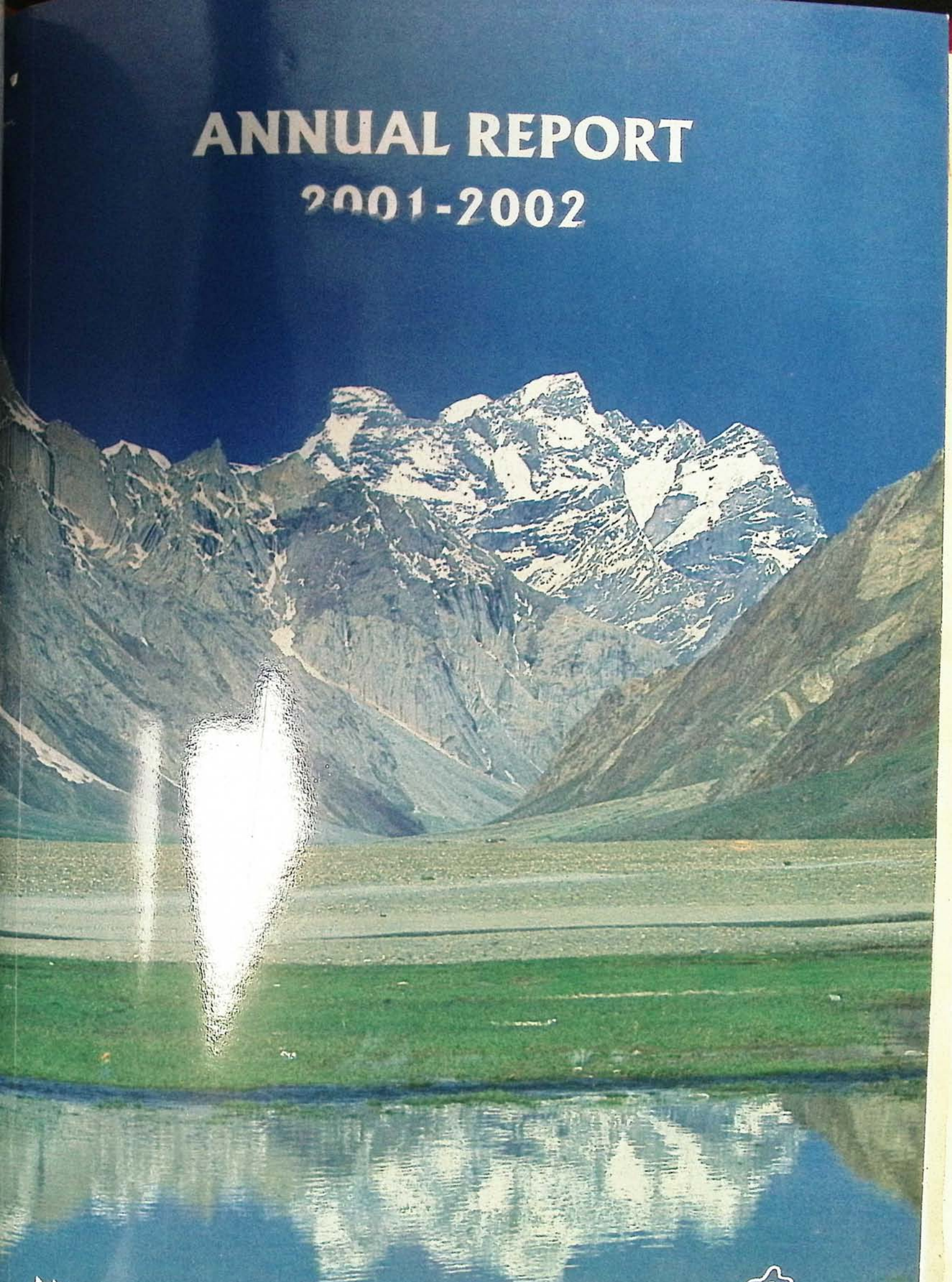
ANNUAL REPORT
2001-2002



भारतीय वन्यजीव संस्थान
Wildlife Institute of India

जहाँ है हरियाली ।
वहाँ है खुशहाली ॥

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Acknowledgements
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DIRECTOR'S NOTE

The wildlife forensic capacity established at the Institute during 1995 continued to maintain steady progress. Five manuals were being prepared for identifying species from hair, epidermal derivatives, tissues, and portions of body parts. These will make a significant contribution to science and law enforcement. During July 2001 a new project, on characterization of species from bone, tusk, rhino horn and antler, was initiated.

Officers of the Indian Customs and Central Excise Service play an important role in controlling international trade in wild plants, animals, their parts and products. In addition to the regular two-week course for Indian Customs and Central Excise Probationers, the Institute developed a module for wildlife protection for senior officers of this service and conducted a four-day short course during July and August 2001.

During the year, the Conservation Genetics laboratory became fully functional. It is hoped that the work in collaboration with the Smithsonian Institution, though at present focused on the Indian wolf and some other canids, will meet a wide range of objectives in future for the laboratory.

The Institute has, over the years, made contributions to two of India's major initiatives, Project Tiger and Project Elephant. The Institute, in collaboration with the Uttaranchal forest department and Project Elephant, MOEF, GOI conducted a National Symposium on Elephant Conservation, Management and Research at Haridwar during December 2001. Besides senior officers from the MOEF, GOI and Uttaranchal government, Chief Wildlife Wardens and State representatives from thirteen elephant range states participated. The issues ranged from the problem of human co-existence with elephants in certain areas to landscape based planning, policies, law enforcement and habitat management strategies.

During February 2002 a new Institutional Co-operation Programme in Natural Resource Ecology and Management was established between the Wildlife Institute of India and the University of Tromso, Norway. This is funded by Indo-Norwegian Institutional Co-operation Programme. It aims to address pastoralism and wildlife conservation in the Indian Himalaya, habitat differentiation and diet analysis of wild and domestic ungulates, and carrying capacity assessments of livestock and wildlife.

The Wildlife Institute of India was selected in the institutional category for the prestigious Rajiv Gandhi Conservation Award for the year 1999 for outstanding contribution to the field of wildlife conservation. The award was conferred by the Honourable Vice-President of India in a special ceremony at Vigyan Bhawan, New Delhi on 3rd October 2001.

(V.B. Sawarkar)

The Year at a Glance

April 2001

- First Internship course for FRI-Postgraduate Diploma Course, Dehradun, April 9-27, 2001
- Field Training Workshop on Abundance Monitoring of Large Mammalian Prey and Predators, Chamba, Himachal Pradesh, April 17-19, 2001
- Second Meeting of the Indian Subcontinent Regional Orchid Specialist Group (ISROSG), IUCN/ Species Survival Commission, Dehra Dun, April 17 –19, 2001

May 2001

- Workshop on Community Participation in Forest and Wildlife Conservation, Munsiary Block, Pithoragarh, Uttaranchal, May 10, 2001
- Training Workshop for field staff of Himachal Pradesh Forest Department, Nahan, May 16-18, 2001

June 2001

- India Ecodevelopment Project (IEDP) Workshop on Participatory process approach for village ecodevelopment & ecotourism planning and management, Buxa Tiger Reserve, West Bengal., June 4-8, 2001
- Workshop on Developing Strategies for Ecotourism in India", LBSNAA Mussoorie, June 27-29, 2001

July 2001

- Ecoguide Training Programme for Rajaji NP, Banog WLS and Govind Pashu Vihar, July 9-18, 2001

August 2001

- National Workshop on Regional Planning for Wildlife Protected Areas, India Habitat Centre, New Delhi, August 6-8, 2001
- XL Governing Body Meeting, New Delhi, August 8, 2001

September 2001

- Sloth bear Workshop in Panna Tiger Reserve, Madhya Pradesh, September 24–27, 2001
- Training Programme on Environmental Impact Assessment under GEF India Ecodevelopment Project, September 27- 29, 2001

October 2001

- The XV Annual Research Seminar (ARS) of WII, October 18-20, 2001
- VI Meeting of Training Research and Academic Council of WII, Dehradun, October 20, 2001

November 2001

- One Week Capsule Course in Wildlife Management for IFS Officers, November 5–9, 2001
- Multi-stakeholder Workshop on Ecotourism in Corbett, Binsar and Nainital, Garjia, Nov. 8- 9, 2001
- Second Training Course on Wetland Conservation and Management, Nov. 19-Dec. 2, 2001
- Planning Workshop on UNESCO Project 'Enhancing our Heritage: Monitoring and Managing for Success in Natural World Heritage Sites', Keoladeo NP, Bharatpur, November 21-23, 2001
- Planning Workshop on UNESCO Project 'Enhancing our Heritage: Monitoring and Managing for Success in Natural World Heritage Sites', Royal Chitwan NP, Nepal, November 27-29, 2001

December 2001

- XLI Governing Body Meeting, New Delhi, December 4, 2001
- IX Annual General Meeting of WII Society, New Delhi, December 5, 2001
- A module on "Ecodevelopment for Biodiversity Conservation", for lateral entrants from December 5-28, 2001
- National symposium on elephant conservation, management and research, Haridwar, December 16-20, 2001

January 2002

- Training Workshop on Habitat Evaluation and Wildlife Census Techniques at Jaldapara Wildlife Sanctuary, West Bengal, January 24-26, 2002

February 2002

- One-week training programme on Environmental Impact Assessment of Watershed Projects, January 28–February 1, 2002
- VII Training Research and Academic Council of WII, Dehradun, February 5, 2002

March 2002

- Workshop on Using Multivariate Statistics in Natural Sciences, Dehradun, February 6-8, 2002
- XII Endangered Species and Zoo Management Course, Bhopal, February 14 -March 2, 2002

Work Programme 2001-2002

Short Courses

- First Internship course for FRI Postgraduate Diploma Course, Dehradun, *April 9-27, 2001*
- Ecoguide Training Programme for Rajaji NP, Benog WLS and Govind Pashu Vihar, *July 9-18, 2001*
- Training Programme on Environmental Impact Assessment under GEF India Ecodevelopment Project, *September 27- 29, 2001*
- One Week Capsule Course in Wildlife Management for IFS Officers, *November 5–9, 2001*
- Second Training Course on Wetland Conservation and Management, *November 19-December 2, 2001*
- A module on "Ecodevelopment for Biodiversity Conservation", for lateral entrants, *December 5-28, 2001*
- One-week training programme on Environmental Impact Assessment of Watershed Projects, *January 28-February 1, 2002*
- XII Endangered Species and Zoo Management Course, Bhopal, *February 14 -March 2, 2002*

Workshops, Seminars, Conferences and Meetings

- Field Training Workshop on Abundance Monitoring of Large Mammalian Prey and Predators, Chamba, Himachal Pradesh, *April 17-19, 2001*
- Second Meeting of the Indian Subcontinent Regional Orchid Specialist Group (ISROSG), IUCN/Species Survival Commission, Dehra Dun, *April 17 –19, 2001*
- Workshop on Community Participation in Forest and Wildlife Conservation, Munsiary Block, Pithoragarh, Uttaranchal, *May 10, 2001*
- Training Workshop for field staff of Himachal Pradesh Forest Department, Nahan, *May 16-18, 2001*
- India Ecodevelopment Project (IEDP) Workshop on "Participatory process approach for village ecodevelopment and ecotourism planning and management, Buxa Tigre Reserve, West Bengal, *June 4-8, 2001*
- Workshop on "Developing Strategies for Ecotourism in India", LBSNAA Mussoorie, *June-27-29, 2001*
- National Workshop on Regional Planning for Wildlife Protected Areas, India Habitat Centre, New Delhi, *August 6-8, 2001*
- Sloth bear Workshop in Panna Tiger Reserve, Madhya Pradesh, *September 24 – 27, 2001*
- Multi-stakeholder Workshop on "Ecotourism in Corbett, Binsar and Nainital (CBN), Garjia, *November 8- 9, 2001*
- Planning Workshop on UNESCO Project Enhancing our Heritage: Monitoring and Managing for Success in Natural World Heritage Sites, Keoladeo National Park, Bharatpur, *November 21-23, 2001*
- Planning Workshop on UNESCO Project Enhancing our Heritage: Monitoring and Managing for Success in Natural World Heritage Sites, Royal Chitwan National Park, Nepal, *November 27-29, 2001*
- National symposium on elephant conservation, management and research, Haridwar, *December 16-20, 2001*
- Training Workshop on Habitat Evaluation and Wildlife Census Techniques at Jaldapara Wildlife Sanctuary, West Bengal, *January 24-26, 2002*
- Workshop on Using Multivariate Statistics in Natural Sciences, Dehradun, February 6-8, 2002

Seminar

- The XV Annual Research Seminar (ARS) of WII, *October 18-20, 2001*

Meetings

- XL Governing Body Meeting, New Delhi, *August 8, 2001*
- VI Training, Research and Academic Council , Dehradun, *October 20, 2001*
- XLI Governing Body Meeting, New Delhi, *December 4, 2001*
- IX Annual General Meeting of WII-Society, New Delhi, *December 5, 2001*
- VII Training, Research and Academic Council, Dehradun, *February 5, 2002*

Background

India is a country where plants and animals have been worshipped since time immemorial. But as civilization developed, human beings started exploiting natural resources for their survival and comfort. They did not care about the plants and fauna that have evolved before them.

Conservation of forest resources was not a priority for a long time, since short-term economic considerations prevailed. After India's independence, the need was felt for a comprehensive conservation management strategy. The focus shifted, from pure economics to a holistic look at our natural resources, aimed primarily at conservation while protecting the interests of people who are dependent on those resources. Such a strategy led to the setting up of the Wildlife Institute of India (WII) at Dehradun in 1982, with a mandate to train the wildlife managers, researchers, conservationists and other people interested in wildlife conservation, and to carry out research and advise on matters of conservation and management of wildlife resources. The task was not easy, but dedicated team effort and admirable support from the government converted this dream into reality.

The WII's programmes are mainly field-based and conducted throughout the country. This helps its faculty and technical staff to keep abreast with the field situation and incorporate new ideas in teaching and training programmes. This also helps in integrating biological, ecological, socio-economic and human aspects of conservation over large regional landscapes. 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 detail knowledge and the latest technology. In recognition of the Institute's potential, the UNESCO has identified the WII as regional training centre for south and south-east Asia to send their professionals for training in wildlife management at the WII.

Aims and Objectives

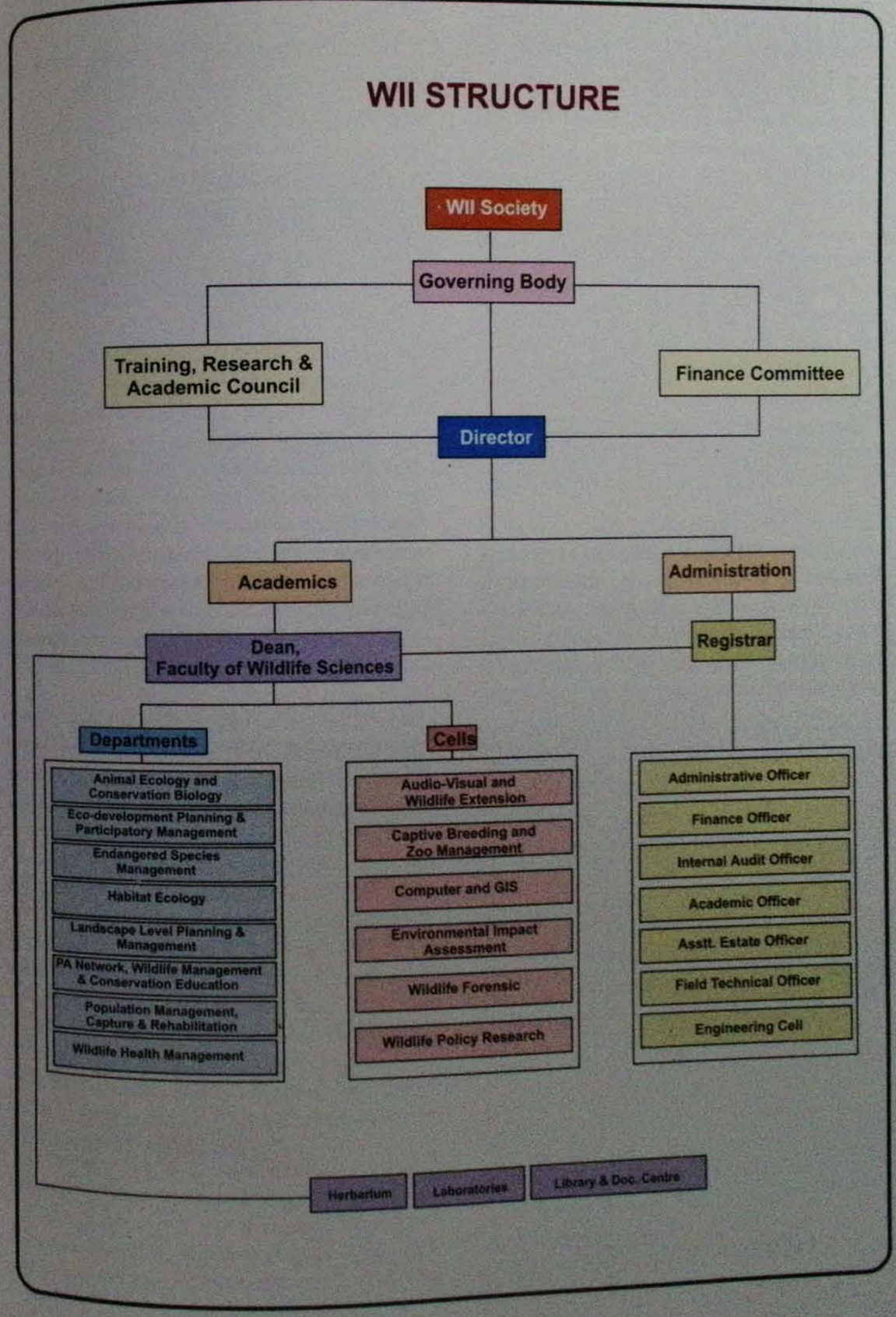
- To build capacity and develop human resources in wildlife science.
- To develop as a centre of excellence in wildlife science.
- To provide consultancy and advisory services in wildlife conservation.
- To advocate issues relevant to wildlife science and conservation.
- To develop as a regional centre 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 science and promote its application in the field, in a manner that accords with our economic and socio-cultural milieu.

