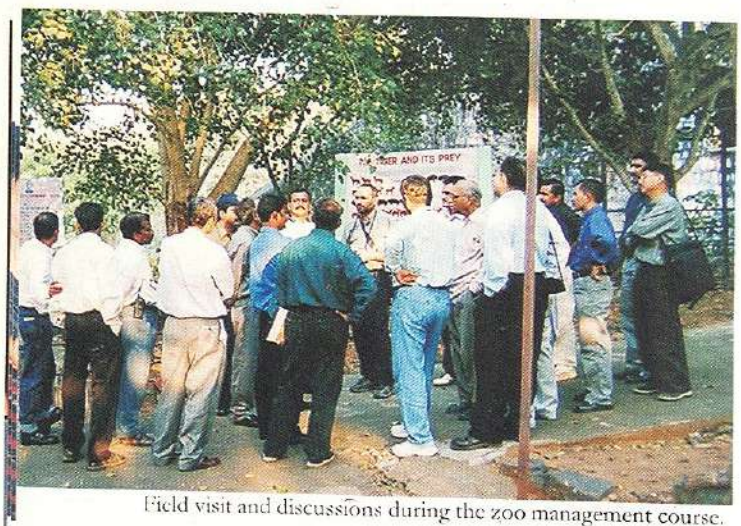
Training Workshop on 'Monitoring of Wild Animals and Habitat in the Protected Areas of Bihar', Bhimbandh Wildlife Sanctuary, Bihar, *December 25-28, 2002.* On request from the Forest Department, Government of Bihar, a Field Training workshop on the 'Monitoring of Animals and Habitat in the Protected Areas of Bihar' was organized at Bhimbandh Wildlife Sanctuary, Bihar, by the Wildlife Institute of India for officers serving in various wildlife protected areas. A total of 28 officer trainees, ranging from Assistant Conservator of Forests, Range officers and the Foresters from eight protected areas, participated in this training workshop. The necessary funds for this were provided by the Forest Department, Government of Bihar.

The main objective of this workshop was to give the wildlife staff exposure in matters related to the need for monitoring animals and habitat for better management of resources, Discussions on line transect, map reading, age and sex structure of animals, Encounter rate sampling, Study designing, and Orientation walk in the forest – Familiarization of track, pellets, plants and other indirect signs, Line transect walk, Discussion on block count and roadside vehicle count, Field exercise: Dung count, laying track plots and Block count; Data analysis (Line transect data dung count, block count data), Monitoring tiger and leopard populations – Pugmark, Field exercise: Vehicle count, mist net demonstration, Camera trap and radio telemetry, Field exercise: Bird count Field exercise: Pug mark tracing.

This training was conducted in workshop mode, with theory classes on a given subject followed by field demonstration and exercises on the given topic. The trainee officers themselves were asked to conduct various field related exercises to provide them with first hand experience and confidence in handling various field-related issues concerning wildlife management. One of the major highlights of this workshop was the practical demonstration, handling and use of advanced equipment (GPS, camera trap and map reading) by the trainee officers. Besides practical demonstration and conduct of field exercises on monitoring tools for animals and habitat for better management of resources, that is roadside monitoring of wildlife, line transect sampling for large ungulates, dung counts for estimating the relative abundance of large ungulates, tiger census through pug mark tracing, camera trapping, and radio collaring, block count for estimating the population of tigers' prey species and point count method for estimating the bird abundance were highly appreciated by all the trainees. The trainees were also given first-hand experience in analysing and interpreting data collected during various field exercises.

XIII Endangered Species and Zoo Management Course (Directors' Level), Arignar Anna Zoological Park, Chennai, and Nehru Zoological Park, Hyderabad *January 6-15, 2003.* This course was conducted by the Wildlife Institute of India and sponsored by the Central Zoo Authority. It was part of the series of courses conducted by WII to train zoo professionals in modern techniques and concepts pertaining to *ex-situ* management of wild animals, especially endangered species. The special theme for this course was *'Co-ordinated and Planned Breeding Programmes; with a case study of Lion-Tailed Macaques breeding and re-introduction'*. The course was inaugurated on January 6, 2003 at Chennai by Dr. S. Sukhdev, CWLW, Tamil Nadu, and was attended by 22 officer trainees from fifteen States and UTs, Forest Departments, and one trainee from the Indira Gandhi National Forest Academy, Dehra Dun.

The course consisted of lectures and discussions with twenty specialist faculty including Shri Pushp Kumar; Former PCCF, A.P. and Senior Zoo Consultant, Hyderabad; Shri S.C. Sharma, ADG of Forests (Wildlife), Retd; New Delhi; Shri P.R. Sinha, Member Secretary, CZA; Shri S.K. Patnaik, IFS, Chief Conservator of Forests (Wildlife), Orissa; Dr. B.R. Sharma, Director, PNHZP, Darjeeling (W.B.); Dr. Ajith Kumar, Co-ordinator, National LTM Breeding Programme, SACON, Coimbatore; Dr. C.S. Yalakki, Director, Thiruvananthapuram Zoo, Thiruvananthapuram; Dr. Goutam Narayan of the Pygmy Hog Captive Breeding Project; Shri Rajat Bhargava, Zoo Consultant, U.P.; Ms. Meena Raghunathan, Programme Coordinator, CEE, Ahmedabad; Shri S.K. Niraj, Regional Deputy Director (Wildlife Preservation), Mumbai; Dr. Adit Pal, National School of Architecture, New Delhi; Dr. L.N. Acharjyo, Senior Veterinary Professional; Veterinary Officers from Hyderabad and Mysore zoos, Shri G. Ananthekrishnan, City Editor, The Hindu, Chennai, Shri N. Krishnakumar, CF (Research), Chennai and members of WII faculty. During the course, field visits were made to Madras Crocodile Bank, Chennai, Sri Venkateshwara Zoological Park, Tirupati and Nehru Zoological Park, Hyderabad. At these visits the participants had useful interactions with Shri Rom Whitaker, Director, Madras Crocodile Bank, Chennai, Shri A.V. Joseph, Director, Nehru Zoological Park and senior A.P. Forest department officials. The participants gave presentations related to their zoo management experiences and to the organizations for which they worked.



Field visit and discussions during the zoo management course.
Photo: A.V. Library

The Valedictory Function was held on February 15, 2003. Shri S.K. Das, PCCF and Shri Hitesh Malhotra, CWLW of Andhra Pradesh, alongwith Dr. Gowhar Ali Khan, Senior Veterinary Professional, addressed the participants during the function and Shri Das distributed certificates to the participants.

Course on Legal Issues in Wildlife Management, *January 13-17, 2003.* To acquaint enforcement personnel with the policy and laws at State, National and International levels concerning wildlife/ biodiversity conservation and to equip them to take up legal protection measures in an effective manner. This training course was conducted at WII as part of the regular nine-month PG Diploma Course.

Training Programme on Biodiversity Conservation and Strategic Planning for Uttar Pradesh Forest Department, *January 20-25, 2003.* A training programme on Biodiversity Conservation and Strategic Planning was organized for the Uttar Pradesh Forest Department. The course was sponsored by the World Bank assisted Uttar Pradesh Forestry Project, and was attended by six officers from the Uttar Pradesh Forest Department. The objective of the course was to show various facets

of biodiversity conservation and to share strategic planning approaches for management of biodiversity. Inputs from the Institute's faculty and external resource persons were provided during the course. The participants also went on a field visit to assess the environmental impact of ecotourism activities on the banks of the river Ganga near Rishikesh.

Participants during the visit to Corbett discussing PA management *Photo: S. Wilson*

Training of Trainers Workshop (ToT) for Developing Environmental Safeguards in Identified Components of the World Bank funded Integrated Watershed Development (Hills–II), Shiwalik Project, Uttaranchal, *January 28–30, 2003.* The workshop was organized by the Institute and sponsored by the IWD Project. It was attended by thirty participants representing Watershed Management Directorate, Forest, Agriculture and Horticulture Departments of the Governmentt of Uttaranchal. The objectives of the workshop were (i) to develop methods to identify and integrate environmental safeguards into activities of the IWDP (Hills II) Shiwalik Project, (ii) to develop the capacity to conduct cost-benefit analyses of activities in relation to the environmental safeguards implemented in the IWDP (Hill – II) Shiwalik Project, (iii) to develop key environmental indicators for monitoring of core project activities, (iv) to sensitize and train core project staff to integrate environmental issues in current scheme/activities/components in the implementation of Shiwalik Watershed Development Strategy.

Inputs were provided by the Institute's faculty and resource persons. Shri Anil Joshi, Founder and Chief Functionary, Himalayan Environmental Studies and Conservation (HESCO), Dehradun delivered the valedictory address. The proceedings of the workshop, containing recommendations for developing environmental safeguards, have been submitted to the IWD project authorities.

Two-week Capsule Course in Wildlife Management for IFS Officers, *February 3-14, 2003.* A two-week capsule course in Wildlife Management for IFS Officers was organized as part of their compulsory training programme. The course was sponsored by the MoEF, Government of India and was attended by sixteen officers from eight States and AGMUT Cadre. The main objective of the course was to acquaint Protected Area managers, and other forest officials who have not had the benefit of formal training in the subject, with the principles and practices of wildlife management and their relevance to mainstream forestry. In all 31 interactive sessions on various facets of wildlife conservation and management were organized by the Institute's faculty and practising foresters.

The highlight of the course was a field visit to Corbett Tiger Reserve, where the participants had first hand experience of the challenges faced by the PA management and the strategies adopted to deal with them.

A panel discussion on the 'Improvement in working of the Forest Department: Need for career development through training and upgrading of skills' was organized on the concluding day. Shri Vinod Rishi, Director, IGNFA, delivered the valedictory address.

Training Workshop for Spearhead Teams of HPFD on 'Planning for Biodiversity Conservation in and around PAs through Sustainable Livelihoods Based Approach', Chail, Himachal Pradesh, *February 10-12, 2003.* The training workshop had the following major objectives: (i) to understand the concept and approach of Biodiversity Conservation through PAs and surrounding landscapes, (ii) to understand the links between the livelihoods of local communities and biodiversity, and how a sustainable livelihood approach can be used to strengthen biodiversity conservation in and around PAs, (iii) to build basic understanding about the concept of participatory planning for biodiversity conservation and its related issues, and (iv) to understand the importance of institutions in participatory biodiversity conservation

projects and how to undertake an institution building process for such projects. The Training Workshop was organized by the Institute as part of the ongoing WII-HPFD consultancy assignment. In all 24 frontline staff of the HP Forest Department representing different protected areas attended the Training Workshop. This included six Forest Rangers, seven Deputy Rangers and eleven Forest Guards.

The participants were acquainted with the current approaches to biodiversity conservation, including the sustainable livelihoods based approach, community participation, institution building process and project planning. The workshop decided that each of the spearhead team would initiate interaction with the local communities and collect the desired information in the prescribed format.

Sixth Special Short Term Course on Wildlife Protection, the Law and Forensic Science *February 17-28, 2003.* The Wildlife Institute of India organized this Course for probationers of Indian Customs and Central Excise Service Group "A" (54th Batch) at the request of the Customs Academy, Faridabad. Nineteen probationers attended the course.

Besides theoretical classes by the Institute's faculty members, various professional and legal experts from outside Agencies/Departments/NGOs were invited to deliver specialized inputs to the customs probationers, and add to their theoretical and practical knowledge about the illegal national and international trade of the wildlife and their products. A four day field visit was also undertaken to Dudhwa National Park's International trans-border (India–Nepal) Chowki, Gouri Phanta, District Lakhimpur Kheri (U.P.) in order to orientate the probationers practically about the situation.

Training workshop on Laboratory and Field research methods for Bhutanese Forest officials, Dehradun, *February 17–March 5, 2003.* Based at the request of the Bhutan Government, WII organized a training workshop for forest officials of Bhutan, the objective of the workshop was to train Officials in various laboratory and field research methods. A total of ten participants joined the workshop. The laboratory based training was carried out in the WII and the field techniques were demonstrated in Rajaji National Park. The various topics covered during the entire period included: Elephant and Goral ecology, ungulate population estimation, vegetation quantification, camera trapping, radio tracking, study and collection of kills and various laboratory techniques, such as faecal analysis, gut content identification, aging, nutrient analysis and different forensic aspects.

Training Workshop for Enhancing Technical Capabilities of the Officers and Staff of the Elephant Ranges in Northeast India, *February 24-March 1, 2003.* The Training Workshop was held at Kohra range of Kaziranga National Park was the third in series, the other two being one each at Bandipur National Park in Karnataka and Buxa Tiger Reserve, West Bengal. The workshop was conducted by the Wildlife Institute of India at the behest of, and with financial support from the Directorate of Project Elephant, Ministry of Environment and Forests, New Delhi. Besides the Assam Forest Department through the Director, Kaziranga National Park, provided the suitable site, administrative and logistic support for the successful completion of this workshop.

The main objective of having Training of Trainers (ToT) was to equip the trainee officers with all the required knowledge and skills relating to elephant conservation, so that they can impart similar training to other officers in the state on their return. A total of fourteen Trainee Officers from three States, Nagaland (three officers), Arunachal Pradesh (two officers), and Assam (nine Officers) attended this workshop.

A three-fold method was adopted in conducting this workshop that included classroom lectures through the best possible experts in their given fields both in the panel mode and as case studies using audio-visual aids. The second method used to impart this training involved visits to field sites for on-the-spot assessment of the themes that were covered in the classroom lectures. The field visits also helped the trainee officers to undertake practical exercises and demonstration the topics and themes such as Population estimation, habitat management, man-elephant conflict, and anti-poaching camps. A field trip to Kaziranga National Park was made everyday, either in the morning or afternoon sessions. Selected reading material, in the form of a compendium and copies of the lectures

Participants watching "The pride of Kaziranga" during field visit.
Photo: A.K. Gupta

delivered by various resource persons was provided for the trainee officers.

Practical demonstrations on the use and maintenance of wireless sets and Arms were arranged with the help of Police and Army personnel. The use of various types of traditional and modern techniques as mitigating measures for man-elephant conflict was also discussed with the help of slide shows.

Regional training workshop on Chemical Immobilization techniques for managing elephants in the wild and in captivity, Kaziranga National Park, Assam *March 3-6, 2003.* WII in collaboration with Project Elephant and Assam Forest Department organized a training workshop on chemical restraint techniques for managing elephants in the wild and in captivity. The objective to expose the participants to the recent developments in the field of chemical immobilization, both equipment and drugs, and to show them the team effort required for any chemical immobilization operation. A total of twenty participants of DCF, ACF, veterinary officer and RO level attended the workshop from Arunachal Pradesh, Nagaland and Assam.

Training Course on Wetland Conservation and Management. *March 3-7, 2003.* This course was funded by the World Bank aided U.P. Forestry Project, and was tailor-made for the officers of the U.P. Forest department with the objective of developing their capabilities in Wetland conservation and management, particularly for the State of Uttar Pradesh. Thirteen officers of DCF, ACF and Range Officer level joined this course and received hands on experience in theory and practice of wetland management. During the course the following topics were covered: (i) Introduction to wetlands: Definition, classification, wetland functions and values; (ii) Introduction to the vegetation of Indian wetlands; (iii) Wetland hydrology and water budget; (iv) Mapping of wetlands of Uttar Pradesh State by remote sensing; (v) Aquatic bird value of wetlands of Uttar Pradesh State; (vi) Wetland loss: priorities of wetlands for conservation; (vii) Conservation of wetlands of Uttar Pradesh using the Sarus crane as a flagship species; (viii) Problems with conserving wetlands of Uttar Pradesh; (ix) Application of Laws and Acts for the conservation of wetlands. Presentation based on case studies; (x) Wetland management issues in India. Wetland management principles; (xi) Identifying major problems and determining objectives and priorities. Developing a wetland management plan; (xii) Management of wetlands for water birds; (xiii) Wetland pollution, eutrophication and their control; (xiv) management of wetlands for the control of aquatic weeds; and (xv) Conservation Management of wetlands of U.P: Case studies on Bakhira, Nawabganj, Vijayasagar, Okhla and National Chambal Sanctuaries

Uttar Pradesh has a large number of wetlands and wetland protected areas. It is believed that developing the capabilities of forest officers in U.P. for managing their wetlands is a brilliant step taken by the U.P. Forest Department. The Wildlife Institute of India congratulates the U.P. Forest Department for their efforts in conserving wetlands. We look forward for such initiatives from other States. The course fee for the short course was nominal on a no-loss-no-gain basis, and other States should come forward to join the initiative taken by the U.P. Forest Department.

National Seminar on Conservation and Management of Marine Biodiversity, Kanyakumari, Tamil Nadu, *March 21-22, 2003.* This National Seminar was sponsored by the Ministry of Environment and Forests, Government of India, and executed by the Wildlife Institute of India in which over 150 scientists, marine biologists and experts deliberated and discussed issues related to Marine Biodiversity Conservation.

The proposed themes/agenda for this Seminar were (i) Status of marine biodiversity hotspots along the Indian coast and marine habitat; (ii) Threatened and

Lighting of the traditional lamp by Hon'ble Minister of Environment & Forests, Govt. of India, Shri T.R. Baalu at the inaugural session of the National Seminar at Kanyakumari *Photo: A.V. Library*

endangered flora and fauna in the Indian marine environment; (iii) Need for marine protected areas to safeguard marine biodiversity; (iv) Identification of sensitive and degraded marine habitats for restoration; (v) Ecological security of marine habitats for sustainable renewable resources; (vi) Development of action plan for international marine conservation obligations; (vii) Institutional framework for marine conservation and management action plan; (viii) Regional and international co-operation and networking; and (ix) formation of marine conservation advisory body.

The seminar was inaugurated by the Hon. Minister for Environment and Forests, Government of India, Shri T.R. Baalu, and the keynote address was given by Dr. S.Z. Qasim, former member of the Planning Commission on "Ecological security of Indian Marine Environment for Sustainable Development". The Minister declared the need for establishing a centre for excellence on marine conservation and management at Kanyakumari, Tamilnadu.

A total of 35 papers was presented, in six technical sessions spread over the two days, by eminent workers in the marine environment which ranged from status report of rare and endangered marine fauna, marine biodiversity hotspots, the need for marine protected area planning, creation of database and projects, community participation and integrated planning.

The broad conclusions of the seminar were: (i) First to asses the status of over-exploited marine biota in consultation with the specialized agencies and users, and to develop an appropriate strategy for making such exploitation feasible or otherwise within the existing framework of rules and legislation; (ii) To identify critical marine biodiversity hotspots within the Indian marine environment and to establish a protection conservation and management action plan; (iii) To integrate and develop every marine environment related activity by all agencies in an eco-friendly manner; (iv) To consider establishing a centre of excellence which will co-ordinate all future marine biodiversity, resources and habitat related issues; and (v) To develop appropriate state-of-art capacity building of human resources for good management and conservation of marine biodiversity.

Based on the recommendations it is proposed to develop a concise marine conservation action plan shortly.

Training Workshop on Wildlife Forensics and Law for the Staff of Gangotri National Park, Uttaranchal, *March 25-26, 2003.* A two-day training workshop on Wildlife forensics and the law was organized by the Wildlife Forensic Cell for Forest Guard and Deputy Rangers of Gangotri National Park, Uttaranchal at the Wildlife Institute of India. A total of ten staff members of the Gangotri National Park were nominated for this workshop but eight members of the Park attended this workshop. The workshop provided hands-on training in seeing the kinds of items found in trade and understand ways and means to identify these. Trainees were told about the kind and extent of wildlife trade in India and the need for developing wildlife forensics to implement the Indian Wildlife (Protection) Act, 1972. Other key topics dealt with were: *Criminalistics*, identification o f hair of some of the high altitude animals that are traded, such as Musk Deer, Serow, Goral and Blue sheep, identification of Musk Deer pod and Bear bile: Musk deer pods and bear bile are also traded in the Himalayan region, examination and identification of tusk items, canines, claws and antlers.

Attended by WII personnel

Project Elephant Steering Committee Meeting, *April 4, 2002.* The objective of the meeting was to discuss about the progress of Project Elephant. It was organised by the Ministry of Environment and Forests, New Delhi. There were nearly twenty officers from different elephant states in the country, and the meeting was chaired by Hon. Minister of Environment and Forests, Shri T.R. Baalu. The discussions centered on the conservation of elephant in different parts of India under Project Elephant. Dr. A.J.T. Johnsingh attended it.

Workshop on Environmental Impact Assessment Studies, *April 4-5, 2002.* The objective of the workshop was to create awareness among the environmental professionals about the EIA process and the methods prescribed in the EIA Manual brought out by MoEF. The workshop aimed at assisting the project developers and environmental consultants in improving the quality of EIA reports. It was organised by the Environment Monitoring Training and Research Centre (EMTRC) in association with the Central Pollution Control Board (CPCB).

Environmental Impact Assessment (EIA) is an important decision making tool in respect of various developmental projects. Not withstanding long years of experience, the methods for objective assessment of environmental implications for different categories of projects are not yet accessible to the project proponents and regulatory bodies. The workshop provided a forum for exchange of expert inputs on suitable methods for baseline data generation and impact prediction for addressing different environmental components. Dr. Asha Rajvanshi provided inputs on '*Methodologies for identification and assessment of impacts of development projects on biodiversity*'.

National Communications Project Meet on Climate Change, Forest Survey of India, Dehra Dun, *April 12, 2002.* The meeting was conducted by WINROCK International, New Delhi, under NATCOM, for the formulation of projects and interaction among different Institutions on subjects such as inventory development, future scenes, targeted research and vulnerability assessment. Among these, the Institute has given the chance to work on vulnerability assessment in the agriculture and forestry sectors. Dr. B.S. Adhikari attended it, and developed a project which was submitted for the funding.

First consultation meeting, Sairopa (Kullu), *May 4, 2002.* The first consultation meeting was organized at the Great Himalayan National Park, Sairopa (Kullu) to discuss the sustainable livelihoods based approach to conservation. Seven participating faculty members from the Institute attended this meeting. The CCF (Wildlife) and the Director, GHNP, represented the HPFD.

Zero Base Budgeting, Mussoorie, *May 11-15, 2002.* Dr. Mehar Singh, Registrar attended this training course which was organised by National Productivity Council, Jaipur.

Regional Workshop on the Changing Face of Pastoralism in the Hindu-Kush Himalaya Tibetan Plateau Highlands, Lhasa, China, *May 12-19, 2002.* This workshop was jointly organized by the International Centre for Integrated Mountain Development (ICIMOD) and the Tibet Academy of Agriculture and Animal Sciences (TAAS). The objectives of the workshop were: (i) to exchange knowledge and experiences on current practice of rangeland management and pastoralism within the Hindu-Kush Himalaya (HKH) region, (ii) to highlight the success stories and better management practices in the region and draw lessons from them, and (iii) to identify critical issues and strategies that can help rangelands and pastoral communities in the region, in terms of safeguarding the rich natural and cultural heritage. Over 150 participants from about eighteen countries with a keen interest in the HKH region participated in the workshop. The sessions of the workshop covered a wide range of topics including case studies from representative countries, successful approaches to pastoral development, diversification of livelihoods, and group discussions on topical themes. In addition, visits to the Tibetan rangelands within Damshiung (Damxung) county, sites of Juniper and rangeland restoration, historical and cultural places allowed the participants to interact closely with each other and share ideas of mutual interest. Drs. G.S. Rawat and Y.V. Bhatnagar from WII participated in the workshop. A poster and paper written by Drs. G.S. Rawat and B.S. Adhikari, entitled 'Vegetation Structure and Livestock Grazing in Eastern Ladakh, India' was presented in the workshop. The participants from WII facilitated group discussions on 'Rangeland Conservation in

Tibetan Plateau' and learnt various facets of rangeland ecology and management in the region.

Snow Leopard Survival Strategy (SLSS) Summit workshop, Seattle, USA, *May 21-25, 2002.* The International Snow Leopard Trust (ISLT) is a reputed conservation organization involved in snow leopard conservation throughout its range in Asia. ISLT has been involved gathering crucial insights from local and international experts on the conservation of this highly endangered species through e-discussions and questionnaire surveys over the past year. These discussions culminated in a Snow Leopard Survival Strategy (SLSS) Summit workshop in Seattle, USA. The document from this workshop has been prepared with inputs from over fifty experts from about twenty countries. This strategy document will be further discussed within each range country, and WII and ISLT are proposing to take the lead in these discussions in India. Dr. Yash Veer Bhatnagar participated in the workshop. This participation and the document thus produced will give a further impetus to the cause of conservation of the high Himalayan and Trans-Himalayan tracts of the country.

IUCN/SSC Asian Elephant Specialist Group meeting, Phnom Phen, Cambodia, *May 27–30, 2002.* The Asian Elephant Specialist Group of IUCN/ SSC organized a four-day meeting for revising and updating the Asian Elephant Action Plan 1990. The updated action plan took a renewed look at the size, trend, status, distribution and conservation action taken on the elephant populations of various range states. The Specialist Group in its deliberation also constituted three task forces, that is, elephant–human conflict, captive elephant welfare and management, poaching and ivory trade, which will address issues for conservation of Asian Elephant. The meeting was attended by over sixty participants representing Asian elephant range states such as India, Nepal, Indonesia, Sabah, Sri Lanka, Cambodia, Thailand, China, Myanmar, Lao PDR, Bangladesh, and Vietnam. Mr. H.E. Chan Tong Yves, Secretary of State, Ministry of Agriculture, Forestry and Fisheries, Royal Government of Cambodia presented the keynote address. Dr. A.J.T. Johnsingh and Dr. Sushant Chowdhury attended this meeting on behalf of the Wildlife Institute of India. Dr. Chowdhury contributed the regional chapter on eastern India elephant population for formulation and updating the Asian Elephant Action Plan. Dr. A.J.T. Johnsingh gave a presentation on 'Action Plan for the Conservation of North Western Range, India'.

Veterinary Specialist Group Futures Search Workshop, White Oak Conservation Center, Yulee, FL, USA, *June 4-6, 2002.* Dr. P.K. Malik attended the Futures Search Workshop organized by the IUCN VSG Group. The following were the goals: (i) identify conservation oriented issues and needs related to wildlife health that the IUCN VSG can effectively address and, perhaps, be in a unique situation (ii) to develop strategies for meeting these needs and to address the identified issues, (iii) identify resources needed for effective operation, (iv) determine an appropriate membership policy to meet objectives.

III World Conference on Mountain Ungulates, Zaragossa, Spain, *June 10-15, 2002.* The IUCN/ SSC Caprinae Specialist Group, University of Zaragossa, Spain, and the Government of Aragon, Spain, jointly organized the III World Conference on Mountain Ungulates at Zaragossa, Spain from 10 to 15 June 2002. From WII, Dr. S. Sathyakumar participated in this conference and presented one paper 'Estimating Abundance of Mountain Ungulates in Kedarnath Wildlife Sanctuary, Western Himalaya' and two posters, 'Conservation Status of Mountain Ungulates in Nanda Devi National Park, India' and 'Habitat Use by Himalayan Tahr and Goral in Great Himalayan National Park, India'. Another poster on 'Conservation status of Tibetan Gazelle in Ladakh, India' by Dr. Y.V. Bhatnagar was also presented at this conference.

Residential Programme on e-HRM: Human Resources Development in the age of Information Technology, Manali, *June 25-29, 2002.* Dr. Mehar Singh, Registrar attended this training course which was organised by National Productivity Council, New Delhi.

National Workshop on Strategies, Implementation Mechanisms and Operational Exposure of the ENVIS-EMCB Nodes at Visakhapatnam, *July 6-11, 2002.* The Ministry of Environment and Forests, Government of India has launched a major initiative under the World Bank assisted Environment Management Capacity Building Technical Assistance Project (EMCB TAP) to expand the network and to reach through involvement of additional institutions/organizations in State

Governments, academic sector, corporate sector, NGO sector. The objective of this workshop was to discuss the strategies, guidelines and operational procedures to be adopted for the ENVIS-EMCB TAP network. Dr. V.B. Mathur was invited to participate in this workshop and make a presentation on the 'Profile and Activities of ENVIS Centre on Wildlife and Protected Areas'.

Society for Conservation Biology Meeting at Canterbury, UK, *July 14-19, 2002.* Society for Conservation Biology invited Dr. Y.V. Jhala to present a paper on 'Causes of Wolf attacks on livestock and children: Implications for Indian Wolf Conservation' in the symposium on 'Human-carnivore conflict: local solutions with global applications'. The Conservation Biology Society meeting had several other symposia on topics such as conservation planning, sustainable use, landscape ecology and biodiversity in agricultural landscapes. Over a thousand delegates consisting of scientists, park managers and conservationists from all over the world attended the meeting. A major decision taken at the society meeting was to establish regional chapters for the society, with one centre in India.

National Workshop on Biodiversity Characterization at Landscape Level using RS&GIS, National Remote Sensing Agency, Hyderabad, *July 19, 2002.* A national workshop on Biodiversity Characterization at Landscape Level using RS&GIS was organized by the National Remote Sensing Agency, Hyderabad on July, 19, 2002. The objective of this workshop was to review the progress made by Principal Scientists and Regional Coordinators in the implementation of the Department of Space (DOS) and Department of Biotechnology (DBT) sponsored biodiversity characterization project. Dr.V.B.Mathur was invited to participate in the workshop and make a presentation on 'Biodiversity Characterization in Goriganga Catchment, Askot Wildlife Sanctuary, Uttranchal State.

Meeting on 'Approval of Management Plans for Protected Area in Gujarat', *July 19, 2002.* The meeting was convened by the CCF (Wildlife) and CWLW of Gujarat to consider the draft management plans for select PAs and approve them in consultation with the representatives of the MoEF, GOI and WII. The revised management plans for Gir Conservation Area and Velavador National Park in addition to the management plan for Sakkarbaug Zoo, Junagadh were considered. WII received the draft management plans prior to the meeting. Dr. P.K. Mathur attended the meeting on behalf of the Director, Wildlife Institute of India, and gave his comments on the draft management plans.

Meeting of High Level Co-ordination Committee on 'Regional Planning for Gir Conservation Area', GEER Foundation, Gandhinagar (Gujarat), *July 20, 2002.* The meeting deliberated on the need, requirements, and strategies for regional planning in the Gir Conservation Area. The Government of Gujarat has set up a high level committee on regional planning for Gir Conservation Area. The committee includes Secretary level representatives from the Departments of Agriculture, Animal Husbandry, Water Resources, Irrigation, Highways, Mining, Rural Development, Forest, and Industry. WII's representative, Dr. P.K. Mathur, was invited as a Special Invitee considering its role in the process of regional planning initiated under the GEF-India Ecodevelopment Project.

The meeting was chaired by the Principal Secretary, Forest and Environment, Government of Gujarat, and was attended by the senior officials representing different ministries or departments. The meeting highlighted the need for regional planning for Gir Conservation Area (GCA) and focussed on current threats and biotic pressures. The committee decided that the various representatives will work out the alternative strategies to fulfill the requirements of their respective mandates. The committee decided to meet again after three months.

Workshop of Forest Ministers, Forest Secretaries and Chief Wildlife Wardens, New Delhi, *July 22-23, 2002.* The following were on the Agenda: (i) JFM as a model for protection and management; (ii) role of FDA in improving/ increasing forest cover; (iii) involvement of local communities in protected areas through eco-development; (iv) integrating rural development programmes with the activities of eco-development; (v) role of national green corps in creating awareness and mass support for protection and conservation of forests and wildlife. It was organised and sponsored by the MoEF, New Delhi. The participants deliberated on key issues and drafted recommendations of the workshop. Dr. B.K. Mishra participated in this workshop.