Institution Organization

The chart below depicts the WII's structure.



Training and Academics

TRAINING PROGRAMMES

XXII Postgraduate Diploma Course in Wildlife Management

The XXII Postgraduate Diploma Course commenced from September 1, 2000 with a total of fifteen officer trainees who were DCFs/ACFs/ Veterinary Doctors. Of them, ten officer trainees were from different States within the country and three were sponsored by the Global Tiger Forum. Among the foreign trainees, one each from Nepal and Sri Lanka were sponsored by the Ministry of Environment & Forests, the government of India under the SAARC fellowship scheme. One trainee each from Bangladesh and Vietnam were sponsored by the Global Tiger Forum. The Capacity Building under the ITEC/SCAAP Programme by the Ministry of External Affairs, the Government of India provided support to a trainee from Tanzania.

During the reporting period, the Management Plan Tour at Bandhavgarh Tiger Reserve (Madhya Pradesh) from April 13-30, 2001 and a High Altitude Techniques Tour at Kedarnath Musk Deer Sanctuary from May 19-23, 2001 were conducted for the officer trainees.

Prior to the conclusion of the course on May 31, 2001 the *Viva-voce* examination was held during May 28-29, 2001, followed by a Valedictory Function. All officer trainees were awarded the 'Diploma in Wildlife Management' on their successful completion of the course. In addition, awarded for outstanding performance in the course, the Institute's Gold Medal and the Wildlife Preservation Society Silver Medal for the 'Top Trainee' were bagged by Shri Subhankar Sen Gupta of West Bengal. He was also given the Institute's Prize for 'Top Trainee in Wildlife Biology'. Shri B.N. Talukdar of Assam was awarded the Silver Medal for the 'Best All Round Wildlifer'. He also shared the Institute's Prize with Shri Mundrika Singh (Madhya Pradesh) for 'Best Management Term Paper'. Shri Mundrika Singh and Shri Kumar Pushkar were jointly awarded the N.R. Nair Memorial Silver Medal for 'Best Management with Plan'. Mr. K.G.S. Weerasinghe (Sri Lanka) was awarded Silver Medal for 'Best Foreign Trainee'. Shri S.K. Srivastava was the Course Director for this course.

XXIII Postgraduate Diploma Course in Wildlife Management

The XXIII Postgraduate Diploma Course commenced from September 1, 2001 for nine months with a total of eighteen officer trainees who were DCFs/ACFs/Veterinary Doctors from different States within the country. Three officer trainees were sponsored by the Global Tiger Forum under the Capacity Building Programme.

The Institute opened some of the modules to lateral entrants. One such was the second training module on Wetland Conservation and Management, conducted from November 19 to December 2, 2001. The overall objective of this module was to provide the basic knowledge and skills necessary for developing a wetland management plan. The module was attended by thirty participants, eighteen from the WII's regular XXIII Diploma course and twelve lateral entrants from Forest Departments, Universities, Research Institutions, and NGOs.

Apart from theory classes, a conceptual exercise for planning conservation strategy for wetlands was carried out. As a part of the module, participants were taken to Keoladeo National Park (KNP), Bharatpur and Chilika lagoon, Orissa to familiarise themselves with the ecology and management of inland and coastal wetlands. The inputs in the field were provided by Shri Praveen, Director, KNP; Shri Rajkumar Singh, Dy. Director, Shri Ajit Pattnaik, CEO, Chilika Development Authority, Bhubaneshwar and DFO, Chilika Wildlife Sanctuary. At Bhubaneshwar, Shri Saroj Patnaik, CCF and CWLW (Retd.) presided over the valedictory function. Dr. S.A. Hussain was the Module Co-ordinator.

Similarly, a module on "Ecodevelopment for Biodiversity Conservation", was organized at this Institute for lateral entrants from December 5-28, 2001. This module aimed at imparting current concepts and practices in integrating development

Diploma officers of Wildlife Management Course during various modules and field visits
Photo : S.K. Srivastava, S. Wilson and V. Verma

conservation of natural resources in the context of Protected Area Management. There were seven participants from five States who joined as lateral entrants alongwith eighteen trainees for this module which was competency based; the method strongly adhered to the principles of adult learning and thereby relied heavily on the the experiential learning cycle. The mode of learning covered a wide range including group discussions, demonstrations, structured and semi-structured exercises, role play, case studies and simulations.

To acquaint enforcement personnel with the policies and laws at state, national and international levels concerning wildlife and biodiversity conservation and to equip them to take up legal protection measures in a correct and effective manner, this training module on Legal Issues in Wildlife Management was conducted. It offered insight into the various Acts and Conservation strategies relevant to wildlife protection and equipping the enforcement personnel with information for effective prosecution of cases.

A training module on Environmental Impact Assessment, (EIA) was conducted from December 24 to 29, 2001. The objectives of the module were to provide participants with a broad understanding of the theory and practice of Environmental Impact Assessment and to enhance their independent skills to plan, conduct and review impact assessments of development projects. A total of twelve lateral enterants took part in the course representing senior scientists, resource managers, and environmental managers from Forestry Research Institutions, the Zoological Survey of India, State Forest Departments, the National Hydro Power Corporation (NHPC) and Gujarat Ambuja Cements Ltd. The module involved lectures, audio-visual presentations of case studies, visual tours of development sites, and group work for designing appropriate assessment practices based on real and simulated situations. The professional inputs in the module were provided by WII faculty, and guest speakers from reputed institutions in the country and senior officials of the Environmental Division of Ministry of Environment and Forests (MoEF). The participants also visited the mine site of M/s Pyrites Phosphate and Chemical Limited (PPCL), Maldeota, Dehradun. During this field visit, they acquired first hand knowledge of an underground mine operation and appreciated the successful efforts of the scientists of ICFRE in the ecological

restoration of the overburdened dumps. The module was coordinated by Dr. Asha Rajvanshi.

As an integral part of the nine-month Postgraduate Diploma Course, the following field tours/exercises were undertaken: (i) One-day Field Trip to Rajaji National Park (Dholkhand, Beribada, Ranipur and Chilla) on September15, 2001 for trekking, orientation and study of animal behaviour; (ii) Orientation Tour to Corbett National Park (Uttranchal) from October 21 to 27, 2001; (iii) Captive Management Tour to National Zoological Park (Delhi) from November 10 to 11, 2001; (iv) One-day Trip to Asan Barrage (Uttaranchal) on November 24, 2001; (v) Wetland Management Tour to Keoladeo-Ghana National Park, Bharatpur (Rajasthan) from November 25 to 27, 2001; (vi) Techniques Tour to Sariska Tiger Reserve (Rajasthan) from November 27 to December 7, 2001.

The following field tours were also undertaken by the officer trainees: (i) Management Tour to several PAs/Wildlife Sanctuaries and Zoological Parks in West Bengal, Meghalaya, Assam and Sikkim from January 28 to February 22, 2002; (ii) Management Term Paper Exercise in Dudhwa National Park (Uttar Pradesh) March 4 to 15, 2001. Dr. P.K. Malik was the Course Director and Dr. K. Sivakumar the Associate Course Director.

XVII Certificate Course in Wildlife Management

The XVII Certificate Course in Wildlife Management commenced on November 1, 2001 with thirteen officer trainees from different states (Assam, Kerala, Mizoram, Madhya Pradesh, Maharashtra, Tripura, Uttranchal, West Bengal, Chhattisgarh) and one from Bangladesh. The Global Tiger Forum sponsored three officer trainees. The course started with the introduction of wildlife biology and field techniques and later addressed all major aspects of wildlife management including human dimensions. The management tour was conducted in different Zoos and Protected Areas of Gujarat.

The following officer trainees were awarded distinctions and prizes for outstanding performance. *Institute Gold Medal in Wildlife Conservation:*

Trainees of Certificate Course in Wildlife Management
Photo : Samual Wilson

Shri Rang Nath Pandey (Uttaranchal) and Shri Uttam Kumar Gupta (Chhattisgarh); *Institute's Prize for Wildlife Management:* Shri Rang Nath Pandey (Uttaranchal) and Shri Uttam Kumar Gupta (Chhattisgarh); *Best All Round Wildlifer:* Shri V.K. Mishra (Madhya Pradesh), Shri Rang Nath Pandey (Uttaranchal), Shri Joseph Thomas (Kerala) and Shri Uttam Kumar Gupta (Chhattisgarh) were awarded with Honours Certificate. Dr. V. P. Uniyal was the Course Director.

SHORT COURSES

First Internship course for FRI-P.G. Diploma Course, Dehradun, *April 9-27, 2001.* As part of the current Postgraduate Diploma Course in Biodiversity Conservation at the Forest Research Institute, Dehradun, a three-week Internship Course on Wildlife Science was organised at the Wildlife Institute of India. A total of eight students attended and successfully completed the course. The main objectives of the course were to orient the students towards wildlife science especially Indian Wildlife, to understand the importance of wildlife management in biodiversity conservation and to understand research methods in wildlife science. Apart from classroom teaching, a day-long wildlife orientation tour was organised in the Rajaji National Park. The students were exposed to the various management strategies in the Rajaji National Park. Dr. K. Sivakumar co-ordinated this course.

Specialization Module on Biodiversity Conservation and Wildlife Management, *April 9-17, 2001.* The second three-week specialization module on Biodiversity Conservation and Wildlife Management was organized by the WII for the IFS Probationers (1998-2001 batch) undergoing training at the Indira Gandhi National Forest Academy, Dehradun. Thirteen IFS Probationers including one foreign trainee from Bhutan attended the course. The module covered various facets of wildlife conservation and management. Specialized inputs on Biogeography and Conservation Planning, Wildlife Management in Managed Forests, the Human Dimension in PA Management, Wildlife Legislation, Wildlife Interpretation and Tourism Planning, Wildlife Health, Wildlife Forensices, GIS Applications, Ex-situ Conservation and Wildlife Photography were provided. Guest lectures were delivered by Shri P.R. Sinha, Shri Manoj Mishra, Shri Ajai Saxena, Shri J.S. Chouhan and Shri Dev Raj. A field visit to the Dudhwa Tiger Reserve was also organized. Shri S.K. Pande, Principal Chief Conservator of Forests, Himachal Pradesh delivered the valedictory address. Shri Anil Bhardwaj was the Course Director and Dr. V.B. Mathur the Course Co-ordinator.

Eco-guide Training Programme for Rajaji NP, Benog WLS and Govind Pashu Vihar, *July 9-18, 2001.* Wildlife Institute of India initiated its project "Building Partnerships for Biodiversity Conservation in Rajaji National Park" with Ford Foundation assistance. An initiative was undertaken to train local youths as Ecotourist Guides under this project. The training programme aimed to use local trained youths for Ecotourism in the Park, achieving the dual objective of providing a livelihood to these people and strengthening the protection of the Park. In all twenty-five local youths from different villages around Rajaji National Park, Benog Wildlife Sanctuary and Govind Pashu Vihar and five staff were trained in the different skills required for an Ecotourist Guide. These trained youths are likely to be used for Ecotourism in their respective protected areas. This is another step forward in the project towards capacity building of the local communities, which in turn will benefit the park. Smt. Bitapi C. Sinha co-ordinated the trainng programme.

Training Programme on Environmental Impact Assessment under GEF India Ecodevelopment Project, *September 27- 29, 2001.* The objectives of the training programme were to improve scientific and technical abilities of managers and other PA staff to evaluate and monitor biodiversity conservation linked to activities, policies and projects that are currently being implemented under India–Ecodevelopment Project in different Protected Areas of the country. Participants from three out of seven GEF sites attended this prgramme. The financial support for the workshop was provided by the consultancy assignment awarded to WII by the MoEF for Protected Area Management Planning Guidelines and the Training including Regional Planning and Regulation under the GEF India Ecodevelopment Project.

The training programme was structured into fifteen sessions spread over a period of three days, and focused on approaches for environmental reviews and strategies for future monitoring of the success of the environmental review of the GEF India Project. Lessons learnt from conducting an Environmental Review of the GEF Projects in some sites during the project to preparatory phase of the India–Ecodevelopment project were shared for improved understanding of environmental review practices. Dr. Asha Rajvanshi and other WII faculty members constituted the core team of consultancy assignment under GEF-India Ecodevelopment Project and provided inputs. Some external resource persons, who had the experience of managing the PA sites where the GEF–India Project is being implemented, were also invited to provide resource inputs in this training programme. Dr. Asha Rajvanshi was the Co-ordinator.

One-Week Compulsory Training Course for IFS Officers in Wildlife Management, *November 5-9, 2001.* The objectives of the course were to (i) orientate the participants towards critical issues in protected area management and discuss strategies to deal with them, and (ii) appreciate the need for addressing the socio-economic problems of forests dwelling communities and enhancing the productivity of buffer areas and multiple-use land as a strategy for effective wildlife conservation. A field trip to Rajaji National Park, lectures by WII faculty and guest faculty on relevant topics, case studies, panel discussion and audio-visual shows were part of the training.

Out of 34 nominated IFS officers from different States within country, only twelve (one each from Tamil Nadu, Karnataka, Madhya Pradesh and Jharkhand and two each from Gujarat, Chhattisgarh, Himachal Pradesh, Andhra Pradesh and Gujarat) participated in the One-Week Compulsory Training Course for IFS Officers in Wildlife Management, conducted under the sponsorship of the Ministry of Environment & Forest, Government of India. Shri S.K. Srivastava was the Course Director.

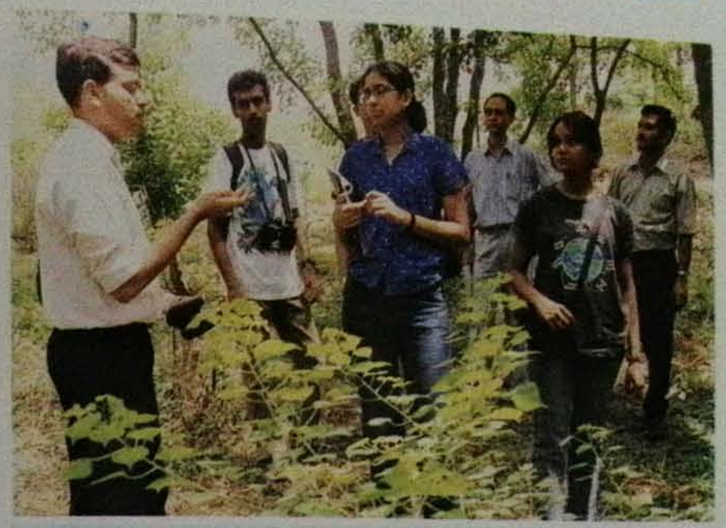
One-week training programme on Environmental Impact Assessment of Watershed Projects, *January 28–February 1, 2002.* The key objectives of the course were to introduce EIA as a tool to chart a new course of development actions that incorporate sustainability assurances in watershed development initiatives in the country. This course was organized in response to a request from the Regional Training Centre for Integrated Watershed Development Project (IWDP) with support from The World Bank funded IWDP Project currently implemented in five states. A total of twelve participants took part in the training programme. The structure of the course was specially designed to focus on the conceptual and practical aspects of EIA for addressing environmental aspects and conservation measures for watershed development projects, to highlight the importance of participatory approaches in projects formulation, and promote the criteria-driven performance evaluation of WSD projects. The WII faculty along with resource inputs from a large number of professionals from other local research and training institutions such as the Central Soil and Water Conservation Research and Training Institute, the Integrated Watershed Development Project (IWDP) and the Indian Council of Forestry Research and Education (ICFRE) took part in the course. A day visit to a Watershed project site at Palli Majhola was organized with active support from the co-ordinators of Doon Valley Watershed Project, to familiarize the participants with the role of Participatory Rural Appraisal (PRA) in project planning. The participants were familiarized to the contributions of self-help groups, and the environmental restoration activities in progress at the site of this watershed development project. Shri B.P. Pandey, IAS, Chief Project Director, IWDP & Secretary (Agriculture), Government of Uttaranchal, Dehradun graced the valedictory function and gave the certificates of participation to all the participants. Dr. Asha Rajvanshi was the Co-ordinator.