Workshop on people and eco-development with special reference to Periyar Tiger Reserve, Kerala, *July 24-26, 2002.* The objective was to facilitate the dissemination of knowledge about issues of sustainable development, grassroots democracy, common property rights, ecological conservation, and preservation of local community wisdom. It was organised by the School of Social Sciences, Kottayam University. The workshop analysed the impact of the ecodevelopment programme on the livelihoods of the tribals dependent on Periyar Tiger Reserve. There were deliberations on the dependence of the tribals on the Periyar Tiger Reserve, their institutional development and political structure. The prospects of Village Ecodevelopment Committees and their success in a heterogeneous society of stratified power, property relations were also discussed. Dr. Ruchi Badola participated in this workshop.

XIV International Congress on Bear Research and Management, Steinkjer, Norway, *July 24–August 4, 2002.* The objective of the congress was to give an opportunity to bear biologists from around the globe to gather and discuss their research findings and conservation of different bear species. It was sponsored by the organizers of XIV International Bear Research and Management Congress. This conference was attended by nearly 200 bear biologists from all over the world. Dr. A.J.T. Johnsingh gave a presentation on 'Bear Conservation in India' and chaired the session on 'Landscape and Habitat Approach in Bear Research and Management'. K. Yoganand, Naim Akhtar and Harendra Bargali who have worked on Bear projects at WII were also present.

Pilot Environmental Information Centre: Workshop with Data Providers, New Delhi, *August 21-22, 2002.* The objective of this workshop was to get first-hand information from various data collecting agencies about the environmental data collected by them that can be used in environmental impact assessment studies. The deliberations at the workshop focused on improving data availability and accessibility; reviewing frequency of updating data, existing mechanisms of data sharing, and future possibilities of dissemination and value addition of data through EIC. The workshop was organized by Ecosmart India Limited on behalf of MoEF as a component under the World Bank funded Environmental Management and Capacity Building (EMCB) Project. Dr Asha Rajvanshi attended the workshop.

Residential training programme on "Managing Performance: Achieving Results", Ladakh, *August 24-28, 2002.* Dr. Mehar Singh, Registrar and Shri P.K. Aggarwal, Administrative Officer, attended this training course which was organised by National Productivity Council, New Delhi.

Demonstration-cum-training on microchip application in elephant, New Delhi, *August 28, 2002.* Dr. P.K. Malik and Dr. Sushant Choudhary attended this demonstration-cum-training organized at National Zoological Park, New Delhi. The training was sponsored by Project Elephant, Government of India.

Expert Committee Meeting on "Web Enhanced Training Programme on ISIS (Window Interface), New Delhi, *August 28, 2002".* Shri Madan S. Rana, Librarian as a member of the Expert Committee participated in the meeting organized by IGNOU in collaboration with NISSAT. Madan S. Rana developed a module on Information Retrieval for this Training Course.

National Workshop on Education and Training in Remote Sensing and Geoinformation Science, Indian Institute of Remote Sensing, Dehradun, *September 4-5, 2002.* This workshop was organized to discuss the education and training programmes of Indian Institute of Remote Sensing and to incorporate changes in them in view of the changing scenario and acquisition of state-of-art knowledge in the field of remote sensing applications, Dr. V.B. Mathur was invited to attend this workshop and make a presentation on the 'Review of IIRS Training Programmes in the field of Biodiversity Conservation'. The workshop was inaugurated by Dr. R. Navalgund, Director, National Remote Sensing Agency, Hyderabad and attended by over 25 scientists and academicians from various institutions and universities.

Residential Programme on Modern Office Management, Goa, *September 9-13, 2002.* Dr. Mehar Singh, Registrar attended this training course which was organised by National Productivity Council, New Delhi.

International Workshop on Forest Canopy Density Assessment Using Satellite Remote Sensing, Indian Institute of Remote Sensing, Dehradun, *September 12-13, 2002.* The Indian Institute of Remote Sensing organized this international workshop in collaboration with International Tropical Timber Organization (ITTO) and Japan Overseas Forest Consultant Association (JOFCA) with the objective to introduce new remote sensing technique for forest mapping and classification based on the Forest Canopy Density Model and to validate the results of density assessment. Dr. V.B. Mathur was invited to attend this workshop and to discuss recent trends in tropical forest cover and density mapping at regional and local levels. The workshop was attended by foresters, academicians and researchers from various national and international institutions.

Meeting of the Scientific Advisory Committee (SAC) of the ENVIS Programme, *September 18, 2002.* The meeting was convened under the chairmanship of Secretary, Environment & Forests, Government of India to evaluate and monitor the performance of all ENVIS Centres. Dr. V.B. Mathur was invited to participate in this meeting and to make presentation on the activities of WII-ENVIS Centre on Wildlife and Protected Areas.

Seminar on Recent Trends and Strategies for Ecotourism in India, Hyderabad, *September 20-21, 2002.* Shri Rajiv Bhartari attended the Seminar on Recent Trends and Strategies for Ecotourism in India organized by Andhra Pradesh Tourism Development Corporation. He made a presentation on ecotourism in Northern India in the states of Ladakh, Himachal Pradesh, Uttaranchal and Sikkim and also on the CBN Ecotourism Initiative.

First Workshop on Development of National Guidance Manual on EIA Practice with Support Manuals on Select Developmental Projects for enhancing the Quality and Effectiveness of Indian EIAs, New Delhi, *September 24, 2002.* The workshop was organized by the National Environmental Engineering Research Institute, Nagpur, at CSIR Vigyan Kendra, New Delhi. The objective of the workshop was to deliberate on the issues related to improvements in the Guidance/ Support Manuals on EIA practices within the existing EC process, and those which can be taken up with revisions in the EC process.

Preparation of the National Guidance Manual on EIA practice to provide technical guidance to project proponents/ EIA consultants, and serve as a referral document to produce quality output (such as EIA/ RA reports) at various steps of the EC process, is one of the major initiatives of MoEF under the World Bank funded Environmental Management Capacity Building (EMCB). Dr. Asha Rajvanshi participated in the workshop and also spoke at the technical session on Baseline Data Requirements with particular reference to biological environment.

Meeting of the Research Advisory Committee (RAC) for Man and Biosphere Programme, *September 26, 2002.* This meeting was convened by the Research Advisory Committee for the Man and Biosphere (M & B) Programme of the Ministry of Environment and Forests, Government of India. Dr. V.B. Mathur was invited to participate in the meeting to review the research proposals to be funded under the M&B programme.

Workshop on Captive Elephant Management, Trichur, Kerala, *October 25-28, 2002.* The objective of the workshop was to discuss various aspects of captive elephant management. It was organised by Elephant Welfare Association and Kerala Agricultural University, Kerala Forest Research Institute, Wildlife Trust of India and Asian Elephant Research and Conservation Centre and sponsored by the RSPCA, London. The workshop was attended by delegates from India and abroad. More than forty papers were presented. Sessions on conservation biology, diseases, management, lecture, training, work and demonstrations of animal handling were conducted. Field visits to Guruvayur Temple Elephant Camp, Punnathurkotta at Guruvayur were made to inform delegates about existing management practices. Capt (Dr.) Parag Nigam participated in the workshop. Dr. P.K. Malik attended the workshop.

Workshop on Control of *Prosopis juliflora* in Banni Grassland, Kutch (Gujarat), *October 28-29, 2002.* The objectives of the workshop were: (i) to deliberate on the current status of grasslands in Banni and associated floral and faunal species, (ii) to ascertain the current extent and problem of invasion by woody *Prosopis juliflora* in Banni grasslands, (iii) to evolve strategies for its control.

The workshop was organized by the Gujarat Ecological Society, Vadodara in collaboration with

Gujarat Institute of Desert Ecology (GUIDE), Bhuj (Gujarat). The workshop participants included representatives of various state/national level scientific institutions working in the desert region. professional foresters, NGOs, and local inhabitants of Banni attended the workshop. Dr. P.K. Mathur was invited to be one of the external resource person.

Workshop on Sustainable Livestock Grazing Policies for Indian Trans-Himalaya, *November 11-12, 2002.* The workshop deliberated on the current status of livestock grazing in the Indian Trans-Himalayan region and its competition and conflict with endangered wildlife, to evolve a sustainable grazing policy. The workshop was a result of collaboration between agencies, that is the Wildlife Institute of India (WII), the IUCN – Himal Programme, ICIMODE, Nepal and Ladakh Hill Development Council (LAHDC). The workshop participants included representatives of state, national, and international scientific organizations, particularly those working in high altitude landscapes in the Himalayan and Trans-Himalayan regions. The concerned line departments under the LAHDC, local NGOs and pastoralists also actively participated in the workshop. Dr. P.K. Mathur was invited to be one of the resource persons.

The workshop deliberated specifically on the current trends of livestock grazing in the Indian Trans-Himalayan region, its conflicts with wildlife and mechanisms for sustainable livestock grazing along side conservation of biodiversity. The problems faced by pastoralists and their livestock due to the curtailment in traditional practices of migration were considered. A need for integrating livestock grazing and the occupations of pastoralists with other sectors in the region was highlighted. The workshop participants were of the opinion that the problems of livestock and pastoralists can be well addressed while adopting a holistic and landscape management approach and involving all the concerned stakeholders.

National Workshop on Mountain Environment and Development: Potential and Prospects, Kosi – Katarmal, Almora, *December 9-10, 2002.* This workshop was held at the G.B. Pant Institute of Himalayan Environment and Development, Kosi – Katarmal, Almora. Dr. G.S. Rawat participated in this workshop and gave a presentation on Linking Conservation with Development in the Indian Trans-Himalaya. The presentation de..t with key issues of nature and biodiversity conservation in the Indian trans-Himalaya (especially Ladakh and Lahul & Spiti) that need to be linked with the developmental plans so that a balanced approach of development and conservation may be taken. Besides the presentation, Dr. Rawat participated in the panel discussion on Development perspectives in the Himalayan region.

Regional Wetland Workshop, Dehra Dun, *December 10, 2002.* Dr. S.A. Hussain presented a talk on Wetlands of Indian Himalayas: A review of their status. The RRSA in collaboration with ZSE and SACON organized a workshop to disseminate information on the status of wetlands at Northern India under its GEF sponsored National Wetland Project sponsored by MoEF. Based on a review of the status of four wetlands in Himalaya, Dr. Hussain presented a talk on the status of the wetlands of Indian Himalayas.

Regional Workshop on the Conservation and Management of Himalayan Medicinal Plants, Kathmandu, Nepal, *December 15-20, 2002.* This workshop was jointly organized by the Ministry of Forests and Soil Conservation, HMG Nepal, International Development Research Centre (IDRC) – Canada and WWF-UNESCO's People and Plants programme. Dr. G.S. Rawat attended this workshop in the capacity of a member, Technical Committee. The workshop deliberated on various themes that is Wild harvesting and *in-situ* conservation of Medicinal and Aromatic Plants (MAPs), Domestication, cultivation, *ex-situ* conservation and marketing of MAPs, and traditional medicinal systems, benefit sharing, indigenous knowledge and ethical practices. The workshop was attended by more than fifty participants (professional botanists, foresters, protected area managers and herbal practitioners) from the region. The deliberations were of tremendous benefit to the participating faculty, and expected to be of much use in the formulation of conservation plans in the Indian Himalaya as well as for conducting training programmes.

One-week compulsory training course on "Intelligence Gathering and Crime Prevention with special reference to wildlife", Hyderabad, *December 16-20, 2002.* Dr. Mehar Singh, Registrar attended this training course which was organised by Sardar Vallabhbhai Patel National Police Academy, Hyderabad.

Terminal Workshop, EmCab (Environment Management Capacity Building Programme) Project IGIDR (Indira Gandhi Institute for Development Research), Mumbai, *January 3, 2003.* Dr. S.A. Hussain and Dr. Ruchi Badola presented a summarized report of the project Valuation and Evaluation of Management Alternatives for Bhitarkanika Mangrove Ecosystem – Summary of findings. The project was sponsored by EmCaB Project, IGIDR, Mumbai.

Consultation Meeting on the 'Assessment of Threat Status of the Medicinal Plants on the Northwest Himalaya, *January 31, 2003.* The Consultation Meeting organized at the Institute was sponsored by the Ministry of Environment and Forests, Government of India. It was attended by thirty-one participants representing government agencies, scientific institutions, NGOs, pharmaceutical industry from Uttaranchal, Himachal Pradesh and Jammu & Kashmir. The objective of the consultation was to discuss various issues related to the conservation of wild genetic resources and the assessment of the threat to medicinal plants in order to develop a viable strategy that addresses the aspects of both conservation and use. Dr. R.S. Tolia, Principal Secretary (Rural Development and Forests), Government of Uttaranchal, delivered a keynote address on 'Polices and strategies of Uttaranchal State on Medicinal Plants' and Professor A.N. Purohit spoke on the 'Future of Medicinal Plant Conservation *vis-à-vis* Biotechnological Interventions' during the inaugural session. Dr. G.V. Sarat Babu, Additional Director, MoEF and Shri Aseem Srivastava, DIG (WL), MoEF provided an overview of the recently enacted Biodiversity Act, 2002 and the recently amended Wildlife (Protection) Act, 2002 respectively.

Dr. R.S. Tolia, Principal Secretary (RD&F), Govt. of Uttaranchal delivering the keynote address. *Photo: V. Verma*

Training workshop for field co-ordinators of elephant reserves in India, Dehradun, Uttaranchal, *January 31–February 4, 2003.* Knowing the current situation of elephant conservation in India, a National Workshop for Field Co-ordinators of Elephant Reserves in India was organized at Dehradun between 31st January and 4th February, 2003 in collaboration with the Forest Department, Uttaranchal. The objective of the workshop was to share and discuss matters related to elephant conservation in their respective ranges.

This workshop was officially launched by the Principal Chief Conservator of Forest, Uttaranchal, in the presence of Mr. V.B. Sawarkar, Director, WII, Mr. S.S. Bist, Director, Project Elephant, Professor A.J.T. Johnsingh, Dr. R. Sukumar, IISC and faculty members of WII. In total, 29 participants participated and of these 21 were from various elephant reserves. After having a brainstorming session on 'Current status and conservation of elephants in India', a field visit to Rajaji National Park and Corbett Tiger Reserve was conducted. All the Field Co-ordinators were invited to discuss the perspective plan of concerned elephant reserves. Various issues related to human-elephant conflict, elephant corridors and status of elephant population in various zones were discussed.

Training Course on Wetland Conservation and Management for the Officers of U.P. Forest Department, Dehradun, *March 3-7, 2003.* This course was funded by the World Bank aided U.P. Forestry Project and, therefore, tailor-made for the officers of the U.P. Forest Department to develop their capabilities in wetland conservation and management. Thirteen officers of DCF, ACF and Range Officer level joined this course and received hands-on experience in theory and practice of wetland management.

Workshop on Conservation and sustainable utilization of medicinal plants in Uttaranchal, Wildlife Institute of India, *March 21, 2003.* The main agenda for discussion in the workshop was to identify the potential areas of medicinal plant collection, organizations responsible for the collection of medicinal plants from the villagers, and the place from where it will be supplied to the users. Dr. B.S. Adhikari participated in it.

Reflections Workshop on Community Based Natural Resources Management Programme, New Delhi, *March 27, 2003.* The objective was to analyse the foundation's role through its project in enhancing access and management control of local communities over forest resources to enable them to meet their subsistence and income needs in a sustainable manner as well as enhance environmental quality, improve livelihoods and facilitate empowerment of resource dependent and marginalized groups. It was organised by the Ford Foundation, New Delhi. The workshop participants reflected and analysed the foundation's role in meeting the above objectives, considered persistent challenges, and were able to identify emerging issues. Dr. Ruchi Badola participated in the workshop.

Surveys, Study Tours, Visits and Talks

Field Trip to study site in the Pin Valley National Park, Spiti, Himachal Pradesh, *June 21-30, 2002.* WII has a MoU with the Nature Conservation Foundation (NCF), Mysore, a non-profit organization dedicated to promoting the use of science for wildlife conservation in India. The primary areas of joint work are in the Indian Trans-Himalaya. Sumanta Bagchi, alumni of WII's Masters programme, along with Dr. Charudutt Mishra, Executive Trustee NCF, and Dr. Yash Veer Bhatnagar, WII wrote up a proposal on 'Forage relations between ibex, *Capra ibex*, and livestock in the Indian Trans-Himalaya'. This work was funded by the International Snow Leopard Trust (ISLT), recognizing the importance of resolving the issue of wild ungulate – livestock competition in the Trans-Himalayan tracts. Dr. Bhatnagar visited the study site in the Pin Valley National Park for field information.

Visit to Musk deer breeding farm, Kanchulakharak, *June 22-23 and July 11-13, 2002.* Capt. (Dr.) Parag Nigam visited the Musk deer breeding farm to discuss various issues relating to the translocation of Musk deer to a new area to investigate the mortality in Musk deer and suggest remedial measures to prevent further deaths.

Visit to Gangotri WLS and Bhagirathi Catchment including Dogadda, Asiganga, Dharamganga and Bhatwari watersheds, *June, 2002 and January, 2003.* Dr. B.S. Adhikari conducted a study in the Garhwal Himalaya under the project Developing predictive models for climatic change and vegetation structure in western Himalaya.

Visit to the University of Peradeniya, *July 1-24, 2002.* Dr. S.A. Hussain visited the University of Peradeniya. During his stay Dr. Hussain gave fifteen lectures in the Postgraduate Institute of Science for the students of the M.Sc. Course on Fish and Wildlife Management.

During this period Dr. Hussain also demonstrated the use of equipment such as map reading using both compass and GPS, compass for direction finding, pedometer, laser-guided range-finder and its application, radio telemetry and its application,

With Professor Mangala de Silva, Department of Zoology, Dr. S.A. Hussain took the students to Ruhuna National Park and demonstrated the technique for estimating animal abundance and for quantifying vegetation parameters, which was previously discussed with the students in the theory classes. During his visit to the Department of Zoology Dr. Hussain gave eight lectures. Besides this the students were helped in the analysis of data that was gathered during the field visits.

Field demonstration of immobilization techniques, *July 27, 2002.* Dr. P.K. Malik and Capt. (Dr.) Parag Nigam carried out a field demonstration of immobilization techniques for Indira Gandhi National forest Academy probationers at Rampur Mandi Deer Park.

Study conducted at Changthang Region of Ladakh, mainly the south-eastern part of Zanskar region, *November, 2002.* Dr. B.S. Adhikari conducted a study at Changthang Region of Ladakh, mainly the south-eastern part of Zanskar region under the collaborative project between WII and IIRS, Dehradun entitled Biodiversity characterisation in the Indian Trans-Himalaya.

The Institute conducted 3 regular courses, continued one M.Sc. Wildlife Science course, thirty seven short courses,workshops, meeting, symposium and an Annual Research Seminar during the reporting year. Faculty members of the Institute also participated in a large number of workshops, seminars, and conferences conducted by other organisations.

Research

Completed Projects

EXTERNALLY FUNDED RESEARCH PROJECTS

WII-USDA Forest Service Collaborative Project

Management of Forests in India for Biological Diversity and Forest Productivity – A New Perspective

Investigators (Indian Team): Shri V.B. Sawarkar– PI, Dr. P.K. Mathur-CI (TCA) & N.O., Dr. Atul Gupta–CI (GCA), Shri Sanjay K. Srivastava–CI (ACA), Shri Sunil B. Banubakode – CI (SCA)

Researchers: Dr. Anjana Pant (SCA), Shri Harish Kumar (TCA), Shri Ashish Kumar (GCA), and Shri T.K. Sajeev (ACA)

Co-opted Personnel: Shri S.G. Chavan

US Team: Mr. Tom Darden-Coordinator, Mr. Richard Holthausen (SCA), Dr. Bruce G. Marcot (GCA), Dr. John F. Lehmkuhl (TCA), Dr. Martin G. Raphael (ACA)

Collaborators: Shri Dhananjay Mohan, IGNFA

Field managers: Shri T.T.C. Marak, Shri Rupak De, Dr. V.N. Pandey, Shri P.C. Tyagi, Shri Ajai Saxena, Shri D.V.S. Khati and other field managers at each project site.

Date of Initiation: January 18, 1996
Date of completion: December 31, 2002
Budget allotted: Rs. 134.56 lac

The objectives of the project are: (i) to assess, document, and map as appropriate, the kinds, extent and distribution of plant and animal diversity in selected forest sites through rapid survey methods, (ii) to use the existing status and habitat relationships' information to set up baseline information, (iii) on a stand to landscape level perspective, evaluate the impact of the existing variety of forestry practices, use of forest based resources by local people including the methods of harvests and collection, fires, the operation of varied concessions and rights on micro-habitat elements, key habitats, species, communities, the overall forest productivity and diversity, (iv) to assess rapidly the local village systems in terms of varied land-use, forest resource dependency including raising and grazing of domestic livestock, other vocations, skills, economy and markets. This will be seen in relation to forest systems. Threats to ecological harmony and the economic status of people will be documented, (v) to use modern ecological concepts in developing practical management tools and practices for bringing about harmony within the forests and between forest and village systems through sustainable land-use practices which make ecological and economic sense. Document problems and threat mitigation prescriptions and develop site-specific guides for management, and (vi) to conduct workshops and seminars to share experience and disseminate knowledge.

The study sites are: (i) Garo Hills Conservation Area (GCA) comprising the Balphakram NP, Siju WLS and outlying Reserve and Community forests in Meghalaya, (ii) the *Terai* Conservation Area (TCA) that comprises Dudhwa Tiger Reserve and forests of north and south Kheri Forest divisions in UP, (iii) the Satpura Conservation Area (SCA) consisting of Satpura NP, Bori and Pachmarhi WLS, managed forests of Hoshangabad, north, west and south Betul forest divisions of MP besides the Melghat Tiger Reserve and managed forests of east, west and south Melghat divisions of Maharashtra, and (iv) the Anamalai Conservation Area (ACA) that includes the Anamalai WLS and managed forests of Kodaikanal and Dindigul divisions of Tamil Nadu. The sites represent a diversity of ecological, managerial, socio-cultural and economic challenges necessary for testing a range of technological templates and options, the development of management tools and the final product in the form of field guides.

The project was scheduled to end in June, 2002. The concluding National Workshop was, thus, scheduled and planned for June, 2002. Due to a sudden disturbed situation at the international border, however the advice issued by the American Embassy, the US visitors could not visit India. The workshop was postponed at the last moment. On restoration of the normal, the US agency and the GOI were requested to grant a 'no cost extension' up to December, 2002. This was the third time 'no cost

WII-USDA Forest Service Collaborative Project Final Reports
Photo: V. Verma

extension' of the project. During the reporting period, the project was, therefore, in its seventh and final year. Only one researcher (GCA) continued to work for the project, while the other three had already left in the previous year. The main task during the extended period was that of writing draft chapters for the final report-cum-field management guide. The Indian research team, in consultation with the counterpart US scientists, devoted much time during the reporting period to the finalization of various chapters as earlier agreed upon for each of the six-volume reports through e-mail exchange. The US Science Team arrived at WII a week before the Project Terminal Workshop, and they largely spent their time in finalizing six volumes and preparation for the workshop. The Project Terminal Workshop was held on December 11-13, 2002 at Claridges Corbett Hideaway, Ramnagar (Nainital) wherein senior professional foresters from sister institutions, MoEF, and project field sites participated. The workshop had presentations by the team members on the approach to the project, research findings and management recommendations for each of the Conservation Areas. The workshop participants had a field visit to Corbett Tiger Reserve on December 15, 2002. The final report-cum-field guide (six volumes) was released at the time of project workshop.

The project has used the concept of a large landscape or Conservation Area (CA) comprising select protected areas, adjoining managed forests and intervening private/community lands. Each of the CA had a detailed assessment on floral and faunal resources and biotic pressure. As envisaged in the project, a spatial resource database in GIS domain was developed for each of the CA. Detailed landscape level assessments using FRAGSTATS and BioCAP software were made. A Wildlife Habitat Relationship (WHR) database for 184 wildlife species was developed. The detailed biological, ecological and socio-economic analysis of four field-demonstration sites is a significant contribution. Volume I of the final report-cum-field guide addresses conceptual and scientific bases for the approach, and should be of use to any manager or researcher interested in such an approach anywhere. Volume II covers Wildlife Habitat Relationships and includes a framework evaluating multiple wildlife species simultaneously, and narrative summaries of life histories of short-listed wildlife species selected to represent various criteria of rarity, endemism, management focus, habitat associations, and other factors. Volumes III to VI represent intensive case studies of four Conservation Areas selected across India to show the great diversity of cultural situations, ecological conditions, site histories, and management challenges. The researcher working for the TCA site in Uttar Pradesh submitted his Ph.D. dissertation entitled "An Ecological Assessment of Forest Spatial Heterogeneity, Species Diversity and Grassland Burning Practices in the *Terai* Conservation Area". The research team also published three different research papers in joint authorship during the period, and a researcher working for GCA site made a presentation during the workshop on 'Conservation of Elephants' held at Haridwar (Uttaranchal).

It was the first project of its kind in the country wherein the concept of a large landscape was used for integrated resource assessment across different land allocations. Many useful lessons have been learnt from this major project, principally the need to think broadly across different constituent areas of the landscape when managing native species and communities. Cumulative effects in buffer areas or zones of influence outside the existing protected areas, or even along international borders were also taken into account while developing site-specific management plans. Management approach on different spatial scales is seen as the best way to avoid conflict in resource use and to plan for appropriate ways to conserve biodiversity in managed forests. The spatial resource database for each of the conservation areas is a significant contribution through this project. The project provided management recommendations, particularly site/landscape level prescriptions for each of the conservation areas. The findings in the case of *Terai* Conservation Area (TCA) have incorporated recommendations on grassland burning practices based on an experimental trial over a period of three years.

WII-USFWS Collaborative Project

Indian Wildlife Health Co-operative (IWHC)

Coordinators: Dr. P.K. Malik and Dr. F. Joshua Dein

Date of initiation: October 1, 1995

Date of completion: December 31, 2002

Budget allotted: Rs. 58.80 lac

The project is a collaboration between Wildlife Institute of India and US Fish and Wildlife Service. The project was initiated in 1995 and the five centres of Indian Wildlife Health Co-operative were created at Veterinary Colleges in Jabalpur (Madhya Pradesh), Chennai (Tamil Nadu), Guwahati (Assam), Hissar (Haryana) and Anand (Gujarat) through a Memorandum of Understanding between the agricultural universities and WII. The colleges agreed to designate a faculty member as the Wildlife Health Co-ordinator (WHC), who would integrate and focus the college and faculty resources. The five WHCs first participated in the nine-month Diploma Course in Wildlife Management at WII, and then received three months of intensive training and experience in the US, organized by the National Wildlife Health Centre (NWHC), USA. This provided a solid background in wildlife science and international exposure with which to build their Centres. The WII-FWS project also contributed field vehicles, diagnostic teaching, research and communication equipment. A key goal was to develop good working relationships with state protected area officials and managers, and provide wildlife health services to them when needed. They would also develop and teach a wildlife health curriculum for students, faculty from other colleges and government veterinarians to increase the availability of trained individuals.

The formal objectives of IWHC were: (i) to advance the capabilities of veterinary colleges to provide diagnosis and investigation of disease outbreaks, information exchange, education to and consultation with wildlife managers and veterinarians, (ii) to develop a standard wildlife health curriculum in all veterinary colleges, (iii) to enhance the capabilities of faculty members from four veterinary colleges and the Indian Veterinary Research Institute, enabling them to teach a course in Wildlife health at the undergraduate level, and supervise graduate student programmes (iv) to increase coordination of wildlife health programmes in India through the establishment of an Indian Wildlife Health Co-operative (IWHC), and (v) development of a field guide on wildlife diseases.

A country-wide survey was done in important PAs to collect information on wildlife mortality for the preparation of a field guide on wildlife disease. Due to the great paucity of information available through the records in PAs, the field guide is still incomplete and is in progress phase.

From this exercise, the IWHC is formulated. The five IWHC Regional Centres are located at Anand, Chennai, Guwahati, Hissar and Jabalpur Veterinary Medical Institutions with appropriately trained faculty to conduct wildlife health monitoring programme. The aim is to enable these regional centres to provide timely consultation and investigation of mortality events in protected areas. The project is called "Development of an Indian Co-operative Wildlife Health Programme (IWHC)". The project is a collaborative effort between WII, USFWS, National Wildlife Health Research Centre (USGS) and five veterinary institutes in India. The approach is appropriate for India because of the availability of Veterinary Colleges with their associated diagnostic laboratories, in proximity to large wildlife areas. The completion of this project is the foundation for the incorporation of Wildlife Health Monitoring and Research as components of proactive wildlife management and agriculture in the 21st century.

It is beyond doubt that in the coming years, the interface conflict between humans, livestock and wildlife will increase. It is only to be expected that this will lead to an emergence of new diseases and an increased load of parasites and pathogens. The rising demand of food and animal products to sustain human population has already led to increased use of agricultural chemicals and other chemicals causing pollution to the environment. Developmental projects and activities have brought the protected areas under tremendous pressures. In the circumstances, scientific intervention in the health management of wild flora and fauna for sustaining viable populations, will become most challenging to wildlife managers.

WII's initiatives to address such issues are a mile stone in conservation management and WII perceives this area as an interdisciplinary effort between health professionals, wildlife managers, ecologists and conservation professionals.

Identifying potential areas for conserving biodiversity in the Indian Himalayas

Investigators : Dr. V.B.Mathur, Dr. R.S.Chundawat, Shri Qamar Qureshi, Dr. Y.V. Bhatnagar (WII), Dr. Don O. Hunter (US Geological Survey, Midcontinental Ecological Science Centre, Fort Collins, USA) and Dr. Rodney Jackson (Snow Leopard Conservancy, USA)

Researchers : Shri Rashid H. Raza, Ms. Meera Anna Oommen, and Shri Raja Jaypal.

Date of initiation: October 1, 1995

Date of completion: September 30, 2002

Budget allotted: Rs. 45.61 lac

"Temperate forest and alpine meadows in and around Kedarnath WLS, many areas are outside the P.A boundary. The project helped identify such areas of conservation importance."
Photo: Rashid H. Raza

The project was initiated with the goal of assessing the adequacy of the protected area network in the Indian Himalaya, in providing coverage to the rich biodiversity and to identify potential areas for conservation. The major objectives of the project are: (i) to build a biodiversity model from target surveys of vegetation, birds and mammals in two existing national parks, (ii) to apply the biodiversity model to protected and unprotected areas representing the two major biogeographic zones in the Indian Himalayas, and (iii) to develop a biodiversity action plan for both biogeographic zones. Extensive use of Remote sensing and GIS techniques in combination with field surveys has been the method of thrust of the project.

In a two-pronged strategy, patterns of distribution of biodiversity at regional and local scales have been studied in order to assess the adequacy of protected area coverage in relation to distribution of biodiversity at the regional scales and to develop meaningful correlates and surrogates of biodiversity values which can be used with remote sensing and GIS at local scales. Socioeconomic concerns have been integrated in the assessment of potential areas.

The project has mainly focused on plants, birds and large mammals for study. Secondary databases for the distribution of woody plants and forest breeding birds in the western Himalaya have been developed. Species diversity peaks for both birds and plants in the middle altitude zone (1500-2000 m) and not in the lowest altitudes as has been traditionally assumed. Fieldwork in Kedarnath WLS for developing surrogates of birds and plant diversity has also been completed. Diversity patterns of plants and birds differ, with the highest plant diversity occurring in the low altitude (2000 m) zone and the bird diversity peaking in the mid-elevations (2700 m). However, bird communities seem to be strongly related to vegetation communities. The broadleaved forests are distinct and have diverse bird communities in comparison with conifer habitats. This has much potential use in predicting bird communities using vegetation community distribution maps derived from Remote Sensing and GIS. Techniques combining topographic information from spatial data layers and satellite imagery for modelling vegetation distribution and improving vegetation classification have been developed.