XII Endangered Species and Zoo Management Course, Bhopal, *February 14 - March 2, 2002.* This course was a part of the series of courses conducted by the Wildlife Institute of India to train zoo professionals in modern techniques in *ex-situ* management of animals, especially endangered species. The course was sponsored by the Central Zoo Authority.

Twenty-one trainees attended this course from twelve states. In all seventeen institutions were represented, of which eleven were state forest departments, three from Municipal Corporations, two from private institutions and one from a veterinary university. Four of the trainees were veterinarians. The course consisted of lectures, discussions and practical exercises with several faculty members.

During the course, field visits were made to the Gandhi Zoological Park, Gwalior and the National Zoological Park, New Delhi. On these visits the participants had useful interactions with Shri B.S. Bonal, Director, National Zoological Park, Shri P.R. Sinha, Member Secretary, Central Zoo Authority, plus veterinary doctors and other staff members of both zoos. At Gwalior the trainees were able to observe the current process of renovation and modernization of a very old and small zoo. They also conducted a survey of visitors to assess their needs and impressions of the zoo. At Delhi, Dr. Acharjyo gave a practical demonstration of the use of transponders in marking animals in captivity. Other practical exercises as a part of this course were conducted at Van Vihar National Park, Bhopal. A three-day module on Zoo based education and interpretation was part of this course. This module was conducted in collaboration with Centre for Environmental Education, Ahmedabad. The copies of numerous detailed publications were distributed to the participants of the workshop as part of the course material package.

Shri S.K. Pande, Director General (Forests) and Shri S.C. Sharma, IFS, Additional Director General (Wildlife) were the Chief Guests. Others present included Shri P.R. Sinha, Shri B.S. Bonal and L.N. Acharjyo. Shri S.K. Pande and Shri S.C. Sharma addressed the gathering and Shri S.K. Pande distributed certificates to the participants. Dr. Ravi Chellam was the Course Director and Shri B.C. Choudhury the Course Advisor.



M.Sc. students during their field visit ***Photo : Vinod Verma***

5th Special Short Term Course on Wildlife Protection, Law & Forensic Science for Probationers of Indian Customs and Central Excise Group 'A' (53rd Batch), *Feb 25–March 8, 2002.* Poaching and illegal trade in wildlife has seen discomforting increase in recent times. There is also growing evidence such crimes are being executed in organised manner in our country. Law enforcement is an essential tool of wildlife management. Without adequate law enforcement, the finest research and management programmes would have little meaning. Therefore, this course was organised with the following objectives: (i) to acquaint enforcement personnel officers of the Indian Customs and Central Excise Service with the policy and law at State, National and International levels concerning wildlife conservation, and (ii) to equip them to take up legal protection measures in a correct and effective manner. A total of 22 participants attended the course. Shri S.K. Srivastava, Dr. V.P. Uniyal, Dr. S.P. Sinha and Shri S.K. Mukherjee provided inputs. Dr. A.K. Gupta was the Course Director and Shri Sunil B. Banubakode the Associate Course Director.

ACADEMIC PROGRAMMES

VIII M.Sc. (Wildlife Science)

The Institute conducted the National Entrance Examination for M.Sc. Course (Wildlife Science) on April 22, 2001 at four centres Dehradun, Bangalore, Kolkata and Mumbai. A total of 576 candidates applied for the course, out of which 554 were eligible to sit in the examination. Three hundred and thirty three candidates appeared for the test, of which 55.9%, 5.7%, 26.7% and 11.7% candidates respectively were from Dehradun, Mumbai, Kolkata and Bangalore. A total of 43 candidates were short-listed for an interview and personality test. Finally, ten candidates were selected and eight students (one foreign candidate) joined the VIII M.Sc. Course.

The classes for the M.Sc. degree started on July 15, 2001 and several guest faculties gave their inputs for various course units, such as Dr. P.K. Hajra for Vegetation science, Dr. S.K. Dutta for Herpetology, Dr. Kenneth Gerow and Dr. Sudha Purohit for Statistics, Shri T.R. Shankar Raman for birds, Dr. Robert Fleischer and Dr. Jesus Maldonado for conservation biology. Dr. Barry Noon delivered a popular talk. During the period from August 3 to 10, 2001 and September 22 to 23, 2001 the students were taken to Rajaji National Park and Benog Wildlife Sanctuary respectively for orientation tour. The techniques tour was conducted from October 21 to November 4, 2001 at Gir Wildlife Sanctuary, Gujarat, and the wetland tour was conducted from February 4 to 11, 2002 in Keoladeo National Park, Bharatpur. A day trip was also conducted for waterfowl count along the Ganges between Bhimgauda barrage and the confluence of the rivers Ganga and Song. Two semester examinations are completed, and all students have passed both. The third semester is in progress. Dr. B.S. Adhikari is the Course Director and Dr. Karthikeyan Vasudevan the Associate Course Director.

Ph.D. Programme

Status of Doctoral Research in the WII (2001-2002) is given in the table as follows:

S. No.	Thesis Title	Name & University	Supervisor (s)
Degree Awarded			
1.	A study on the breeding biology of the Nicobar Megapode *Megapodius nicobariensis*.	Sivakumar, K., Bharathiar University, Coimbatore	Dr. Ravi Sankaran
2.	Impact of iron ore mining on the elephant habitat of Singhbhum forests, Bihar	Rakesh Kumar Singh Saurashtra University, Rajkot	Dr. Sushant Chowdhury
3.	Conservation and Management of Olive ridley sea turtle (*Lepidochelys olivacea*) population along the Orissa coast.	Bivash Pandav, Utkal University, Bhubaneshwar	Dr. S.K. Dutta
4.	Amphibian species assemblages of the wet evergreen forests of Southern Western ghats of India and the effects of forest fragmentation on their diversity	Karthikeyan Vasudevan, Utkal University, Bhubaneshwar	Dr. S.K. Dutta
5.	Genetic and morphometric studies to differentiate between wild and domestic Asian Water Buffaloes (*Bubalus bubalis*) and their hybrids in Kaziranga National Park, Assam, India	Parag D. Muley, University of Wisconsin – Madison, USA	*Supervisor:* Professor Jack J. Rutledge *Indian Advisors:* Dr. P.K. Mathur and Dr. P.K. Malik
Thesis Submitted, Award Awaited			
1.	A study on the structure and composition of forests along an altitudinal gradient in upper Bhagirathi catchment, Garhwal Himalaya	Sanjay Kr. Uniyal, FRI Deemed University, Dehradun	Dr. G.S. Rawat
2.	Ecological impact of anthropogenic pressures on high altitude forests along Bhagirathi catchment	Anjali Awasthi, FRI Deemed University, Dehradun	Dr. Asha Rajvanshi, Dr. G.S. Rawat
3.	Feeding ecology and territoriality of wolves in the Bhal, Gujarat	Bharat Jethva, FRI Deemed University, Dehradun	Dr. Y.V. Jhala
Registered			
1.	Diversity and rarity in avifaunal assemblages in the Western Himalaya : A study of patterns and mechanisms	Rashid H. Raza, FRI Deemed University, Dehradun	Dr. V.B. Mathur
2.	Development of Spatial Database in Geographical Information System Domain for Bandhavgarh Tiger Reserve and Assessment of Landuse/ Landcover Changes	Panna Lal, FRI Deemed University, Dehradun	Dr. V.B. Mathur
3.	India's Tiger Conservation Programme: Achievements, Contemporary Issues and Prospective Strategies	Anoop Badhwa, FRI Deemed University, Dehradun	Dr. V.B. Mathur
4.	Interactions between Forage, Recruitment and Activity Patterns of Blackbuck (*Antelope cervicapra*)	Priyadarshini, K.V.R., Saurashtra University, Rajkot	Dr. Y.V. Jhala
5.	Factors affecting variation in social organisation and mating system of blackbuck (*Antelope cervicapra*).	Ishwaran Kavita, Department of Zoology, University of Florida at Gainesville, USA	Dr. Y.V. Jhala *(Ph.D. committee member)*
6.	Potential for angling within the general context of ecotourism	P.K. Pant, FRI Deemed University, Dehradun	Dr. A. K. Gupta
7.	Ecology of brown bear *(Ursus arctos)* with special reference to assessment of man-brown bear conflicts in Kugti Wildlife sanctuary, Himachal Pradesh and mitigation strategies.	Bipin Chand Rathore Saurashtra University Rajkot	Dr. N.P.S. Chauhan

M.Sc. Dissertation *(External candidates)*

S. No.	Name of the Student	Thesis Title	University	Supervisor
1.	Joseph Vattakaven	Ungulate densities and ranging patterns of wolves in the Bhal.	FRI Deemed University, Dehradun	Dr. Y.V. Jhala
2.	Vinayak Patil	Jackal densities, breeding biology and ranging patterns in the Bhal.	FRI Deemed University, Dehradun	Dr. Y.V. Jhala
3.	Archana Srivastava	Assessment of roadside population of primates and impact of provisioned food and vehicular traffics in Dehradun (WII to Devi Temple)	Jiwaji University, Gwalior	Dr. A.K. Gupta
4.	Vikram Kaushal	Assessment of roadside population of primates and impact of provisioned food and vehicular traffics in Dehradun (Lacchiwala area)	Jiwaji University, Gwalior	Dr. A.K. Gupta

Ken River, Panna National Park *Photo : S.K. Srivastava*

WORKSHOP, SEMINARS, CONFERENCES & MEETINGS

Organized by the WII

Training Workshop on Abundance Monitoring of Large Mammalian Prey and Predators, Chamba, Himachal Pradesh, *April 17-19, 2001.* Based on request from the Forest Department of Himachal Pradesh, WII organised a training workshop for the wildlife staff of Kalatop-Khajjiar and Gamgul Siyabehi Wildlife Sanctuaries, Chamba Wildlife Division, Himachal Pradesh. The objective of this workshop was to provide field training to the wildlife staff in abundance monitoring of large mammals with special reference to the leopard and its major prey. This workshop was attended by 21 wildlife staff members (range officers, foresters and forest guards) and the DFO (Wildlife), Chamba.

The formal sessions were held at Chamba during which the participants gained knowledge on the biodiversity values of Kalatop-Khajjiar and Gamgul Siyabehi WLS, animal tracks and signs, techniques for monitoring large mammals of their region, and on the leopard-human conflicts with the help of a case study from Uttaranchal. The relevant training material provided was in Hindi. The field training sessions were held at Kalatop-Khajjiar WLS. The participants were trained in identification of different animal tracks and signs, leopard pugmark tracing, preparation of track plots and also on the selection and use of trails for monitoring large mammals and their evidence. The use of camera traps was demonstrated to the participants. The workshop concluded with the presentation of the analysed results of the fieldwork carried out by the participants. The training was provided by Dr. S. Sathyakumar, assisted by Shri Devendra Chauhan, Research Fellow.

His Excellency, Shri S.S. Barnala, the Governor of Uttaranchal addressing the gathering *Photo : V. Verma*

Second Meeting of the Indian Subcontinent Regional Orchid Specialist Group (ISROSG), IUCN/Species Survival Commission, Dehra Dun, *April 17–19, 2001.* The objectives of this meeting were to: (i) review the present status of orchids in the Indian Sub-continent and their conservation, (ii) update current knowledge on the biology and ecology, and (iii) deliberate on the sustainable commercial utilization of species of horticultural importance. The meeting was co-sponsored by ISROSG, the Orchid Society of India, and the Indian Society for Conservation Biologists. The meeting was inaugurated by His Excellency, Shri S.S. Barnala, the Governor of Uttaranchal State. Over fifty participants attended this meeting, which was chaired by ISROSG Chair, Mr. Udai Pradhan. At the beginning of the meeting the participants observed a two-minute silence in memory of a renowned Orchidologist, Dr. Gunner Seidenfaden of Denmark, who passed away on February 9, 2001. A diplomat by profession and the Danish Ambassador to Thailand, Dr. Seidenfaden's love for Southeast Asian orchids was unparalleled. The discussions were organised in five sessions: (i) Plenary meeting of ISROSG, (ii) Status report from other countries, (iii) Status report from India, (iv) Commerce and Ecotourism, (v) Recent Inventories and Status Surveys, (vi) Concluding session. The meeting was co-ordinated by Dr. G.S. Rawat, Member, ISROSG/IUCN-SSC's Orchid Specialist Group.

Workshop on Community Participation in Forest and Wildlife Conservation, Munsiary Block, Pithoragarh, Uttaranchal, *May 10, 2001.* The Munsiary block of Pithoragarh district in Uttaranchal forms the upper catchment of the river Gori Ganga, a tributary of the Sharada. The area lies between the eastern flank of the Nanda Devi Biosphere Reserve and the Askot Wildlife sanctuary, and supports a large chunk of community owned Van Panchayats, Reserved Forests and alpine grazing lands. The WII, in collaboration with the Foundation for Ecological Security (FES; Formerly a part of National Tree Grower's Co-operative Federation Ltd.) organised one-day workshop at Munsiary with the following objectives: (i) to discuss the conservation and livelihood issues in the area, (ii) to evolve a joint Forest and Wildlife Conservation programme for it, and (iii) to discuss the legal issues pertaining to wildlife protection, habitat conservation and illegal trade. Over 100 participants, including several senior citizens of Gori Valley, representatives from the Forest and Revenue Departments, Research Institutions and People's representatives, attended the workshop. The workshop provided a forum to the local communities to interact closely with government officials and technical Institutions. All the participants were of the opinion that the long-term ecological security of the valley rests on collaborative efforts in conservation. Workshop co-ordinators were Dr. G.S. Rawat (WII) and Mr. Ramnarayan (FES).

Training workshop for field staff of Himachal Pradesh Forest Department, Nahan, *May 16-18, 2001.* This workshop was focussed on census techniques for the frontline staff. Various census techniques were discussed with the participants. Emphasis was given on census techniques for leopard and other large mammals as the staff required. Shri S.B. Banubakode, Dr. K. Sivakumar and Dr. S.P. Goyal were the resource persons. The WII organised this workshop in collaboration with the Himachal Pradesh Forest Department.

India Ecodevelopment Project (IEDP) workshop on the participatory process approach for village ecodevelopment and ecotourism planning and management, Buxa Tiger Reserve, West Bengal, *June 4-8, 2001.* The objective of the workshop was to steer the issues on identified themes through site specific case studies, and interact among the Management Plan Officers to improve the management plan. Four GEF site participants - two from Periyar, one from Nagarhole, two from Palamau and nine from Buxa Tiger Reserve attended the workshop. Besides site-level participants, several other north Bengal officers also took part in the workshop. The presence of PCCF (WL), W.B. and CCF (WL), W.B in the deliberations and field activities provided valuable opportunities for the participants to discuss various wildlife management issues.

The field visits to two Forest Protection Committees (FPCs) on the western side (Paniyalguri and Nimati-Domohani) and two on the eastern side (Kumargram and Barobisha) of the Buxa Tiger Reserve provided an overview of the participatory process activities and their role in the ecodevelopment work. The most spectacular process of the participation was the involvement of women in all committees. The self-help group constituted by the women is an important step in self-realization and advancement. Women now form a regular patrolling force for forest protection.

The case study presented by the staff of Periyar Tiger Reserve on the *Cinnamomum* bark collection was an excellent example of people's participation and biodiversity conservation. The people of the local community were earlier engaged in poaching, tree cutting and *Cinnamomum* bark collection. They are now involved in the ecotourism activities of taking the visitors on the Periyar Tiger trail. A case study from Palamau Tiger Reserve was also presented. The preparation of 56 microplans, with implementation on 55 of them showed the restoration of a better political environment for conservation advancement. Dr. Sushant Chowdhury was the co-ordinator of this site-level workshop.