The Terminal Workshop of the project was organized in the Institute on 4-5 September, 2002. The objective of this workshop was to share the salient findings and recommendations with PA planners, managers, scientists and researchers in the project sites in Uttaranchal, Himachal Pradesh and Jammu & Kashmir states. A detailed presentation on the Western Himalayas spatial database was made along with this a panel discussion on the applications of this comprehensive database in strengthening field conservation in the Himalayas was organized during the terminal workshop. The USFWS project counterpart scientists Dr.Don Hunter and Dr.Chris Emmerich participated in this workshop alongwith 25 Indian participants.

Based on this collaborative study and the discussions and recommendations of the Terminal Workshop of this project, an Action Plan for the conservation of biodiversity in the Himalayan as well as Trans-Himalayan Biogeographic Zone is being developed, which will include the assessment of the existing PA network as well as the potential sites that may be included in the PA network.

IUCN SSC Otter Specialist Group

Survey of otters in southern Western Ghats

Investigators: Dr. S.A. Hussain

Researchers: Shri Anoop, K.R. Technical Assistant

Date of initiation: August 2001

Date of completion: December 2002

Total budget: Rs. 47,000 (US $1000)

The objectives of the project are: (i) Determine the presence/absence of otters in the aquatic system of southern Western Ghats, (ii) Identify associated threat to otter populations in the region (iii) Examine the feasibility of taking a long term research project on otters.

Otters are semi-aquatic social carnivores of the family *Mustelidae* that inhabit different types of aquatic environments such as rivers and streams, lakes, reservoirs and mangrove forests. Of the thirteen species of otters distributed worldwide, three species, that is Eurasian otter *Lutra lutra*, smooth-coated otter *Lutra perspicillata*, and the Oriental small-clawed otter *Amblonyx cinerius* occur in the Indian subcontinent. It is believed that otters are increasingly rare because of loss and degradation of their habitat, scarcity of prey biomass and poaching. We examined the presence or absence of otters in the wetlands of southern Western Ghats by a rapid assessment. As otters are very difficult to see, indirect evidence such as footprints, spraint piles and dens were searched for along the banks of water sources to ascertain the presence of otters in the region surveyed.

During the survey, several reservoirs, that is, Periyar, Peechi, Mattupetty, Bheemanoda, Parambikulam, Aliyar Kutty and Poringal, located in the western Ghats were visited and all of them were found to have otter populations. Out of these, only Mattupetty reservoir is not within a protected area. Nevertheless, in all these reservoirs fishing pressure was observed. This shows the ability of otters to adapt to disturbances like fishing. The other areas surveyed were water bodies and tributaries of Kunthi, Pambar, Chalakudy rivers, Karuvannur river, Vazhachal, Kakkathuruthi river, Kole wetland, Kadalundy river, Kadalundy estuary and Pamba river. All these areas were found to support good otter populations. In the inland water bodies, such as rivers Chalakudy, Karuvannur and Kadalundy, the conflict between otters and human beings is comparatively severe resulting in casualties to otters. Incidences of otter poaching were reported from two places. Such intentional poaching coincides with the arrival of skin collectors from outside the state.

Out of the 44 rivers and numerous reservoirs, the sites visited during the survey account for only 25% of the water bodies in the region. Of the three otter species, the Oriental small-clawed otter *Aonyx cineria* was found in Eravikulam National Park and higher elevations of Periyar Tiger Reserve. The other two species were found sympatrically in most of their range. Based on this survey, conducting an ecological study of resource partitioning among sympatric otter species in Kerala is suggested.

Grant-in-Aid

Impact of land-use pattern changes on habitat and ecology of Sarus Cranes (*Grus antigone*) in the Indo-Gangetic flood plains

Investigator: Shri B.C. Choudhury

Researchers: Ms. Jatinder Kaur and Mr. K. S. Gopi Sundar

Date of initiation: February 1, 1998

Date of completion: March 31, 2003

Budget allotted: Rs 21.11 lac

The objectives of the project are: (i) to study the ecology and behaviour of the Indian Sarus Crane in natural and human-altered habitats to determine the critical biological requirement of the species, (ii) to determine change in the land-use patterns over the years, with reference to the ecological distribution of Sarus Cranes in India, and to identify significant negative and positive impact of changes in land-use pattern on the ecology and behaviour of the species, (iii) to suggest strategies for the long-term survival of Sarus Crane in its present range of distribution.

Detailed fieldwork on select aspects of Sarus Crane (*Grus antigone*) ecology was carried out under the project in Rajasthan (Kota and Bharatpur districts) and Uttar Pradesh (Etawah and Mainpuri districts) from December 1999 to July 2002.

Though natural wetlands were observed to be the most crucial requirement for the survival of Sarus Cranes, a mosaic of wetlands in agricultural landscape appears to be the changed but essential component

Congregation of Sarus

Photo: Jatinder Kaur

in the present situation. While nesting initiation synchronizes with the monsoon season in general, the Sarus appears to have adapted to a dual nesting pattern, synchronizing with the man-induced flooding of landscape through artificial canal water in arid zones. The survival chances of the second nests were governed by other factors such as predation, hydrology and availability of food. Human induced factors contributed significantly to the mortality of eggs and chicks at all stages of growth.

The data on movement, territory size, and weaning patterns have been analysed and show fluctuation with the rate of precipitation, hydric nature of the habitat and limited availability of food.

The social behaviour of Sarus in the study area is largely influenced by the breeding status and season. Social grouping ranged from adult Sarus pairs with chicks, to weaned juveniles and adults in non-breeding congregations, courting pairs and nesting pairs. Relative precipitation, wetland hydrology and breeding physiology largely determined the cue for social groupings.

Road accidents, pesticides, poaching, collisions with electric wires and robbing of eggs contributed significantly to the mortality of Sarus at both the sites. Changes in the land use pattern, particularly crops, such as conversion of paddy land to sugarcane in Uttar Pradesh and soyabean in Rajasthan, is posing a severe threat to the Sarus' long-term survival. The impact of such land use pattern change is reflected on the species life history parameters from nesting, foraging, to courtship and breeding congregation success.

Management recommendation in U.P. is largely to maintain a minimum of 10% of natural wetlands in the agricultural landscape and to develop a mechanism to assist village communities to protect Sarus cranes. Creation of awareness about Sarus 'cranes' habitat needs to the other government agencies such as irrigation and agricultural department is also pivotal.

In the arid-Rajasthan landscape, retention of a critical minimum water level in the wetlands, protection and management of wetlands created by surplus flow, and use of Sarus crane in community-managed eco-tourism sites are considered to be beneficial. Development of community Sarus protection committees in the Agricultural landscape with N.G.O involvement is also suggested.

During this reporting year, the researchers have completed the data analysis. The final report of the project is being completed with the Satellite imagery data analysis of changes in land use pattern during the year 1999-2003. One researcher is working on this aspect and another one has been provided with a grant to work at the International Crane Foundation (ICF),USA to compare the study results with other non-migratory crane species in the world. Based on this analysis and report, a long-term strategy for the conservation of Sarus Crane in Indo-Gangetic plain will be prepared.

Evaluation and Refinement of pugmark technique for Individual Tiger Identification and Census

Investigators: Shri V.B. Sawarkar, Dr. Y.V. Jhala and Shri Qamar Qureshi

Researcher: Shri Sandeep Sharma

Date of Initiation: January 1, 2002

Date of completion: July 30, 2002

Budget allotted: Rs. 0.60 lac

This project developed a computational flowchart and analytical algorithm, based on previous research done on evaluation of the use of tiger pugmark for individual tiger identification and later on its use for population monitoring of tigers.

The researcher for this project, Mr. Sandeep Sharma, was deputed for six-month course in software programming and information technology at MCITR, C-DAC (Centre for Development of Advanced Computing), Pune. The researcher

successfully completed the course and obtained an 'A' certificate for his performance. He also developed a Windows based software **PUGMARK© 1.0** for analysis of pugmarks of tigers and other large carnivores. This software will also be helpful in maintaining the database about pugmark-based population monitoring of tigers and other large carnivores in protected areas. The beta-version of software is being used by BNHS in their research project on Jerdon's Courser.

Software PUGMARK© 1.0 *Photo: Sandeep Sharma*

Ford Foundation

Building Partnerships for Biodiversity Conservation in Rajaji National Park

Project Co-ordinators: Dr. B.K. Mishra (April 2002 to October 2002), Shri A.K. Bhardwaj (September 1999 to March 2002) and Shri B.M.S. Rathore (February 1996 to September 1999)

Date of initiation: February, 1996

Date of completion: October, 2002

Budget allotted: US $ 70,000

The objectives of the project are: (i) Capacity enhancement of park management for bio-diversity conservation with people's involvement, (ii) Capacity enhancement of identified park-dependent local communities to minimize PA-people conflicts, and (iii) Facilitate co-ordination amongst major stakeholders to resolve conflicts that hinder biodiversity conservation

The following outputs were envisaged at the end of first phase of project:

1. (a) Ten trained park staff as trainers, and subsequent staff training in place (project aims to cover between 40-50% of total staff during the project period). (b) Development of training resources including course curriculum, audiovisual training aids and training manuals.
2. (a) Ten trained community organizers, (b) Development of community training resources, (c) Programme spread in adjoining villages.
3. (a) Ten identified villages covered for institution building, (b) Completion of ten-village micro plans, (c) Local enterprise development initiated in ten villages, (d) Institutional co-ordination mechanism for stakeholders' participation in place, and (e) Completion of research studies/ status reports commissioned during the course of the project.

Progress to date: (i) Initial consultative meetings/ workshops and their impacts

Subject of consultative meetings/workshops	No. of meetings/ work-shops	Major Partners involved	Significant impacts/ outcomes
Trust building with PA staff	4	WII team & PA Staff / officials	Building mutual trust, sensitisation about the current project and training need assessment.
Training of Staff in handling Firearms and immobilization techniques.	2	Staff of PA and WII	Building trust and confidence. Generating skills among staff.
Trust Building between staff and communities	4	WII Team, PA staff, NGOs & community representatives	Trust building amongst staff, communities, NGOs and consensus about project approach.
Building strategies for partnerships during project implementation including PA protection and Bhabhar grass extraction	10	WII Team, PA staff, UPFD officials, Local NGOs, IIPA, WWF, & community representatives	Evolving strategies to address people-park issues, roles of different partners, village level institutional structures for project and modalities of controlled harvest of Bhabhar/PA protection.
Community sensitisation and awareness and village resource surveys through NGO partners and Project Motivator.	30	Different section of village communities, GKMSS, HARC & Project Motivator	Awareness about the project, village resources and park issues.

UPFD: UP Forest Department; *IIPA*: Indian Institute of Public Administration, *WWF*: World Wildlife Fund, *GKMSS*: Ghad Kshetra Mukti Sangharsh Samiti, *HARC*: Himalayan Action and Research Centre

Major Output of the Project

A - Capacity Building and Empowerment: Constitution and training of spearhead team comprising twelve members; Training of other PA staff by spearhead team - 22 training programmes (75 staff trained); Training of village community/NGO representatives - 52 EDC members/community representatives trained; Development of training resources – two training manuals, slides and visual charts; Village awareness campaigns; Establishment of staff welfare mechanism

B - Institution Building: Establishment of Ecodevelopment committees – fourteen villages; Preparation and implementation of microplans – fourteen villages, as against the initial target of ten villages; Initiation of local enterprise development - seven villages (six different types).

As per the micro plans, a range of activities in the form of soil and moisture conservation, fuel and fodder development, adoption of energy saving devices, developing alternative livelihoods and wildlife damage control measures have been carried out by the PA management. This has over the time improved the mutual trust between the park staff and the communities, promoted community participation in PA protection and local development, empowered the village level institutions through creation of village common funds and improved awareness about the park conservation and the community development. However, there is an urgent need to carry forward these initiatives by the PA management for continuity of the programme.

C - Developing Co-ordination Mechanism of Stakeholders: Active partners involved in the project – twelve; PA level co-ordination mechanism evolved.

D - Action Research and Documentation: Action research studies commissioned – seven; Reports/documents prepared - five.

Results/lessons learnt

Positive Impacts of the Project: (i) Improvement in staff skills, knowledge and attitudes to work in favourable and unfavorable conditions, (ii) Confidence among staff to convey the relevant things (iii) Creation of a common platform where staff and communities jointly discuss problems and search for solutions, (iv) Better mutual understanding about problems of staff and village communities as well as improved trust between staff and EDC members, (v) Development of direct contact with villagers and smooth working, (vi) Creation of awareness among common masses about forest and wildlife, (vii) Reduction of conflict between local staff and village communities, (viii) Increase in curiosity of staff and community representatives for biodiversity conservation, (ix) Improved communications between different levels of staff and officials of PA, (x) Decentralization for problem solving of villagers at local level, (xi) Increase in local developmental work and improved co-ordination among a few agencies working in the area, (xii) Improved flow of information from EDC members to the park management, (xiii) Negative Impacts (xiv) Increase in the workload of staff due to dual responsibilities of protection and eco-development, (xv) Some dilution in protection activities due to more stress on participatory initiatives, (xvi) Difficulties of arriving at common consensus in few areas on certain occasions. (xvii) Sometimes confusion regarding the strategy to achieve the objective of conservation due to great flexibility in the programme, (xviii) Disappointment among the youth trained for different livelihood enterprises due to lack of resources and efforts to start these activities, (xix) Confusion regarding the use of village common funds, (xx) Increase in expectations of the local communities, (xxi) Increase in the expenditure of EDC executives and Staff due to more mobility, (xxii) Unexpected increase in the movement of people in the park, (xxiii) Groupism in a few villages where EDCs were constituted with inadequate dialogue, and (xxiv) Failure of the programme to get back adequate benefits to PA from the people.

Issues and challenges

A larger issue is resource use conflicts between the livelihood needs of local communities and conservation values in the Rajaji National Park. The Rajaji situation is a typical one, which demonstrates the gap between policy and the existing ground realities. On one side is the National Park with its conservation values governed by the Wildlife (Protection) Act that does not allow any resource use inside the park. On the other hand are the local people who have been traditionally dependent on the resources of this park, and who do not have any alternative to these resources. In such a situation the law has actually served to convert the natural resources, which were largely used by local people

as common property resources into open access resources. Due to prevailing policies and the law, the people have lost their stake in conservation of these areas. Rajaji is also a case of market and policy failures. There is no mechanism to attribute appropriate value to the 'public goods' provided by the Protected Area. There are few incentives and enabling legislation for the people to use the area sustainably. The larger government programmes, manifested through the mandate of other government departments operating in the area, are directly or indirectly contributing to forest loss and degradation.

With this background, the following are the lessons learnt and areas for future intervention: (i) *Park staff is the key to the success of any project:* The most important lessons that emerge from this is that continuous capacity building of the staff who are the primary stakeholders has to be in place before any participatory approaches are planned or implemented, (ii) *Local communities and their awareness:* The NGO partners have a great role to play in awareness generation, but later on this can be undertaken by village motivators under the supervision of the spearhead teams responsible for the capacity building and empowerment of primary stakeholders. There is also a need for due consensus to be developed between the park management and the NGO partners, (iii) *Local sustainable livelihood: Sustainability and alternative enterprise development* The livelihood sustainability and the resource extraction from the PA are directly related. A massive initiative has to be undertaken for livelihood analysis and to evolve mechanisms for the sustainability of these livelihoods, (iv) *Institution building:* The institution building process should not be hastened. The creation of EDCs should be preceded by sufficient dialogue between the local communities and the staff as well as within the local communities, (v) *Need for new partners:* The park management will have to take up the role of facilitator for local development, through village level institutions in the adjoining villages of the park. New partners need to be found and roped in for conservation development initiative in these areas. There is a need to develop the PA level co-ordination mechanism to get the synergy of different agencies working together, (vi) *Going beyond the boundaries of the park:* It is important that the programme activities should build links with other agencies and divisions (vii) *Man-wildlife conflict:* Some decentralised mechanism to deal with the problem through EDCs can be far more effective then the park management alone, (viii) *Staff welfare:* A beginning in this direction has been made but there is a need to sustain it and expand the scope of the staff welfare committee proposed for PA, (ix) *Focus on women and self help groups*: One of the weak areas of the project still remains the focus on women. The focus of the programme on women groups and creation of self help groups has not only plenty of scope to sustain the project initiatives, but is in fact essential to the programme, (x) *Importance of short-term studies and documentation* : these are crucial.

TERI-UPFD Project

To assess man-animal conflicts in Uttar Pradesh, including elephant damage in the areas of Barkot, Rajaji and Landsdown; wild boar in areas surrounding Dudhwa and Corbett, tiger-human conflicts in Katarniaghat, monkey-human conflicts in Lucknow and Almora, and leopard-human conflicts in Pauri, Chamoli and Pithoragarh and compare the leopard-human conflict situation in these areas with the Thailisen region of Pauri-Garhwal where leopard-human conflicts are reported to be low

Faculty: Dr. N.P.S. Chauhan

Technical Assistants: Mr. Nitin Kamboj and Mr. Suraj Dutt

Date of initiation: February, 2001

Date of completion: December, 2002

Budget allotted: Rs. 6.00 lac

Initially the project duration was one year but later on a no-cost extension was provided up to June 2003. The project was systematically started in February 2001. The fieldwork and data analysis and compilation were done simultaneously. The project reports were submitted to the TERI in December 2002, and pending work as per the project objectives are being completed.

Most of the relevant literature pertaining to the human-wildlife conflict problems was collected and reviewed to cover various aspects of the project study. Maps of the study areas were prepared. The Rajaji National Park, Barkot, Pauri, Lansdowne, Thailisen, Corbett and Dudhwa tiger reserves, and part of Chamoli and Pauri districts were covered and primary and secondary data were collected.

In and around Barkot, Rajaji National Park and Landsdown, assessment of human casualties and

crop damage by elephant was completed. Elephant frequently visit different areas, that is, Goltappar, Ghamandpur, Jakhan, Rani Pokhari and Sainkot blocks of Barkot Forest range of Dehradun Division especially during summers after crossing river Jakhan in 6th west of the division and cause extensive damage to crops. Earlier there used to be a few incidences of crop damage by straying elephants in Ghamandpur and Majri Villages (Lachhiwala Forest Range) only during summers. Now the crop damage by elephants is widespread and recorded in Ghamandpur, Lysterpur, Rani Pokhari and Dujyawala villages. Damage to *kharif* crops by elephant was assessed in Ganeshpur, Banjarawala, Ganga Bhogpur Talla, Ganga Bhogpur Malla and Kassan villages. In Kandokhal Vikash Khand (Gohari Range), elephants caused extensive damage to wheat, rice and vegetable crops. Also in Bailwala and Bindasene villages, rice, maize and mundwa crops were severely damaged by elephant. Extensive damage is reported to four *kharif* crops, that is, maize (*Zea mays*), groundnut (*Arachis hypogea*), bajra (*Pennisetum typhoides*) and jowar (*Sorghum vulgare*), and two *rabi* crops, that is, wheat (*Triticum aestivum*) and gram (*Cicer arietenum*). Agricultural crop damage by wild pigs in and around Dudhwa and Corbett TRs was also evaluated. The crop damage problem in the peripheries of Corbett TR covering Dhara, Dhela, Jhirna and Kalagarh villages were covered to study the nature and extent of the problem. Although the damage caused to the crops was caused by elephant, pigs and monkeys, it was difficult to separate the damage caused by each species to these crops.

The study on tiger-human conflicts in Katarniaghat, leopard-human conflicts in Pauri, Chamoli, Pithoragarh and Thailisen was in progress. Based on Forest Department information, 140 humans were killed by leopards alone in Pauri Garhwal since 1988. Over the years, the number of leopard victims ranged from two to twenty per year. Blocks Pabau and Pauri are severely affected. In Pabau alone, leopards killed 28 humans between 1996 and 1997. It appears that around Pabau there could be a high survival rate of cubs, and acquired hunting behaviour from mother could be one of the reasons for high incidences of human predation. The Pabau area is surrounded by relatively good forest and provides good cover for increasing in leopard populations. Of the 126 leopard victims, 66% were females. In the hills, females are responsible for all the work, thus there is a higher probability of their encountering leopards than males.

Village-wise location of man-leopard and tiger conflicts and demographic information were also compiled and mapped. Fieldwork in leopard-affected areas of Chamoli, Pauri and Thailisen was continued. An assessment of monkey-human conflicts in Lucknow and Almora was also done. Information on occurrence of these conflicts was collected in specially designed formats. All related information available with the departments was collected. Based on this information and a survey of highly affected areas, results are being compiled to establish facts and management implications.

In Rai Bareilly district, there were a total of 108 child-lifting cases by wolf in twenty-five different villages of Lalgunj tehsil, and eight villages of Rai Bareilly tehsil. In Shravasti district, five child-lifting cases by wolf occurred during 2000.

Ongoing Projects

Diversity and rarity in floral and avifaunal assemblages in the western Himalaya: A study of patterns and mechanisms to devise viable biodiversity conservation strategies

Investigators : Dr. V.B.Mathur and Dr. K.J. Gaston

Researcher: Shri Rashid H. Raza

Date of initiation : June 2001

Date of completion : June 2004

Budget allotted : Rs. 19.92 lac

The objectives of the project are: (i) to determine the patterns and relationships of plant and bird diversity and rarity along a complete altitudinal gradient (from foothills to 5000 metres), (ii) to identify and investigate the relative role of different mechanisms in generating the observed patterns of diversity and rarity, (iii) to identify altitudinal zones and habitats of high diversity and rarity and hence of conservation importance, and (iv) to develop guidelines for meeting biodiversity conservation goals based on understanding of the processes generating diversity and rarity patterns.

This study will determine the patterns of diversity and rarity of woody plants and birds along a complete altitudinal gradient from subtropical to tundra biomes in the Western Himalaya. It will also examine the relative contributions of environmental factors such as climate (mediated via altitude and

A gradient of Oaks meeting the alpine on the Southern side of Chiplakot ridge.
Photo: Rashid H. Raza

aspect) and area, and biological factors, such as range sizes, abundance, biomass, body size and species life history traits, in generating the patterns. Regional, historical and biogeographical factors will be taken into consideration during the interpretation of the results. This will be the first comprehensive attempt in the Himalaya to understand the patterns and processes of diversity and rarity, two fundamental issues in ecology and conservation biology. The study will make a significant contribution to identifying zonation in plant and bird communities, zones of high diversity, and concentrations of rare species. By relating patterns to processes it will provide broad generalizations for integration with vital management issues.

During the reporting period extensive field surveys were carried out in the middle Goriganga Valley, Askot Wildlife Sanctuary. This area harbours a good representation of Himalayan plant and bird species endemics, threatened Himalayan birds and birds of otherwise 'uncommon' occurrence. The presence in this area of 81 bird species listed as 'biome restricted' by the Birdlife International representing three global biomes was a major finding of the field surveys. The survey results indicate that this area has a high biological value and low intensity of human disturbance making it a highly suitable area for bioresource conservation as well as bioprospecting.

Ecology of Otters in Corbett Tiger Reserve: Impact of Kalagarh reservoir on the habitat use pattern

Investigator: Dr. S.A. Hussain

Researcher: Shri Asghar Nawab

Date of initiation: November 2000

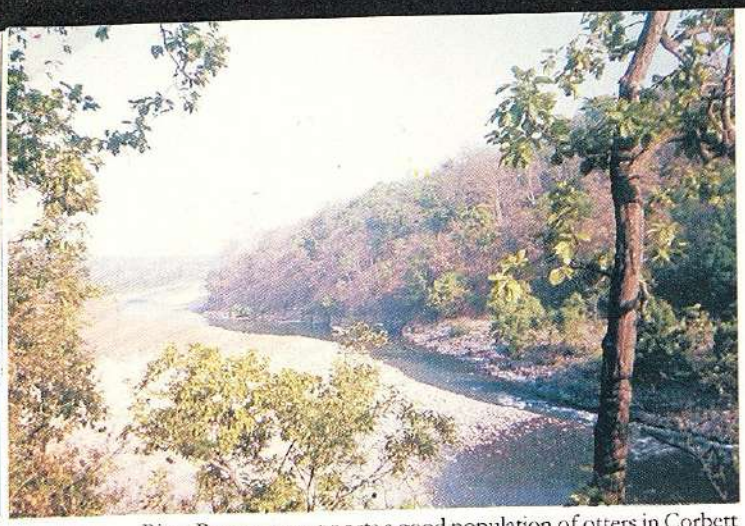
Date of completion: November 2004

Budget allotted: Rs. 10, 66,400.00

(Rs.7, 82,400.00 original budget+2,37,000 Additional fund alloted+47,000 given by IUCN SSC Otter Specialist group = 10,66,400)

The objectives of the project are: (i) to determine the status of otters in the Corbett Tiger Reserve and in the adjacent areas between Yamuna and Sharada river systems, (ii) to identify the factors governing their distribution, (iii) to examine habitat use patterns along the Ramganga main stream and the reservoir, (iv) to compare the feeding habits of otters between Ramganga main stream and the Reservoir, and (v) to examine associated threats to otter populations, such as cases of poaching and destruction of stream habitats in the region.

Base camp for the project was established at Kalagarh and field study was initiated. Initially the study was focused on a 14-km stretch of Ramganga River inside the Corbett National Park. During the study based on seventeen parameters the otter habitat in the Ramganga River was characterized. The types and number of den sites were mapped and characterized. During the current reporting period the otter survey has been extended to the entire Ramganga River from Domunda to Dhikala, Sonanadi and Palain Rivers. From February to June 2002, the survey was extended along the major perennial water bodies within the Corbett Tiger Reserve. These were Ramganga, Mandal, Palain, Sonanadi rivers and the reservoir. The aim of the survey was to prepare an index of positive sites based on direct observations and presence or absence of otter signs, and thus identify stretches that need special management measures for the conservation of otters within the study area. Using landmarks the study area was divided into seven zones ranging between 3.5km to 39.5km in length. Each field survey lasted for fourteen to twenty days and required the concerted efforts of four-trained forest personnel. Sampling was carried out by laying random plots of 100 x 15m at regular intervals of 500m. These plots were intensively searched for otter evidence, such as footprints (track sets), communal latrines/spraint sites, grooming/basking sites and den/holt sites. Whenever otter evidence was found, a separate plot (treated as used plot) of 100x15m was laid, with the otter evidence as the centre point. These plots were laid irrespective of the random plot. The co-ordinates of locations were recorded using a global positioning system unit (Magellan Trail Master hand-held GPS unit). Different levels of habitat disturbance (High, Medium, Low, Nil) were also recorded based on



River Ramganga supports a good population of otters in Corbett Tiger Reserve *Photo: Asghar Nawab*

five parameters, that is, poaching, various forms of fishing, removal of sand and boulders, extraction of bank vegetation and livestock grazing.

The results showed that otters prefer the three major perennial water bodies, namely River Ramganga (Zone 1), River Mandal (Zone 2) and River Palain (Zone 4). Human presence along the riverbank was evident in areas that lay close to the vicinity of the Reserve boundary, such as village Khadrasi (along River Ramganga, Zone1) and village Khansoor (along River Mandal, Zone 2). Fishing appeared to be the major form of disturbance and locals usually practice destructive methods, such as, dynamiting, 'ghan' or hammering and also use Ichthyotoxic plants. This leads to indiscriminate killing of large numbers of fish (juvenile as well as brood fish) that adversely affects the population of fish and the water quality of the river. Incidents of poaching were reported from River Ramganga (Zone 1). It is stressed that conservation programmes and monitoring activities be extended by the management staff of CTR to determine the trend in the otter populations. It is evident that Zones 1, 2 and 4 that show the presence of otters need special attention and also the ones that lie in close proximity to human habitation. The current situation of otters in Corbett Tiger Reserve is encouraging, but it must be emphasized that the area occupied by the species is very small. This means that, while the population may be thriving at present, it is extremely vulnerable.

The field data collected during the above-mentioned periods is being analysed. Apart from this, the survey needs to be carried out for yet another season that is winter (2004) and along with this fish sampling for both seasons, that is, summer (2003) and winter (2004).

Developing a spatial conservation protocol for central Indian highlands through a biogeographical analysis of birds and existing protected area network: A Geographical Information Systems approach

Investigators: Shri Qamar Qureshi and Dr. Ravi Chellam

Researcher : Shri R. Jayapal

Date of Initiation : February 9, 2001

Date of completion : February 8, 2006

Budget allotted : Rs. 33.92 lac

The main objectives of the project are : (i) to analyse patterns of species richness in birds of the Central Indian Highlands, and to study interaction among biological, environmental and socio-economic correlates of biodiversity using birds as reference taxa, (ii) to sub-regionalize the biogeographical province of the Central Indian Highlands based on these ecological interactions and patterns, to assist in identifying landscape units of unique biodiversity value, and (iii) to develop a spatial framework of conservation protocol for the region through a complementary analysis of existing PA network and bio-geographical constructions using GIS.

Progress: The entire study area was gridded into 15' x 15' block squares (1:50,000 scale), and a preliminary investigation of environmental features of the region (including topography, drainage, soil, and agro-climate) revealed fifteen sub-regions which form the primary sampling units of the study. In each sub-region, major representative habitats are being identified for field sampling of birds and vegetation. The field work involves sampling for breeding bird species using modified variable-width line transects, habitat measurements, and ground truthing of WiFS-FCC vegetation cover data for habitat mapping.

A total of sixteen habitat types was covered and 92 species of terrestrial birds were recorded in the transects. Ten habitat attributes regarding structural and biological characteristics of trees and shrubs, grass cover, bamboo cover, and human disturbance were measured for each habitat.

The nature of associations between bird species richness and habitat characteristics was investigated. Evidence was searched for the relative roles of ecological versus bio-geographical factors in

determining the biodiversity of an area, by analysing the bird-vegetation relationships across teak and sal biomes of the Central Indian Highlands.

Bird species richness, across teak and sal biomes, was found to show a strong, non-linear relationship (quadratic model) with select habitat variables; on the contrary, it was a linear function of habitat structure within the biomes. It was postulated that the hump-shaped curvilinear response of the quadratic model was a manifestation of the role of biogeography, while the linear association is an outcome of proximate ecological factors. Thus, it was argued that the bird species richness was essentially a function of bio-geographical history at the regional level, and a function of ecological factors on a local scale.

The field survey has also discovered new breeding and distribution records of populations of several species of forest birds in Central India (including Bonelli's Hawk Eagle, White-rumped Spinetail Swift, Malabar Pied Hornbill, Drongo Cuckoo, Oriental Scops Owl, Hair-crested Drongo, Ashy Drongo, and Grey-headed Myna), and added new information regarding the distribution and population status of birds of the Central Indian Highlands.