Workshop on Developing Strategies for Ecotourism in India, LBSNAA Mussoorie, *June-27-29, 2001.* This workshop was organized by the Wildlife Institute of India in collaboration with the Lal Bahadur Shastri National Academy of Administration (LBSNAA). The workshop was sponsored by the LBSNAA. The workshop had 41 participants from the Forest and the Tourism Departments, private sector, research and training institutions. The workshop was co-ordinated by Shri Rajiv Bhartari, WII and Ms. Uma Devi, Senior Deputy Director LBSNAA. Dr. Nandita Jain, Programme Manager, The Mountain Institute - Asia Region Programme and Dr. Sejal Worah, Consultant WWF, UK, conducted the workshop and facilitated various sessions.

The objectives of the workshop were: (i) to provide an opportunity for sharing experience in ecotourism from different States and across various sectors; (ii) to define the Indian approach to ecotourism and to develop aims and objectives for ecotourism

in the Indian context and (iii) to identify issues, constraints and processes for the promotion of ecotourism in India. The first half of the workshop was devoted to developing a vision for the development of ecotourism in India while the second half focussed on preparing broad strategies and an action plan for the promotion of ecotourism. Shri V.B. Sawarkar's contribution addressed the field perspective. The workshop provided a valuable opportunity for dialogue between senior officials from the government and the private sector. The workshop proceedings have been made into a brochure for wider dissemination

National Workshop on Regional Planning for Wildlife Protected Areas, India Habitat Centre, New Delhi, *August 6-8, 2001.* The objectives of the workshop were to: (i) retrospect - highlight accomplishment, status, trends, constraints and gaps in PA management regarding unplanned development; (ii) appreciate environmental benefits and economic gains arising from PAs and develop a long term perspective; (iii) address challenges (conflicts and constraints) in PA management and suggest appropriate options and actions; (iv) ensure integration of ecological and PA concerns in large scale landuse planning; (v) evolve mechanisms for broadening participation, consensus building and inter-agency co-operation; (vi) suggest means for sustainability of ecodevelopment inputs and their augmentation; (vii) facilitate process of regional planning, provide insight (framework, guidelines, regulations) and give future direction for such efforts.

The Project Tiger, Government of India and the Wildlife Institute of India, Dehra Dun, jointly organized this workshop as part of the ongoing assignment of the GEF-India Ecodevelopment Project executed in seven protected area sites across the country. The project aims at making Regional Planning, an integral part of the management planning process at seven PA sites. The workshop was well attended by senior planners, administrators, field practitioners, decision-makers, entrepreneurs, scientists, NGOs, and elected representatives of people. In all, there were 110 participants at the workshop.

Inaugural session of National Workshop on Regional Planning for Wildlife Protected Areas *Photo : V. Verma*

Dr. P.K. Mathur presented the summary of the Site/ State Level Workshop held at Ahmedabad and set the agenda for the National Workshop. The workshop commenced with a panel discussion on the "Protected Areas and Landscape – Challenges and Opportunities". Four distinguished panellists: Shri S.K. Pande, Shri H.S. Panwar, Shri A.K. Mukerji and Professor Shekhar Singh participated in the panel, and set the stage for the workshop.

This was followed by the inaugural session. Shri P.V. Jayakrishnan, IAS, was the Chief Guest on occasion and delivered the inaugural address while the Hon.Shri Holkhomang Haokip, Member of Parliament (Lok Sabha) and member of the WII Society was the Guest of Honour. Altogether there were seven Technical Sessions including seven site-specific presentations on Regional Planning from the seven GEF-IEP sites. The participants broadly deliberated on two themes *i.e.* Incorporation of Ecological and PA concerns in Large Landscape Planning, and Building Alliances – Mechanisms for Inter-Agency Co-operation, Inter-State Relations, Trans-boundary Issues and Ecodevelopment.

A compendium containing background information, 25 invited papers and other published papers relevant to the workshop theme, was distributed to the participants.

The concluding session included presentations from the two working group representatives Shri H.S. Panwar and Dr. V.B. Mathur, and a workshop summary. The workshop ended with remarks by Shri B.S. Baswan, IAS, and the Chairman in which he hoped that the concerned institutions and agencies would initiate appropriate actions on the workshop recommendations. Dr. P.K. Mathur was the co-ordinator for the workshop.

Sloth bear Workshop in Panna Tiger Reserve, *September 24 – 27, 2001.* The objective was to disseminate the findings of the sloth bear project to 28 participants from the forest department and NGOs. Dr. A.J.T.Johnsingh made a presentation on 'Bear Conservation in India' to the participants and they were briefed in the field about the various field methods used in the study of sloth bear ecology and behaviour in the tiger reserve. He was also the co-ordinator of the workshop.

Participants of Sloth Bear Workshop during field visit. *Photo : A.J.T. Johnsingh*

XV Annual Research Seminar, Dehradun, *October 18-20, 2001.* Shri H.S. Panwar, member TRAC, chaired the seminar. A total of 24 papers were presented by the Researchers, Post Graduate Interns, Collaborators and Faculty Members of the institute. About 200 delegates from all over the country and a few from foreign countries attended the ARS. About 100 external delegates: 46 from other Government Institutions, seventeen from State Forest Departments, sixteen from Academic Institutions, thirteen from NGOs and five from media and other agencies attended the ARS. Some 100 internal participants (Faculty Members, Researchers and Post Graduate Interns) from the institute also attended the ARS.

The following were adjudged as the top five presentations:

Name	Topic of Presentation
K.S. Gopi Sundar	Super ovulation! The 2000 breeding season of Sarus Cranes *(Grus antigone)* in Etawah and Mainpuri, India.
Sandeep Sharma	Tiger Pugmarks - A quantitative approach.
Aparajita Datta	An ecological study of sympatric hornbills and fruiting patterns in a tropical forest in Arunachal Pradesh: An overview.
K. Yoganand	Behaviour, ecology and conservation of sloth bear in Panna National Park: An overview.
Dr. Dinesh K. Sharma	Establishment and achievements of conservation genetics facility at WII.

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

Discussion and question answer session during Annual Research Seminar *Photo : V. Verma*

Multi-stakeholder Workshop on Ecotourism in Corbett Binsar Nainital (CBN), Garjia, Uttaranchal, *November 8-9, 2002.* The two-day multi-stakeholder workshop was held at Garjia to : (i) share the findings of twenty consultations on ecotourism with the stakeholders group in CBN, (ii) develop components of a framework for ecotourism in CBN and to identify future course of action, and (iii) seek commitments from individuals and organizations.

The workshop had over forty-five participants, mainly from the private sector and the local communities. The workshop was sponsored by Leadership for Environment and Development (LEAD) and IUCN Himal Programme. The workshop was co-ordinated by Shri Rajiv Bhartari and Dr. V.B. Mathur. Dr. Nandita Jain and Dr. Sejal Worah facilitated various sessions of the workshop.

Planning Workshop on UNESCO Project Enhancing our Heritage: Monitoring and Managing for Success in Natural World Heritage Sites, Keoladeo National Park, Bharatpur, *November 21-23, 2001.* The objectives of the workshop were to: (i) Introduce the project 'Enhancing our Heritage' to the participants; (ii) Explain the World Commission on Protected Area (WCPA) framework for assessing protected area management effectiveness; (iii) Discuss the four-year project implementation schedule and specifically the initial assessment. The workshop was sponsored by UNESCO, University of Queensland, Australia, Government of Rajasthan and Government of Assam. A total of 32 participants attended the workshop. The goal of the workshop was to provide an overview of the project to the participants from the two pilot sites for the project in India *i.e.* Keoladeo and Kaziranga National Parks. Specially developed documentation containing : (i) a manual describing the project, its implementation and the management effectiveness framework and (ii) a workbook containing assessment methods and case studies were given to the participants. The role of the WII in the technical backstopping of the project and the facilitation of activities was explained to the participants. The workshop was co-ordinated by Dr. V.B. Mathur. Shri S.K. Mukherjee, Shri B.C. Choudhury, Dr. Marc Hockings, Mr. Nigel Smith and Ms. Sue Stolton provided valuable contributions.

Planning Workshop on UNESCO Project 'Enhancing our Heritage: Monitoring and Managing for Success in Natural World Heritage Sites', Royal Chitwan National Park, Nepal, *November 27-29, 2001.* The objectives of the workshop were to: (i) Introduce the project 'Enhancing our Heritage' to the participants; (ii) Explain the World Commission on Protected Area (WCPA) framework for assessing protected area management effectiveness; and (iii) Discuss the four year project implementation schedule and specifically the initial assessment. It was sponsored by UNESCO, University of Queensland, Australia, Royal Chitwan National Park and Department of National Parks & Wildlife Conservation, Nepal. A total of eighteen participants attended the workshop, whose goal was to provide an overview of the project to the participants from the project pilot site – Royal Chitwan National Park. This was done through interaction, discussion and documentation. The role of the WII in the technical backstopping of the project activities, ensuring fund flow and co-ordination between site, the Govenrment of Nepal and the International Project Management, was explained to the participants. The workshop was co-ordinated by Dr. V.B. Mathur. Shri S.K. Mukherjee, Shri B.C. Choudhury, Dr. Marc Hockings, Mr. Nigel Smith and Ms. Sue Stolton provided valuable contributions.

National symposium on elephant conservation, management and research, BHEL Haridwar, *December 16-20, 2001.* The Wildlife Institute of India in collaboration with Project Elephant, MoEF, GOI and the Uttaranchal Forest Department organized a five days' symposium in the BHEL auditorium, Haridwar to take a decade review on elephant conservation, management and research in the country. The symposium was inaugurated and chaired by the Hon. Chief Minister, Government of Uttaranchal, Shri Bhagat Singh Koshiyari. On this occasion Dr. Mohan Singh Rawat Gaonwasi, the Hon. Forest Minister, Uttaranchal, was the Guest of Honour. Senior officers Shri S.K. Pande, DG, MoEF, GOI, Dr. R.S. Tolia, Principal Secretary and Commissioner, Forest and Rural Development, Uttaranchal, Shri S.C. Sharma, ADG (Wildlife), MoEF, GOI, Shri S.S. Bist, IGF and Director (PE), Shri S.K. Mukherjee, Director, WII and Shri A.S. Negi, CCF and Chief Wildlife Warden, Uttaranchal put forward their concerns for conservation and management of elephants. The Chief Wildlife Wardens and their representatives from thirteen elephant-bearing States, researchers and scientists

Inauguration of National Symposium *Photo : V. Verma*

from several Institutions, decision makers and administrators from Central and State Governments, NGOs and Asian Elephant Conservation Action Fund, USFWS participated in the presentations and deliberations. The six technical sessions on status distribution and the monitoring of elephant populations, ecology habitat and corridors, interface conflict and management, research and monitoring, protection, law and policy, education awareness and participation included several presentations. The concluding session under the Chairmanship of Dr. R.S. Tolia drafted 21 recommendations for implementation at various levels. A field trip to Rajaji and Corbett National Parks was organized to acquaint the participants with the landscape integration issues and the corridor need of elephants in the proposed Rajaji - Corbett Elephant Reserve. Dr. Sushant Chowdhury co-ordinated the technical aspect of the symposium.

Training Workshop on Habitat Evaluation and Wildlife Census Techniques at Jaldapara Wildlife Sanctuary, West Bengal, *January 24-26, 2002.* The objectives of the workshop were: (i) To discuss the habitat evaluation concepts, methods and practices, (ii) To provide an overview of planning and implementing wildlife census operation, (iii) To provide hands-on experience of conducting herbivore and carnivore census operations in the field. It was sponsored by the Wildlife Wing, Directorate of Forests, Government of the West Bengal. A total of 72 officers and frontline staff of the West Bengal Forest Directorate participated in the workshop. This training workshop was organized to assist the Wildlife Wing, Directorate of Forests, West Bengal in their capacity-building initiatives in the field of habitat evaluation and wildlife census techniques. Six technical sessions and three field sessions covering the theoretical as well as practical aspects were organized. The data collected during the field exercises was analyzed and interpreted by the participants. An overwhelming response and enthusiasm was shown by the participants who after gaining the requisite skills, actually conducted the herbivore and carnivore census operations in North Bengal. The workshop was coordinated by Dr. V.B. Mathur, Dr. G.S. Rawat, Dr. S. Sathyakumar, Shri Sunil Banubakode and

Participants of training programme for frontline staff of Jaldapara Wildlife Sanctuary *Photo : V.B. Mathur*

Ms. Tanushree Biswas from the WII and Shri U.K. Bhattacharya, IFS, Shri Ravi Kant Sinha, IFS and Shri Vinod Yadav, IFS providing valuable contributions to the training workshop.

Workshop on Using Multivariate Statistics in Natural Sciences, Dehradun, *February 6-8, 2002.* A three-day workshop was organized for researchers from the Indian Institute of Remote Sensing, Dehradun in Using Multivariate Statistics in Natural Sciences. Topics covered were PCA, Discriminate Analysis, Cluster Analysis, Logistic and Multiple Regression, and SPSS software use for this analysis. Dr. Y.V. Jhala and Qamar Qureshi organised the workshop.

Workshops, Seminars, Conferences and Meetings

Attended by WII personnel

Workshop on Conflict Resolution for Natural Resource Management, Bhopal, *April 2-6, 2001.* Dr. Ruchi Badola participated in the workshop organized by the World Bank and the IIFM.

Workshop on Captive Rearing of Galliformes, Morni Hills, Haryana, *April 3-7, 2001.* This workshop was conducted by the CZA, World Pheasant Association and the Haryana State Wildlife Department for the managers of the zoos/ captive breeding centres for pheasant in India. Shri S.K. Mukherjee and Dr. S. Sathyakumar participated in this workshop as Resource Persons and provided information to the participants.

IUCN-Himal INTACH Workshop, New Delhi, *April 25-26, 2001.* Dr. P.K. Mathur attended the two-day IUCN-Himal Workshop jointly organised by the WII and INTACH. Dr. Mathur made a case study presentation entitled "Livestock Grazing in Himalayas – Issues and Approaches" based on the research he supervised in the Great Himalayan National Park Conservation Area during 1995-1999. Shri S.K. Mukherjee, Shri B.C. Choudhury and Dr. V.B. Mathur also participated from the Wildlife Institute of India.

International Workshop on Integrating Biodiversity into National Environmental Assessment Processes: Best Practices and Country Case Studies, Lusaka, Zambia, *April 30-May 4, 2001.* The objective of this workshop was to discuss the results of the national EIA status reports and country case studies prepared by the representatives of the fifteen countries under the initiatives of UNEP. The workshop focused on identifying examples of good practices and exploring guiding principles for the effective integration of biodiversity concerns with Impact Assessment procedures. The workshop was organised by the United Nations Environment Programme (UNEP) and the United Nations Development Programme (UNDP) under the Biodiversity Planning Support Programme. Dr. V.B. Mathur and Dr. Asha Rajvanshi were invited as resource persons by the Task Manager for the Biodiversity Support Planning Programme (BPSP) to attend the above workshop. Dr. Mathur made a presentation on "Existing National EIA Framework for Integration of Biodiversity Concerns in EIA" and Dr. Asha Rajvanshi made a presentation on "Evaluation of the efficacy of the existing country specific EIA legislations and guidelines for integration of biodiversity concerns in EIA". The two presentations led to the preparation of a joint output on a suggested framework and guiding principles for better integration of biodiversity in EIA in India. The recommendations from national case studies presented in this workshop have been incorporated in the seventh meeting of the Subsidiary Body on Scientific and Technical and Technological Advice of the Convention on Biodiversity held in Montreal.

Thematic Workshop on Adequacy of Conservation Management of PAs and Non-PAs of Uttaranchal, *May 2, 2001.* The Uttaranchal Forest Department and TERI, New Delhi, jointly organised this one-day thematic workshop. Shri V.B. Sawarkar, Dr. P.K. Mathur and Shri S.K. Srivastava participated in this workshop. Shri Srivastava provided information for the development of strategy for conserving the remaining ecosystems/habitats in the erstwhile UP State. Shri V.B. Sawarkar provided the technical contribution in this workshop. Broad issues and strategy framework proposed by TERI were evaluated to give them a final shape. The project was originally commissioned by U.P., then bifurcated after the establishment of the new state of Uttaranchal.