Impact of forest fragmentation on the Hoolock Gibbon (*Hylobates hoolock*) in Assam, India

Investigators: Dr. A.K. Gupta, Dr. Ravi Chellam and Shri Qamar Qureshi

Researcher: Ms. Kashmira Kakati

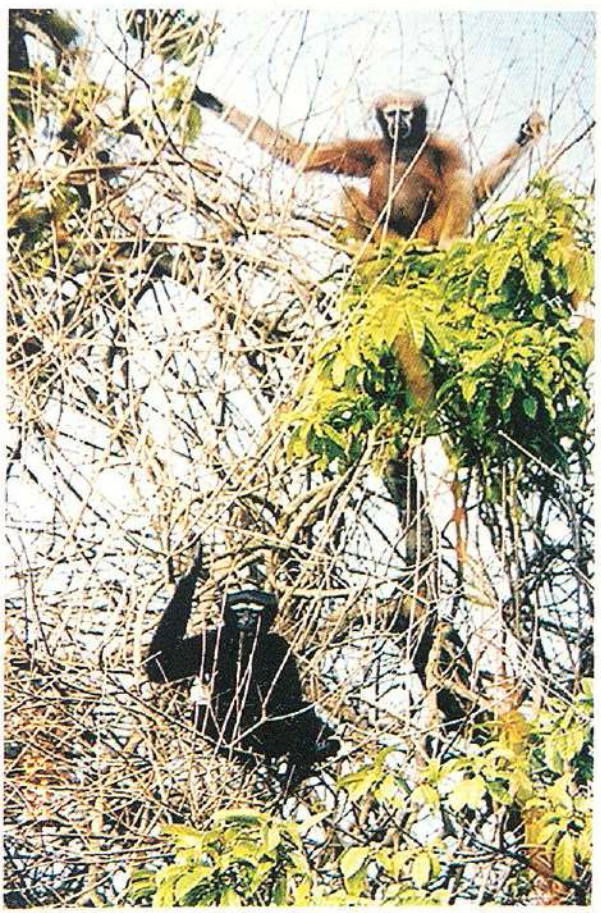
Date of initiation: January 22, 2001

Date of completion: January 22, 2004

Budget allotted: Rs. 22.80 lac

The objective of the project is to compare the following parameters of gibbon groups in a relatively large and continuous forest with those in forest fragments (i) Demographic characteristics of the populations, (ii) Sizes and characteristics of the home ranges, (iii) Species diversity in the diet and composition (leaf/fruit).

A survey of fourteen sites was carried out to look at differences in encounter rates as an index of gibbon population densities, and gibbon group size as an index of the status of the population, that is, the larger the group size, the better the recruitment to the population. The 28 day survey was carried out in the months of May and June 2002 in the Doomdooma, Dibrugarh, Digboi and Tinsukia Forest Divisions of Upper Assam. Sites consisted of eleven forest fragments in two size classes (<5 km^2 20-30km^2) and three large forest tracts acting as controls (>100 km^2). Two survey teams of three to five people each sampled every site over two days' walking between 6-20 km/site. Encounter rates for gibbon groups were lowest (0.09/km) in the small forest fragments with an increasing trend being noticed as the forest size increased (0.23/km in 20-30 km^2 forest fragments and 0.58/km in the controls). Similar trends were recorded with group sizes as well, with the smallest groups (2.5, N=2) in the small fragments compared with the mid-size fragments (3.2, N=26) and large forests (3.7, N=32). Ranging results from an intensive one-year study of six gibbon groups in similar forest sizes did not, however, show a similar scaling (<5 km^2 =38.5ha and 15.7ha; 20-30km^2 = 12.5ha and 23ha; >100km^2= 22.5ha and 23ha) indicating that gibbon home range sizes are not solely determined by the size of the forest fragment. Sattelite data (IRS-LISS III) was procured



Hoolock gibbon (male & female) *Photo: S. Dasgupta*

and vegetation types and fragments were mapped. Time series analysis of the process of frgmentation is planned.

The Ecology of the Asiatic wild dog (*Cuon alpinus* Pallas) in Central India

Investigators: Dr. A.J.T. Johnsingh, Dr. K. Sankar

Researcher: Shri Bhaskar Acharya

Date of initiation: May 5, 2001

Date of completion: January 2004

Total budget allotted: Rs. 15,47,550.00

The objective of the project is to collect information on dhole habitat use and ranging patterns, food habits, behaviour, social organisation, and prey species abundance, in Pench Tiger Reserve, Madhya Pradesh. Fieldwork was initiated on 5th May 2001. In July 2002, one adult female dhole was radio-collared in the Tiger Reserve. Subsequently, this individual and her pack's movements, activity patterns, and other ecological information was recorded until December 2002. Three other packs have been under observation since February 2003. Data on dhole pack characteristics, behaviour, activity and movement of dholes, were being recorded whenever a pack was encountered. Eight new transects have been added to the twelve permanently marked line transects in the intensive study area, on which systematic estimation of prey abundance has been in progress since November 2001. Data regarding the encounter rates and group composition of prey species such as chital, sambar, nilgai, gaur, wild pig and langur were being recorded, using vehicle-based counts. Carnivore scats and kills were recorded for dietary analysis whenever encountered. Efforts are in progress to radio-collar a few more dholes, preferably from adjacent packs.

Characterisation of species from bone, tusk, rhino horn and antler to deal with wildlife offence cases

Investigator: Dr. S. P. Goyal

Researcher: Smt. Rina Rani Singh, SRF and Ms. Tanushree Biswas, T.A.

Date of Initiation: July 2, 2001

Date of Completion: July 1, 2006

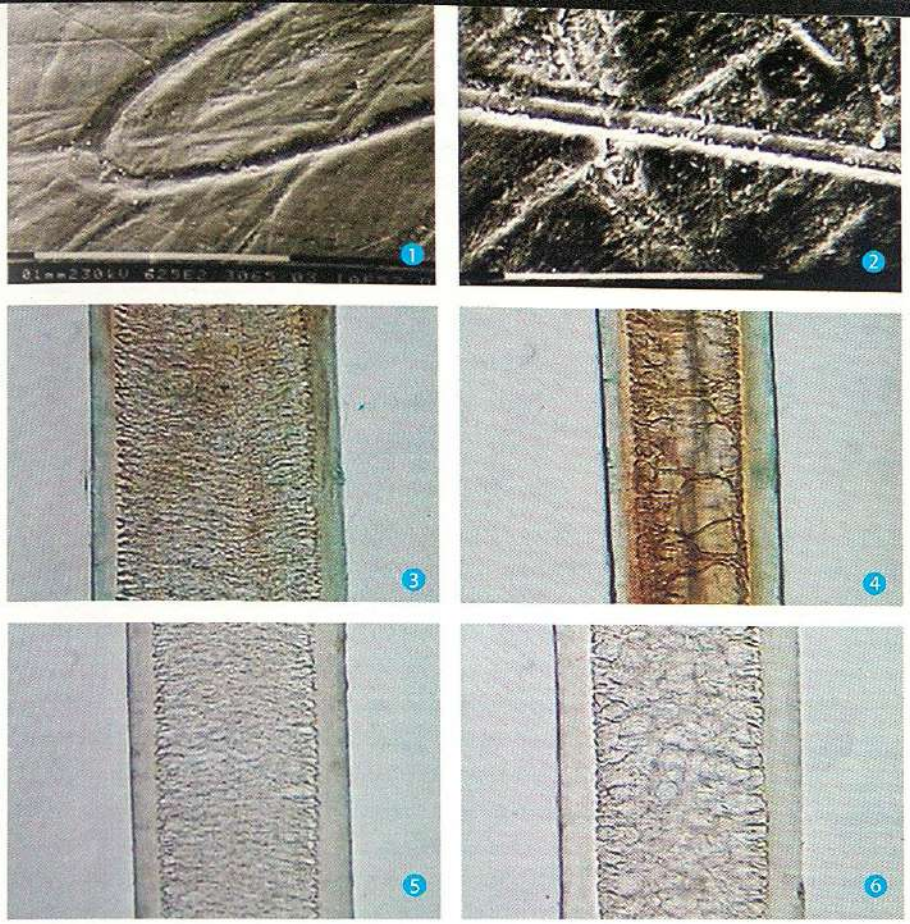
Budget allotted: Rs. 42.60 lac

Project aims are to standardize protocols for identifying species from bones, tusk, antler items and rhino horn. The objectives of the project are as follows: (a) Develop morphmetric, crystallographic and DNA based techniques to characterize species from bones of major animals such as Tiger, Leopard, Chital, Sambar, Barking deer and Swamp deer. (b) Establish species-specific characteristics of raw and finished products of Asian ivory, and prepare protocols to differentiate from other similar products used in the trade. (c) Investigate source-area of Asian elephant ivory. (d) Determine characteristics of rhino horn, and (e) Establish species characteristics and keys to identify antler of deer species.

Scanning Electron Microscopy (SEM) technique was used to characterize surface structure of Asian elephant ivory (n=7) and African elephant ivory (n=4) in three different portions of each sample. Dentine surface of Asian ivory is rough compared to African ivory and dentinal tubules are arranged in V-shape (Fig. 1) mostly, whereas in African ivory dentinal tubules are arranged from U to V shape (Fig. 2). We are in the process of quantifying their proportion.

Experiment was done to get best the Schreger angle in ivory, by putting it on to a stamp pad and then enlarging the image of the ivory piece through photocopying, photography and scanning. It was noted that scanning gives best results and angles to be measured are distinct. Schreger angle were measured at three-portion central, middle and outer of Asian elephant ivory (n=10) and African elephant ivory (n=1). The average central, middle and outer angle of Asian elephant ivory was 67.82^0, 85.16^0 and 112.15^0 respectively, whereas for African ivory it was 73.2^0, 110.1^0 and 126.1^0 respectively. To improve these data we have thought of additional modifications to this. Colour intensity of Asian elephant ivory (n=3) and African elephant ivory (n=3) was done and we are trying to refine it further. The Schreger line grey scale intensity (0-256) in the case of Asian Elephant tusk ranged from 221.99 to 233.09, while in the African Elephant tusk it ranged from 217.08 to 224.74.

Morphometric measurements for antlers were done for Chital (n=46), Sambar (n=22), Barking deer (n=4), Swamp deer (n=10) and Hog deer (n=18). Barking deer antler is the smallest and has only one tine whereas Swamp deer antler has five tines. In antlers of Sambar, Chital and Hog deer, there are two tines each. The second tine of the chital antler emerges earlier than the Sambar antler. The lower angle of antler of Chital (>55) is greater than the Sambar



(1) SEM of African Ivory; (2) SEM of Asian Ivory; (3) Medulla of *Herpestes edwardsi* (400x); (4) Medulla of *Herpestes palustris* (400x); (5) Medulla of *Herpestes smithi* (400x); (6) Medulla of *Herpestes urva* (400x) *Photo: S.P. Goyal*

(<55). Upper angle of Chital angle (<50) is smaller than Sambar (>50). Antler of barking deer was smallest in terms of girth as well as length. Sambar antler was largest and thickest. The length of pedicle was longest in Sambar (9.66±0.44) while short in chital (4.67±0.23). The average length of the main branch of Chital, Sambar, Swamp deer and Hog deer was 64.72(S.E = 5.47), 63.18 (S.E = 3.25), 47.1 (S.E= 6.3), 36.37 (S.E= 2.18) respectively. The length of the second tine (from the branching) was observed to be smallest (5.93±0.42) in hog deer while largest in Sambar (23.05±?1.58). Eight Skulls of tiger were measured, of which three were intact. Femur, humerus, pelvic and pectoral bones of tiger (n=8) were also measured.

X-ray diffraction (XRD) technique was used to determine mineral composition of antler (n=7), ivory (n=9), Rhino horn (n=2), Buffalo horn (n=1), fake Rhino horn (n=1) and bone (n=1). We tested the effect of duration of grinding and increasing the time per step of scanning from 1 to 10 seconds for the best condition needed to ascertain mineral composition. X-ray diffractogram of rhino horn was different from ivory and antler. Minor peaks of rhino horn revealed its amorphous nature, whereas ivory and antler sample matches with hydroxyapatite minerals (American Standard Test Matching file no. 9, card no. – 432). Minute but distinct differences between ivory and antler diffractogram were observed. Crystallite size of ivory ranged between ~ 16.9 – 63.5 nm and antler ranged between ~ 26.5 –169.8 nm. Scatter plot between maximum and minimum background intensity could separate antler, ivory and rhino horn into different clusters. Cell parameter 'a' and cell volume in the case of ivory is smaller than in antler. Work is in progress for comparing Asian ivory with African ivory.

Thermo-gravimetric analysis (TGA) in which weight loss is noted at different temperature was carried out for Asian ivory (n=3) and African ivory (n=7) at the Indian Institute of Technology, Roorkee. Approximately 10 mg of samples was burnt up to 1400°C under nitrogen medium 100 ml/min. Average weight loss in case of African ivory is higher (48.15%) than Asian ivory (47.15%). Average loss of moisture content in African ivory (3.45%) is less than Asian ivory (4.62%).

Preliminary DNA isolation was carried out using Quigene Kit from a sample of antler of Chital and a bone of Sambar and was successfully isolated. The phenol chloroform method was used to extract DNA from ivory (n=6), Elephant bone (n=2), Tiger bone (n=1), suspected elephant bone (n=1), antlers (n=6), Rhino horn (n=1) and fake Rhino horn (n=1). DNA was successfully extracted from elephant bone (n=2), tiger bone (n=1), suspected elephant bone (n=1), antlers (n=4) and Rhino horn (n=1). Cytochrome 'b' amplification was tried for elephant bone (n=2), tiger bone (n=1), suspected elephant bone (n=1), antlers (n=6) and it was successful for elephant bone (n=2), suspected elephant bone (n=1), Rhino horn (n=1) and antlers (n=2).

The ecology of the leopard in Satpura National Park and Bori Wildlife Sanctuary

Investigators: Dr. Ravi Chellam and Shri Qamar Qureshi

Researcher : Shri Advait Edgaonkar

Date of initiation : June 2001

Date of completion : June 2006

Budget allotted : Rs. 38.72 lac

The objectives of the project are (i) to investigate leopard habitat use and preference, (ii) to examine the role of seasons, habitat, sex and social status on territory, ranging and habitat selection, (iii) to quantify the food habits and prey preferences of the leopard, and (iv) to validate and test various methods for estimating leopard numbers, densities, and indices of abundance, and to recommend an effective technique for monitoring their population.

Fieldwork for the long term study on leopard ecology started in January 2002. A study area of about 180 km^2 was identified in Bori Wildlife Sanctuary and Satpura National Park. Transects and trails were monitored for the prey and the predator. Ten transects each 2 km long were randomly laid in this area. These were walked for a total of 262 km to obtain densities of ungulate prey base. Estimates show a relatively low density of ungulate prey with muntjac 4.4, sambar 2.5, chital 1.5, and nilgai 1 groups/ km^2 similarly in birds, jungle fowl and spurfowl were 4.7 groups/km^2 while peafowl were 0.7 groups/km^2. Nine trails were monitored during the monsoon season for a total of 696.17 km to establish encounter rates of potential prey as well as indirect signs of predators (tiger, leopard and dhole). A total of 64 scats belonging to tiger, leopard and dhole were analysed to obtain information about the predator food habits, the main prey preferred by the leopard were the Cervids followed by langur.

A box trap was constructed for the trapping of leopards and carried out during the night. Camera trapping has just commenced on a preliminary basis where 106 trap/nights have been completed. The results obtained from this will be used to design a mark-recapture framework for estimating leopard densities. Currently, the Radio-collaring exercise is in progress.

Social Organization and Dispersal in Asiatic Lions

Investigators: Dr. Y. V. Jhala, Dr. Ravi Chellam and Shri B. J. Pathak, IFS, Conservator (Wildlife), Junagadh Circle, Gujarat

Researcher: Ms. V. Meena

Date of initiation: March 2002

Date of completion: March 2007

Budget allotted: Rs. 62.40 lac

The major objectives of this project are to understand the factors that influence the social organization in Asiatic lions, and determine the dispersal patterns of sub-adult male lions, using radio-telemetry. A component also addresses the issue of long-term ecological monitoring. Since the study relies basically on radio-tagged lions, permission for radio-collaring lions has been sought and is awaited from the Chief Wildlife Warden, Gujarat. Base camp has been set up in Sasan and logistic arrangements worked out. Meanwhile, the researcher has surveyed the area to determine the best site for radio-collaring lions for achieving the objectives of this study. This area has been identified as central Gir since it has minimal human influence and is likely to best represent an evolutionary ecological scenario. Data on lion densities through individual identification of whisker patterns, population structure, infanticide of cubs by adult male lions, ungulate densities by line transect methods and data on livestock availability have been collected. Behaviour sampling strategies for lions have been worked out and preliminary data collected. Once lions are radio-collared the research is poised to commence intensive data collection.

Conservation genetics of marine turtle on the mainland coast and islands of India

Investigators: Shri B.C. Choudhury, WII, Kartik Shanker, Madras Crocodile Bank Trust, Mamallapuram, Ramesh K. Aggarwal and Lalji Singh, Centre for Cellular and Molecular Biology, Hyderabad

Researchers: Ms. Pavani Somaya, T.P. Velvan, Centre for Celluar and Molecular Biology, Hyderabad and Gopi G.V., WII

Dated of initiation: August 2001

Date of completion: July 2004

Budget allotted: Rs. 26.92 lakh

The objectives of the project are: (i) Documentation of mito-chondrial DNA haplotypes of marine

turtles in the Indian ocean; (ii) Population genetics of the Olive Ridley (*Lepidochelys olivacea*) off the mainland coast and islands in India; and (iii) Multiple paternity in Olive Ridleys on the east coast of India.

Olive Ridley sea turtles (*Lepidochelys olivacea*) are among the most abundant marine turtle species in Indian waters. Gahirmatha, Rushikulya and Devi River mouth in Orissa on the East coast of India, are among the few sites of the world where mass nesting (arribada) takes place. These sites are threatened due to large scale trawling mortality. In addition, drowning of adult turtles and poaching of eggs, equally threaten smaller populations of the olives found sporadically along the entire east coast of India. In order to devise effective management and conservation strategies for this important pelagic turtle species, it becomes imperative to understand the genetic structure of its populations in Indian waters. In this background, we carried out a feasibility study from 1999-2001, to have some insight into the population structure of various nesting aggregations of Olive Ridleys on the east coast of India using different DNA typing approaches. Our preliminary studies suggested that the Olive Ridleys along the East coast of India represent: a) one large population with almost non-significant sub-structuring along the coast, and more importantly, b) possible ancestral source population for re-colonisation or replacement of contemporary global populations of Olive Ridleys both in the Pacific and the Atlantic oceans. These results, that have significant implications both to defining the conservation needs of Olive Ridleys in Indian waters and also in our understanding of the origin, evolution and Trans-Ocean migration/ philopatry of this important marine turtle species, need further validation.

A larger study was initiated in 2001, to confirm our earlier observations and also to test the hypothesis of 'Natal homing' that has been seen in some of the related species of marine turtles, with samples from all along the Indian coastline including those in and around the Andaman Islands. For the purpose, more than 250 blood/tissue samples were collected from different nesting sites in Andaman & Nicobar Islands Lakshadweep, Tamil Nadu, and Gujarat.

Mitochondrial D-loop control region polymorphism was analysed in 48 samples of Olive Ridleys collected previously from the Orissa beach. The analysis revealed two new haplotypes specific to the Indian population, in addition to the three other new haplotypes found in our earlier studies. Comparison analysis of the d-loop haplotypic data with those recorded for other global basins established Indian Olive Ridleys to be genetically unique and the most ancient population. The ancestral status of Indian population was further supported by the identification of a 7-bp indel signature sequence (deletion) that it shared with all the related species including the Kemp Ridleys. In comparison, all other global Olive Ridley populations carried the indel (insertion) indicating them to be of recent origin.

In addition to the above, ~750 bp domain of the mitochondrial 16S gene was amplified and sequenced for all the 84 samples from the Orissa coast. The analysis of the ~55,000 bp thus sequenced revealed only one haplotype in all the samples.

Extensive micro-satellite studies were undertaken to validate our earlier observations about the genetic structure of Olive Ridley populations along the east coast of India. For the purpose, Olive Ridley turtles sampled from three nesting sites in Orissa and one in Tamil Nadu, were analysed using a number of cross-species micro-satellite markers and many Olive Ridley markers newly developed at CCMB. The micro satellite analysis revealed a moderate to high level of polymorphism among the 80+ individuals from four sites. Interestingly, all the samples exhibited heterozygosity for at least one micro-satellite loci analysed in the study. The allelic diversity data analysed for different estimates of population genetic structure conclusively demonstrate that Olive Ridley turtles in Indian waters on the East coast have a reasonably wide genetic base and represent a genetically vibrant population. Further more, allelic diversity at micro satellite loci as well as the mitochondrial haplotypes were found randomly distributed across the samples, suggesting that there is no genetic difference between the populations from different nesting sites and that these represent the continuum of the one same large interbreeding population all along the East coast of India. Our observations are in agreement with the field data obtained in another study conducted by WII, Dehradun, that Olive Ridley sea turtles routinely use more than one nesting beach in Orissa.

Protocols were standardized for total genomic DNA isolation from small field samples of turtle

comprising blood or muscle tissue collected during 2001 from other sites in Indian waters. Genomic DNA could be isolated from 230 samples. The samples were tested for DNA amplification and restriction digestion. These samples comprising both Olive Ridley and Loggerhead turtles, will be used for mitochondrial d-loop haplotypic diversity.

Conservation Ecology of an Isolated Population of Gaur (*Bos gaurus*) in Trishna Wildlife Sanctuary, Tripura.

Investigators: Dr. A.K. Gupta and Dr. K. Sankar

Researcher: Shri Sabyasachi Dasgupta

Date of initiation: January 2002

Date of completion: December 2004

Budget allotted: Rs. 18.34 lac

The objectives of the project are: (i) to study status, distribution, population structure, habitat use and food plants of the endangered mammals in Trishna Wildlife Sanctuary (TWS), (ii) to prepare land-cover and vegetation maps of TWS, (iii) to identify major threats to the endangered mammals, and (iv) Suggest management recommendations for the conservation of the biodiversity in general and that of the target species in particular.

Progress: (i) Vegetation sampling was started to quantify floral diversity in different forest types throught the sanctuary using the stratified random sampling method for representative samples. Various habitat disturbance parameters were also recorded in those plots. Permanent vegetation plots along the different transects were laid to record seasonal changes in the vegetation and to quantify the disturbances to different habitat types; (ii) One group each of Hoolock Gibbon – *Bunopithecus hoolock*, Capped Langur – *Trachypithecus pileata*, and Pigtailed Macaque – *Macaca nemestrina* were living in Joychandpur – Kasari area of the sanctuary. A total of eight days per season (four months in a season) per group was spent following them from dawn to dusk to collect ecological information, especially on food habits. Whenever gaur (*Bos gaurus*) was encountered, they were followed to collect data on their diet; (iii) GPS locations of study animals (only primates) were recorded during group-scans to observe their movement patterns. The samples of identified food plants and their parts were collected for chemical analysis. A few main food trees were marked for phenological studies, and new food trees for phenological studies were added when encountered during the study. The phenological study was conducted once in ten days. Locations of roosting trees were also recorded.

During the course of this study a tigress with one cub was located inside the TWS. This sighting of tiger in Tripura is roughly 28 years after any tiger was seen last in Tripura. There is likely to be one male tiger in this area too.

Status and Ecology of the Leopard in Pauri Garhwal. Phase-II: Ranging patterns and reproductive biology of the leopard (*Panthera pardus*) in Pauri Garhwal Himalayas

Investigator: Dr. S.P. Goyal

Researcher: Shri Devendra Singh

Date of initiation: January 1, 2002

Date of completion: December 31, 2005

Budget allotted: Rs. 37,93,900.00

The present project aims (i) to determine ranging patterns and home range of females under three conflict zones (low, medium and high) and correlate these with respect to topography, vegetation, prey (wild and domestic) abundance, land use patterns and human dimension, (ii) to understand reproductive biology with reference to frequency of pregnancy/lactation in different conflict zones, and (iii) to suggest mitigatory measures to minimize conflict in the hills. Under this project we have planned to radio collar leopards.

Transects/trails have been identified and monitored in selected Intensive Study Areas (ISA) of these three conflict zones to determine the distribution, population and habitat use by the leopard in addition to prey (wild and domestic) abundance. Permanent plots of cement have been prepared on identified trails in order to monitor the animals throughout the year. Leopard sign such as tracks and scats have been collected systematically on each trail/transect. Prey species tracks are also recorded on transect/

Leopard photographs taken from Garhwal Himalaya

Photo: Devendra Singh

trails. Sixty-three scats have been collected from different conflict zones. We planned to determine the efficacy of Carnivore Survey Discs (CSD) for monitoring leopards on the trails. Intensive collection of data will commence once leopards are radio collared.

Camera traps have been used to understand relative abundance and identify leopards in different ISA. Of the 74-camera trap night's, leopards were photographed fifteen times. Leopard cat, red fox, porcupine and pheasant were also photographed. Four sightings of leopards were also recorded from different sites.

An Assessment of ecodevelopment initiatives in Periyar Tiger Reserve

Investigators: Shri A.K. Bhardwaj and Dr. Ruchi Badola

Researcher: Shri A.K. Bhardwaj

Date of initiation: April 1, 2002

Date of completion: Ongoing. Likely to be completed by the end of this academic year.

Budget allotted: Rs. 1.00 lakh

Objectives: 1. To examine the kind of inputs provided to local communities (Ecodevelopment committees) through ecodevelopment programme

2. To examine the impacts of such ecodevelopment programme with respect to following parameters: (a) change in socio-economic conditions of local communities (EDC members) prior to and after the initiation of ecodevelopment programme; (b) Change in quantum of forest resource (fuel wood, fodder, and NTFP) use by local communities; (c) Extent of park-people conflicts after the implementation of the programme; (d) State of attitudes of local communities (EDC members) towards conservation; (e) To examine the viability of EDCs formed under the ecodevelopment; and (f) programme with respect to: (i) structure and membership; (ii) Economic status (funds received/generated/invested/ spent and audit system); (iii) Capacity building of members; (iv) Level of participation and empowerment of women and marginal groups; (v) Decision making and conflict resolution mechanism adopted; and (vi) On the basis of above findings critically examine the factors responsible for the success and failure of ecodevelopment initiatives with respect to Periyar Tiger Reserve and suggest measures for effective implementation of the future programme.

Progress: For the purpose of arriving at proper samples, a rapid survey of all the EDCs was carried out during last year. This year, based on the rapid survey of EDCs, detailed survey of EDCs was initiated. So far this has been completed for 6 EDCs. In addition to this, for the staff attitude survey the questionnaires were designed, tested and administered. Responses for these questionnaires have also been received.

Findings/achievements: The project is still going on and the final results will be available only during the end of this academic year.

Landmarks/Milestone: The major milestones for the project are as follows:

i. Literature survey – ongoing process
ii. Rapid survey of EDCs – completed
iii. Detailed survey of selected EDCs – going on
iv. Staff attitude survey – response is received and data yet to be processed
v. Data analysis – partially initiated and will be completed during this year
vi. Final report writing – proposed to be completed during this year.

EXTERNALLY FUNDED RESEARCH PROJECTS

U.S. Fish and Wildlife Service

Conservation of the Indian Wolf

Principal Investigator: Dr. Y.V. Jhala

Researchers: Dr. Bharat Jethva and Priyadarshini K.V.R.

Collaborators: Dr. Olav Oftedal, Dr. Robert Fleischer, Dr. Jesus Maldonado, Smithsonian Institution

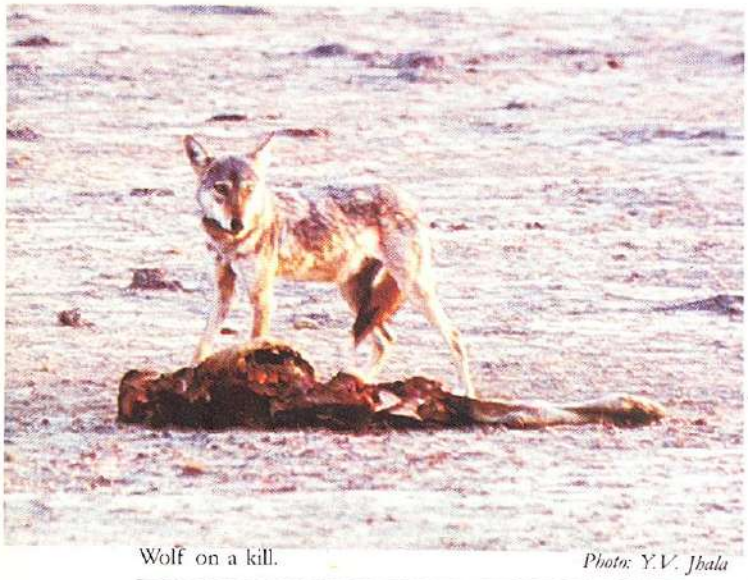
Date of initiation: May, 1996

Date of completion: December, 2003

Budget allotted: Rs. 64, 82,700 only

The major objective of this research project is to understand the ecology of the endangered wolf, its prey species, and other sympatric carnivores. In short, the project involves the study of ecosystem components and processes of semi-arid systems that are likely to affect the top carnivores, primarily wolves.

There are three intensive study sites, the Bhal, Kutch areas in Gujarat, and Ojar area near Nasik in Maharashtra. At the intensive study sites modern techniques of radio-telemetry are being used to collect data on wolves, sympatric carnivores, such as jackals and hyenas, and prey species, such as blackbuck and chinkara. Rare and endangered carnivores, such as the caracal are also being studied. Practical aspects of human-wolf conflicts are a major component of the study.



Wolf on a kill. *Photo: Y.V. Jhala*

Rabies epidemics continue to take their toll of wild carnivore populations for the second consequent year in Kutch. Wolves, hyenas and jackals are especially vulnerable. Wolves had shown high resilience by re-colonizing areas where entire packs were killed by the disease last year. Rabies has stuck again this year, before pups reached dispersal age, thereby, effectively curtailing recruitment. It remains to be seen what long-term effect rabies has on the population dynamics of wolves in this region.

Specific data targeted to fill in voids were collected in the Bhal and Nasik study sites since these intensive research sites are to be concluded this year. Continuous monitoring of radio-collared wolves has provided data on rates of predation on domestic and wild prey. This data conclusively shows that most cattle that feature in the diet of wolves were scavenged, actual predation on cattle was rare. Areas like the Bhal, where conflicts with human interests are minimal, show good promise for long-term wolf conservation. Such areas could serve as source populations in larger landscapes. A major cyclonic storm hit the Bhal coast during the past monsoon. The subsequent floods caused severe mortality in the blackbuck population. In spite of this mortality the blackbuck population in Velavadar National Park increased as predicted. This was probably due to the release of the population from control by jackal predation on blackbuck calves.

Mitochondrial DNA analysis of wolves and dogs from the Indian sub-continent has shown that three different wolf lineages currently exist. Of these, the Himalayan wolf lineage ranging between Himachal Pradesh and Eastern Nepal is the most ancient, and ancestral to all wolf lineages. The peninsular wolves form a separate sister clade from the common wolf-dog clade. Wolves from Northern and Western Kashmir belong to the wolf-dog clade, which ranges from North America to Eurasia. All Indian dogs sampled belonged to the wolf-dog clade. This points out that neither the Indian peninsular wolves nor the Himalayan wolves were ancestors of dogs. Further our analysis suggests that contamination of wild wolf gene pools by interbreeding with feral dogs is not a serious threat in India compared to wolf populations in Europe.

Data on food habits, ranging patterns, habitat use, human conflicts, mortality factors, population parameters, and behaviour are being collected. The results of the study will be synthesized to help develop

a national conservation strategy for wolves, their habitats, prey, and associated fauna of the arid and semi-arid regions.

During the past year one Ph.D. and three Masters degrees were awarded based on the work done on this project.

Planning and development of interpretive facilities in Panna National Park and Corbett National Park

Project Coordinator: Shri B.C. Choudhury

Site Coordinators, Panna: Smt. Bitapi C. Sinha and Field Director, Panna Tiger Reserve

Site Coordinators, Corbett: Shri Rajiv Bhartari, Dr. Mehar Singh and Field Director, Corbett Tiger Reserve

USFWS counterparts: Mr. Gary Stolz (Refuge Manager, USFWS, Texas, USA) and Mr. Gayle Hazelwood (Chief Interpreter, Martin Luther King Junior National Historic Site, Atlanta, USA)

Researcher: Ms. Anjali Ravi

Date of initiation: October 1, 1995

Date of completion: September 30, 2003

Budget allotted: Rs. 119.91 lac

Objectives: The objectives of the project are: (i) to study Kanha and Melghat interpretive programme and develop suitable interpretive methodologies for Indian situation assimilating the best of American technology and expertise with Indian socio-cultural reality (ii) to develop area-specific and comprehensive interpretive plans for two different areas viz., Panna National Park and Corbett National Park. (iii) to implement these interpretive plans with the help of concerned State Government, and (iv) to prepare a manual on interpretation and conservation education.

During the reporting year implementation of the Interpretive Plan for Panna National Park was undertaken. Based on the themes identified in the Interpretive Plan Document, individual panels were identified and the text prepared. Panels are ready for printing after layout and designing.

A landscape architect was hired to provide plans for outdoor landscaping and plantation, and to provide civil designs for construction of a Kitchen-cum-Cafeteria, amphitheatre and overhead water tank. Civil works for a 100 seater capacity amphitheatre are also in progress.

One of the components identified under the project is a ten to fifteen minute signature film on Panna National Park, which will show the incredible beauty, richness and diversity of Panna Tiger Reserve, with a view to attracting more visitors to this relatively unknown forest. Three trips, each lasting about fifteen days, were made by the filmmaker to Panna. The first trip covered the dry season with emphasis on visuals obtained at waterholes of birds and animals congregating to drink. During the second trip the emphasis was on filming the transformation of the landscape from parched brown to verdant green. The third and the final trip emphasized the filming of species, mammals, birds, insects, flowers, and fruits. The change in landscape during winter was filmed. From misty mornings to glowing daylight was the highlight of this period. The script writing and the editing of the film are in progress.

The Birds of Panna National Park – A Checklist was officially released on 26th June 2002 by Dr. A.P. Dwivedi, PCCF and Chief Wildlife Warden, M.P. during the official launch of the fabrication work. The book is a priced publication and all proceeds from the sale will go to the staff welfare fund.

The domain name *www.pannatigerreserve.org* was registered in August 2001. Since then work on the website has been in progress. The website was officially launched on October 2, 2002 by Shri Aditya Vijay Singh, Chief Secretary, Government of Madhya Pradesh in the presence of an august gathering at Panna. The Website is now fully operational. Keeping in view the knowledge required for the upkeep of the site a computer person identified by the Park Director was trained at the Wildlife Institute of India for a period of one month. During the training he acquired skills in uploading and downloading of the information from the site and its upkeep.

During the reporting year the progress of work undertaken was reviewed twice. The first meeting was held on 4th June 2002 at Dehradun. During the meeting different aspects of the project were discussed in detail. The second meeting was held on 16th October 2002 at Panna. It was attended by a representative of the M.P. Forest Department, Park Officials, USFWS Office, Director, WII, Project Co-ordinator and Nodal Officer and the Site Co-ordinator. The meeting reviewed the progress of work, discussed the supplementary fund requirement and also reviewed the progress of work by the fabricators.

During the reporting year the following activities were undertaken at the Corbett site. Research was carried out on the Jim Corbett legacy and heritage from his period, the history of the formation and development of Corbett NP, and cultural and social aspects of the region to identify interpretive themes, and to prepare an interpretation plan for the Jim Corbett Museum at Kaladhungi. Information regarding this was obtained through procuring various historical documents, field visits and interviews. In addition, an extensive visitor survey was conducted for Corbett NP, Kaladhungi and Nainital with the help of detailed questionnaires to find out visitor characteristics, experience, motivations, activities, use of interpretive facilities and suggestions for future developments. Interpretive themes were identified and the preparation of a prospectus is currently underway.

The photo-documentation work with respect to interpretive themes, that is, landscapes, plants culture, management and wild animals of Corbett National Park was completed. Hence, a balanced collection of slides and print photographs has been compiled and indexed for the purpose of documentation and use in displays and publications and any future use. Original films made by Jim Corbett and F.W. Champion have been procured by the project. These films will serve as a vital inte_ tive resource and provide footage for the planned orientation film for visitors in Corbett NP. A refresher course for the registered nature guides to Corbett NP, local youth, representatives of the tourism industry and forest staff from Kaladhungi was organized. This activity was undertaken to enhance interpretive skills by providing exposure to the history and heritage of Kaladhungi and Nainital, highlighting the links with Jim Corbett after whom the National Park is named. Inviting tenders for installation of displays and signage at Corbett NP, Dhangari Interpretation Centre and Jim Corbett Museum, Kaladhungi was initiated in February/March 2003.

The progress and output of the Corbett site have been slow due to change of site-coordinators as well as new MoUs with Uttaranchal Government. The project is due to be completed by December 2003. However, a no-cost extension of one year may still be required to complete all expected outputs.

Ministry of Environment and Forests

Studies on the Animal – Habitat Interactions in the Buffer Zone of Nanda Devi Biosphere Reserve

Investigators: Dr. S. Sathyakumar

Co-Investigator: Dr. G. S. Rawat

Researcher: Shri Ramesh S. Negi

Date of initiation: February 2002

Date of completion: February 2005

Budget allotted: Rs. 4.49 lac

The objectives of the project are to: (i) assess the status of wildlife habitats along the gradients of human use, (ii) study the distribution, abundance and habitat use by large mammals and pheasants, and (iii) identify threats to large mammalian and pheasant species and their habitats, and suggest possible mitigation for long term conservation and management

The study was conducted in Bedni – Ali – Roopkund area (3000 – 5200 m asl) in the buffer zone of Nanda Devi BR. The lower part of the study area is characterized by 'treeline – Krummholz – alpine meadow' ecotone that is inhabited by Himalayan musk deer, serow, Himalayan Tahr and several pheasants. Upper parts are preferred by blue sheep and the snow leopard. During the study period extensive sampling was done to assess the biotic pressure in the area. A total of 312 permanent plots were established along seven transects (1.6 – 2.0 km in length), which represented the area in terms of altitude, aspect, slope and gradients of anthropogenic pressures. Data on vegetation, abundance and habitat use by ungulates, pheasants and livestock were collected using standard methods. Exclosures were set up to study the impact of livestock grazing on the vegetation cover and species composition in the study area.

Data on the density and abundance of livestock using various parts of the buffer zone were analysed. Based on the livestock density as well as the relative abundance of pellets/dung the study area was stratified into high, moderate and low-pressure zones. The direct and indirect evidence of wild ungulates and pheasant and data on the patterns of habitat use during different seasons were analysed.

All India Co-ordinated Research Project on Taxonomy of Indian Orchids

National Co-ordinator: Dr. Sathish Kumar

Collaborator: Dr. G.S. Rawat (Uttaranchal and Bihar States)

Researchers: Shri Jeewan S. Jalal and Pankaj Sahni

Date of initiation: December 2002

Date of completion: December 2007

Budget allotted: Rs. 19.35 lac

The objectives of the project are: (i) status survey, collection, identification and preservation of orchids, (ii) maintain collection and taxonomic databases, (iii) develop user-friendly identification manuals, (iv) train college students, teachers and local communities in parataxonomy, and (v) to bring out volumes on Indian Orchids.

During reporting period the existing literature on the orchids of Uttaranchal and erstwhile Bihar was collected and reviewed. The work was carried out in collaboration with Professor Y.P.S. Pangtey, Department of Botany, K.U. Nainital and Professor A.K. Pandey, Department of Botany, TM Bhagalpur University, Bhagalpur. Herbaria of above departments, WII, BSI, and FRI were consulted to record the past localities of an orchid survey and prioritize the areas for a further survey. Datasheets for the collection of ecological and ethno-botanical information on the orchids were designed. Field surveys in both states are in progress.

Several new locations of rare and threatened orchids were recorded. An interesting species of Gastrochilus was recorded in the higher altitudes of Uttaranchal.

GOI-UNDP Sub-Programme

Wildlife Protected Area Management in Jaldapara Wildlife Sanctuary

Sub-Programme Coordinator: Dr. B.K. Mishra

Date of initiation: October 1999

Date of completion: June, 2003

Budget allotted: US $ 2,00,000

This Sub-programme is aimed at assisting the Forest Department of West Bengal to update and implement an integrated management and ecodevelopment plan in Jaldapara Protected Area (32 villages, population approximately 87,300 comprising of about 15,000 families).

Immediate objectives of the project were: (i) to update and implement an integrated management and eco-development plan, (ii) to enhance the capacity of the State Wildlife Agency, and (iii) to strengthen support for conservation measures by the State Government

Focus of the Project: (i) Capacity Building, Management Plan updation and implementation through West Bengal Forest Department, local communities and other stakeholders of the area; and (ii) Emphasis was on the process rather than merely achieving targets.

The partners in the project and their role: (i) Government of India, the Ministry of Environment & Forests contributed through institutional and budgetary support in kind under several centrally sponsored schemes (Project Tiger, Project Elephant, Ecodevelopment, Sanctuaries and National Parks) at Jaldapara. (ii) The State Government of West Bengal contributed in kind through local staff salaries, office space and other logistics in Jaldapara WLS. (iii) The UNDP provided funds to support the Sub-programme activities. UNDP inputs were to meet the cost of international and national experts, sub-contracts, expandable and non-expandable equipment and expenses under miscellaneous activities. (iv) The Wildlife Institute of India facilitated implementation of the sub-programme on behalf of the State Forest Department, Government of West Bengal, and was involved in supporting the protected area management in training, research and monitoring during the implementation phase. It also assisted the Protected Area Management Unit in updating and integrating the existing wildlife management and ecodevelopment plan, and it's implementation in Jaldapara Wildlife Sanctuary. Most of the activities which are implemented in the field are to be done by the Executing Agency (i.e. West Bengal Forest Department) and thus the Implementing Agency (i.e. WII) have very limited role to influence the speed of implementation of the programme in the field.

Physical Progress of the Project: The first meeting of the implementing agency and the executing agency was conducted on September 9, 1999 in which a Memorandum of Understanding between the two

agencies was finalized. A PA Level Co-ordination Committee was constituted in Jaldapara Wildlife Sanctuary in the month of April 2000. The main responsibility of the Committee was the advisory role and approval of various activities being proposed under the project for the PA. A State Level Co-ordination Committee was also set up with representation from the executing agency, implementing agency, Local NGOs, UNDP and MoEF. The mandate of this committee was to serve as a forum for co-ordination and collaboration between the stakeholders. Altogether four meetings of this committee were held on November 2000, April 2001, November 2001 and July 2002 respectively. A spearhead team consisting of frontline staff and NGO representatives was constituted in the PA during April 2000. The spearhead team was responsible for carrying out the micro planning and multiplying the training effect within the staff of the PA and the communities.

Two training programmes were organized for the staff of the spearhead team of the PA and local communities. The focus of these two training programmes was to understand the concept of eco-development and community participation and to impart skills and attitudes required for them. It was followed by a field visit to Kalakad-Mundanthurai Tiger Reserve and Periyar Tiger Reserve of South India. The purpose of this visit was to make the participants understand how the concepts of eco-development can actually be translated into action in the field. They were also exposed to various eco-development initiatives in these two areas to pick up some lessons, which can be implemented in Jaldapara.

A training-cum-field visit to Corbett Tiger Reserve for the field staff of Jaldapara Wildlife Sanctuary was organized in November 2000. This was combined with theoretical information by faculty members at WII. A Training-cum-field visit for Mahavats to South India was organized in January 2001. During this training the participants were exposed to various aspects of captive elephant management in areas of Southern India. A workshop for evolving monitoring protocols for EDCs and Frontline Staff was conducted in November 2001.

A Stakeholders' workshop was organized in November 2002 to appraise the situation on completion of the UNDP Project. The objective of this workshop was to bring together different stakeholders for developing a mechanism of working together for conservation and development of the PA and the surrounding communities. Gender training was organized in Jaldapara in November 2002 to empower the women EDC members to install more confidence for capacity building.

So far, nine micro plans have been prepared against the initial target of six and eco-development activities are being implemented in two Eco-development Committees as per the micro plans.

One of the important outputs of the project was to revise the management plan in the light of information generated and lessons learnt during the project. West Bengal Forest Department chosen one Officer from Jaldapara, a member of the spearhead team with the PG Diploma in Wildlife Management from WII, to update the Management Plan. This work was successfully completed in December 2002.

During the course of the project implementation, a need of baseline information on certain aspects was felt. Therefore, three short-term action research studies were commissioned through different partners and outside agencies. These are: (i) Overall impact assessment of IND/97/956 project, which was carried out by the UNDP through its Junior Programme Officers; (ii) Gender Impact Assessment Study, and (iii) A study on the estimation of palatable biomass in Jaldapara Wildlife Sanctuary.

Main Constraints of the Project:

- *Delayed Fund Flow:* Although the Project started in October 1999, the flow of funds started only by the end of March, 2000. This has initially delayed the implementation of the project activities by at least five months.
- *Process based Participatory Project Needs Time:* This is a process based participatory project, which is influenced by many externals due to involvement of a number of stakeholders. To have actual influence on the project, adequate time is needed, first to generate mutual trust and then to understand the project itself.
- *Frequent Changes in Field:* Frequent change of guards in the field leads to further complications as any new person taking over the responsibility requires his own time to understand the project and to gear up implementation responsibilities.
- *Delay in Constitution of Committees:* Constituting various committees took more time than was

expected. While the PA Level Coordination Committee was constituted in April 2000, the State Level Co-ordination Committee was constituted only in November 2000. Such delays complicated the approval procedures for the project activities, and thus the whole process was delayed.

- *Auditing System:* The system of auditing demands that the audited statements for each quarter be received from the Implementing Agency and only then are funds for the next quarter released. As per the UNDP norms, the expenditure at Jaldapara is to be reported as the actual, and not on the basis of advances given to them by WII. State Government has its own system of auditing to the Accountant General, which takes much time. Because of the combined effect of all these, the whole process is delayed.
- *Natural factors:* Natural factors are also sometimes very important externals, which can influence project activities. Floods in the project site during the project tenure ate away more than two months during which nothing could be done in the field.

Qualitative Changes

A number of changes that cannot be put in quantitative terms can be seen because of the project initiatives. To capture document these changes we may need further scientific investigation. However, in the meetings of spearhead team and the stakeholder's workshop during the tenure of this project, the following qualitative changes were clearly observed.

Conflict Mitigation: The conflict mapping exercise with the spearhead team revealed that the conflicts between the park management and village communities of the project area have considerably reduced. Likewise, the conflicts between the PA management and other stakeholders like tourist, other government agencies, NGOs as well as media have reduced to a greater extent.

Change in Attitudes: One of the most important contributions of the project has been a drastic change in the attitudes of staff towards the people's issue and that of the communities towards the staff and park conservation issues. At present there is at least a pool of staff in the PA sensitive to the issue of park people interactions and their management actions are much more effective as compared to before. Members of the ecodevelopment committees are directly or indirectly helping in habitat protection work, and detection as well as passing on information about illegal activities. However, much still depends upon the attitude and capability of the local staff of the area to extract the help of the local villagers for park protection, making use of the goodwill generated through the project implementation. As already explained they are new partners in the project and these partners have become much more sensitive towards the park conservation issues through their involvement with the project team.

Better Awareness: A beginning in this direction was made through village nature awareness camps organized by NGO partners like Nandadevi Foundation, Alipur Nature Club, and Euro Club. The spearhead team through institutional building process further strengthened this. Villages where the project has been implemented are much more sensitive to the conservation issues of the park as compared to the earlier situation.

Level of Participation: Before the formation of Forest Protection Committees (FPCs) and EDCs in the area, the communities were almost neglected. And gradually due to the project initiatives and subsequent implementation of the ecodevelopment programme through ecodevelopment committees have raised the level of participation of local communities in the PA conservation initiatives. However, this still fluctuates depending upon the level of communication between the local staff and the communities. In any case the level of participation is still limited up to the material incentive level and much more needs to be done to enhance this level of participation to a higher level in conservation development initiatives of the park.

Olive Ridley Conservation Programme

Investigators/Nodal Officer: Shri B.C. Choudhury

Collaborators: Various coastal state agencies

Date of initiation: January 2000

Date of completion: June 2003

Budget allotted: 3,00,000 US $

The objectives of the project are: (i) development of a sustainable model for conservation of marine turtles and restoration/conservation of their habitat along the Indian coastline through a holistic and people centred approach, (ii) participatory

management of unprotected sea turtle nesting beaches which includes capacity building of major stakeholders such as central and state forestry, Coast Guard, Navy and Fisheries Department and NGOs, (iii) popularization of the use of TEDs, (iv) to prepare a management action plan for conservation of marine turtles along the Indian coastline.

The Wildlife Institute of India has continued the implementation of the third year National GOI – UNDP Olive Ridley Sea Turtle Conservation Programme during the reporting period.

Capacity Building Workshops: The capacity building workshop for frontline staff of the East coast of India was conducted at Chilka, Orissa in collaboration with the Orissa Forest Department and for the West coast of India at Cochin by the Central Marine Fisheries Research Institute. Forest, fisheries and sea turtle concerned agencies were trained during the workshops.

Workshop on TED promotion and implementation along the Indian coast: The Marine Product Export Development Authority in collaboration with WII conducted this workshop at Visakhapatnam in December 2002. The TED demonstration, efficiency and implementation along the different coastal states were discussed in detail.

Workshop on Eco-friendly (Sea turtle) coastal development: The Andhra Pradesh Forest department and the WII conducted the eco-friendly coastal development workshop at Visakhapatnam. Delegates from different coast based organizations participated in the workshop and were recommended for different coastal zone management activities.

The Turtle Excluder Device (TED) : TED if installed and used properly in the trawl nets can greatly reduce the incidental capture of sea turtles during trawling. The TED designed by CIFT was found to be extremely efficient in excluding turtles from trawl nets

Photo: Biwash Pandav

The project activities are ongoing and will be completed by June 2003. A book on Marine Turtles of India is in preparation at the University Press, Hyderabad. Four research manuals on sea turtle conservation and management are also in preparation at the Centre for Herpetology, Madras Crocodile Bank Trust, Mammalapuram. The final report is being prepared at the WII and will be ready by June 2003.

Department of Science & Technology Project

Acoustic signals in two avian species: their characterization and importance

Investigator: Dr. Anil Kumar

Date of initiation: January 28, 2002

Date of completion: January 27, 2005

Budget allotted: Rs. 10.96 Lac

The objectives of the project are (i) to record and analyse the physical characteristics of acoustic signals in the Red-vented bulbul, *Pycnonotus cafer* and Himalayan bulbul, *P. leucogenys* species, (ii) to understand the biological function of these signals in both species and (iii) possible role of acoustic signals in species isolation.

Digitization and documentation of acoustic signals: Different types of acoustic signals of Red-vented bulbul, *Pycnonotus cafer* and the Himalayan bulbul, *Pycnonotus leucogenys* were recorded periodically and most recordings were digitized. Acoustical analysis is in progress. Vocal signals of these species can be classified into songs and calls, on the basis of their physical characteristics and context of production.

Physical characteristics and functional significance of song: Individuals of both species sang throughout the year. All songs were discrete type, composed of strophes (phrases) preceded and followed by temporal gaps. In a song bout, the usually same types of strophes were repeated several times in stereotyped order with minor structural variations of elements before switching to another type of strophe. Sometimes a single element type was found interjected between two distinct strophes. Incomplete strophes were also used. Duration of strophes was about 0.65 to 1.2

Himalayan Bulbul (*Pycnonotus leucogenys*) and a pair of Red-vented Bulbul (*Pycnonotus cafer*) *Photo: Anil Kumar*

sec. and gap between strophes was three to nine seconds. The range of frequency varied from 1.25 to 8.00 kHz (in most phrases, 1.5 to 4.5 kHz). Most strophes were composed of two to six elements, often dissimilar in structure. Behavioural observations revealed that the biological function of song in these species seemed to be for maintaining pair bond and synchronizing breeding activities.

In some recordings the singing rate (phrases per minute) and song complexity levels (types of elements per minute) were much higher (about four times to normal singing) in both species. It seems that both species used two categories of songs. Most probably, individuals used Type-A songs (common and throughout the year) to maintain their pair bonds and Type-B songs (rare, fast and complex) for mating. These findings need to be confirmed, however, by a second year's investigations and playback experiments.

Types of calls: Both species were observed by using different types of context specific calls. These signals were simple, made up of a series of monosyllabic elements/notes with preceded temporal gaps. Roosting calls were used throughout the year. Immediately after returning to roosting sites, the birds gave a fast, wide-band, roosting chorus for about 10 to 35 minutes. Alarm calls were observed in the presence of predators such as hawks, mongoose and tree-pies. Pre-flight calls were short, low pitched, made up of only two to six elements, used just before flight. Besides the above-mentioned signals, begging calls, distress calls, mobbing calls and greeting calls were also observed. Acoustical characterization of these signals is in progress.

Major findings of the project are: (i) in contrast to most temperate birds, both species sang throughout the year, (ii) both males and females were observed singing, and (iii) two categories of songs were observed.

Establishment of bio-acoustic laboratory: With the fund support of DST (Department of Science and Technology, New Delhi), sound analysis workstation was established. It is composed of Compaq, Pentium 4 computer, Avisoft SAS Lab pro, version 4.1 (signal analysis and synthesis software), Core Sound, M-Audiofile 2496 (analog to digital converter and data acquisition card with supporting software) and Core Sound cables for signal transfer, that is, 2-RAC-to-RAC and 7 pin-coaxial cables. Digitization of analog audio signals, spectrography, acoustical characterization (based on frequency, time and amplitude), editing and synthesis of complex signals is possible through this workstation.

Indira Gandhi Institute of Development Research

Valuation of the Bhitarkanika Mangrove Ecosystem for Ecological Security and Sustainable Resource Use

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

Researchers: Ms. Poonam Prabha Semwal, Ms. Kalpana Ambashtha, and Ms. Shivani Chandola

Date of initiation: May 2001

Date of completion: Ongoing

Budget allotted: Rs. 13,40,142.00

The objectives of the project are to (i) enumerate ecological functions and key productive uses of the BCA, (ii) estimate the use values and ecological services provided by BCA, (iii) quantify the extent of local community's dependency on Bhitarkanika and identify marginalized stakeholders, (iv) examine the local community's attitude towards present and proposed management alternatives and (v) derive a predictive model to assess the impact of sea level rise (at 50 cm, 1 m and 2 m) on the Bhitarkanika mangrove ecosystem.

Human settlement in Bhitarkanika *Photo: Poonam Semwal*

During the reporting year the fieldwork was completed, the data analysed and the draft final report prepared and submitted to the funding agency for peer review. Comments of the peer reviewers were incorporated and the report resubmitted. Final acceptance of the report is awaited.

The loss of mangrove of Bhitarkanika is mainly due to human encroachment, reclamation of land for agriculture and unsustainable resource-use practices such as aquaculture activities. A total of 307 villages having 1.5-lakh population in the adjoining areas depend for fuel, fodder and other non-timber forest produce on the Bhitarkanika mangrove ecosystem. Recent development activities such as the construction of jetties, roads and the proposal of a major port at Dhamara threaten the existence of this ecosystem. Declaration of the mangrove forests of Bhitarkanika as a Protected Area has affected the local people as they lost access to their life support system. On the other hand the unsustainable resource use practices of the locals is a major threat to its continued existence. The resulting scenario is one of conflicts between the forest department and the local people. The present study is an attempt to fill in the information gap regarding the functions and services performed by mangroves. This study would assist the planners and PA managers to make informed decisions regarding the management of the Bhitarkanika mangrove ecosystem.

Four parameters, that is, nutrient retention, land accretion, storm abatement, and fish and shellfish production were selected for valuation. The nutrient retention function was Rs 16450.00 /acre/year, which is quite high compared to the valuation results of another study. The fish and shell production valuation was done at three levels and the estimated value for offshore fishery, Inshore fishery and fish seedling was determined by using the market value method, which was Rs. 1785/hr, Rs. 89.30/hr and Rs. 0.94/hr respectively. The storm abatement function was valued using the damage cost avoided method. In the village having mangrove cover the damage cost avoided was estimated to be Rs. 5465/ household. The value of land accretion function was estimated to be Rs. 46238398.00 over a period of 111 years.

The data on socio-economic and dependency aspects reveal a high degree of resource use by villagers despite the protected status of the Bhitarkanika mangroves. Wood from the Bhitarkanika mangroves is being used, particularly by the communities in the periphery of the forest, for firewood purposes. An overall 14.2% of the needs of each of the households was being met by the forests with a mean consumption of 3.1259 + 0.3216 qtl./annum in the sample villages. Highest consumption was in those villages located within 1.5 kms of BNP, (5.8 + 0.533 qtl./annum). Highest fish extraction (1.25 + 0.391 qtl.) was observed in villages located in peripheral areas of the mangroves, and the least, that is, 0.60 + 0.495, for those farthest from it. Thus, the highest consumption of Non Timber Forest Products (NTFP) was seen in villages in the adjoining areas of forest while villages situated more than 3 kms away from the forest did not use this resource.

The findings point out that the local people appreciate the contribution of Bhitarkanika mangroves to their lives and livelihoods. A high percentage of people (88.6%) recognized the contribution of mangroves in cyclone and flood mitigation. The people have recognized even functions such as biodiversity conservation and ground water recharge.

A predictive model to assess the extent of the impact of sea level rise on Bhitarkanika is developed. In this study, data was generated from different maps in the form of point information of elevation and then the digital elevation model was interpolated. The map is depicted with two levels of inundation, (a) 0-1 m, which indicates the predicted sea level rise of 1 m, and (b) 1-2 m. of sea level rise. The local coastal process and wave patterns are not considered at present due to lack of reliable information that can be extrapolated on a large scale.

The land between 0-1 metre elevations has 73.2 to 63.9 percent-estimated probability of inundation by the year 2200. The possible area of inundation at three levels, that is, 0-1, 1-2 and 0-2 m rise are 194.77 km^2 (6.5%), 253.71 km^2 (8.5%) and 448.48 km^2 (15%) of BCA respectively. Though this seems small, it may well adversely affect the vegetation community of the entire Bhitarkanika Conservation Area.

The estimated goods and services provided by the Bhitarkanika Mangrove Ecosystem is significantly high when compared to other land uses in the area such as aquaculture, paddy cultivation and development options. Moreover, the ecosystem services provided by the natural systems cannot be substituted by man-made capital. Despite this, the Bhitarkanika mangroves are facing threats of extinction due to anthropogenic and developmental pressures. There is a high degree of resource extraction by the locals due to availability of limited livelihood options such as paddy cultivation and fishing. Land use changes coupled with developmental activities threaten the ecological integrity of the Bhitarkanika Mangrove Ecosystem.

This case study suggests that the value of the estimated goods and services provided by the Bhitarkanika mangrove ecosystem is significantly high as compared to other land uses in the area such as aquaculture, paddy cultivation and development options. However, it suffers due to market failure as the ecosystem is being damaged by economic activities that are not required to meet the direct consequences of degradation such as establishment of settlements, paddy cultivation, prawn culture, mechanized fishing and other developmental activities. The people are able to appreciate the contribution of Bhitarkanika mangroves to their lives and livelihoods directly in the form of increased agricultural production and production of fish and prospects for better tourism. This awareness combined with the positive attitudes towards conservation local people's willingness to be represented in decision-making process and bodies for management of the forests, should be harnessed to create a powerful support base and opinion forum for the conservation and development of the Bhitarkanika Conservation Area.

The aim of management of the Bhitarkanika mangrove forest would be to strengthen the ability of the mangroves to perform the ecological functions so that the benefits to people from these are increased. The need is to further educate and sensitize the people and the policy makers of the fact that the monetary value of these ecosystem functions is much more than the direct benefits from the exploitation of mangroves. In order to solve the existing and future problem arising from un-coordinated resource use and allocation it is important to deal with the problems and issues on a spatial scale rather than addressing these sectorally. It is proposed that a Bhitarkanika Conservation Area Management Authority be set up. For effective conservation and management of the Bhitarkanika Conservation Area, it is important to go beyond protection measures for certain areas, habitats or landscape features, and impose binding requirements for coordination of sectoral policies at the scale of an ecological unit. However, it can only be done in practice by the presence of enabling legislation backed by strong political will.

National Fish & Wildlife Foundation and Save the Tiger Fund, Washington D.C.

Monitoring of forest conditions and prey base for the tiger conservation in the Terai Arc

Investigators: Dr. A.J.T. Johnsingh, Shri Qamar Qureshi, Dr. S.P. Goyal, and Dr. G.S. Rawat

Researchers: Shri K. Ramesh, Shri Raja Pandian and Dr. Ashish David

Date of initiation: July 2002

Date of completion: November 2003

Budget allotted: US $ 53,500

The objective of the project is to assess the status of tiger, prey base, forest condition and human population in the Indian part of the Terai Arc Tiger Conservation Landscape, which extends from Simbalwara – Kalesar forests, west of Yamuna River to Valmiki Tiger Reserve, east of Gandak River. The project is making good progress. Necessary permissions from Uttaranchal, Uttar Pradesh and Bihar governments have been obtained. Satellite data

(i) Kosi river; (ii) Fuelwood consumption; (iii)Boulder mining; (iv)Encroachment *Photo: A.J.T. Johnsingh*

(IRS-LISS III) have been procured to map vegetation types and critical corridors important for large mammal movement. Spatial database is being developed to prioritize conservation areas in the Indian part of the Terai Arc. Anthropogenic and socio-economic data purchased from the office of Census Directorate, New Delhi are being decoded and placed in appropriate format to be transferred into GIS domain. So far about 220 foot-transects have been walked, covering a total distance of 920 km. Except at Valmiki Tiger Reserve, primary data have been collected on tiger presence, prey availability and disturbance status for all administrative units/ forests (seventeen forest divisions, five wildlife sanctuaries and three National Parks) with in the project area. Tiger survey work in Valmiki Tiger Reserve, vegetation quantification and pellet count of ungulates will be completed in April-June 2003.

Institutional Co-operation Programme between the Wildlife Institute of India (WII) and the University of Tromso (UiT) in Natural Resource Ecology and Management

Collaborators: Dr. A.J.T. Johnsingh, Dr. G.S. Rawat, Dr. R. S. Chundawat, Dr. S. Sathyakumar and Dr. Y.V. Bhatnagar (WII), Dr. J. L. Fox (UiT)

Research Associates: Dr. Anjali Awasthi and Dr. Sanjay Kr. Uniyal

Technical Assistants: Sh. Tsweang Namgial and Ms. Swati

Date of initiation: March 2002

Expected date of completion: March 2005

Budget allotted: Rs. 78.40 Lac (Under IND – 040 Institutional Cooperation Programme (ICP) NORAD

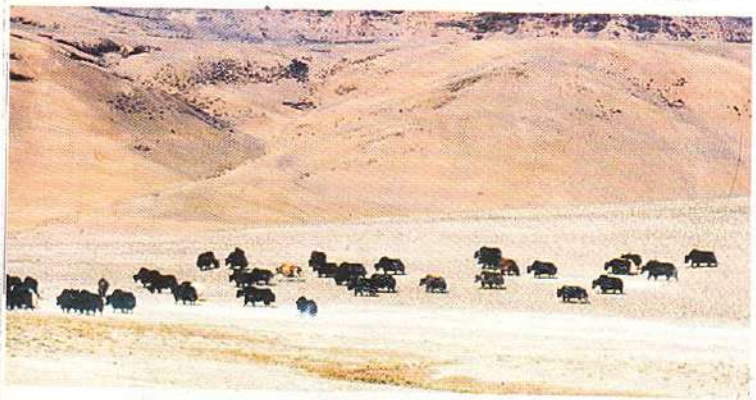
The objectives of the project are to: (i) develop WII as a Centre of Excellence in mountain ecology and wildlife management, (ii) produce a state of the art report on Himalayan Wildlife Conservation and sustainability of pastoralism in the region, (iii) enhance WII's laboratory facilities for wildlife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

Alpine meadow Rupi Bhava *Photo: G.S. Rawat*

The project began with an extensive literature search on the pastoralism and ungulate food habits in the region. The compiled literature was stored in a computerized database in WINSIS ver.1.31. Protocols for Plant and Soil sample collections for field for nutrient and chemical analysis were developed. During the summer and monsoon extensive surveys were conducted on the assessment of alpine vegetation and its use by domestic livestock at two sites of Greater Himalaya. A reconnaissance of Trans-Himalayan study site, that is, Tso Kar basin, was carried out. A short survey on "Argali–Livestock Interactions in Gya Miru" was initiated. In addition, several short-term studies were planned. The research findings of this programme and an overview were presented during the Annual Research Seminar held at the Institute. Director, WII visited the Agriculture University of Norway and NORAGRIC, and University of Tromso to interact with the collaborating scientists and to sign the Memorandum of Understanding between the two agencies. The UiT collaborator, Dr. J.L. Fox visited the Institute twice to discuss the field and laboratory programmes.