IUCN Regional Training Workshop on Planning National Protected Area Systems in Asia, Bangkok, Thailand, *May 18-22, 2001.* The IUCN, as part of its current activities to build the capacity of Protected Area Managers in Asia, organized this Regional Training Workshop. The main objective was to develop a practical and useful training package based on the IUCN World Commission on Protected Area (WPCA) guidelines "National System Planning for Protected Areas". Senior Protected Area Managers from ten Asian countries participated in this workshop. Dr. V.B. Mathur, invited as the resource person, made a presentation on the "Biogeographic Basis of Conservation Planning".

International Conference on Bear Research and Management, Jackson Hole, Wyoming, USA, *May 20–26, 2001.* The objective of the conference was to disseminate the information available on this topic. It was organised by the International Association for Bear Research and Management. Dr. A.J.T. Johnsingh made a presentation on 'Bear Conservation in India' highlighting the ecology, behaviour and conservation status of the four species of bear (brown bear, black bear, sloth bear and Malayan sun bear) found in India. It emerged that the conservation status of the brown bear and the Malayan sun bear is precarious in India. Dr. N.P.S. Chauhan, Dr. S. Sathyakumar and Shri K. Yoganand also participated in this conference and presented papers/posters. A poster entitled "Observations on food habits of the Asiatic black bear in Kedarnath Wildlife Sanctuary, Western Himalaya – Preliminary evidence on the role of black bears in enhancing seed germination and dispersal" by Dr. S. Sathyakumar and Dr. Syam Viswanath was presented at this conference.

Meeting on the approval of management plans for select PAs in Gujarat, Gandhinagar, *June 7-8, 2001.* Dr. P.K. Mathur attended the meeting for the consideration and approval of management plans for thirteen protected areas in Gujarat convened by the Chief Wildlife Warden, Gujarat at the GEER Foundation, Gandhinagar. Field managers of concerned PA sites made presentations on their prepared draft plans; subsequently the participating members deliberated making appropriate decisions for approval or revision of the management plans.

Workshop on Biodiversity Education, Awareness and Training, IGNFA, Dehradun, *June 15, 2001.* The Uttaranchal Forest Department and the Tata Energy Research Institute (TERI), New Delhi organized this workshop. Representatives from scientific institutions FSI, ZSI, BSI, IIRS and senior officers of the Uttaranchal Forest Department participated. Dr. V.B. Mathur was invited as a resource person to deliberate on the concept paper prepared by the Uttaranchal Forest Department for creating public awareness of biodiversity conservation.

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Commemorative Workshop, Kanha Tiger Reserve, *June 26-27, 2001.* The Kanha Tiger Reserve, Mandla, organized a Commemorative Workshop on completion of 25 years' work, which coincided with the meeting of the Madhya Pradesh State Wildlife Advisory Board. Dr. P.K. Mathur represented the WII in both workshop and meeting of the State Wildlife Advisory Board. The Commemorative Workshop was chaired by Shri Digvijay Singh, the Hon.Chief Minister, Madhya Pradesh, while the Hon.Forest Minister, MP, chaired the State Wildlife Advisory Board meeting.

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UNESCO-IUCN Regional Workshop on Enhancing our Heritage: Monitoring and Managing for Success in World Natural Heritage sites, Serengeti National Park, Tanzania, *July 16-22, 2001.* The UNESCO World Heritage Centre (WHC) in collaboration with IUCN World Commission of Protected Areas (WCPA) and other partners have initiated a project 'Enhancing our Heritage: Monitoring and managing for Success in World Natural Heritage Sites'. The

IUCN-Himal INTACH Workshop, New Delhi, *April 25-26, 2001.* Dr. P.K. Mathur attended the two-day IUCN-Himal Workshop jointly organised by the WII and INTACH. Dr. Mathur made a case study presentation entitled "Livestock Grazing in Himalayas – Issues and Approaches" based on the research he supervised in the Great Himalayan National Park Conservation Area during 1995-1999. Shri S.K. Mukherjee, Shri B.C. Choudhury and Dr. V.B. Mathur also participated from the Wildlife Institute of India.

International Workshop on Integrating Biodiversity into National Environmental Assessment Processes: Best Practices and Country Case Studies, Lusaka, Zambia, *April 30-May 4, 2001.* The objective of this workshop was to discuss the results of the national EIA status reports and country case studies prepared by the representatives of the fifteen countries under the initiatives of UNEP. The workshop focused on identifying examples of good practices and exploring guiding principles for the effective integration of biodiversity concerns with Impact Assessment procedures. The workshop was organised by the United Nations Environment Programme (UNEP) and the United Nations Development Programme (UNDP) under the Biodiversity Planning Support Programme. Dr. V.B. Mathur and Dr. Asha Rajvanshi were invited as resource persons by the Task Manager for the Biodiversity Support Planning Programme (BPSP) to attend the above workshop. Dr. Mathur made a presentation on "Existing National EIA Framework for Integration of Biodiversity Concerns in EIA" and Dr. Asha Rajvanshi made a presentation on "Evaluation of the efficacy of the existing country specific EIA legislations and guidelines for integration of biodiversity concerns in EIA". The two presentations led to the preparation of a joint output on a suggested framework and guiding principles for better integration of biodiversity in EIA in India. The recommendations from national case studies presented in this workshop have been incorporated in the seventh meeting of the Subsidiary Body on Scientific and Technical and Technological Advice of the Convention on Biodiversity held in Montreal.

Thematic Workshop on Adequacy of Conservation Management of PAs and Non-PAs of Uttaranchal, *May 2, 2001.* The Uttaranchal Forest Department and TERI, New Delhi, jointly organised this one-day thematic workshop. Shri V.B. Sawarkar, Dr. P.K. Mathur and Shri S.K. Srivastava participated in this workshop. Shri Srivastava provided information for the development of strategy for conserving the remaining ecosystems/habitats in the erstwhile UP State. Shri V.B. Sawarkar provided the technical contribution in this workshop. Broad issues and strategy framework proposed by TERI were evaluated to give them a final shape. The project was originally commissioned by U.P., then bifurcated after the establishment of the new state of Uttaranchal.

IUCN Regional Training Workshop on Planning National Protected Area Systems in Asia, Bangkok, Thailand, *May 18-22, 2001.* The IUCN, as part of its current activities to build the capacity of Protected Area Managers in Asia, organized this Regional Training Workshop. The main objective was to develop a practical and useful training package based on the IUCN World Commission on Protected Area (WPCA) guidelines "National System Planning for Protected Areas". Senior Protected Area Managers from ten Asian countries participated in this workshop. Dr. V.B. Mathur, invited as the resource person, made a presentation on the "Biogeographic Basis of Conservation Planning".

International Conference on Bear Research and Management, Jackson Hole, Wyoming, USA, *May 20–26, 2001.* The objective of the conference was to disseminate the information available on this topic. It was organised by the International Association for Bear Research and Management. Dr. A.J.T. Johnsingh made a presentation on 'Bear Conservation in India' highlighting the ecology, behaviour and conservation status of the four species of bear (brown bear, black bear, sloth bear and Malayan sun bear) found in India. It emerged that the conservation status of the brown bear and the Malayan sun bear is precarious in India. Dr. N.P.S. Chauhan, Dr. S. Sathyakumar and Shri K. Yoganand also participated in this conference and presented papers/posters. A poster entitled "Observations on food habits of the Asiatic black bear in Kedarnath Wildlife Sanctuary, Western Himalaya – Preliminary evidence on the role of black bears in enhancing seed germination and dispersal" by Dr. S. Sathyakumar and Dr. Syam Viswanath was presented at this conference.

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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. Dr. V.B. Mathur and Shri B.C. Choudhury were invited to be resource persons in the Regional Workshop held in Serengeti National Park, Tanzania from July 16-22, 2001. Senior park managers and NGO representatives from Tanzania, Uganda, South Africa and the Seychelles participated in this workshop.

Workshop on Management planning for Bihar Forest Officers, Patna, *July 18, 2001.* Shri S.K. Srivastava participated in this workshop organized by the Bihar Forest department at Patna, and made a presentation on 'Management planning for the Protected Areas'.

Module on Wildlife Protection for Senior Indian Customs and Central Excise Officers (1984 Batch), *July 31–August 3, 2001.* The objective of this module was to sensitize Customs Officers in the matters relating to Wildlife Protection, Forensic Science and Conservation. It was organised by NACEN, Faridabad. A total of 22 participants attended. Dr. A K. Gupta participated in the panel discussion on Inter-departmental Co-ordination. Shri S.K. Srivastava also provided information on Wildlife trade and protection, including inter-departmental co-ordination. Dr. A.J.T. Johnsingh made two presentations: One on biodiversity conservation focusing on large mammal conservation, and the other on the ecology and the behaviour of elephants with reference to poaching for ivory. Dr. A K. Gupta was the Course Director for this module.

Expert Consultation on Remote Sensing and GIS as a monitoring tool in Uttaranchal State, Dehradun, *August 1, 2001.* The Government of Uttaranchal organized this expert consultation at Dehradun. Representatives from IIRS, WIHG, ZSI, BSI, FRI, ICFRE and senior officers of Uttaranchal State participated. The objectives of the expert consultation were to: (i) Prepare a database of datasets and reports of projects carried out by national institutions in Uttaranchal, and (ii) Identify watersheds for pilot projects on database development. Dr. V.B. Mathur participated in this consultation, and made a presentation on the projects undertaken by the institute in Uttaranchal.

National Workshop on Regional Planning, for Wildlife Protected Areas, New Delhi, *August 6-8, 2001.* Shri V.B. Sawarkar presented a paper on principles for wildlife management planning at the landscape level.

WWF – India Workshop on 'Satpura – Maikal Landscape', IIFM, Bhopal, *August 23-24, 2001.* The WWF-India organized this workshop at the Indian Institute of Forest Management, Bhopal. Over fifty participants from Madhya Pradesh and Maharashtra, including PA managers, NGOs, representatives from scientific institutions and other agencies, participated in the workshop. Dr. V.B. Mathur was invited to make a presentation on 'Landscape Evaluation for Tiger Habitat Assessment and Corridor Identification: A Remote Sensing – GIS Approach'.

Education and awareness workshop, Ahmedabad, *August 2001.* The Centre for Environmental Education (CEE), Ahmedabad conducted this workshop to assess sea turtle conservation awareness and education needs. Based on discussion and deliberations, the CEE has developed strategies and an action plan for the state-wise implementation of education programmes. A handout and poster on the marine turtles of India has been brought out by CEE too, and distributed to all maritime state agencies. Shri B.C. Choudhury attended the workshop.

DOS-DBT Workshop on Jai Vigyan Project, Port Blair, Andaman and Nicobar Islands, *September 3-4, 2001.* The Department of Space (DOS) and the Department of Biotechnology (DBT) organized this workshop at Port Blair, which was chaired by Dr. Manju Sharma, Secretary, DBT. The participants included scientists from SACON, MSSRF, NRSA, IIRS, CARI and senior officers of the A and N Forest Department. Dr. V.B. Mathur made a presentation on 'Conservation Priorities for A & N Islands'. He also made a presentation on 'Development of Management Information System' in the office of the PCCF, A&N Islands.

Brainstorm meeting on the application of remote sensing and GIS technology to the management of elephant habitats and corridors, Bangalore, *September 7, 2001.* The Karnataka Forest Department and the Project Elephant Directorate, New Delhi, organized this brainstorm meeting in Aranya Bhawan, Bangalore. Scientists from IIRS, SACON, AERC, ORSA and officers of the Wildlife Wing, Karnataka participated. Dr. V.B. Mathur was invited to make a presentation on 'Landscape Evaluation and Corridor Identification using RS-GIS technology'. He was also made a member of the working group set up to develop a spatial database in GIS domain.

Terai Arc Landscape Planning Meeting in Washington DC, *September 7, 2001.* The objective was to plan for Terai Arc Tiger Conservation Landscape. It was organised by the National Fish and Wildlife Foundation, Washington D.C. USA. Terai Arc Tiger Conservation Landscape stretches from the Yamuna River in the west to the Valmiki Tiger Reserve, Bihar, in the east. This productive habitat once continuous and rich in large mammals such as tiger, rhino and elephant is threatened by fragmentation and biotic pressures. A presentation was made by Dr. A.J.T.Johnsingh explaining the possibility of revival this landscape.

Workshop on measures to mitigate elephant deaths by train accidents in Rajaji National Park, *September 9, 2001.* Shri S.K. Srivastava attended the workshop, organized by the Uttaranchal Forest department at WII, and participated in discussions.

Canid Biology and Conservation Conference, Oxford, UK, *September 17-21, 2001.* The conference was organized by the IUCN Canid Specialist Group and the Wildlife Conservation Research Unit of Oxford University. Dr. Y.V. Jhala attended the conference.

Workshop for Honorary Wildlife Wardens of Rajasthan, *October 4-5, 2001.* Shri S.K. Srivastava attended the workshop organized by the Rajasthan Forest Department at Jaipur and made a presentation on 'Applicability of Wildlife Protection Act for Honorary Wildlife Wardens'. Shri Srivastava also co-chaired one of the sessions.

Workshop on Biodiversity Conservation Priorities in Uttaranchal, *October 5, 2001.* Dr. G.S. Rawat and Dr. S. Sathyakumar participated in this workshop conducted by the Uttaranchal State Forest Department, and made presentations on conservation priorities of the flora and fauna in Uttaranchal.

Asian Global Positioning System (GPS) Conference, New Delhi, *October 29-30, 2001.* The Centre for Spatial Database Management and Solutions (CSDMS) in collaboration with the Asian Remote Sensing Research Information Network (ARSRIN), the Asian Association of Remote Sensing (AARS) and the Asian Institute of Technology (AIT), Bangkok, organized this conference. Dr. V.B. Mathur was invited to present his paper on 'GPS applications in spatial database development of Tadoba – Andhari Tiger Reserve, Maharashtra.

Pre World Wilderness Congress Wilderness Management Training Course, Port Elizabeth, South Africa, *October 26-31, 2001 and* **the seventh World Wilderness Congress, Port Elizabeth, South Africa,** *November 2-8, 2001.* The seventh Wilderness Management Training Course, on "The Challenge of the Wilderness – An Introduction to Wilderness Philosophy, Concepts and Practice" held at Shamwari Private Game Reserve and the Zuurberg Inn, was attended by twenty five managers and trainers from fifteen African countries as well as Russia, Brazil, Canada and India. Dr. S.P. Goyal attended this course. All participants were fully sponsored by the Sierra Club, USA, and the Wildlife Foundation, USA. The course introduced them to wilderness philosophy, concepts and the principles of wildland management. Wilderness areas are defined as areas in which there is no motor transport, no roads and no permanent human habitation. The only access is on foot, on horseback or bicycle. These are not parks or reserves but could be a designated area within a reserve or on private property. They are important because they serve as reservoirs of the indigenous flora and fauna of that particular area. Course presenters were from the Wilderness Action Group, and the Centre for Environment and Development of the University of Natal, as well as from the USA.

Participants of Pre World Wilderness Congress Wilderness Management Training Course, South Africa

Afterwards, Dr. S.P. Goyal attended the seventh WWC in Port Elizabeth, South Africa. The conference was attended more than 700 participants from various countries structured in two parts, Part I: World Wilderness Summit, and Part II: Wilderness Working Sessions. Various issues were covered ranging from the role of tribal communities to science and stewardship in order to protect and sustain wilderness values.

International Symposium on the Tiger, New Delhi, *November 6-8, 2001.* The symposium was hosted by the Global Tiger Forum. The participants included delegates from several tiger range countries. An M.Sc. student of the WII Shri Sandeep Sharma presented his work on 'Evaluation of Pugmark Census Technique'. An outcome of his M.Sc. dissertation which was supervised by Shri V.B. Sawarkar and Dr. Y.V. Jhala. The objective was to bring together all the members of the Global Tiger Forum to discuss tiger conservation. It was organised by the Global Tiger Forum, New Delhi. A presentation was made by Dr. A.J.T.Johnsingh on the conservation status of 36 cat species in the world, with special reference to *Panthera tigris*.

Elephant mahout training programme, Corbett Training Centre, *November 24–25, 2001.* The objective was to train mahouts in Captive Elephant Management. It was organised by Project Elephant. Dr. A.J.T.Johnsingh gave a presentation on the ecology and behaviour of elephants for 22 men working with domestic elephants. This presentation in English was translated into Hindi by Mrs. Bitapi C. Sinha.

Workshop on Captive Rearing of Galliformes, Chail, Himachal Pradesh, *November 27-28, 2001.* This workshop was conducted by the Central Zoo Authority of India, World Pheasant Association and the Himachal Pradesh State Wildlife Department at Chail from November 27 to 28, 2001. It was primarily for the keepers of zoos and captive breeding centres for pheasant in India. Dr. S. Sathyakumar participated in this workshop as a resource person and provided teaching inputs to the participants.