The strengthening of food habit analysis laboratory is in progress. Two sophisticated and highly useful laboratory equipment *viz.*, Atomic Absorption Spectrometer (AAS) and High Performance Liquid Chromatography (HPLC) have been procured. A large number of food plants and ungulate pellets were collected from various study sites for analysis. WII's laboratory personnel would be shortly trained in various techniques.

The recruitment of project personnel was made during March 2002, and the fieldwork was initiated in Uttaranchal study sites (Dayara in Uttarkashi and



The Changpas rear yak for milk, meat and draught power *Photo: Sanjay Kr. Uniyal*

Bedni in Chamoli) in May 2002, and continued through all seasons of the year. A short investigation on Argali–livestock interaction was initiated in Ladakh in November 2002. An intensive study on pastoralism and wildlife-livestock interactions was initiated in the Tso Kar basin, Ladakh, in November 2002.

Department of Wildlife Protection, Jammu & Kashmir Government

Aspects of Ecology of Hangul (*Cervus elaphas hanglu*) in Dachigam National Park, Kashmir

Principal Investigator: Dr. S. Sathyakumar

Co-Investigator: Shri Qamar Qureshi

Technical Assistant: Shri Khursheed Ahmad

Date of initiation: September 5, 2001

Date of completion: September 4, 2004

Project Budget: Rs. 3.00 lac

This research project is funded and run by Jammu & Kashmir Wildlife Department. WII provides technical expertise.

The objectives of the project are: (i) Assess the status and distribution of Hangul in Dachigam National Park and adjoining areas, (ii) Study the habitat use and food habits of the Hangul in different seasons, and (iii) Identify threats, anthropogenic pressures and other factors that affect the Hangul or its habitat.

For the reporting year, habitat quantification and population estimation for Hangul were carried out in different seasons.

Projects Initiated

WINROCK International India, New Delhi

Developing predictive models for climate change and vegetation structure in western Himalaya

Investigators: Dr. B.S. Adhikari and Dr. G.S. Rawat

Date of initiation: April 23, 2002

Date of completion: May 31, 2003

Budget allotted: Rs. 3,56,385.00

The objectives of the project are: (i) to establish the relationship between structural (biomass) and functional (productivity) traits of dominant species along a climatic gradient, (ii) to identify model variable for vegetation-climate changes and establish baseline data on key variables, and (iii) to correlate the anthropogenic pressures with the vegetation structure, function *vis-à-vis* impact of climate.

Progress during the year: Two technical reports have been submitted.

Findings/Achievements: Work is in progress.

Garhwal Himalayan forest ecosystem *Photo: B.S. Adhikari*

International Snow Leapord Trust (ISLT) and US Fish and Wildlife Service

Strengthening Field Conservation through Ecological Studies, Capacity Building and Conservation Awareness in Ladakh Trans Himalaya: A Collaborative Initiative

Investigators: Dr. V.B. Mathur and Dr. Yash Veer Bhatnagar

Research Team Members (during 2002-03): Dr. G.S. Rawat, Dr. B.S. Adhikari, Sh. Qamar Qureshi, Dr. S. Sathyakumar, Dr. Karthik Vasudevan, Ms. Bindu Raghavan, Mr. Swarnasikhar Pant, Ms. S. Das

Date of initiation: August 2002

Date of completion: July 2005

Budget allotted: Rs. 28 lakhs

The Trans-Himalaya have unique biodiversity values about which precious little is known. Recognizing this and the long-term interest in the region, the Wildlife Institute of India (WII) and its collaborating agencies in the recently concluded Himalayan Biodiversity Project (HBD), the International Snow Leopard Trust (ISLT) and the United States Fish and Wildlife Service (USFWS) initiated a collaborative

programme to enhance conservation and research activities in the Trans-Himalaya, with a focus on the Ladakh region that constitutes the bulk of the Trans Himalaya in India. Certain aspects of Ladakh's unique biodiversity have remained largely unexplored. It was also felt that there was tremendous scope and need for conservation activities in Ladakh. It was thus decided to work on a collaborative effort that would provide basic infrastructure in Ladakh and allow work by a multidisciplinary team. The Collaborative Ladakh Field Research Station (CLFRS), a four room office-cum-residence was hired in Oct 1999 at Leh. The collaborative project provides basic staff and other necessary facilities to scientists visiting Ladakh to work.

The approach was to use the varied specialization available in WII to collect hitherto unknown, or little known information about wildlife taxa, socio-economic and human-wildlife interactions based on rapid and extensive surveys covering the entire landscape in Ladakh. The second year (2001) had a similar approach, but most studies were more focussed. These two years have thus yielded a vast treasure of information regarding lesser-known species such as the Tibetan gazelle, Tibetan argali, kiang, brown bear, black necked crane, also about taxa such as reptiles and amphibians, insects and ecosystems such as the valuable wetlands of Ladakh. Such information can be crucial to the understanding of the overall biodiversity value of Ladakh. It has been further shown that considerable wildlife values exist in regions outside the already large PA network of Ladakh, which has prompted reconsideration and remodelling of conservation planning in the region.

Based on the outputs in the initial two years it was proposed, under a new programme, to continue research on selected issues in a more focussed manner. The project proposes to make a holistic assessment of significant conservation issues in Ladakh, and set up a working model for a possible solution. At the same time, it proposes to continue with the assessment of baseline status of rare and lesser-known taxa, limited to two to three such surveys in a year. As a continuing process, better-trained and equipped staff will be generated through training workshops dealing with techniques and wildlife management. Also, the management of wildlife in PAs and outside them will be made more streamlined, based on better conservation and management plans from consultations among scientists and managers. Awareness among various stakeholders regarding wildlife conservation will also be generated, based upon solid research findings. More specific objectives of the project are detailed below: (i) Conduct a focussed applied research project on the issue of the impact of livestock grazing on the vegetation, the abiotic environment and sympatric wildlife species and attempt to develop a working model for planning conservation in the intensive study site, (ii) Generate baseline information through targeted field surveys on rare and endangered taxa and add to the spatial database being developed at WII, (iii) Develop resource material for conservation education of various target groups in Ladakh, (iv) Build capacity of the local Government department(s) and Non-Government Organizations for wildlife monitoring and management of their wildlife-related natural resources, and (v) Develop a Conservation Action Plan for conserving of wildlife in Ladakh, including both areas within existing PAs and outside.

Progress and findings: During 2002 short surveys were conducted on the Biodiversity characterization and vegetation mapping in Ladakh (in collaboration with the Indian Institute of Remote Sensing, Dehradun), brown bear surveys in Zanskar (with funding from the International Bear Association), Ladakh urial survey in the Indus valley (with funding from the Wildlife Trust of India, New Delhi) and herpetological surveys in central Ladakh (with funding from the Declining Amphibian Population Task Force).

Under the biodiversity characterization component, the Chang Thang, central Ladakh, Nubra and parts of Kargil and Zanskar areas were surveyed and ground truthed for vegetation types and plant species of ethno-botanical importance. A detailed land use map of the region is being prepared.

This was the second year of the brown bear surveys during which the scientists have found further evidence of the rare species' occurrence and distribution in Zanskar, and the possible routes of population exchange between this region and the Jammu region, across the Zanskar range. The existing GIS based distribution map of the region is also being updated and the model is being fine-tuned based on new information emerging from this pioneering study on the species.

Ladakh urial is an endemic sheep subspecies that occurs only in the Indus catchment in Ladakh and parts of PoK. No systematic study has been conducted on the species so far, of which fewer than 2000 may now be surviving. Most of the range of the species happens to be at the lowest elevations along major river systems, where anthropogenic pressures are the highest. With this imminent threat to the species in mind, a short survey to assess the general status and distribution of the species was conducted during June 2003. This survey also helped in identifying the site for a Masters dissertation work – the first such study on this rare species. The latter study was conducted between November 2002 and April 2003 and was able to establish that competition with livestock is at present major threat to the urial, and further local extinction of the species can be expected this threat is not sufficiently addressed.

Year 2002 was the third consecutive year for the herpetological surveys under the project. During earlier surveys an updated inventory of herpetofauna was prepared and the primary threats assessed. During the present survey observations on UV radiation increase in the region were assessed; this was an issue that earlier surveys had hypothesized as a major cause of amphibian declines in the region. Data on reptile densities based on 'line transects' were calculated in central and western Ladakh for establishing baseline quantitative information on these aspects as well as testing out and establishing suitable sampling protocols.

Further more, under the conservation education initiative of the study, an excellent poster on the snow leopard and mountains was produced in collaboration with the Centre for Environmental Education, Ahmedabad. Shri Shafat Ahmed, Chief Wildlife Warden, Jammu and Kashmir, released this poster at a small function in Delhi to commemorate the International Year of the Mountains (2002). Work on a second set of interactive posters on Trans Himalayan conservation is being prepared with the CEE.

It is hoped that the multidisciplinary research and training will significantly contribute to enhancing knowledge of the region and aid in the identification of significant conservation 'hotspots' in Ladakh. This could ultimately lead to the development of a comprehensive conservation action plan for Ladakh Trans-Himalaya. Implementation of selected conservation initiatives will also be taken up under the new project.

Grant in Aid

An evaluation of the endemism of the amphibian assemblages from the Western Ghats using molecular techniques

Investigators: Dr. Karthikeyan Vasudevan (WII), Dr. Ramesh K. Aggarwal (CCMB) and Dr. Kartik Shanker (CH-MCBT)

Researchers: Shri. M.S. Chaitra

Date of initiation: January 17, 2003

Date of completion: January 17, 2004

Budget allotted: Rs. 3.18 lacs

The objectives of the project are: (i) To ascertain whether the amphibian taxa recognized at present are true natural assemblages, (ii) To evaluate the species richness and distribution patterns of Ranidae and Rhacophoridae using molecular techniques.

Progress: For the first phase of the study, over fifty tissue samples of amphibians from the collection available at WII were selected for molecular analysis. The samples have been taken to CCMB, Hyderabad for laboratory work. The work is initiated to isolate usable DNA from the small toe tip samples typing as well as from formalin preserved tissues for DNA.

In addition, DNA typing work was completed for a few amphibian samples that may be new frog species. The samples were used to isolate, amplify and sequence three taxonomically informative target regions of the mitochondrial genome, that is, 12S, 16S and cytochrome-b. These data are being used to ascertain the genetic status of the samples by comparing with reference sequences of other frog species found around the world.

Findings/achievements: (i) Working protocol has been standardized for the isolation of DNA from small-sized toe tip samples as well as formalin preserved samples. Using the protocols, small quantities of DNA could be isolated from most of the toe tip samples. DNA samples would be used for molecular typing; and (ii) Very interestingly, preliminary analysis of the data to assign the phylogenetic position of the contentious new species of frog, suggests it to be a new species closely related to the ancient

Nasikabatrachus a recent discovery *Photo: S.U. Saravanakumar*

masses mentioned above including the Indian land mass were coalesced as Gondwana. The finding, thus, highlights the bio-geographic importance of the Western Ghats and demonstrates the application of molecular techniques in clarifying the taxonomic position and inferring biogeographic patterns. All our data, which is being analysed further, suggest this frog is a new species to science and could result in the emerging of a new family of amphibians.

Neobatrachians or 'transition frogs' which have led to the diversification of anurans globally. This species seems to be related to the Australian Myobatrachids, South American Leptodactylids and African Heleophrynids suggesting an ancient lineage dating back some 120 to 170 million years, when the land

Landmarks/Milestone: An inter-institutional memorandum of understanding as signed on October 29, 2002 for the execution of the project. On March 26, 2003 a collaborative project was formulated for funding through the Department of Biotechnology.

The Institute completed eight research projects. During the reporting year, there were 24 ongoing projects while three new projects were initiated.

Suru Valley, Ladakh *Photo: V.P. Uniyal*

Organization

Collaborations

USDA Forest Service

The collaboration with the USDA Forest Service continued on the major project on the management of forests in India for biological diversity and forest productivity at four field demonstration sites. This was the eleventh year of scientific exchange and collaboration with this important federal agency of the USA. The formal and informal exchange with the counterpart scientists continued which helped participating faculty members in strengthening their teaching, training and research activities. The Science Team and Project Coordinator of the ongoing WII-USDA Forest Service Project including Dr. Martin G. Raphael, Dr. Bruce G. Marcot, Dr. John F. Lehmkuhl, Dr. Richard Holthausen, and Mr. Tom Darden visited WII from December 5-10, 2002 for the finalization of expected output of the major project and later participated in the Project Terminal and Review Workshop held at Ramnagar (Nainital). Dr. James R. Stevenson, Programme Leader, FERRO, Washington DC; Mr. G.K. Gupta, Programme Specialist and Mrs. Usha Kapur, Programme Co-ordinator from FERRO, American Embassy participated in the project workshop at Ramnagar.

IUCN Indian National Committee

The Wildlife Institute of India continued to hold the Secretariat of the Indian National Committee for the IUCN. During the reporting year the membership of the Indian National Committee remained static with twenty organizations as members of the Indian National Committee for the IUCN. Triennium work plan was made and the Secretariat concentrated its focus on facilitating the two projects funded by IUCN and UNESCO.

IUCN's Sustainable Use Programme – Asia: Biodiversity Conservation Strategy for the Himal Region

This project is operated by the Indian National Committee through a consortium of three institutional members of the IUCN, that is, Wildlife Institute of India, Indian Institute of Forest Management, Bhopal and the GB Pant Institute of Himalayan Environment and Development, Almora. During the reporting year all the three institutions completed the first phase of the work and reports were reviewed by the Steering Committee. The following projects were initiated by the collaborating consortium:

(i) Medicinal Plant Use in the Himalayan Region – GB Pant Institute of Himalayan Institute Environment and Development, Almora, (ii) Indigenous Knowledge of Resource use in the Indian Himalayas – Indian Institute of Forest Management, Bhopal, (iii) Evolving Sustainable Livestock Grazing Policy Guidelines and Practices in the Himalaya – Wildlife Institute of India, Dehradun, (iv) Developing Strategies for Biodiversity Conservation through Ecotourism and Community Participation in the Himalayan Landscape – Wildlife Institute of India, Dehradun.

A Review meeting of the Himal Project was held in October, 2002 in which Dr. (Ms.) Aban Marker Kabraji, Regional Director, Asia, IUCN Asia Regional Office, Bangkok, Thailand and Dr. P. Balakrishna, Head, Regional Biodiversity Programme, Asia, IUCN, Sri Lanka attended the meeting. It was decided that the Himal programme would complete the present work, and the Indian National Committee would assist the South Asian Secretariat to develop a new Mountain Programme for India. It was also proposed to organize a donor workshop and present the findings of the Himal work for raising additional support for the Mountain Programme.

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.

Ten 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, Keoladev National Park, Bharatpur and the Royal Chitawan National Park, Nepal. The Ministry of Environment and Forest, Government of India has entrusted the responsibility of project implementation as a Regional Partner Institution for the 4 year project (2002-2005) to the Wildlife Institute of India. The WII has signed contracts with the UNESCO and the University of Queensland and Memorandum of Understanding (MoU) with the State Governments of Assam and Rajasthan for implementation of the project activities at the two sites. Efforts are underway to sign a MoU with the Department of National Parks and Wildlife Conservation (DNPWC), Nepal for project implementation in the Royal Chitawan National Park. The WII organized several site level consultations to carry out the task of 'Initial Assessment of the Management Effectiveness' at the two Indian sites as per the methodology evolved for this global project. Dr.V.B.Mathur has been designated as the Nodal Officer for this project.

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) has given a planning grant to the Ministry of Environment and Forests, Government of India, to develop a ten year World Heritage Biodiversity Programme (WHBP) for India. The goal of this WHB Programme is to strengthen biodiversity conservation in protected areas by building replicable models at World Heritage Sites that emphasize law enforcement, promote habitat integrity and connectivity and improve the professional, social and political profile of the protected area management community and its civil society partners. The MOEF has 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. Several Planning Workshops and Site Level consultations were organized by the WII-ATREE project team to develop the 10 year World Heritage Biodiversity Programme for India. WII and ATREE have engaged the services of several experts to identify potential new sites for designation as the World Heritage Sites. The WHBP for India is expected to be ready for submission to the UNESCO by October, 2003. Dr.V.B.Mathur from WII and Dr. J. Krishnaswamy from ATREE are coordinating this project.

WII-USFWS Collaborative Projects

The following WII-USFWS collaborative projects (Phase II) initiated in September 1995 completed their tenure in December 2002. (i) Identify potential areas for conserving biodiversity in the Indian Himalayas, (ii) Evaluation of Panna National Park with special reference to the ecology of the sloth bear, (iii) The relationships among large herbivores, habitat and humans in the Rajaji-Corbett National Parks, (iv) Impact of fragmentation on the biological diversity of rain forest small mammals and herpetofauna of the Western Ghats Mountains, South India, (v) Establishment of a Wildlife Forensic capacity at the Wildlife Institute of India, and (vi) Development of an Indian co-operative wildlife health programme and technical assistance with WII's wildlife health research.

Two other projects, Conservation of the Indian Wolf and Planning and Development of Interpretation Facilities for selected Protected Areas in India, which are operational under separate agreements, will continue until December 2003. The details of work conducted under each component of the project have been provided in the research section by respective PIs.

Foundation for Ecological Security's Uttaranchal Unit

WII has been collaborating with the Foundation for Ecological Security's Uttaranchal Unit, which was

working on biodiversity conservation, ecological restoration of degraded areas and status survey of medicinal plants in higher altitudes of the Gori Valley in Pithoragarh District. Several joint surveys were conducted on the flora, fauna and medicinal plants of the area. Dr. G.S. Rawat is the nodal officer from WII in this collaboration.

UNESCO-IUCN Enhancing our Natural Heritage Project

This project is now operational after being approved by the Chairman, Indian National Committee for the IUCN and Secretary, Ministry of Environment and Forests. An independent unit at the Wildlife Institute of India is now implementing this project.

The members meeting and the proposal to organize the Indian Parks Congress have been under consideration with the Ministry of Environment and Forests.

Services

Development of Biodiversity Information Module for Uttar Pradesh and Uttranchal Forest Departments

The WII entered into a contract agreement in September, 1999, with the Food and Agriculture Organization (FAO) of the United Nations to work on the design and development of a Biodiversity Information Module (BIM). This would act as part of the overall Forest Management Information System (FMIS) being developed in collaboration with the Siemens Information System Ltd., (SISL) for the Uttar Pradesh Forest Department (UPFD), and Uttaranchal Forest Department (UAFD). The FMIS being developed for the UPFD and UAFD seeks to improve the current information management procedures and to make use of information technology in department activities, particularly the use of state-of the-art database management systems and GIS technology. The BIM will address the information management needs of *in-situ* and *ex-situ* conservation areas and also the managed forest areas. As part of the project, a biodiversity database which will provide comprehensive information on physical, ecological, management and socio-economic attributes pertaining to various categories of conservation areas, is also being designed. Once functional, the BIM will facilitate the preparation of resource inventories and assist in the PA management planning and decision-making. During the period under review, the Project Management Unit (PMU) of the World Bank Forestry was involved in getting the software developed based on the 'Conceptual' as well as the 'Detailed Design' submitted by the four member WII team. Due to reasons beyond our control the project completion has been delayed, for which an extension has been sought from the World Bank by the Uttar Pradesh Forestry Project. The WII team worked to further improve the functionalities of BIM.

WII-HPFD Project

The Himachal Pradesh Forest Department (HPFD) has entrusted a short-term (one year) consultancy assignment to the Institute so as to formulate the following two conservation projects: (i) Conservation of flora and fauna in and around the Great Himalayan National Park, and (ii) Conservation of endangered wildlife species in Himachal Pradesh.

The HPFD has agreed to provide an amount of Rs. 55.00 lac to the Institute towards these assignments. The Institute has involved a multi-disciplinary faculty team for the preparation of the above projects and has also engaged select external resource persons, to achieve the objectives envisaged in two separate project agreements. The assignment commenced in April, 2002. The select participating faculty members

Iris melisii - Recent invasion in Kanawar WLS

Photo: G.S. Rawat

Rheum moorcroftianum - A medicinal herb

Livestock grazing in Kanawar WLS *Photo: G.S. Rawat*

had a consultative meeting with the CCF (Wildlife), HP, and Director, GHNP, at Sairopa in May, 2002. Subsequent to this, the PCCF (WL) and CWLW, HP convened a review meeting in July, 2002. During the meeting it was decided that the Institute team would use the Sustainable Livelihoods Based Approach to Conservation and, as agreed upon, a workshop on this theme was organized at Shimla in August, 2002. Participating faculty members visited different field sites, including identified protected areas and Parvati Hydroelectric Project Phase-II site near GHNP, for field assessment and interaction with the concerned field managers, NGOs and local inhabitants. Concerned faculty members also visited existing *ex situ* conservation facilities in HP so as to make assessment of the current situation and to suggest improvement, augmentation and strengthening. The Institute submitted the first progress report for the period April-November, 2002 to the HPFD. As desired by the client organization, a training workshop for the spearhead teams in the conservation of biodiversity and sustainable livelihoods based approach was organized at Chail, HP, in February, 2003.

Meconopsis aculeata "Queen of Himalayan flower "
Photo: V.P. Uniyal

Teaching inputs provided to other institutions in Dehradun/Outside

S. No.	Institution	Name	Date	Topic
1.	IFS Probationers at IGNFA, Dehradun (For 1999 batch)	Dr. P.K. Malik and Capt. (Dr.) Parag Nigam	Apr. 2002	Wildlife Health Management and Immobilization and restraint techniques
2.	Indira Gandhi National Forests Academy, Dehradun	Shri B. C. Choudhury	May 6, 2002	Wetland Management & Policy
3.	Regional Training Institute (RTI), Raipur, Dehradun	Dr. Asha Rajvanshi	May 8-9, 2002	Application of Life Cycle Assessment in EIA
4.	Indira Gandhi National Forests Academy, Dehradun	Shri B. C. Choudhury	May 15, 2002	Wetland Management & Policy
5.	FRI Deemed University, Dehradun	Dr. Asha Rajvanshi	May 20, 2002	Introduction to theory and practice of EIA (Refreshers course for teachers)
6.	Lal Bahadur Shastri National Admn. Academy, Mussoorie	Dr. A.J.T. Jonhsingh	May 20, 2002	Biodiversity Conservation in India
7.	FRI, DU, Dehradun	Dr. Ruchi Badola	May 27, 2002	Ecodevelopment
8.	Forest Survey of India, Dehradun	Dr. V.B. Mathur	Jun. 20, 2002	GIS Applications in Wildlife Conservation.
9.	IGNFA, Dehradun	Dr. Asha Rajvanshi	Jun. 20, 2002	Role of EIA as a management tool for resource conservation. (IFS Probationers of 2002 – 2003)
10.	Amphibian hands-on training workshop, Kerala University, Trissur	Karthikeyan Vasudevan	Jun. 28, 2002	Designing herpetological studies
11.	IGNFA, Dehradun	Dr. V.B. Mathur	Jul. 2, 2002	Landscape Evaluation for Tiger Habitat Assessment and Corridor Identification : A Remote Sensing and GIS Approach
12.	IIRS, Dehradun	Dr. Asha Rajvanshi	Jul. 11, 2002	Application of principles and practices of EIA in disaster management (Training course for participants on Geo-informatics for Environmental Assessment & Disaster Management
13.	Forest Survey of India, Dehradun	Dr. V.B. Mathur	Jul. 12, 2002	Resource Mapping of PAs using GIS
14.	IFS Probationers at IGNFA, Dehradun (For 2000 batch)	Dr. P.K. Malik and Capt. (Dr.) Parag Nigam	Jul. & Aug. 2002	Wildlife Health Management and Immobilization and restraint techniques
15.	Forest Survey of India, Dehradun	Dr. V.B. Mathur	Aug. 9, 2002	Remote Sensing and GIS Applications in Protected Area Management.
16.	Forest Survey of India	Dr. V.B. Mathur	Aug.16, 2002	Remote Sensing and GIS Applications in Wildlife Conservation
17.	TERI, New Delhi	Dr. B.K. Mishra	Aug. 26, 2002	Conceptual Issues in Ecodevelopment
18.	TERI, New Delhi	Dr. Ruchi Badola	Aug. 27, 2002	Participatory Rural Appraisal
19.	TERI, New Delhi	Dr. V.B. Mathur	Sep. 2, 2002	Review of Protected Area Network in India
20.	Indian Institute of Remote Sensing, Dehradun	Dr. B.K. Mishra	Sep. 4, 2002	Ecodevelopment Concepts
21.	Indira Gandhi National Forests Academy, Dehradun	Shri B. C. Choudhury	Sep. 13, 2002	Wetland Management & Policy
22.	Forest Research Institute Deemed University, Dehradun	Dr. Asha Rajvanshi	Sep. 17-20, 2002	Lecture inputs in course module on EIA. (Masters course in Environmental Management)

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S. No.	Institution	Name	Date	Topic
23.	IGNFA, Dehradun	Dr. V.B. Mathur	Sep. 19, 2002	GIS Applications in Wildlife Conservation
24.	State Forest Service College, Coimbatore	Dr. A.J.T. Johnsingh	Sep. 23 2002	Biodiversity Conservation and related issues in India
25.	State Forest Service College, Coimbatore	Dr. A.J.T. Johnsingh	Sep. 25, 2002	Biodiversity Conservation and related issues in India
26.	Regional Training Institute, Raipur, Dehradun	Dr. Asha Rajvanshi	Sep. 26-27, 2002	Environmental Impact Assessment and Life Cycle Assessment (Training course for Group B officers/staff of Ordnance Factories and allied establishments)
27.	Indira Gandhi National Forests Academy, Dehradun	Shri B. C. Choudhury	Oct. 1, 2002	Wetland Management & Policy
28.	National Water Academy, Khadakwasla Pune	Dr. Asha Rajvanshi	Oct. 10, 2002	Environmental Impacts of Hydropower Projects on wildlife: Challenges and solutions
29.	Forest Survey of India, Dehradun	Dr. V.B. Mathur	Oct. 11, 2002	GIS Applications in preparation of Protected Area Management Plans
30.	State Forest Service College, Dehradun	Dr. Asha Rajvanshi	Nov. 13, 2002	Theory and Practice of EIA (participants of a two week course on "Project Formulation and Environmental Impact Assessment).
31.	Indira Gandhi National Forests Academy, Dehradun	Shri B. C. Choudhury	Nov. 13, 2002	Wetland Management & Policy
32.	FRI., Dehraedun	Dr.V.B.Mathur	Dec. 10, 2002	Application of Information Technology in Biodiversity Conservation
33.	Saurastra University, Rajkot, Gujarat	Shri B. C. Choudhury	Jan. 6, 2003	Satellite Telemetry of Sea Turtles
34.	FRI, Dehradun	Dr.V.B.Mathur	Jan. 8, 2003	Integrated Protected Area Network (IPAN) System
35.	ICFRE, Dehradun	Dr. Ruchi Badola	Jan. 9, 2003	Integrating conservation and development in PA management
36.	Navdanya, Dehradun	Dr. V.P. Uniyal	Jan. 15, 2003	Pollination biology and its prospective
37.	FRI, Dehradun	Dr.V.B.Mathur	Feb. 6, 2003	Information Technology Applications for Biodiversity Conservation
38.	Navdanya, Dehradun	Dr. V.P. Uniyal	Feb. 13, 2003	Pollination biology: Theory and practice
39.	Visiting B.Sc. Forestry final year class from College of Forestry, University of Agricultural Sciences, Sirsi (Dharwar), Karnataka	Dr. P.K. Mathur	Mar. 12, 2003	Conservation of Biodiversity

Facilities

ENVIRONMENTAL IMPACT ASSESSMENT CELL

The Environmental Impact Assessment Cell of WII continued to provide professional support in teaching, training and consultancy to sister organization, academic institutions, professional bodies, Government and Corporate organizations. The following are the specific tasks accomplished by the EIA Cell during the reporting year.

Environmental Impact Assessment Study

Rapid Assessment of Habitat Availability and Wildlife Use in the Proposed Human River Project, Maharashtra

The Human River project is proposed for implementation by the Vidharbha Irrigation Development Corporation to overcome the water deficit of the Chandrapur districts and to improve the irrigation input for agricultural production in the Chandrapur district of Maharashtra. Considering that the proposed earthen dam seat across the Human river would traverse largely through protected forests outside the boundaries of the Tadoba-Andhari-Tiger Reserve, the importance of environmental appraisal of this project in the light of likely impact on Tadoba-Andhari Tiger Reserve (TATR) was felt. An assessment of wildlife in the project area was needed before granting environmental clearance. Based on the MoEF's directives the Wildlife Institute of India (WII) undertook the EIA study for this project with the following specific scope of work: (i) Rapid assessment of the habitat available and wildlife use in the proposed Human River Project area with special reference to the Tadoba-Andhari Tiger Reserve, (ii) Identification of the likely impacts on wildlife values and wild animal movement, and (iii) Recommend suitable measures for mitigation of the project impact.

The WII team comprising Dr. Asha Rajvanshi, Dr. V.B. Mathur, Shri Sunil Banubakode and Dr. N.M. Ishwar undertook the field studies in the project area during the month of December, 2002.

Based on the spatial features, the extent of forest area delineated for diversion and clear felling under the project and the initial perception of threats to wildlife conservation through reconnaissance of the area, thrust areas were identified for evaluating the nature and significance of project impacts. From the field studies it was concluded, that (i) 1.5 km section of the Left Bank Canal component of the project aligned through the forested habitat would result in disrupting habitat use and ranging of wild animals. (ii) The project would bring about reduction in the area of Reserved Forest compartments, which form a downstream corridor for the movement of wild animals, especially the tiger. (iii) The proposed project would lead to a loss of 1925-55 ha. of forest land due to submergence and other associated uses and would necessitate the rehabilitation of 23 villages from the project area between the western boundary of the TATR and the proposed submergence. (iv) The section of the Right Bank Canal component of the project is aligned along the already operational Naleshwar canal thereby reducing the need for diversion of additional forestland for the project.

Based on the project impact analysis, WII recommended measures for (i) improving habitat use by animals in the post-project situation in the animal movement corridors in downstream forests, (ii) measures for strengthening conservation in the area between the proposed submergence and the western boundary of the Tadoba Tiger Reserve through the proposed extension of the Andhari Wildlife Sanctuary to include areas outside submergence and evacuated villages and specific management input in the newly created extension of the PA, (iii) improving Left Bank canal design to provide crossways for facilitating animal crossings near strategic locations, (iv) strengthening wildlife conservation within the Tadoba Andhari Tiger Reserve. The report submitted to MoEF is under review for environmental appraisal of the Human River Project.