Fourth International Conference of Asian Digital Libraries, Bangalore, *December10-12, 2001.* Shri M.S. Rana attended the fourth International Conference.

South Indian Zoo Directors meeting cum workshop on Endangered Species Breeding, *December 22-23, 2002.* Shri B.C. Choudhury participated in this workshop as a Resource Person. The participants in this meeting were top-level policy makers, Chief Wildlife Wardens and the Zoo Directors of the four South Indian States of Tamil Nadu, Andhra Pradesh, Karnataka and Kerala. The meeting cum workshop was organized

by the Karnataka Zoo Authority and Central Zoo Authority. Commensurate with the policy of the Central Zoo Authority to initiate only co-ordinated Captive Breeding of Endangered species on a regional species distribution range basis, it was the first attempt of the South Indian Zoo Directors to organize a workshop to discuss the basic protocols of Zoo Management and a Co-ordinated breeding programme. On behalf of the Wildlife Institute of India, B.C. Choudhury discussed the issues relating to co-ordinated research in Zoos and the need for networking with various professional research agencies in the region. The requirement and methods of training Zoo personnel in proper record keeping was also emphasized. The four topics on which the South Indian Zoos agreed to collaborate are: (i) Collection plan and planned breeding of endangered species, (ii) Enrichment of animal enclosures in which the Wildlife Institute of India was given the responsibility for providing guidelines for aquatic animals, (iii) Enrichment of the visitor's experience in Zoos, and (iv) Veterinary facilities, animal care, and management.

The outcome of this South Indian Zoo Directors' meeting is the establishment of a "South Indian Zoo Network", wherein the partners agree to support each other's activities. The CZA, WII and the IVRI, Izatnagar, also agreed to provide the required technical support in this endeavour of the South Indian Zoo Directors.

Ecolodge Design Workshop, Martem Village Resort, Sikkim, *January 17-19, 2002.* Shri Rajiv Bhartari participated in the Ecolodge Design workshop organized by Ecotourism and Conservation Society of Sikkim (ECOSS). It was conducted by Mr. Hitesh Mehta from The International Ecotourism Society (TIES), and provided insights into ecolodge design aspects including practical sessions on site analysis and planning.

South Asia Regional Conference on Ecotourism, Gangtok, Sikkim, *January 21-25, 2002.* The South Asia Regional Conference on Ecotourism (SARCE) was held as the regional meeting for the South Asia region. SARCE was organized by the Ecotourism and Conservation Society of Sikkim (ECOSS) and sponsored by TIES and UNEP. Dr. V.B. Mathur and Shri Rajiv Bhartari participated and acted as moderators for various sessions in the workshop. Shri Rajiv Bhartari made a presentation on "Corbett Binsar Nainital (CBN) Ecotourism Initiative" and helped plan the workshop as a member of the Steering Committee for the Conference. SARCE was one of the six regional meetings organized by The International Ecotourism Society (TIES) with United National Environment Programme (UNEP) to bring together stakeholders from various groups around the world that undertake or are affected by ecotourism. The major objectives of the conferences were to: (i) provide a forum for local communities and ecotourism practitioners who may not otherwise have a voice at the WES and other related international events, (ii) elaborate a strategic analysis of ecotourism as currently practiced in the region, (iii) based on this, to identify regional needs for action to be presented at the Quebec Summit for the International Year of Ecotourism (IYE) and as a basis for further activities (during IYE and beyond) on both national and international policy levels, and (iv) to create or reinforce active networks of regional stakeholders involved in ecotourism.

SARCE was the first ever meeting on ecotourism in the South Asian region, and brought together representatives from India, Nepal, Bhutan and Sri Lanka. Two participants were nominated to present the conclusions from the Conference at the World Ecotourism Summit

Turtle Excluder Devices (TED) demonstration base and workshop, Andhra Pradesh, *January 26, 2002* **and in Orissa,** *February, 9-12, 2002.* The Orissa Forest Department, and Project Swarajya, Cuttack, the State Institute of Fisheries Technology and local NGOs have conducted a TED demonstration workshop and have also set up TED information and demonstration centres at Paradeep and Kakinada respectively. The centres provide information on how to use TEDs. These centres also distribute TEDs free of cost to trawler operators. Shri B.C. Choudhury represented this Institute.

Regional Consultation on the Ecology and Management of Alpine Rangelands, Kathmandu, *February 2–11, 2002.* This meeting was organised by the International Centre for Integrated Mountain Development, Kathmandu, from February 4 to 9, 2002. The major objectives

of the meeting were to: (i) Evolve a Regional Rangeland Ecology and Monitoring programme in the alpine region, (ii) Develop collaborative research among the participating ecologists, and (iii) Discuss the future strategies and action points related to research and management in the region.

The meeting was arranged for a core group of research scientists and managers in the region (India, Nepal and China (Tibet), numbering eight to ten people. The meeting was chaired by Ms. Camille Richard, Rangeland Management Specialist, ICIMOD. All the participants presented their current programmes and possible areas of collaboration. From the WII, Dr. G.S. Rawat and Dr. Y.V. Bhatnagar attended.

Fifth Annual International Conference of Map India, 2002, New Delhi, *February 6-8, 2002.* Map India organized this conference at New Delhi. Over 500 participants from industry, government, scientific institutions, media and user agencies participated in the conference. Dr. V.B. Mathur was invited to make a presentation on 'Spatial Database Development for Conservation Planning in India'.

National Communications Project Meeting on Climate Change at the Indian Institute of Science, Bangalore, *February 7-8, 2002.* Dr. B.S. Adhikari from WII participated in this meeting.

CALIBER – 2002 on Internet Engineering for Libraries and Information Centres, Jaipur, *February 14-16, 2002.* Shri M.S. Rana attended CALIBER – 2002.

National Symposium on Galliformes, AVC College, Tamil Nadu, *Feb 20-22, 2002.* The National Symposium on Galliformes was organised by A.V.C. College, Mayiladuthurai, Tamil Nadu with funding support from the Department of Science and Technology, and the Department of Forest & Environment, Tamil Nadu State. Dr. S. Sathyakumar was invited as a resource person to present two theme papers. Shri K. Ramesh and Shri Naim Akhtar also participated in this symposium and presented papers.

Long-term ecological Monitoring Workshop, Sairopa (GHNP), *February 21-22, 2002.* The objective of the workshop was to train and sensitize front line staff for long-term ecological monitoring in Protected Areas. It was organised by the Himachal Pradesh Forest Department. A total of sixteen participants attended. Dr. V.P. Uniyal presented a case study of long-term ecological monitoring design developed in the FREEP-GHNP Research Project. Dr. G.S. Rawat also participated in this workshop.

Pan-Asian otter workshop, New Delhi, *March 3-4, 2002.* Dr. S.A. Hussain participated and presented two papers in the workshop.

CITES Technical workshop on Trade in the Freshwater Turtle and Tortoise in Asia – Kunming, China, *March 25-28, 2002.* The objective of the technical workshop was to review the status of freshwater turtles and tortoises in Asia, with special reference to the current illegal trade, and to deliberate on the need to place several Asian turtle species in the CITES appendices. It was organized by the CITES Secretariat. Nominated by the Ministry of Environment and Forests, Government of India Shri B.C. Choudhury from the Wildlife Institute represented this country as the CITES scientific authority in the above workshop held in Kunming, China. The Agenda of the meeting was to review the status of freshwater turtles and tortoises in Asia, with special reference to the current illegal trade, and to deliberate on the need to place several Asian turtle species in the CITES appendices. Shri B.C. Choudhury and Shri S.K. Mukherjee presented this country's report.

The CITES technical workshop on Trade in Freshwater Turtle and Tortoise in Kunming, China was meant for the Asian region, and ten countries of the region participated in the workshop. In addition, Germany and the USA as proposer of CITES appendices also participated in the workshop. Members of the CITES-Animal Committee, TRAFFIC, Conservation International and CITES Secretariat facilitated the workshop.

With respect to the Indian freshwater turtle and tortoise, the workshop felt that there is need to include the Kachuga genus of India in the Appendices-II of the CITES.

Based on the earlier studies conducted by Edward Moll, Wildlife Institute of India, Jiwaji University, WWF-India, TRAFFIC-India, Madras Crocodile Bank and other organizations, it is felt that *Kachuga kachuga, Kachuga dhongoka, Kachuga smithi* and *Kachuga sylhetensis* need immediate International trade control. These species may also require additional conservation management support in terms of habitat management, head start and *ex-situ* conservation programmes. Therefore, the proposal to include the Indian Kachuga genus in the Appendices – II of the CITES was found to be appropriate.

Surveys, Study Tours, Visits and Talks

Tour to Rajaji-Corbett Project, *May 1–5, 2001.* Dr. A.J.T. Johnsingh visited Paterpani and Dhikala in Corbett Tiger Reserve to count elephants, particularly tuskers. Nearly 100 elephants were seen but not a single big bull tusker. There were however, many young tuskers. While near Paterpani an eleven foot long king cobra was seen.

Wildlife Survey in Panchchuli Basin, *May 2001.* Dr. G.S. Rawat and Dr. S. Sathyakumar carried out a Wildlife Survey in Golfa RF, Balchidura Pass, and parts of Askot Wildlife Sanctuary area during May 2001 in collaboration with the Foundation for Ecological Security, an NGO in Pithoragarh.

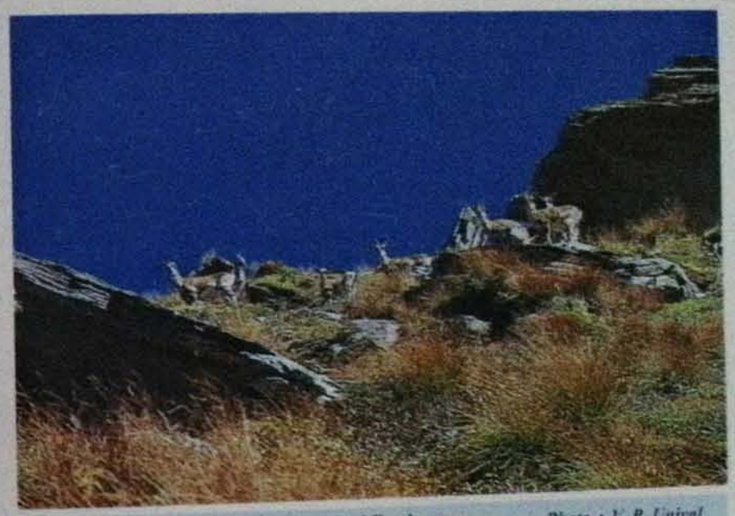
Visit to H.N.B. University of Garhwal, Srinagar, *June 15-16, 2001.* Dr. P.K. Mathur was invited by the H.N.B. University of Garhwal, Srinagar (Uttaranchal) as an external examiner for the M.Sc. Final Practical Examination.

Satellite telemetry study in Orissa: Satellite telemetry study on Olive Ridley sea turtles was begun in April 2001 by the Wildlife Institute of India in collaboration with the Orissa Forest Department and the Smithsonian Institution, USA. Upto mid-August 2001, the migratory route of four PTT transmitter-attached Olive Ridley turtles was documented beyond the south of Sri Lanka. Shri B.C. Choudhury participated in this study.

Talk, Science Gallery, National Zoological Park, Smithsonian Institution, Washington DC. *August 7, 2001.* Dr. Y.V. Jhala gave a talk on 'Lion Whiskers and Tiger Tracks'.

Talk, U. S. Fish and Wildlife Service, Arlington, VA, USA, *August 8, 2001.* Dr. Y.V. Jhala gave a talk on 'The Indian Wolf Research Project-an Update'.

Environmental-cum-Mountaineering Expedition to Nanda Devi, *August 26-September 21, 2001.* This was organised by the Garhwal Rifles Regiment at Lansdown, the Uttaranchal Forest Department and Wildlife Institute of India. In all fourty people participants participated in the expedition. Dr. V.P. Uniyal joined the expedition from the WII.



Blue sheep in Nanda Devi National Park *Photo : V. P. Uniyal*

Exploring the capture of Himalayan Tahr on Table Mountain, Cape Town, South Africa, and their translocation to an identified site in India, *September 12-30, 2001.* The Himalayan tahr was introduced to Table Mountain in Cape Town, South Africa, some eighty years ago. Being an exotic animal the custodial department of South African National Parks (SANPARK) began a programme of culling the species early in 2001. Following this there was a ground swell of ethical questions and protests in South Africa. The Government of India was approached, since the animal had its native range among other countries in the Indian Himalayas, to explore the possibility of capturing animals from Table Mountain and translocating them to a suitable site in India. Pursuant to this request the Ministry of Environment

and Forests Government of India deputed Shri V.B. Sawarkar to visit South Africa from September 12 to 30, 2001 to evaluate the issue in its entirety. The visit was co-ordinated by the Indian Mission in South Africa.

Shri Sawarkar met officials from the custodian agencies, the South African National Parks (SANPARKS) and the Cape Peninsula National Parks (CPNP). There were very useful interactions with members of the Friends of the Tahr (FOTT), other interested parties and citizens possessing knowledge of the tahr, its behaviour and habitat.

Matters relating to the screening of diseases and quarantine procedures were discussed with the Chief State Veterinarian Import/Export Control, Cape Town Quarantine Station, and the Chief State Veterinarian, Chief Directorate: Agriculture Western Cape. Further consultation took place with Professor E.H. Harley, Department of Chemical Pathology, University of Cape Town on the DNA- related issues. The matter of suitable techniques for capture was discussed with Mr. James Innes, wild animal capture expert based in the USA, and a helicopter-based aerial survey of Table Mountain was undertaken to assess vegetation, terrain features and habitat of the tahr and to relate these features to a topographical map. There were fruitful discussions with the officials of CPNP, and the Area Manager, Table Mountain Park. They shared their expertise, experience and the information from their data sets on the previous population surveys of the tahr.

Given the terrain and habitat features, the behaviour of tahr, the period of favorable weather conditions and other operational necessities within the overall time constraint, the helicopter net-gun capture emerged as the best option for capturing of tahr. The passive techniques of capture came up for discussion but they were considered unsuitable in the context of the ruling factors. Thus the technique of the helicopter net-gun capture was considered the most suitable to capture the Table Mountain population of tahr. Schedules for suitable times for capture and other details were worked out, and a report was submitted to the Ministry of Environment and Forests, Government of India.

Study tour and training, *September 2001.* A total of sixteen officials from the coastal state Wildlife and Fisheries, Managers and Scientists nominated by the MoEF participated in the study tour on sea turtle management sites in Malaysia and Australia, and collected first hand information on the current practices in sea turtle management. Shri B.C. Choudhury participated in this study and training programme.

Hands-on training course on Molecular markers- fish population genetics, *October 29-November 10, 2001.* The National Bureau of Fish Genetics and Resources organized this training workshop. The objective was to enhance knowledge on population genetic analysis so that conservation problems at the gene levels may be addressed. Dr. K. Sivakumar attended this training course and discussed his study on fish conservation in the Trans-Himalayas.

Leopard Human Conflict in the Garhwal Himalayas, *March 16 – 17, 2002.* Dr. A.J.T. Johnsingh visited the Garhwal Himalayas. He accompanied the Chief Wildlife Warden, Uttaranchal, to Gauchar to do a post-mortem of a leopard, which was reportedly responsible for killing six children, one woman and injuring three persons. The leopard was 6'3" long, possibly weighed between 30-35 kg, its right upper premolar had not erupted and there was infection around the gum of the premolar. The liver was heavily infected with cysts and was yellow. The animal had negligible fat deposit. He estimated its age was between two and three years. The head was brought to the Institute to study the sutures of the skull and dentition for more accurate aging. It is suspected that the leopard may not be the man-eater, as the killing and attacks on people have lasted for nearly two years.

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

RESEARCH

COMPLETED PROJECTS

WII's Grant-in-aid projects

* **Ecology of tiger: To enable a realistic projection of the requirements needed to maintain a demographically viable population of tigers in India.**

Investigators : Dr. R.S. Chundawat and Dr. A.J.T. Johnsingh
Researcher : Shri Neel Gogate
Date of initiation : 01.04.1996
Date of completion : 31.03.2002
Total budget allotted: 20.55 lacs

The study has the following objectives : (i) To determine the prey requirements for a minimum demographically viable tiger population in a Dry Tropical Forest, (ii) To evaluate tiger habitat suitability with special emphasis on its prey, (iii) To develop an understanding of the predator-prey relationship and to assess prey availability and the distribution pattern of tiger's major prey species, and (iv) To suggest strategies for the management of a demographically viable tiger population and its major prey species in Dry Tropical Forest habitats.

Immobilization & radio-collaring of free ranging tigers in Panna National Park *Photo : J.V. Gruisen*

The Dry Forest in India, forms the largest tiger habitat in the sub-continent but it is also a habitat, where tiger population is most vulnerable. Earlier report of the project has documented the decline of tiger population in the tiger habitats and ecological importance of these forest. The monitoring of tigers and its prey, in the Panna Tiger Reserve with the help of radio-telemetry has helped us document behavioural responses of tigers in their habitat and in understanding how threatened tigers really are in Dry Forests. One of the important finding of the study is that home ranges of tigers are larger then those studied in more productive habitats. A typical home range of male tigers ranges between 150-280 square kilometers and females between 30-60 square kilometers in Panna. This finding has several conservation implications, as we know from studies on other species that populations with larger ranges are highly susceptible to local extinctions. If larger ranges of tiger is a typical characterstic for all Dry Forest habitats then a very large proportion of tiger population of Dry Forest (which support the largest tiger population) in India, is highly vulnerable. Adding to this risk is the small protected area size in these forests, which can support fewer breeding individuals. In current conservation scenario it is always not possible to increase the PA size, therefore alternate management strategies are required and studies such as this can provide necessary ecological and demographic information needed to formulate action plans. Based on the radio-telemetry estimates, it was calculated that at present, in core area of the Reserve, tiger densities ranges between six to eight tigers per hundred square kilometers. A census of tiger population in Panna, based on capture-recapture method using camera trap revealed a density estimate of 6.9 tigers per hundred square kilometres. The study also revealed that survival of tiger population is not dependent on the number of tigers an area supports but depends on the proportion of the breeding population. The territorial population (which is the breeding population) remains constant but the larger transient population fluctuates. The viability of a tiger population depends on how large or small its breeding populations are. During the study period the research team was able to monitor over 13 litters and 30 cubs and their survival and mortality. It was estimated that to maintain a demographically viable population in Panna TR a minimum of nine breeding territories of females were required. The other important finding of the study is the availability of principal prey (food). The study revealed that number rather then biomass plays a bigger role on tiger's ecology. Chital which can attain sufficient density to fulfill the requirement of principal food for tiger, becomes the key prey species in the region. Heterogeinity of resource dispersion in space and time is ruled by climatic factors and determines tiger and prey distribution. In winter and monsoon, when most of the resources are widely distributed animals occupy small area but in summer a few key resources such as water availability is sparse, animals move over larger areas to fulfill their

ecological requirements. Therefore, the availability of resources in few months affect the density of animals in an area. Final report on the work done so far will be ready for publication by the end of this year.

* **An ecological study of sympatric hornbills and fruiting patterns in a tropical forests in Arunachal Pradesh**

Investigators : Dr. G.S. Rawat and Shri Pratap Singh
Researcher : Ms. Aparajita Datta
Date of initiation : March 1997
Date of completion : August 2001
Budget allotted : Rs. 10.49 lac

The objectives of the project were: (i) to study the phenology and seed dispersal pattern of important hornbill food trees, (ii) to determine the diet of sympatric hornbills and identify the plant species which depend on hornbills for seed dispersal, (iii) to study the ecology of sympatric hornbills in terms of nest site selection, foraging behaviour, and patterns of distribution, and (iv) to carry out the status survey of hornbill species in Arunachal Pradesh. The study was conducted in the lowland semi-evergreen forests of Pakhui National Park, western Arunachal Pradesh.

Findings: The study revealed that most of the tree species (64%) in the study area were animal-dispersed. The study area had a diverse array of frugivorous birds, possibly the main group of dispersers. Plant families such as *Lauraceae* and *Meliaceae*, that have fruits adapted for dispersal by birds, were especially species rich. In contrast to the wind-dispersed species, the flowering of bird-dispersed species occurred throughout the year with no discernible peak. The fruiting peak of these species was unimodal, with most trees fruiting between May and July. Fruit scarcity occurred in the period between September and January (end of monsoon and winter). Most species had fairly synchronous fruit production and most species produced fruits annually, though a palm *Livistona jenkinsiana* showed supra-annual fruiting. One species, *Polyalthia simiarum* had two fruiting peaks and consequently, ripe fruit of this species was available for nine to ten months of the year.

Fruits formed 90% of the diet of Hornbills. They consumed eighty fruit species mainly belonging to Lauraceae, Meliaceae, Annonaceae, and Myristicaceae. It was estimated that about one-quarter of the tree species recorded in the area were dispersed by them. There was also evidence of hornbills being the sole dispersers of several large-sized fruits of Meliaceae, Myristicaceae, and Lauraceae. The quality of seed dispersal by hornbills was high. Hornbill-regurgitated seeds are viable and occasionally showed enhanced germination.

The breeding season for all three hornbill species commenced in the hot dry period (March-April) preceding the rainy season. Contrary to what most existing studies have reported, the breeding season did not end before the onset of heavy rains, but, instead, continued through the rainy season (July-August), with both the chick and female remaining incarcerated in the nest cavity through heavy rains. The nesting cycle of the Great hornbill lasted 110-129 days (n = 8), and 120-140 days (n = 9) for the Wreathed hornbill. The nesting cycle of the Oriental Pied hornbill was estimated to be 93 to 97 days (n = 2), though exact dates of nest entry and sealing could not be observed for this species. The incubation period for the Great hornbill was estimated to be 45 to 55 days, and 40 to 45 days for the Wreathed hornbill. Great hornbill females emerged from the nest cavity after 88 to 109 days, while in the Wreathed hornbill and Oriental Pied hornbill, they and the chicks emerged together having remained incarcerated throughout the duration of the nesting cycle.

Fruits dominated in the diet of all three species (over 90% contribution) throughout the breeding season, though animal matter increased marginally during the post-hatching period. A total of 42 plant species and sixteen invertebrate and vertebrate species (seven beetle species, two species each of lizard, bird, and rodent, one species of snake, crab, and flying squirrel) were recorded in the diet during the breeding season of hornbills. Lipid-rich fruits of the Meliaceae, Myristicaceae, Lauraceae, and Annonaceae were especially important in the hornbills' diet. Though a wide variety of non-fig fruit species was eaten, ten species contributed over 90% of the non-fig fruit diet. Although, there were differences in the overall contribution of figs, non-fig fruits and animal matter in the diets of the three hornbill species, there was overlap in the food species consumed. There were no discernible differences in non-fig fruit species' consumption among the three hornbill species. Differences in non-fig diet composition were more pronounced through the years. This was possibly due to the differences in therelative availability of different fruit species in the four-year study period.

All the hornbill species nested only in live trees of five genera. Eighty-three percent of nest trees (n = 36) were on *Tetrameles nudiflora*, an emergent deciduous softwood tree that is relatively common in lowland forests. Several characteristics of this tree species make it an ideal nest tree for hornbills. No significant difference was noted in the nest tree species and nesting habitats used by the three sympatric hornbills, though there were some differences in structural characteristics of the nest trees used. Cavity size seemed to be the main variable that separated the three species in nest site choice; the Great hornbill used larger cavities than the two smaller species, while the Oriental Pied hornbill used smaller-sized cavities in trees closer to riverine areas. Of the known nest trees, nesting attempts were made in 64%, while overall (successful breeding) during a four-year period was 80%. Suggestions on the conservation of Hornbills and adoption of appropriate management practices in Pakhui National Park have been made in the final project report.

* **Current status and distribution of hog deer (*Axis porcinus)* in India**

Investigators : Dr. V.B. Mathur and Shri V.B. Sawarkar
Researcher : Ms. Tanushree Biswas
Date of initiation : 01.05.2000
Date of completion : 31.03.2002
Budget allotted : Rs. 3.5 lac

The objectives of the project were to: (i) Assess the present distribution, range and status of hog deer in India, and (ii) Identify potential areas for hog deer conservation in India. During the first year a questionnaire survey initiated and it evoked only sixteen percent response. Direct field surveys were conducted in 34 (PA and non-PA) areas in five states, *i.e.* Uttar Pradesh, West Bengal, Assam, Arunachal Pradesh and Tripura. Both direct sightings and indirect evidence of fresh and old pellet groups, hoof marks, alarm calls, old skulls, antlers, and skins were used as indicators to assess the presence of the species. Elephant, vehicle and foot transects were used for direct evaluation.

A total of 766 hog deer were sighted, of which seventy percent sightings were from the Kaziranga National Park, Orang, and the Jaldapara Wildlife Sanctuaries. A total of 289 cases of indirect evidences were also obtained. 39 skulls were recorded in different places in Assam and lower Arunachal Pradesh. Indirect evidence of a good hog deer population was obtained only from Nameri (Assam) and D'ering in Arunachal. Hog deer reported in the past from 64 sites have been presently reported from 29 sites, out of which only six – Manas, Kaziranga, Orang, Dudhwa, Corbett and Jaldapara have the maximum potential for long-term conservation of the species.

Hog deer, which were abundant in the past along the entire range, are presently under immense threat due to the rapid loss of grasslands compounded by intense hunting pressure. Alteration in land use patterns within the terai, due to anthropogenic and stochastic events, has made the present status of the species extremely vulnerable. Based on this survey, it has been recommended that the present status of hog deer should be immediately upgraded to Schedule I from its current position in Schedule III of the Wildlife (Protection Act), 1972.

* **A study on distribution, relative abundance and food habits of the leopard *(Panthera pardus)* in the Garhwal Himalayas**

Investigator : Dr. S.P. Goyal
Researcher : Shri Devendra Singh
Date of initiation : December 19,1999
Date of completion : December 31, 2001
Budget allotted : Rs. 5.26 lac

The objectives of the study on the leopard in Pauri Garhwal were: (i) to determine current status, distribution and relative abundance in relation to habitat characteristics (terrain and vegetation), (ii) to study food habits in relation to prey abundance (wild and domestic), and (iii) to prepare long-term research project to study the behaviour and ecology of the leopard in order to suggest measures to reduce leopard-man conflicts.

The survey was undertaken in sixteen administrative blocks of Pauri Garhwal district. The leopard being

solitary and elusive, it is difficult to obtain direct information; therefore village survey was used for information on its distribution, the current status of the leopard and the extent of leopard-man conflicts. Pauri Garhwal district was divided into grids of 2x2 km and the survey was carried in each grid forming > 50 % villages. Questionnaires were designed to obtain information on different aspects relating to leopard-man conflicts. Information such as frequency of visit, livestock lifting and leopard predation on humans was collected through questionnaires and observations by visiting villages in each grid in addition to the assessment of habitat for the leopard. Available information was used with Forest/Wildlife Departments. Leopard-man conflicts were reported from all administrative blocks, but the severity varied across the blocks. The distribution status, extent, and severity of leopard-man conflicts in each administrative block was determined. Based on information obtained during survey work, the entire study area was divided into three categories of leopard-man conflict *i.e.* (i) low, (ii) medium, and (iii) high in each grid. The frequency of leopard predation on humans, livestock lifting, leopards killed as man-eaters by irate villagers each year served as the criteria for determining the severity of leopard-man conflicts in each grid. The conflict zones demarcated provide a platform for studying the behaviour and ecology of the leopard. The data on leopard victims were taken from Forest Department records and interpreted. It appears that women were more prone to be victims of leopards (66% of all deaths). Children under fifteen were more susceptable (68% of victims), but cases have been reported in all age groups. The incidences observed during the survey corroborate Forest Department data that women and children are invariably more susceptible. Leopard attacks on humans varied through the seasons and most deaths were reported in rainy and winter season while a few have been reported in the summer season. This could be due to the extreme growth of weeds in the rainy season which remained throughout winter providing suitable cover for leopards. Leopards come closer to humans during these seasons when they seek opportunities to kill livestock; in this way humans become their prey. Leopard attacks varied during day-time and frequencies of attack were higher during the evening and early morning hours. This was the time when the local people in the hills who do not have toilet facilities defeacate in the open. The data on leopard deaths from Forest Department records were collected and examined. The data indicated that female leopards were reported as man-eaters. It appears that females come nearer to human habitation leading to conflicts.

During the two-year survey 265 scats were collected from different parts of the study area. A broad vegetation map highlighting the different conflict zones (Low, medium and high) of the study area has been prepared. Techniques were also standardized for estimating the prey and predator relationship in the study area.

A brochure popularizing the precautionary measures that locals can adopt to minimise leopard-human conflict was produced.

Collaborative Projects (WII-USFWS)

* **Evaluating Panna National Park, with special reference to the Ecology of the Sloth Bear**

Supervisors: Dr. A.J.T. Johnsingh and Dr. Clifford G. Rice (Washington State Department of Fish and Wildlife, Olympia, WA, USA)
Researcher: Shri K. Yoganand
Date of Initiation : October 1, 1995
Date of completion : September 30, 2001
Budget allotted : Rs. 42.19 lac

The objectives of the project are: (i) Establishing a basis for the conservation of the sloth bear *(Melursus ursinus)*, (ii) Investigate the ecology and behaviour of one sloth bear population in Panna National Park, (iii) Evaluate the habitat quality of Panna National Park with reference to the abundance of sloth bear, (iv) Promote the development of wildlife science in India by involving the Wildlife Institute of India M.Sc. Wildlife Science students in the research programme, and (v) Promote the capability of bear management in India by conducting a workshop involving managers and biologists for making a bear census in India.

Progress: During the present reporting period, laboratory analyses, data analyses and the writing up of reports and other publications were carried out. A workshop to extend the results of the study

and to train wildlife managers in sloth bear population monitoring and habitat assessment methods was held in Panna from September 24 to 27, 2001. More details on the workshop are given under the section "Workshops organised by WII". This project ended in September 2001. The final report writing is being carried out now.

Findings: The sloth bears in Panna occur in low density, range over large areas, are mostly nocturnal and crepuscular and feed predominantly on fruits, ants and termites. The resources available to them are spatially and seasonally patchy and their foraging behaviour closely follows the rules of optimal foragers. The thermal environment of their habitat constrains their activity. They require secure maternity and day-resting dens, fruit and social insect resources that are abundant and available throughout the year. Conflict between bear and people in Panna could be avoided if people followed some simple rules, such as avoiding places of dense shrub cover, particularly during the crepuscular period. Sloth bear scat and digging signs can be reliably used to monitor population trends if adequate sampling is done.

Landmarks: This is the first ever intensive study on the behavioural ecology of the sloth bear in India. In addition to describing the behaviour of sloth bears, the ecological factors driving the sloth bears to behave the way they do was investigated, for the first time. The information gathered will be useful for the conservation of sloth bears in Panna and in other dry deciduous forest habitats, which house more than 50% of the sloth bear population in India.

* **Establishment of Wildlife Forensic Capacity at the Wildlife Institute of India**

Principal Investigators : Shri S.K. Mukherjee and Dr. S.P. Goyal
Co-investigator : Dr. K. Sankar
Researchers : Dr. Archna Bahuguna and Dr. S.P. Rajkumar
Project Biologist : Smt. Rina Rani Singh
Date of initiation : October 1, 1995
Date of completion : September, 2002
Budget allotted : Rs.54.37 lac

The project has the following objectives: (i) to prepare a Perspective Plan for the development of wildlife forensic technology in India, (ii) to establish linkage with national and international institutions of repute in wildlife forensic technology, (iii) to create required infrastructure, (iv) to become proficient in species-specific identification of Indian vertebrates using morphological characteristics, (v) to begin accumulating and storing tissue samples for eventual use in biochemical analysis, and (vi) to disseminate the acquired knowledge to users.

Landmarks : The project is aimed to produce: (i) Perspective Plan at the National level for developing Wildlife Forensics, (ii) manuals for identifying species from parts and products, and (iii) techniques suitable for preserving tissue samples collected in the remotest areas of forests.

Progress: During the reporting year, we worked on revising manuals prepared under the project based on suggestions given by US Counterparts, and re-photographing the hair characteristics.

Findings: All manuals: *i.e.* (i) Identifying species from hair, (ii) Tibetan antelope – Trade and wildlife forensic techniques for identifying shatoosh hair, (iii) A field guide for collecting tissue samples for wildlife forensic analysis, (iv) Epidermal derivatives in Wildlife Trade, with special reference to identifying species from claws and beaks, and (v) are in process of being finalized. These will be made available to various enforcement agencies as well as Central and State Forensic Laboratories.