Advisory support to MoEF

WII continued to provide advisory services to MoEF on matters related to environmental decision-making. WII is represented on the Expert Committee for mining projects. In this capacity WII is advising the Environment Division of MoEF on the evaluation of EIA reports on mining projects for decision making with respect to environmental clearance. The nature of the work involves extensive review of EIA documents received and subsequent evaluation of a specific project prepared as a part of Environmental Management Plans (EMP).

Advisory and technical support to other organizations

During the reporting year, Dr. Asha Rajvanshi provided professional support in reviews of some thematic papers received from co-ordinator, NBSAP Technical and Policy Core Group for the preparation of National Biodiversity Strategy Action Plan (NBSAP), and also provided information support to KALPAVRIKSH for the preparation of the report on the impact of mining in ecologically sensitive areas.

CAPTIVE BREEDING AND ZOO MANAGEMENT CELL

The Mandate and main activities of Captive Breeding and Zoo Management Cell are: (i) Conduct the CZA-sponsored training course for zoo professionals at two levels (Director Level and Middle Level), that alternates annually. One course every year, (ii) Consultancy input to CZA, individual zoos and state governments in *ex situ* conservation and specifically zoo management, and, (iii) Maintain existing studbooks and also compile new ones, as part of the ongoing CZA-sponsored project, (iv) Create a database on Zoological Parks in India.

Maintenance and Publication of the studbooks for five endangered species

The Wildlife Institute of India was awarded a project in 1999-2000 by the Central Zoo Authority of India (CZA) for the compilation of National Studbooks for five endangered species (India tiger, Asiatic lion, One horned rhinoceros, Lion-tailed macaque and Golden langur) housed in various zoos in India. Since, the studbook is a continual process with regular updates, CZA assigned a second phase of the project as Maintenance and publication of the studbooks for five endangered species. The major objectives of this project are to revise and update the old edition of the studbooks with detailed demographic and genetic analysis for captive breeding recommendations. So far, the questionnaires were mailed to 45 zoos and about twenty responses received. The data of previous studbooks were updated by using information sent from the various zoos. The project personnel visited Sanjay Gandhi Zoological Park, Patna, and Nandankanan Zoo, Orissa, during November and December, 2002 and were assigned to provide the input during the Zoo Management Course at Chennai in January, 2003. This was an opportunity to have direct interaction with the zoo professionals on the significance of studbooks and the problems confronted in its maintenance. Currently, the project personnel is doing a Diploma Course in Jersey and a course on SPARKS software use in Amsterdam; these courses will certainly help them a great deal in studbook maintenance.

Creation of a database on Zoological Parks in India

A Technical Assistant was appointed from October 1, 2002 to the Captive Breeding and Zoo Management Cell, and was assigned to create a database on zoos in India essentially focusing on the area, infrastructure, annual visitors, staff, annual budget and revenue, types of enclosures, enclosure design and to liase with the CZA to obtain this information. Based on the CZA's inventory, the TA was assigned the collection of data from zoos across the country, and to visit selected zoos to update the information. She was also given responsibility assisting the faculty in collection and compilation of literature on zoos and also to organize and set up a reference collection.

After consultation with the CZA in the first week of November and the evaluation of existing information on Himachal Pradesh zoos, a database for those in the State has been completed. The data have been analysed, and handed over to the state and CZA. Similar databases are being prepared for all Himalayan states to begin with, and questionnaires have been sent to the states of Uttaranchal, West Bengal, Sikkim and Arunachal Pradesh.

A questionnaire has been designed and dispatched to all zoos in India. Responses have been received from only a few zoos so far. Their data have been entered into the computer. MS Access forms for database design are currently being prepared to make the database more systematic and easier to handle.

References for Zoo relevance

Bibliographic work has been going on systematically during the reporting period. Most of the entries have been made, and are now being sorted, arranged and checked. The bibliography will be keyword based, and references are being arranged according to the keyword list; subject-wise key references are proposed for sharing with all zoos.

An e-group <Indianzoos@groups.yahoo.com> was created for all zoo professionals, researchers, scientists, and has been maintained by the TA since its inception. The existing cell is receiving encouraging and positive responses from the e-group. It is planned to share the literature information with all zoos through the e-group.

Advisory role

The Captive Breeding and Zoo Management Cell was also involved in providing technical information to the project Release of zoo bred Red Panda from Padmaja Naidu Himalayan Zoological Park, Darjeeling to Singalila National Park, in West Bangal and a proposal for Setting up of a Bird of Prey Conservation Breeding Centre in the state of Rajasthan.

THE LIBRARY AND DOCUMENTATION CENTRE (L & DC)

The Library and Documentation Centre (L & DC) at WII serves as a repository of literature related to Wildlife Science and Management in the Indian Subcontinent, and also serves reader through normal and special computer based library and information services, such as current awareness service, compilation of bibliographies and abstracts. Apart from this, it is also establishing and maintaining links with other national information systems in India and abroad to ensure the free flow of information at national and international level.

The L&DC possesses approx. 20000 books, 11,500 newspaper clippings, 7100 maps/toposheets and more than 5000 bound volumes of old and rare journals. The library also maintains a good collection of scientific papers. It subscribes to more than 300 periodicals. During this year, 833 books, proceedings, theses and reports, 500 scientific papers and reprints and 1150 press clippings, also six new CD-ROM titles, were all added to the library collection.

Over 1,26,808 pages of photocopies were provided to users. Approximately 30,000 documents were issued and consulted during 2002-03. Value added service was provided to 134 clients, while ready reference was given service to approximately 3000 clients. About 100 queries from outside users were attended to, and more than 15,000 bibliographic references were given to users. 51 documents have been procured on Inter-Library Loan from nearby libraries. For strengthening the library collection and its services, an evaluation of library services was conducted at different levels to provide better services to the users.

Facts

Services provided during 2002-03

S.No.	Services	Numbers
1.	Photocopy exposure	1,26,808
2.	Documents issued/ consulted	30,000-document approx.
3.	Value added service	134 clients
4.	Ready reference service	3000 clients
5.	Inter Library Loan	51 documents
6.	Document delivery	450 Clients
7.	Document procurement request	114 articles

(Articles requested from NISCAIRE and other libraries)

8.	Articles added to WILD (Indian Wildlife Abstract Service)	289 Articles

Revenue Generation from services during 2002-03

S. No.	Services	Amount (Rs.)
1.	Bibliographical/ photocopying Service	6,103.00
2.	Article Alert Service	7,000.00
3.	WII Publications	2,13,061.00

Volume Added to Library Collection during 2002-2003

S. No.	Types of document	Number
1.	Books & Monographs	833
2.	Journals (bound Volumes)	672
3.	Newspaper clippings	1150
4.	Reprints	500
5.	Maps/toposheets	100

COMPUTER AND GIS CELL

The computer facility of the Institute was considerably strengthened with inputs from the

Institute's own resources and that from various collaborative projects. At present, the computer facility of the Institute is well developed to serve research, training, database, GIS, remote sensing, cartographic and any desktop publishing requirements of the Institute.

Computers are now used in every sphere of the Institute activities from simple word processing to complex data analysis. All the eight faculty departments and the library, administration and finance sections are equipped with a range of Pentiums and 486s. There are four UNIX based Sun workstations with Arc/Info software for the Geographical Information System (GIS), and ERDAS Imagine for digital image processing of remotely sensed data.

The Institute has a heterogeneous computer hardware setup connected to the Local Area Network (LAN). There are two Pentium II file servers, two Pentium III Internet servers and 150 plus nodes. The LAN is based on state-of- the-art structured cabling with fibre optics as the backbone connecting all the office buildings. The computers are connected to LAN through network switches on UTP cable. The Institute has leased-line Internet connection, with its own Internet server hosting the website and mailing system. All the computers are provided with Internet and mailing services. Each user is provided with an individual e-mail account on the Institute's server.

Training: The Computer and GIS Cell of WII conducted computer-training courses for the students, researchers, staff 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, that is, MS Windows 95/98, MS-Office, SPSS, S-Plus and Leap Office plus specialised software packages related to wildlife research. Hands-on training was also given on the Geographical Information System, Remote Sensing and Global Positioning System technology.

Hardware and Software Procurement/ Upgradation: In the reporting year, the following new hardware/software from WII grant-in-aid and other projects was procured: five Compaq Pentium 4 PCs, one HP Pentium 4 workstation, one Compaq EVO notebook computer, three IBM notebook computers, one HP Laserjet 2200 DN printer, six HP Laserjet 1200 printers, one HP 500 Designjet plotter, two HP 1125c inkjet printers, one HP 845c inkjet printer, two HP scanners, three CD writers and three APC UPS of 500VA.

The existing eleven 386 systems were upgraded to Compaq Pentium 4 PCs through the buy-back system. Forty-three existing Digital/HP Pentium systems were upgraded with RAM and hard disk drives to enhance their performance and storage capacity. An additional license for the ERDAS Imagine 8.5 software package was procured to suffice the needs of users for digital image processing and analysis of remotely sensed data from the Institute's research projects. McAfee Active Virus Defence (AVD) software packages were procured to protect all the computers on the Institute's network from virus threat.

National Wildlife Database Cell: 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 links with researchers, protected area managers and planners, 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.

During 2002-2003, the main thrust of activities was on the compilation of reports/bibliographies and modification of the website besides the collection and input of data and their validation as a regular activity. The Protected Area Database was further updated. The species Database was corrected and updated by adding information on the distribution of mammalian species in various protected areas. The Bibliographic Database was updated by the addition of current literature published on Indian wildlife in the various journals and periodicals received. Trainees Database has a list of 452 Diploma and 325 Certificate officers besides information on various short courses. Website of the National Wildlife Database was modified and further updated.

The cell assisted the Computer and the GIS Cell in developing the PA Atlas and PA location maps by providing information on newly created protected areas in the country.

Wildlife Protected Area Network in India: The report was further updated by incorporating the latest information received up to March 2003. More than two hundred (including internal and external) queries were answered and output in various formats was provided.

WILDLIFE FORENSIC CELL

The aims of the Wildlife Forensic Cell are to develop and standardize various techniques for identifying species from varied biological products reported in trade such as hair, bone, claws, teeth, skin and meat. Wildlife forensic knowledge was also disseminated to various law enforcement agencies for implementing Indian Wildlife (Protection) Act, 1972. A facility was established for identifying species based on external morphological characteristics, light microscopy, scanning electron microscopy, crystallography, double diffusion, iso-electric focusing.

Of the total ninety Wildlife Offence cases received during April 2002 to March 2003, 51 cases were from the Forest Department (56.6%), 22 from the Police Department (24.4%), 10 from the Court (11.1%), and 07 from the Government of India (07.7%) . Various biological materials received under wildlife offence cases include hair and skins, followed by shawls, bone, meat, tusk, wool, claw, musk pod, bear bile, antler, hair, horn/hoof, blood, fat, brush, snake venom and others.

One of the important tasks undertaken by the cell was the development of protocols for identifying mongoose species based on hair characteristics (cuticular and medullary patterns), as mongoose hair has been widely used in paint brushes. Of the five mongoose species found in India, the forensic cell could develop protocols for identifying four species, that is, *Herpestes edwardsi* (Common mongoose), *Herpestes smithi* (Ruddy mongoose), *Herpestes palustris* (Bengal mongoose) and *Herpestes urva* (Crab eating mongoose). Discriminate Functional Analysis (DFA) using hair band lengths of four apical bands for all four species was used for identifying species with 95% accuracy. Medullar characteristics of *H. edwardsi* (1), *H. smithi* (2), *H. palustris* (3), and *H. urva* (4) clearly reveal differences among all four species.

Microphotographs of cuticle, medulla and cross section of the hair of forty species in a manual prepared earlier on Identification of Species from Hair with USFWS collaboration were replaced.

Protocols were also standardized for identifying plucked and shed feathers of peafowl (*Pavo cristatus*) based on root morphology.

Wildlife Forensic DNA Facility: Most of the meat cases referred to WII have been preserved in various forms and can be identified only by using DNA based techniques. In view of this, initiatives were taken for establishing the Wildlife Forensic DNA Facility at WII. Work was initiated for standardizing protocols for extracting DNA from highly degraded wildlife forensic materials sent to the forensic cell by various enforcement agencies.

Different methods (Phenol/Chloroform, Qaigen, Chelex-100) were tried and standardized to extract good quality DNA from various forensic samples, such as formalin preserved meat, hair, musk pod, bear bile, antler, blood, scats, cooked/boiled meat and feathers received in wildlife offence cases. Good quality DNA was obtained from these materials. The cell also standardized Random Amplified Polymorphic DNA (RAPD) and Polymerase Chain Reaction – Restriction Fragment Length Polymorphism (PCR-RFLP) methods using for wildlife parts and products. RAPD profile generated using arbitrary primer No. 1 and 5 of RAPD kit (Fig. 2) (Amersham Pharmacia Biosciences), indicated polymorphic loci. There is a need to test how well the results reproduce by using a higher number of samples and primers.

Efforts have been made to standardize protocols for PCR-RFLP using mt DNA Cyt b gene and different restriction enzymes for studying the polymorphism to identify the species for dealing wildlife forensic cases. The cell initiated developing protocols for Sambar, Spotted deer and Common quail.

RAPD technique was tried for DNA extracted using Phenol/Chloroform from putrefied meat of a wildlife offence case referred from Madhya Pradesh without success. Thereafter, mtDNA universal 359-bp Cyt b primer was amplified, and the PCR product was sequenced at DNA Typing Unit, Central Forensic Science Laboratory, Kolkata. The obtained sequence matched the

DNA of blackbuck reference sample (98 %) of WII repository and the blackbuck sequence available at NCBI gene bank data (96%). Based on DNA sequence similarity, it was concluded that the unknown meat sample is of Blackbuck.

With the close co-operation of Zoological Parks at New Delhi, Mysore, Chennai and Kanpur, it was possible to procure 49 tissue samples of which 22 and 20 are of birds and mammals respectively whereas the remaining seven samples are of reptiles.

Shri C.P. Sharma, Laboratory Technician, was sent to attend a two weeks' hands-on training programme on the Molecular Markers organized by the National Bureau of Fish Genetic Resources (ICAR), Lucknow from October 18-31, 2002. Ms. Reeta Sharma spent fifteen days at the DNA Typing Unit, CFSL, Kolkata, during December 2002 to undertake wildlife cases required to be identified using DNA sequencing.

AUDIO VISUAL AND WILDLIFE EXTENSION CELL

The Audio Visual and Wildlife Extension Cell of the Institute caters to the various requirements of academic activities. The unit maintains 16mm films, video films, synchronized programmes, and various other audio-visual equipment. This year two Sanyo LCD video projectors were added in the unit. These are extensively used for teaching purposes. The unit screened eighteen shows of nine projectors synchronised programme of the Institute "We are nature, nature is our world" during the reporting period on different occasions.

A number of slides and prints were reclassified as per the requirement for quick retrieval, and 25 print albums and about 200 transparencies were added in the slide library of the Institute. About 20,000 slides and 6000 prints and their negatives are being maintained in the Cell. A computer was added in the cell for non-linear editing of the video footage.

Photographic support was given to the Forensic Cell for seized material, packets or cartoons, macro-photography of bones, skins, nails of different animals, turtle shells, ivory, shatoosh shawls, tusk, musk, antlers, horns and other material seized by the forest department, police and customs for forensic test and study and to produce in court as evidence. Three persons were provided short training in the operation of video editing software.

CONSERVATION GENETICS LABORATORY

A manuscript regarding our findings on the unique and ancient lineage of peninsular and Himalayan wolves was submitted to 'Science'. Indian and Tibetan wolf samples were amplified with specifically designed micro-satellites to understand the gene flow and pack structure of wolves in the Indian sub-continent. More samples of jackals, dogs and hyena were extracted and amplified.

Dr. Dinesh K. Sharma (Research Associate) received a fellowship from the Smithsonian Institution for a short-term visitor programme. He worked in the molecular genetics laboratory at the National Zoological Park, Smithsonian Institution, and received further training on data analysis and molecular techniques for the conservation of endangered species.

Asiatic lion and leopard scats were procured from different parts of Gir. DNA from scat, tissue and blood of lions was extracted and amplified. Our preliminary results on the amplifications of four micro-satellites on samples of Gir lions have shown little polymorphism. The laboratory is procuring specific polymorphic micro-satellites to get a better insight on Gir lion conservation genetics.

Work was initiated with Project Tiger Directorate to identify any Evolutionary Significant Units of tigers (ESUs) that exist within India. For this tiger scats were obtained from various parts of the country and the laboratory is extracting DNA and amplifying specific micro-satellites. If ESU's exist within the different isolated tiger conservation units in the country then this research will assist in prioritizing tiger conservation efforts.

RESEARCH LABORATORY

The laboratory extends technical input in the teaching, training and analytical fields to research projects and ongoing training programmes of the Institute. The laboratory is equipped with varied basic and modern equipment (Atomic Absorption

Spectrophotometer, High Performance Liquid Chromatograph, UV-Visible Spectrophotometer) required for the analysis of various physio-chemical parameters of plant, soil and water samples. Teaching classes followed by practicals for various ongoing courses were conducted at the laboratory on 'Instrumentation and Analytical Techniques' during the reporting year. This included herbivore pellet and carnivore scat analysis, collection and preservation of biological materials, collection of meteorological data, age and sex determination of animals, osteology of mammals and analysis of plant, soil and water samples for various parameters.

Seven research projects used the analytical facility of the laboratory for plant and soil samples and carnivore scat analysis. A total of 1009 samples were analysed in the laboratory, of which 335 were plant samples (crude protein, ash content, sodium, potassium, calcium, phosphorus, ADF, NDF, lignin, cellulose), 74 soil samples (N_2, organic carbon), and 600 scat samples. The laboratory staff provided technical input in field, including demonstrations of various traps, camera traps, mist netting for birds, electric fence and radio telemetry equipment to various training programmes. The laboratory staff regularly collects data on rainfall, temperature, humidity, wind velocity and direction in the Chandrabani campus. The highest and lowest temperature recorded during the reporting period was 40° C (June 2002) and 1° C (January 2003) respectively. The total annual rainfall recorded was 1300.8 mm.

HERBARIUM

During the reporting period, the WII herbarium received specimens from different areas, that is, Upper Assam (# 1550), Corbett N.P. (# 70), Rajaji N.P. (# 35), Bhabhar Tract (# 75), Bhitarkanika WLS (# 45), Trishna WLS, Tripura (# 117), Dudhwa N.P. (# 100) and forty specimens from Mainpuri and Etawah for identification. Out of these 1970 specimens have been identified so far.

A checklist of plants of the Bhabhar Tract of Uttaranchal was prepared and the compilation of other relevant information is in progress. Work on the compilation of Medicinal Plants of Uttaranchal has been completed. A total of 23 species was first time recorded from the WII campus and added to the existing flora of the campus.

One of the staff members visited upper Assam in connection with the identification of food plant species of Hoolock gibbons, while other staff member visited the Great Himalayan NP and collected data on vegetation. From time to time information was given to visiting classes in the field as well as in the section on Herbarium preparation and its uses, apart from regular courses.

OTHER ACTIVITIES

Voluntary retirement

1. Shri V.B. Sawarkar, Director, WII and
2. Shri S.S. Oberoi, Finance Officer.

Repatriated to parent department

1. Shri Rajiv Bhartari, Professor;
2. Shri S.B. Banubakode, Reader;
3. Shri P.K. Goyal, IAO; and
4. Ms. Sudha Jain, Stenographer.

Joined by transfer on deputation on foreign services

1. Shri I.J. Malhotra joined as Internal Audit Officer and
2. Shri S.S. Lamba joined as Finance Officer.

Appointed

1. Shri Narendra Agarwal, Stenographer Grade-II;
2. Ms. Sunita Agarwal, Library & Information Assistant;
3. Ms. Vikreshwari Dangwal, Library & Information Assistant;
4. Shri Madan Mohan Uniyal, Library & Information Assistant;
5. Shri Harendra Kumar, Assistant Programmer;
6. Smt. Alka Aggarwal, Assistant Programmer;
7. Shri Narinder Singh Bisht, Assistant Programmer;
8. Shri Dinesh Singh Pundir, Assistant Programmer;
9. Shri Rajiv Kumar, LDC and
10. Shri Padam Singh Dhamanda, LDC.

Wildlife Week Celebration

Various programmes organized during wildlife week were as follows: (i) Wildlife Quiz on October 1, 2002 (15 teams participated).

Wildlife Week Celebrations at WII Campus *Photo: Vinod Verma*

(ii) Educational excursion of WII staff: They went to Chilla (Rajaji National Park) on October 2, 2002 and were educated on various aspects of conservation. (iii) Inter-school Drawing and Painting Competition for nearby school students on October 3, 2002. (iv) Wildlife Film Festival at IGNFA auditorium in association with Centre for Media Studies, Delhi and IGNFA on October 4-5, 2002 for twenty schools and other organizations in Dehradun. (v) Popular lecture was delivered by Shri Romulus Whitaker on October 6, 2002. The highlight of all the programmes was the overwhelming response of the participants.

Wildlife Film Festival *'Vatavaran'* 2002

As part of the Wildlife Week Celebrations, a Wildlife Film Festival 'Vatavaran' 2002 was organized for the first time in the state of Uttaranchal on 4-5 October 2002. Four organizations viz. Centre of Media Studies (CMS), New Delhi, Wildlife Institute of India (WII), Dehradun, Indira Gandhi National Forest Academy (IGNFA) and the Uttaranchal Forest Department jointly organized this event with the objective of raising awareness about the country's wilderners resources and the challengers to their sustainable management. Eleven Wildlife films made by eminent film makers like Mike Pandey, Romulus Whitaker, Himanshu Malhotra and others were screened in the IGNFA auditorium. Special screening was organized for over 1200 children from 14 schools in Dehradun. Shri Nav Prabhat, Hon'ble Minister of Forests & Urban Development, Govt. of Uttaranchal inaugurated the film festival and Shri Bikram Grewal was the Guest of Honour. The festival was jointly coordinated by Ms.Alka Tomer (CMS), Dr.V.B.Mathur (WII), Sh. Atul Jindal (IGNFA) and Sh.Sameer Sinha (UFD).

International Day for Biological Diversity celebration

International Day for Biological Diversity was celebrated worldwide on May 22, 2002. The Institute also celebrated this special day. Various competitions were organized in the Seminar Hall (Teaching Block) of the Institute to observe this important event. A Drawing and Painting Competition was organised for the students from classes I-III in the WII community. The theme of the competition was 'Biodiversity Conservation'. An essay competition in Hindi/English was organised for students from classes IV-VI in the WII community. Their topic was *'Jaiva Vividhata Sanrakshan'* (Biodiversity Conservation). WII staff and officials also participated in an essay competition. All competitions received enthusiastic response from students as well as WII staff. More than eighty participants took part in various competitions. The winners were awarded prizes by Shri Vinod Rishi, Director, IGNFA and Mrs. R. Rishi, in a function held on World Forestry Day, that is, March 21, 2003.

World Environment Day celebration

World Environment Day was celebrated in the Institute on June 5, 2002. The following activities were organized for the celebration of World Environment Day: (i) *Recycling and waste management in WII:* Plastic waste was collected in both campuses, (ii) *Newspaper bags preparation by WII family and encouraging nearby shopkeepers to use eco-friendly newspaper bags.* Students, staff & faculty of WII community prepared bags as a token of their contribution to environment. Local shopkeepers were contacted and advised to use these bags. Children from WII campus prepared over 3000 newspaper bags. Students convinced local shopkeepers to use newspaper bags wherever possible. (iii) *Conservation of water and power*

in the campus and office: (a) Preparation of stickers, (b) Pasting of stickers at appropriate locations by involving students. The stickers carried the message to save power, save water, recycle paper and support environmental conservation. These stickers were pasted by students in the campus at suitable places. (iv) *Promotion of eco-friendly cotton bags:* It was decided to stitch eco-friendly cotton bags and to sell them to staff. The bags were prepared and would be on sale. (v) *Uprooting of parthenium:* With the help of labourers, *parthenium* was uprooted from both sides of the road from WII gate to T-junction of Chandrabani.

"Colours of Spring 2003" – a flower show

"Colours of Spring 2003" – a flower show and competition was organised by Diversified Agricultural Support Project (DASP) and Directorate of Horticulture, Uttaranchal at Raj Bhawan, Dehradun, on March 15-16, 2003. The Wildlife Institute of India participated in the following events and was awarded second position in the competition: (i) Flower arrangements, (ii) Potted plants, (iii) Cut Flowers, (iv) the Gerbera, (v) Carnations Rose, (vi) Calendula Petunia, (vii) Potted plants of seasonal flowers, (viii) Bonsai, (ix) Evergreen, (x) Ornamental Wild, (xi) Cacti/ Succulents, and (xii) Bougainvillea.

CAMPUS DEVELOPMENT

The construction work of Seminar Hall cum Interpretation Centre at WII initiated in September, 2000 was completed at a cost of Rs. 2.14 crores. The furnishing work of Seminar Hall such as providing desks, chairs and audiovisual system is in progress.

The construction work of A.C. Plant room building and approach road for HVAC system was completed at a cost of Rs.10.00 lac.

The work for providing and installation of air conditioning system for the Seminar Hall-cum-Interpretation Centre was in progress.

Welcome guests

- IFS Officers of (1981 Batch) from IGNFA, May 8, 2002.
- A batch of 32 Range Forest Officer trainees alongwith their officer in-charge from State Forest Service College, Coimbatore, May 15, 2002.

A visiting class in the Library *Photo: S. Wilson*

- A class of B.Sc. Forestry and Wildlife Management - I year, May 23, 2002.
- A batch of 21 Range Forest Officer trainees and 4 faculty members from State Forest Service College, Burnihat, Assam, June 3, 2002.
- IFS Officers of (1985 Batch) Advanced Forest Management Course in IGNFA, June 17, 2002.
- IFS Officers of (1992 Batch); SFS class from Burnihat, July 7, 2002.
- Students from RIMC, Dehradun, July 23, 2002.
- IFS Officers IGNFA, July 29, 2002.
- SFS class from Forest Research Institute, Dehradun, July 30, 2002.
- The Hon. Forest Minister of Madhya Pradesh, August 5, 2002.
- IFS probationers, August 21, 2002.
- Parliamentary committee from Rajya Sabha on "Papers laid on the table", September 13-16, 2002.
- A class of 14 B.Sc. III year students and Two faculty members from Tamil Nadu Agricultural University Coimbatore, Tamil Nadu, October 3, 2002.
- IFS officers from IGNFA of XV Professional Skill Upgradation course, October 9, 2002.
- A class of 9 B.Sc. Forestry III year students and 2 faculty members from Kerala Agricultural University, College of Forestry Vellanikkars, Thrissur, Kerala, November 8, 2002.
- A class of 42 Post graduate Diploma students of IIFM batch 2002-2004 accompanied by faculty members from Indian Institute of Forest Management, Bhopal, December 10, 2002.
- A class of 25 M.Sc. (Botany) Final year students and one faculty member from Harish Chandra Post Graduate College Varanasi, December 28, 2002.

- A class of 20 school children of 7th & 9th standard with their teachers from Bhatta Goan Area of Mussoorie, Dehradun, January 1, 2003.
- A class of 21 M.Sc. (Zoology) Final year students and one professor from Department of Zoology, JNV University, Jodhpur, Rajasthan, January 4, 2003.
- A class of 25 B.Sc. (Forestry) Final Year students accompanied by one faculty member from Kumaon University Nainital, Uttranchal, January 6, 2003.
- A class of 30 graduate students accompanied by two professors from University Maharani's College, Jaipur, Rajasthan, January 17, 2003.
- A batch of 25 senior IFS officers undergoing Advanced Forest Management Course at IGNFA from Indira Gandhi National Forest Academy, Dehradun, January 23, 2003.
- A class of 28 M.Sc. (Botany) Final year Students with their faculty from North-Eastern Hill University, NEHU Campus, Shillong, (Meghalaya), February 17, 2003.
- A class of 35 Forest Guards accompanied by 2 instructors from National Resource Management Centre (NRMC) Forest Department, Sohna, Haryana, February 22, 2003.
- A group of students from John Martin School, Salangaon, Rajpur, February 25, 2003.
- GOC Army, March 7, 2003.
- A group from Forest Rangers College, Coimbatore, March 12, 2003.
- A batch of 57 forest Deptt. trainees with two faculty members from Forest Research Institute (Indian Council of Forestry Research & Education) Dehradun, March 11, 2003.
- A batch of 61 Range Officers accompanied by 2 faculty members from Tamil Nadu Forest Department Southern Forest Rangers College, Coimbatore, March 12, 2003.
- A class of 23 students of B.Sc. (Forestry) IV year accompanied by 2 staff from University of Agricultural Sciences, Dharwad, College of Forestry, Sirsi, Karnataka, March 12, 2003.

Podophyllum hexandrum : A medicinal plant
Photo: G.S. Rawat

Perspective 2003-04

After receiving the prestigious 'Rajiv Gandhi Wildlife Conservation Award' last year, the expectations are high and it is hoped that the Institute will be able to take up new challenges in the field of biodiversity conservation and wildlife science. Regular training courses like Diploma and Certificate will be conducted as per the schedule in 2003-04. New batch for M.Sc. Wildlife Science will get admission and new brains will fly their wings in new horizon. A regional training course for Range Forest Officers for Northeastern States is also planned for the coming year. The Snow Leopard Information Management System (SLIMS) training workshop for HP Staff; VII Special course in wildlife protection, law & forensic science for probationers of Indian Customs & Central Excise Service Group 'A'; three-week zoo management training programme for middle level zoo personnel; four-days special course on wildlife protection and trade for senior officers from Central Excise & Customs; short term course for Forest Secretaries and Senior Forest Officers; and the vacation training programme on bio-resources for school children are some of the activities, which are planned for the coming period.

IUCN sponsored international training programme on biodiversity and climate change will be organised by the WII. A training course on wetland conservation and management will be conducted for lateral entrants of the Diploma Course. Workshop on wildlife immobilization and restraint; workshop on health monitoring of free ranging wild animal; and workshop on management of wild animals in distress are also planned. Training cum workshops on 'wildlife protection & anti-poaching measures', 'legal issues in wildlife management' and 'combating illegal trade in wildlife' will also be organised by the Institute. Five-day training course on EIA of mining projects for mining sector; three-day training course for integrated watershed development project for Punjab State; and three-week training programme for wetland managers on "Wetland PA/RAMSAR site Management Plan Development" will be organised by the Institute. A national workshop on man-wildlife conflicts: issues, challenges and mitigation measures; and another national workshop on primate conservation *vis-a-vis* biodiversity conservation are also planned. Integrated course on interpretation, conservation education, man-animal conflict and wildlife law for central Indian states will also be conducted.

A proposal is being submitted to the US Fish and Wildlife Service for training of forest officers from Afghanistan. A special course for training of forest and wildlife officials from Sri Lanka is also being developed for the coming year.

Reports of WII-USFWS collaborative Rajaji-Corbett Project, Sloth Bear Project, and Himalayan Biodiversity Project will be finalised during 2003-04. Report of GOI-UNDP Jaldapara Project will also be finalized. Rest of the projects will be continued as per plan.

WII-UNESCO collaborative project on "Enhancing our heritage: managing and monitoring for success in national world heritage sites- Kaziranga, Keoladeo and Royal Chitwan National Parks" and "Professionalizing protected area management for the 21st century: A world heritage biodiversity programme for India (In collaboration with ATREE Bangalore) will be continued. Our collaboration with other organisation will be strengthened further.

The Institute will standardize protocols for identifying species based on DNA and electrophoretic techniques. Air conditioning work for Seminar–cum–Interpretation Centre at WII will be initiated in the coming year. Our outreach activities have been widely appreciated hence they will be encouraged.

Another busy year is coming before the Institute. It is hoped that with the dedication and co-operation of competent and efficient faculty members and staff, the Institute will regularly achieve its goals.

Publications

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Dehradun

14. The Dean,
Faculty of Wildlife Science
Wildlife Institute of India,
Dehrdun

15. The Chairman,
Internal Research Advisory Committee,
Wildlife Institute of India,
Dehradun

16. The Registrar,
Wildlife Institute of India,
Dehradun

17. **Member- Secretary**
The Director,
Wildlife Institute of India,
Dehradun

Finance Committee

1. **Chairman**
Shri M.K. Sharma, IFS
Director General of Forests &
Special Secretary,
Government of India, Ministry of Environment & Forests, Paryavaran Bhavan, B-Block, CGO Complex, Lodi Road,
New Delhi – 110 003

2. Shri N.K. Joshi, IFS
Addl. Director General of Forests (WL) & Director,
Wildlife Preservation, CGO Complex,
Ministry of Environment & Forests,
Paryavaran Bhavan, B-Block, Lodi Road,
New Delhi – 110 003

3. Shri S.B. Singh, IFS (Retd.)
(Former Chief Wildlife Warden, Meghalaya)
House No. 18/494, Indira Nagar
Lucknow – 226 016

4. Shri J.L. Chugh,
Deputy Secretary,
(Representative of JS & FA)
Ministry of Environment & Forests,
Paryavaran Bhavan, B-Block,
CGO Complex, Lodi Road
New Delhi – 110 003

5. **Member-Secretary**
Shri S. Singsit, IFS
Director
Wildlife Institute of India
Dehradun

Special invitee

1. Shri S.S. Lamba,
Finance Officer,
Wildlife Institute of India
Dehradun

2. Shri P.K. Aggarwal
Administrative Officer
Wildlife Institute of India
Dehradun

Building Committee

1. **Chairman,**
Director General
Indian Council for Forest
Research & Education
P.O. New Forest
Dehradun

2. Chief Engineer, CCU
Ministry of Environment & Forests,
Paryavaran Bhavan, B-Block
CGO Complex, Lodi Road,
New Delhi – 110 003

3. **Member-Secretary,**
Director
Wildlife Institute of India
Dehradun

Accounts

Audit Certificate

I have examined the Receipts and Payments Account, Income and Expenditure Account for the year ended 31st March, 2003 and the Balance Sheet as on 31st March, 2003 of the Wildlife Institute of India, Dehradun. I have obtained all the information and explanations that I have required and subject to the observations in the appended Audit Report, I certify, as a result of my audit, that in my opinion these accounts and Balance Sheet are properly drawn up so as to exhibit a true and fare view of the state of affairs of Wildlife Institute of India, Dehradun according to the best of information and explanation given to me and as shown by the books of the organization.

Principal Director of Audit
(Scientific Departments)

Date : 23rd March, 2004

Place : New Delhi

Wildlife Institute of India
Receipt and Payment Account for the year 2002-2003

Receipt			Payments			
		Current Year		Plan	Non Plan	Total
To Opening Balance			By Salaries	13006982.00	7532026.00	20539008.00
Cash in Hand		57440.00	By Honorarium		36900.00	36900.00
Cash in Bank		819478.00	By Fellowship	469269.00		469269.00
			By Wages	311493.00	100831.00	412324.00
Balance in bank (trainees A/c)			By Travel Expenses	2561427.00	119825.00	2681252.00
			By Postage &Telegram	244565.00		244565.00
To Grant in aid			By Electricity & Water		2617365.00	2617365.00
For 2001-2002	49,00,000.00		By Telephone & Trunkcall	930777.00		930777.00
Plan 2002-2003	7,00,00,000.00		By Publicity & Advt.	509511.00		509511.00
Non Plan 2002-2003	1,06,07,000.00	85507000.00	By POL	961562.00		961562.00
			By Stipend	100800.00		100800.00
Rent of Building		148890.00	By Repairing & Maintenance			0.00
Seminar & Workshop		102218.00	of Vehicle	728574.00		728574.00
House Licence Fee		299879.00	By Stationery		1327874.00	1327874.00
			By Operational Expenses	1701857.00		1701857.00
TDS		8631.00	By Entertainment Charges	0.00		0.00
To Security Deposit		171225.00	By Conveyance Charges		4531.00	4531.00
To Cement & Steel		331088.00	By Medical	1599315.00		1599315.00
Encashment of FDR			By Printing & Binding	411545.00		411545.00
Face Value	10350000.00		By News Paper & Magzine	39688.00		39688.00
Interest	2210508.00	12560508.00	By O.T.A.		508427.00	508427.00
To Cable charges		1120.00	By Legal Expenses	77548.00		77548.00
Interest on T.A/F.A.		35696.00	By Estate Maintenance	2165876.00		2165876.00
Interest on Saving A/c		117110.00	By Seminar & Workshop			0.00
To Sale of WII Product		197880.00	By Transfer to Pension Fund		12118067.00	12118067.00
To M.Sc. Course Fee		109360.00	By Pension Contribution		937090.00	937090.00
To Project Cost		614201.00	By Forest Advance for Expenses	978856.00		978856.00
To Loan from Other Projects		2538121.00	By Lab Chemicals	485554.00		485554.00
To Institutional Charges		66725.00	By Uniform	19031.00		19031.00
To Consultancy charges recovered		372500.00	Expenditure for Studbook Project			0.00
Carried Over		**104059070.00**	**Carried Over**			**52607166.00**

Brought Forward		**104059070.00**	**Brought Forward**			**52607166.00**
			CZA workshop expenditure		47642.00	47642.00
			By CGEGIS Subscription			0.00
			Income Tax (TDS)			0.00
			Sale/Trade Tax		0.00	0.00
			Computer Adv.		86200.00	86200.00
			Festival Advance		750.00	750.00
			Scooter Advance		227730.00	227730.00
			By House Building Adv.		369036.00	369036.00
			By Furniture & fixation	524157.00		524157.00
			By Lab Equipment	1320845.00		1320845.00
			By Office Equipment	4229234.00		4229234.00
			By Camp Equipment	154119.00		154119.00
			By Training Equipment	2836294.00		2836294.00
			By Photograph Equipment	230056.00		230056.00
			By Library Books	1041593.00		1041593.00
			By Journals & Periodicals	4112293.00		4112293.00
			By Vehicles	41795.00		41795.00
			By Campus Development	390196.00		390196.00
			By Construction of Seminar Hall	8670159.00		8670159.00
			By Architect Fee	266593.00		266593.00
			By Bonus		252586.00	252586.00
			By Sports Goods	23127.00		23127.00
			By FDR			450000.00
			By Payment of Leave Encashment	873909.00		873909.00
			By WII Contr. Towards EPF		182913.00	182913.00
			By Training Cost	5000000.00		5000000.00
			By Consultancy Fee	50000.00		50000.00
			By Audit Fee	96185.00		96185.00
			By Research Project			
			Expenditure : 6157389			
			Less(Capital Expend) :912375	5245014.00		5245014.00
			By Closing Balance			0.00
			Cash		64126.00	64126.00
			Bank		14665352.00	14665352.00
Carried Over		**104059070**	**Carried Over**			**104,059,070.00**

Brought Forward		**104059070**	**Brought Forward**			**104,059,070.00**
Receipt and Payment A/c of GPF						
GPF:			**GPF:**			
Opening Balance		607105.00				
Misc. Receipt		4615674.00	Adv./Withdrawal by Subscription			4658138.00
Interest Received			Investments:			
MPSEB	243000.00		FDR		5000000.00	
UBI	17852.00		Franklin Templeton		1000000.00	6000000.00
ICICI	462330.00					
Kotak Mahindra	335018.00					
Tata Gilt	642651.00					
On FDRs	644781.00	2345632.00				
Investment Encashed:						
Kotak Mahindra	1500000.00					
Tata Gilt	2495000.00					
FDR with UBI	1200000.00	5195000.00	Closing Balance			2105273.00
Receipt and Payment A/c of Pension						
Pension			**Pension**			
Opening Balance		14814077.00				
Receipt during the year		13133088.00	Expenditure			1595139.00
Interest: on saving A/c	27000.00		Investment done:			
IDBI	5904.00		FDR: UBI			10500000.00
Krishna Bhagya Jal Nigam	5538.00		SBI			4000000.00
UBI	99842.00		IDBI		3000000.00	
FDR	603978.00	742262.00	Krishna Bhagya Jal Nigam		3000000.00	
			Franklin Templeton		6500000.00	
Investment Encashed			TATA		4500000.00	
Krishna Bhagya Jal Nigam	1560000.00		Kotak Mahindra		2800000.00	
FDR	7600000.00	9160000.00	Birla		1200000.00	21000000.00
			Closing			754288.00
Carried Over		**154671908.00**	**Carried Over**			**154671908.00**

Brought Forward		**154671908.00**	**Brought Forward**			**154671908.00**
A/c No. 8 Consultancy Project						
Bank balance (Consultancy Project)		7413431	Payment of Consultancy Project			15247990.00
Receipt for Consultancy project		17478434	Closing Balance (Consultancey Project)			9643875.00
Training Account (A/c No. 2)						
Opening Balance		3465039.84	Payment of Training A/c			7664796.00
Receipt of Training Cell		8533584.16	Closing Balance			4333828.00
Total		**191562397.00**	**Total**			**191562397.00**

(S.S. Lamba)
Finance Officer

(Dr. Mehar Singh)
Registrar

(S. Singsit)
Director

Financial Statements (Non-Profit Organization)
Wildlife Institute of India, Chandrabani, Dehradun
BALANCE SHEET AS ON 31ST MARCH 2003

(Amount-Rs)

CORPUS/CAPITAL FUND AND LIABILITIES	Schedule	Current Year	Previous Year
Corpus/Capital Fund	1	-5,641,287.00	33,020,596.83
Reserve and Surplus	2	350,155,641.00	311,754,928.25
Earmarked/Endowment Fund	3	0.00	0.00
Secured and Borrowings	4	0.00	0.00
Unsecured Loans and Borrowers	5	3,120,225.00	410,878.95
Deferred Credit Liabilities	6	0.00	0.00
Current Liabilities and Provision	7	1,717,675.00	1,755,566.00
Total		**349,352,254.00**	**346,941,970.03**
Assets			
Fixed Assets	8	260,817,529.00	275,642,746.07
Investment - From Earmarked/Endowment Funds	9	0.00	0.00
Investment - Others	10	50,786,000.00	34,096,000.00
Current Assets, Loans, Advances, etc.	11	37,748,725.00	37,203,223.96
Miscellaneous Expenditure (to the extent not written off or adjusted)			
Total		**349,352,254.00**	**346,941,970.03**

(S.S. Lamba)
Finance Officer

(Dr. Mehar Singh)
Registrar

(S. Singsit)
Director

Financial Statements (Non-Profit Organization)
Wildlife Institute of India, Chandrabani, Dehradun
Income and Expenditure Account for period/yeard ended 31st March 2003

(Amount -Rs)

INCOME	Schedule	Current Year	Previous Year
Income from Sales / Services	12	0.00	4,900,000.00
Grants / Subsidies	13	56,789,666.00	41,275,507.00
Fees / Subscriptions	14	584,078.00	3,023,902.44
Income from Investment (Income on Invest. From earmarked / endow. Funds transferred to Funds)	15	0.00	0.00
Income from Royalty, Publication etc.	16	366,604.00	97,310.20
Interest Earned	17	2,327,618.00	1,797,027.00
Other Income	18	26,577,385.00	16,733,643.00
Increase/(decrease) in stock of Finished goods and works-in-progress	19	---	---
TOTAL (A)		**86,645,351.00**	**67,827,389.64**
EXPENDITURE			
Establishment Expenses	20	32,920,748.00	30,663,424.00
Other Administrative Expenses	21	53,188,935.00	39,952,072.60
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)		39,197,550.00	
TOTAL (B)		**125,307,233.00**	**70,615,496.60**
Balance being excess of Income over Expenditure (A-B)		-38,661,882.00	-2,788,106.96
Transfer to Special Reserve (Specify each)			
Transfer to / from General Reserve			
BALANCE BEING SURPLUS (DEFICIT) FOR THE YEAR		**-38,661,882.00**	**-2,788,106.96**

(S.S. Lamba)
Finance Officer

(Dr. Mehar Singh)
Registrar

(S. Singsit)
Director

Financial Statements (Non-Profit Organization)
Wildlife Institute of India, Chandrabani, Dehradun
Schedule forming part of Balance Sheet as on 31st March, 2003

Amount (Rs.)

	Current Year	Previous Year
SCHEDULE 1 - CORPUS / CAPITAL FUND :		
Balance as at the beginning of the year	33,020,596.97	35,808,703.79
Add : Contributions towards Corpus / Capital fund		
Profit & loss A/c	-38,661,884.00	-2,788,106.96
BALANCE AS AT THE YEAR - END	**-5,641,287.03**	**33,020,596.83**
SCHEDULE 2 - RESERVES AND SURPLUS :		
Pension Fund	32,794,288.00	20,514,077.25
GP Fund	17,901,273.00	15,598,104.93
Amount Capitalised	299,460,080.00	275,642,746.07
TOTAL	**350,155,641.00**	**311,754,928.25**
SCHEDULE 3 - EARMARKED/ENDOWMENT FUNDS		
a) Opening Balance of the Funds :	0.00	0.00
b) Additions to the Funds :	0.00	0.00
i. Donations / grants	0.00	0.00
ii. Income from Investments made on accounts of funds	0.00	0.00
iii. Other additions (specify nature)	0.00	0.00
TOTAL (a+b)	**0.00**	**0.00**
c) Utilization / Expenditure towards objective of funds	0.00	0.00
i. Capital Expenditure	0.00	0.00
-Fixed Assets	0.00	0.00
-Others	0.00	0.00
Total	**0.00**	**0.00**
ii. Revenue Expenditure	0.00	0.00
- Salaries, Wages and allowances etc.	0.00	0.00
-Rent	0.00	0.00
-other Administrative expenses	0.00	0.00
Total	**0.00**	**0.00**
TOTAL (c)	**0.00**	**0.00**
NET BALANCE AS AT THE YEAR-END (a+b-c)	**0.00**	**0.00**
SCHEDULE 4 - SECURED LOANS AND BORROWINGS :		
1. Central Government	0.00	0.00
2. State Government (Specify)	0.00	0.00
3. Financial Institution	0.00	0.00
a) Term Loans	0.00	0.00
b) Interest accrued and due	0.00	0.00
4. Banks :	0.00	0.00
a) Term Loans	0.00	0.00
-Interest accrued and due	0.00	0.00
b) Other Loans (Specify)	0.00	0.00
-Interest accrued and due	0.00	0.00
5. Other Institution and Agencies	0.00	0.00
6. Debentures and Bonds	0.00	0.00
7. Other (Specify)	0.00	0.00
TOTAL	**0.00**	**0.00**

SCHEDULE 5 -UNSECURED LOANS AND BORROWINGS			
1. Central Government		0.00	0.00
2. State Government (Specify)		0.00	0.00
3. Financial Institution		0.00	0.00
4. Banks :		0.00	0.00
a) Term Loans		0.00	0.00
b) Other Loans (Specify)		0.00	0.00
5. Other Institution and Agencies		0.00	0.00
6. Debentures and Bonds		0.00	0.00
7. Loans		2,538,121.00	0.00
8. Security Deposit		582,103.95	410,878.95
TOTAL		**3,120,224.95**	**410,878.95**
SCHEDULE 6 - DEFERRED CREDIT LIABILITIES			
a) Acceptances secured by hypothecation of capital equipment and other assets		0.00	0.00
b) Other		0.00	0.00
TOTAL		**0.00**	**0.00**
SCHEDULE 7- CURRENT LIABILITIES AND PROVISIONS			
1. Advances Received			
Tropical rainforest workshop		107,039.00	107,039.00
Zoo mgmt course-02		243,527.00	243,527.00
Hostel caution money		90,000.00	90,000.00
Payment for research		82,202.00	82,202.00
Adv. for printing of eco project		391,700.00	391,700.00
Zoo mgmt. course-01		172,139.00	172,139.00
Adv. for park		25,000.00	25,000.00
CZA mgmt. course 03		119,768.00	119,768.00
Telemetry workshop		117,191.00	117,191.00
CZA value of exhibit design		200,000.00	200,000.00
CZA Studbook project		159,358.00	207,000.00
TOTAL (A)		**1,707,924.00**	**1,755,566.00**
B. PROVISIONS			
1. For Tax deducted at source payable			
CONTRACTOR	1,967.00		
SALARY	14,347.00		
AMC	-7,683.00	8,631.00	
2. Cable Charges Payable		1,120.00	
3. Superannuating/Pension			---
4. Accumulated Leave Encashment			
5. Trade Warranties/Claims			
6. Others (Specify)			
① GPF ContributionPayable		0.00	---
TOTAL (B)		**9,751.00**	**0.00**
TOTAL (A+B)		**1,717,675.00**	**1,755,566.00**

SCHEDULE 8 - FIXED ASSETS		
BUILDING		
BLOCK 10%		
On Freehold Land	122633426.70	136259363.00
Campus Development	6503591.31	6836016.31
Materials and supplies	3477354.95	3863727.95
Boundary Wall	1301580.59	1446200.59
Architectural & supervision fee	7777557.85	8375137.85
Tennis court	477767.32	530852.32
Auditorium	8574076.00	856592.00
Boundary fencing	736141.93	817934.93
BLOCK 20%		
Staff quarters	2540416.00	3175520.00
Road & Culvert	1379289.00	1724111.00
TOTAL (A)	**155401201.65**	**163885455.95**
FURNITURE & FIXTURES		
BLOCK 15%		
Furniture & fixtures	9852803.44	11067376.44
TOTAL (B)	**9852803.44**	**11067376.44**
PLANT & MACHINERY		
BLOCK 20%		
Vehicle	4663182.80	5787183.50
BLOCK 25%		
Office Equipment	7684417.43	6016655.90
Lab equipment	3005301.80	2131224.07
Camp equipment	534667.76	558771.34
Training equipments	23784477.18	28876342.24
DG Set	1477744.50	1970326.00
EPABX	769500.00	1026000.00
AC Plant	2037532.50	2716710.00
TOTAL (C)	**43956823.97**	**49083213.05**
BLOCK 100%		
Library Books	13196444.28	13196444.28
Photographs & Photos	2205930.20	2205930.20
Educational films	1080432.35	1080432.35
Journals & Periodicals	22645690.00	22645690.00
TOTAL (D)	**39128496.83**	**39128496.83**
1.LAND:	6607214.58	6607214.65
Trees	2432709.00	2432709.00
Avenue Plantations	3438280.15	3438280.15
TOTAL (E)	**12478203.73**	**12478203.80**
TOTAL (A+B+C+D+E)	**260817529.62**	**275642746.07**
SCHEDULE 9- INVESTMENT FROM EARMARKED/ENDOWMENT FUNDS		
1. In Governments Securities	0.00	0.00
2. Other approved Securities	0.00	0.00
3. Shares	0.00	0.00
4. Debentures and Bonds	0.00	0.00
5. Subsidiaries and Joint Ventures	0.00	0.00
6. Others (to be specified)	0.00	0.00
i) FDR	0.00	0.00
TOTAL	**0.00**	**0.00**

SCHEDULE 10-INVESTMENTS-OTHER		
1. In Governments Securities	---	---
2. Other approved Securities	---	---
3. Shares	---	---
4. Debentures and Bonds	---	---
5. Subsidiaries and Joint Ventures	---	---
6. Others (to be specified)	---	---
GPF Fund Investment account		
MPSEB Bond	1,800,000.00	1,800,000.00
Kotak Mahindra Fund	0.00	1,500,000.00
Tata Guilt Fund	0.00	2,495,000.00
ICICI	4,500,000.00	4,500,000.00
HDFC	1,996,000.00	1,996,000.00
FDR	6,500,000.00	2,700,000.00
FRANKLIN TEMPLETON	1,000,000.00	0.00
b) Pension Fund		
FDR	12,600,000.00	5,700,000.00
KRISHNA JBN	1,440,000.00	0.00
IDBI	3,000,000.00	0.00
FRANKLIN TEMPLETON	6,500,000.00	0.00
Tata Guilt Fund	4,500,000.00	0.00
Kotak Mahindra Fund	2,800,000.00	0.00
BIRLA PLUS	1,200,000.00	0.00
c) Account No# 01		
FDR	450,000.00	10,905,000.00
d) Training		
FDR	2,500,000.00	2,500,000.00
TOTAL	**50,786,000.00**	**34,096,000.00**

SCHEDULE 11- CURRENT ASSETS, LOANS, ADAVANCES ETC.		
A. CURRENT ASSETS:		
1. Inventories		
STOCK OF CEMENT & STEEL	158534.90	489,622.90
GRANT IN AID ACCRUED BUT NOT RECD	0.00	4,900,000.00
TRAINING COST ACCRUED BUT NOT RECD	403975.00	655,275.00
ADV FOR TRAINING EXPENSES	356043.00	200,896.00
3. Cash balances in hand (including cheques/draft and imprest)		
CASH BALANCE	64126.00	57,440.00
4. Bank Balances:		
a) With Schedule banks:		
TRAINING A/C	4333827.00	3,465,039.84
ACCOUNT NO 1	14665352.74	819,478.74
GPF A/C	2105273.36	607,104.93
PENSION FUND	754288.00	14,814,077.25
CONSULTANCY PROJECT	9643875.00	7,413,431.10
TOTAL (A)	**32485295.00**	**33,422,365.76**

B. LOANS, ADVANCES AND OTHERS ASSETS		
1. Loans:		
a) Staff	1957440.00	1,957,440.00
ADV FOR COMPUTERS	86200.00	---
ADV FOR EXP TO STAFF	2622274.00	1,643,418.00
FESTIVAL ADVANCE	750.00	---
SCOOTER ADVANCE	227730.00	---
HBA	369036.00	---
b) Other Entities engaged in activities/objectives similar to that of the entity		
c) Other (Specify)		
i) Advance for expenses (training)		
ii) Loan to ENVIS Project	0.00	180,000.00
2. Advances and other amounts recoverable in cash or in kind or for value to be received		
a) On Capital Account		
b) Prepayments		
c) Others		
3. Income Accrued :		
a) On Investments from Earmaked/Endowment Funds		
b) On Investment - Others		
c) On Loans and Advances		
d) Others		
i) Grant-in-aid accrued but not received		
ii) Training cost accrued but not received		
(include income due unrealised-Rs.....)		
Total (B)	**5263430.00**	**3,780,858.00**
Total (A+B)	**37748725.00**	**37,203,223.76**

(S.S. Lamba)
Finance Officer

(Dr. Mehar Singh)
Registrar

(S. Singsit)
Director

Financial Statements (Non-Profit Organization)
Wildlife Institute of India, Chandrabani, Dehradun
Schedules for ming Income and Expenditure Account ofr the year ended 31st March, 2003

	(Amount-Rs)	
	Current Yr	Previous Yr.
SCHEDULE 12-INCOME FROM SALES/SERVICES		
1. Income from Sales		
a) Sale		
b) Sale of Raw Material	---	---
C) Sale of scraps	---	---
2. Income from Services	---	---
a) labour and Processing Charges		
b) Professional/Consultancy Services	---	---
c) Agency Commission and Brokerage	---	---
d) Maintenance Services (Equipment/Property)	---	---
e) Other (Specify)	---	---
i) Grant-in-aid accrued but not received	---	---
TOTAL	---	4,900,000.00
	0.00	4,900,000.00
SCHEDULE 13-GRANTS/SUBSIDIES		
(Irrevocable Grants & Subsidies Received		
1) Central Government	---	---
2) State Governments (s)	---	---
3) Government Agencies	---	---
4) Institutions/Welfare Bodies	---	---
5) International Organisations	---	---
6) GRANT IN AID (80607000-23817334)Amt. Capitalised	56,789,666.00	41,275,507.00
TOTAL	56,789,666.00	41,275,507.00
SCHEDULE 14- FEES/SUBSCRIPTIONS		
1) M.Sc. course fees	109,360.00	621,510.00
2) Annual Fees/Subscription	---	---
3) Seminar/Program Fees	102,218.00	---
4) Consultancy Fees	372,500.00	---
5) Other (Specify)		
i) Receipt of training cost	---	---
ii) Other training receipts/short courses	---	2,144,492.44
iii) Training cost accrued	---	257,900.00
TOTAL	584,078.00	3,023,902.44
SCHEDULE 15-INCOME FROM INVESTMENTS		
(Income on Invest. From Earmarked/Endowment Funds transferred to Funds)		
1) Interest	---	---
a) On Govt. Securities		
b) Other Bonds/Debentures		
2) Dividends :	---	---
a) On Shares		
b) On Mutual Fund Securities		
3) Rents	---	---
4) Other (Specify)	---	---
TOTAL	0.00	0.00
SCHEDULE 16-INCOME FROM ROYALTY, PUBLICATION ETC.		
1) Income from Royalty		
2) Income from Publications		
3) Other (Specify)		
HL Fees	299,879.00	---
Institutional charges	66,725.00	---
Earth BBC	---	97,310.20
TOTAL	366,604.00	97,310.20
SCHEDULE 17-INTEREST EARNED		
1) On Term Deposits:		
a) With Scheduled Banks	117,110.00	363,449.00
b) With Non-Scheduled Banks	---	---
c) With Institutions	---	---
d) Others	---	---
e) On investment	2,210,508.00	1,433,578.00
2) Interest on Debtors and Receivables		
TOTAL	2,327,618.00	1,797,027.00

SCHEDULE 18- OTHER INCOME			
1) Profit on Sale/disposal of Assets:		---	
a) Owned assets			
b) Assets acquired out of grants, or received free of cost			
2)Export Incentives realized		---	
3) Fees for Miscellaneous Services		---	
4) Miscellaneous Income		---	
i) Misc. Receipt			
Sale of WII products		197,880.00	
ii) Training cost accrued but not received		---	
iii) WII receipt (Instt. charges)		---	
iv) M.Sc. Course fee		---	
v) Receipt during the year to earth BBC		---	
vi) Rent of building		148,890.00	
vii) Misc Receipts (penal intt. On Car Adv.)		35,696.00	
	Consultancy Project receipts	17,478,434.00	12,924,346.00
	Training Receipts	8,102,284.00	2,689,352.00
	Saving of Project Cost	614,201.00	
	EPF Receipts		1,119,945.00
TOTAL		**26,577,385.00**	**16,733,643.00**
SCHEDULE 19- INCREASE/(DECREASE) IN STOCK OF FINISHED GOODS & WORK IN PROGRESS			
a) Closing stock		---	---
- Finished Goods		---	---
- Work-in-progress		---	---
b) Opening Stock		---	---
- Finished Goods		---	---
- Work-in-progress		---	---
NET INCREASED/(DECREASE) [a-b]		---	---
SCHEDULE 20- ESTABLISHMENT EXPENSES			
a) Salaries and Wages		20,539,008.00	20,232,581.00
i) Wages		412,324.00	593,263.00
ii) Honorarium		36,900.00	2,950.00
iii) Fellowship		469,269.00	1,042,089.00
iv) Medical Expenses		1,599,315.00	1,810,559.00
v) stipend		100,800.00	755,972.00
vi) Travelling charges		2,681,252.00	2,087,158.00
b) Allowances and Bonus		---	---
i) Bonus		252,586.00	236,009.00
ii) OTA		508,427.00	390,525.00
iii) LTC		---	43,409.00
c) Contribution to Provident Fund		182,913.00	1,061,208.00
i) Research Project Expenses	6,157,389.00	---	
Less: Capital Expenses	912,375.00	5,245,014.00	2,048,795.00
d) Contribution to Other Fund (specify)		---	---
i) Govt. Contr. To pension fund		---	---
ii) Leave salary and Pension contr.		---	---
iii) WII Revenue & Pension Fund		---	---
iv) NTGCF Project Refund		---	276,231.00
e) Staff Welfare Expenses		---	---
ii) Uniforms		19,031.00	82,675.00
f) Expenses on Employees' Retirement And Terminal Benefits		---	---
g) Other (specify)		---	---
h) Leave encashment		873,909.00	---
TOTAL		**32,920,748.00**	**30,663,424.00**

SCHEDULE 21- OTHER ADMINISTRATIVE EXPENSES				
Electricity & water		2,617,365.00		2,488,275.00
Repair & maintenance		728,574.00		490,245.00
Postage & telegram		244,565.00		165,358.00
Printing & binding		411,545.00		42,520.00
Stationery		1,327,874.00		877,772.00
Conveyance		4,531.00	---	
Auditors remuneration		96,185.00	---	
Publication		0.00		534,132.00
Consultancy charges		50,000.00	---	
Advertisement & publicity		509,511.00		169,183.00
Estate maintenance		2,165,876.00		2,052,677.00
Landscaping			---	30,940.00
Forensic lab expenses			---	13,287.00
Lab chemicals		485,554.00		406,614.00
Legal expenses		77,548.00		37,500.00
Newspaper & magazines		39,688.00		31,710.00
Rajiv Gandhi award expenses			---	350.00
Operational expenses (Contingency)		1,701,857.00		4,276,143.00
Pension contribution		13,055,157.00	---	
POL		961,562.00		1,069,509.00
Tel. & trunck call charges		930,777.00		1,017,977.00
Training Cost		5,000,000.00		4,939,980.00
Consultancy project		15,247,990.00		10,937,655.40
Earthcare BBC			---	97,310.00
Training Account Expenses	7,664,796.00	7,509,649.00	---	
Less: Adv. For Expenses	155,147.00			
Pension & EPF expenses				
Sports goods		23,127.00		129,579.00
Depreciation			---	

TOTAL		53,188,935.00		29,808,716.40
SCHEDULE 22- EXPENDITURE ON GRANTS,SUBSIDIES ETC.				
a) Grants given to Institutions/Organisations				
b) Subsidies given to Institutions/Organisations				
TOTAL		0.00		0.00
SCHEDULE 23-INTEREST				
a) On Fixed Loans				
b) On other Loans (including Bank Charges)				
c) Others(specify)				
TOTAL		0.00		0.00

(S.S. Lamba)
Finance Officer

(Dr. Mehar Singh)
Registrar

(S. Singsit)
Director

Permanent Assests of
Wildlife Institute of India, Chandrabani, Dehradun

S. No.	Particular	As on 31-03-02	As on 31-03-03
1	Building Complex	136259363.00	122633426.70
2	Campus Development	6836016.31	6503591.31
3	Materials and supplies	3863727.95	3477354.95
4	Boundary Wall	1446200.59	1301580.59
5	Architectural & supervision fee	8375137.85	7777557.85
6	Tennis court	530852.32	477767.32
7	Auditorium	856592.00	8574076.00
8	Boundary fencing	817934.93	736141.93
9	Staff quarters	3175520.00	2540416.00
10	Road & Culvert	1724111.00	1379289.00
11	Furniture & fixtures	11067376.44	9852803.44
12	Vehicle	5787183.50	4663182.80
13	Office Equipment	6016655.90	7684417.43
14	Lab equipment	2131224.07	3005301.80
15	Camp equipment	558771.34	534667.76
16	Training equipments	28876342.24	23784477.18
17	DG Set	1970326.00	1477744.50
18	EPABX	1026000.00	769500.00
19	AC Plant	2716710.00	2037532.50
20	Library Books	13196444.28	13196444.28
21	Photographs & Photos	2205930.20	2205930.20
22	Educational films	1080432.35	1080432.35
23	Journals & Periodicals	22645690.00	22645690.00
24	Land	6607214.65	6607214.65
25	Trees	2432709.00	2432709.00
26	Avenue Plantations	3438280.15	3438280.15
	Grand Total	**275642746.07**	**260817529.68**

(S.S. Lamba)
Finance Officer

(Dr. Mehar Singh)
Registrar

(S. Singsit)
Director