* **Impact of fragmentation on the biological diversity of small rainforest mammals and herpetofauna of the Western Ghats Mountains, South India. (Collaborative project between WII, SACON and USFWS)**

Investigators : Dr. Ravi Chellam, Shri B.C Choudhury (WII), Dr. Ajith Kumar (SACON) and Dr. Barry Noon, Department of Fishery and Wildlife Biology (Colarado State University)
Researchers : Dr. N.M. Ishwar, Dr. Divya Mudappa and Dr. Karthikeyan Vasudevan
Date of initiation : October 1, 1995
Date of completion : January 31, 2002
Budget allotted : Rs. 40.81 lac

The objectives of the project are: (i) To identify the major factors which govern the distribution of small mammals and herpetofauna in a large, continuous and relatively undisturbed rainforest in the Kalakad-Mundanthurai Tiger Reserve (KMTR), (ii) To identify the extent and nature of changes brought about by forest fragmentation on the micro and macro habitat features, and relate these changes to changes in species composition and abundance in the rainforest fragments of Anamalai hills, (iii) To develop a set of statistical models based on (1) and (2) above, which will allow the prediction of faunal changes as a function of fragmentation, and (iv) To carry out a survey of rainforest fragments in the Western Ghats of Kerala to validate the predictions of these models;

Progress : The survey of rainforest fragments in three forest divisions of Kerala for amphibians and reptiles was completed in June, 2001. Five research seminars were conducted at Chennai, Coimbatore, Valparai, Tirunelveli and Thiruvananthapuram to communicate the major research findings and their implications for conservation and management to the officials of the concerned State Forest Departments, Staff of the Protected Areas, Conservation NGOs, Academicians and the media. All workshops were very well attended and the presentations were well received; the media gave excellent coverage to these events. A draft of the final report has been prepared and is currently under review. A well-illustrated booklet, which presents the research findings, has been published with a poster depicting the elusive small carnivores of the Western Ghats.

Findings : All the three researchers who worked in the project have obtained their Ph.D. degrees. The murid rodent and shrew community in the undisturbed forest had low species richness and abundance. While species richness and abundance increased in the rainforest fragments due to the intrusion of some commensurate species, the endemics were more abundant in the undisturbed forests in the KMTR.

The brown palm civet, an arboreal frugivore and a major seed disperser, dominated the small carnivore community in the KMTR. Changes in the small carnivore community in the fragmented landscape included a decline in mongoose and small Indian civet. These changes were related to habitat features rather than the fragment area.

There were major differences among sites within the continuous rainforests in the KMTR in the density, composition and relative abundance of amphibian and reptile communities. The distribution of amphibians is particularly narrow, with drainages having different species assemblages. This is the major reason for low local, but high regional, species richness. In reptiles, the turnover of taxa is primarily related to altitude.

There is an overriding influence of fragment area on species richness in amphibians and reptiles. Overall species richness and densities of different taxa, however, respond to habitat features other than area, especially human disturbance.

Most amphibians and reptiles were rare in both continuous and fragmented forests. The forest fragments together contained more species than the continuous forest and the largest fragment. This results from the patchy distribution of many species, especially amphibians, and the intrusion of secondary forest species into fragments, especially reptiles and rodents.

Many species unique to the Anamalai Hills are confined to forest fragments, some of them privately owned and managed for the production of coffee and cardamom.

* **Ecology and Management of Problematic sloth bears (*Melursus ursinus)* in North Bilaspur Forest Division, Madhya Pradesh, India**

Faculty : Dr. N.P.S. Chauhan
Researchers : Shri Harendra Bargali and Shri Naim Akhtar
Date of initiation : February 1998
Date of completion : June 2001
Budget allotted: Rs. 22.80 lac

The project aims to study the ecology and management of problematic sloth bears in North Bilaspur forest division. The objectives were to: (i) prepare habitat maps and quantify vegetation composition and structure within each habitat, (ii) assess the distribution and population density of

the sloth bear, (iii) quantify habitat use and ranging patterns of bears using radio-telemetry, assess seasonal dietary pattern, (iv) evaluate human-bear conflicts and formulate recommendations for their mitigation. The study will develop conservation and management plans for sloth bears in this region. The data analysis and compilation has been completed. The final report is in preparation and will be submitted by October 2002.

Progress & findings: In the North Bilaspur Forest Division, Chattishgarh, human casualties and agricultural crop damage by sloth bear (*Melursus ursinus*) are serious problems. 122 out of a total of 178 villages were affected. From 1973 to 1998, total 370 (93.6%) mauling cases and 25 (6.3%) human deaths occurred in this division. Of these, 210 cases (53.16%) occurred in forests, 104 (26.33%) were in crop fields, and 81 (20.51%) cases were in the vicinity of villages. The analysis of 265 cases showed up more cases in August, September, October and January. The victims were involved in cattle grazing (24.5%), farming or crop protection (11.8%), defecation (28.4%), or moving in forests (24.5%) or in the vicinity of villages (11.8%), or non-timber forest produce collection (7.9%). Attacks were more on males (73.6%) than females (21.7%).

Sloth bears stray out of forests and dens and invade human habitation and cultivation areas for their food. During 1998, six sloth bears, three males and three females were captured and radio collared to study their habitat use and activity patterns. They were found active early in the evening, in the night and late in the mornings. Activity and resting period (denning) averaged between sixteen and ten hours respectively. The crop stages, food availability and disturbance factors appear to their control activity pattern.

The feeding ecology of the sloth bear was studied by analyzing 568 scats: 21 species of plants, three groups of insects, bees and unknown animal matter (bone, hairs and tissue) constituted the bear diet. Both animal and plant materials constituted part of its diet throughout the year. Annually, the frequency of animal material (78.5%) was almost same as the frequency of plant material (77.8%). In order to avoid human-bear conflicts, locals need to be vigilant and restrict their movements during dawn and dusk or should move in groups during the collection of NTFP and while moving through forest paths.

Collaborative Ladakh Field Research Project (CLFRP)

* **Developing and implementing a field research facility and programme in Ladakh, under a tripartite collaborative programme of WII, the International Snow Leopard Trust, and US Fish and Wildlife Service**

Investigators : Dr. V.B. Mathur, Dr. Yash Veer Bhatnagar, Dr. R.S. Chundawat, Qamar Qureshi, Rodney Jackson and Dr. Don O. Hunter
Team Members:
Research Components : Dr. G.S. Rawat and Dr. B.S. Adhikari (Vegetation), Dr. V.P. Uniyal (Insects), Dr. Karthik Vasudevan and Shri B.C. Choudhury (Herpetofauna), Dr. K. Sivakumar (Fishes), Dr. Yash Veer Bhatnagar and Mr. Rinchen Wangchuk (SLC), (Tibetan gazelle), Dr. S. Sathyakumar (Brown bear survey and People-Wildlife Conflicts), Dr. S.A. Hussain and Dr. B. Pandav (High Altitude Wetlands)
Date of initiation : October 1, 1999
Date of completion : September 2001
Budget allotted : Rs. 15.00 lac

The Trans-Himalaya constitutes a large proportion of the country's geographical area and the bulk of this falls within the Ladakh region. This fragile but harsh landscape poses major conservation challenges – many of these stemming from the simple lack of information. Since 1999, the WII and its partners on the project have begun research and conservation initiatives on a wide range of taxa and ecosystems in Ladakh that had previously received little attention from the Institute or other organizations. Based on information gathered in the initial two years, it is proposed to continue research in a more focused manner on selected issues. It is hoped that the multidisciplinary research and training activity will significantly contribute to enhancing the knowledge of the region and aid in the identification of gaps in PA coverage in Ladakh.

This will ultimately lead to the development of a comprehensive conservation action plan for Ladakh Trans-Himalaya. Selected conservation initiatives will also be taken up under the CLFRS.

Glimpses of fragile landscape of Ladakh in Trans-Himalaya where conservation is a major challenge

Photo : G.S. Rawat, B. Pandav & V.P. Uniyal

The basic objectives of the programme are : (i) to establish baseline status and distribution of different taxa from selected regions of Ladakh, and gather baseline information on key socio-economic parameters, (ii) to create a spatial database in GIS domain, (iii) to develop a detailed biogeographic classification and identify gaps in PA coverage in the Ladakh region, (iv) to identify primary conservation issues in the PAs of Ladakh, and (v) to develop a conservation action plan for Ladakh and implement of selected conservation initiatives.

Baseline surveys were undertaken by WII scientists and researchers between May and August 2001 on seven components, *i.e.* vegetation, insects, herpetofauna, fishes, Tibetan gazelle, wetlands and brown bear (people-wildlife conflicts). The surveys have revealed aspects of species' presence and distribution, including range extensions, and potentially some new descriptions.

It was decided to include three new research components during 2001 – fish fauna of streams and rivers in Ladakh (Dr. K. Sivakumar), brown bear survey and people-brown bear conflicts in Zanskar (Dr. S. Sathyakumar) and vegetation mapping in Ladakh (Shri Qamar Qureshi, Dr. G.S. Rawat and Dr. V.B. Mathur). In addition, the Wetland component included work on breeding birds of selected lakes in Ladakh (Dr. S.A. Hussain and Dr. B. Pandav).

An intensive study was conducted on the floristic structure and plant communities in the Tso Kar basin of eastern Ladakh in August 2001. The study component also addressed the pattern of livestock herding in the area which was sponsored by ICIMOD, Kathmandu. The study reveals that contrary to earlier belief, the Changthang plateau has far more diverse flora and a very high proportion of graminoids (dicots : monocots, 2:1), and that the traditional system of rotational grazing has, so far, kept these rangelands in relatively good condition. Suggestions for better management of these rangelands and long term monitoring have been made.

Insect surveys were carried out in the Zanskar, Suru and Rumbak valleys during July 2001. This was a continuation of efforts initiated in 2000 where the Changthang, Nubra, Leh and Kargil regions were covered. These surveys covered different vegetation types across altitudes ranging from 2,800 to 5,500 m with varying biotic pressure. The insects were represented by nine different orders, *i.e.* Coleoptera, Lepidoptera, Hymenoptera, Hemiptera, Orthoptera, Diptera, Isoptera, Plecoptera and Homoptera. They represented thirty families and about 196 species. Most insects belong to the order Lepidoptera. Identification of nearly 30% of collected specimens was done. Preliminary findings suggest that a high diversity of vegetation and crops increased insect diversity in the region.

The reptile and amphibian survey team visited Leh, Kargil and Changthang regions. They documented local extinctions in two amphibian species from the Ladakh region. The reasons for this are not clear so far, increasing UV radiation however, is suspected to have caused these declines. A

recommendation is being prepared to assign amphibian populations in Ladakh under "Threatened" category based on the findings from the survey from "Least Concern or Data Deficient" category of the IUCN to which they had been previously assigned.

In the fish survey, rivers and streams in the Indus, Zanskar and Shyok catchments were surveyed and a total of 32 species of fishes were recorded. These were five exotic species, confined to a few sites in the Indus catchment. There were eleven species which were not identifiable. They were arranged tentatively in different genera and family. Two species belong to the genus *Diptychus*, two belong to *Schizopygopysis*, one belongs to the family *Amblycipitidae*, and the remaining six species belong to the family *Balitoridae*. The relative condition of adults was better than the juveniles. It may be inferred that the environment where young ones were living was sub-optimal.

A survey of Brown Bear-Human conflict was carried out in the Zanskar and Suru Valleys. The objectives of this survey were to assess the status and distribution of brown bear, the extent and magnitude of livestock depredation by brown bear, snow leopard and wolf; and the causes for high incidence of livestock depredation. Results indicated that substantial livestock depredation occurred in Zanskar due to brown bear and wolf. The primary cause for this was probably the unsupervised livestock grazing practiced in these parts, coupled with less effort invested in tracing missing livestock.

The study on the Tibetan gazelle has shown that the species is on the verge of extinction in Ladakh. This is a species that was earlier distributed in over 20,000 km^2 in the Changthang but is now limited to just two or three sites with a population of less than fifty individuals. Past hunting pressures, and stochastic events had decimated the populations in the past. The present threat seems to be primarily from increasing competition with domestic livestock, and the occasional severe winter that can decimate the small population. Research focusing on the processes and the means to initiate community participation in reviving the populations is being proposed.

Under the wetland component, ten lakes and marshes were surveyed to monitor breeding bird population. The Changthang region had 44 species of water birds, of which 21 species were breeding. Evidence of greylag goose breeding in Ladakh was found in Lam Tso, Chumur, for the first time. The highest number of birds was recorded in Tso Kar (2,500 birds) of which the dominant species was the ruddy shelduck, followed by Stratsapuk Tso (1,900) and Tso Moriri (800). Out of 42 black necked cranes recorded from fifteen sites of which eleven pairs had juveniles with them. The Hanle plains, Fukche and Chusul marshes had three pairs each with one or two juveniles. The brood size of different species of birds was estimated from the number of chicks observed with the adults. The mean brood size of different species varied considerably. It was higher for ruddy-shelduck, followed by merganser, bar-headed geese and the great crested grebe. Large herds of goat and sheep were often found grazing in many of the nesting grounds, which disturb the nesting birds, tramples the eggs and the accompanying dogs eating eggs and chicks. This is perhaps the major threat for breeding waterfowl of Ladakh.

The project has not only generated valuable scientific information but has also provided a unique opportunity to over fifteen WII faculty and researchers to conduct studies. From the surveys conducted already, five papers have been communicated as scientific papers, paper presentations or popular articles.

The proposal for the continuation of further research and conservation initiatives in Ladakh for three years with the International Snow Leopard Trust (ISLT) and the Snow Leopard Conservancy (SLC) as major collaborating partners has also been approved by the Training, Research and Academic Council (TRAC) of the Institute.

Serious decline in reptile and amphibian populations in Ladakh

Photo : V.V. Bhatnagar

FREEP-KMTR Project

* **Study on Revising and Upgrading the Management Plan of KMTR**

Investigators : Shri S.K. Mukherjee, Shri V.B. Sawarkar, Dr. A.J.T. Johnsingh, Shri S.K. Srivastava, Dr. A.K. Gupta and Shri S.B. Banubakode
Researcher: Ms. Jayanti Ray
Date of initiation : March 1, 2001
Date of completion : December 2001
Budget allotted : Rs. 15.00 lac

A six-month project under the World Bank assisted FREE Project was initiated to consolidate available studies on the biodiversity of KMTR and its various social, ecological and cultural values to revise the Management Plan. On a consultative basis, management prescriptions were made for regulating various biotic as well as socio-economic pressures on the park. The ecodevelopment concept has been made a permanent feature of management, taking into consideration the experience gained so far. A special feature on the study was to develop a long term HRD perspective and to integrate the PA management concerns. The prescription also dealt with regional (across state boundary) issues and regulations pertaining to Southern Western Ghats since KMTR is an integral part of the area. The final report has been submitted to the Field Director (Project Tiger) KMTR.

ONGOING PROJECTS

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

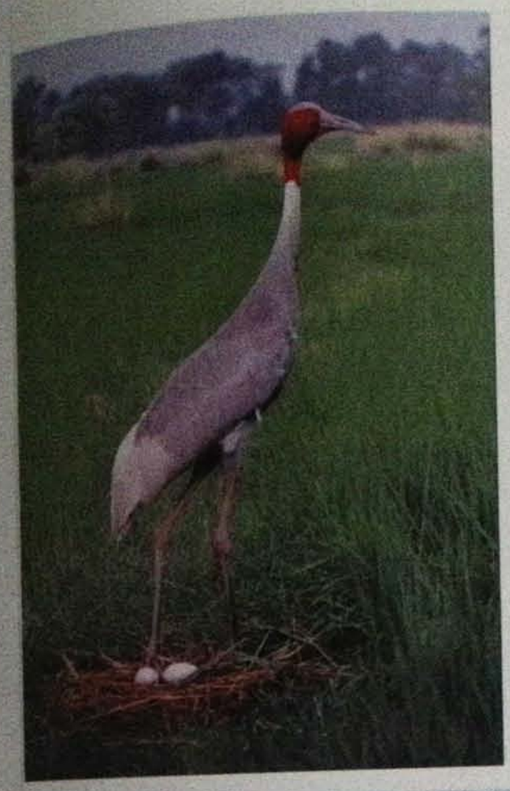
Principal investigator : Shri B.C. Choudhury
Researchers : Ms. Jatinder Kaur and Shri K. S. Gopi Sundar
Date of initiation : February 1, 1998
Date of completion : March 31, 2003
Budget allotted : Rs. 21.11 lac

The objectives of the project are: (i) to study the ecology and behaviour of the Indian Sarus Crane in natural human-altered habitat to determine the critical biological requirment of the species, (ii) to determine change in the land-use patterns overs the years, with reference to the ecological distribution of Sarus Crane in India, and to identify significant negative and postive impacts of changes in land-use pattern, on the ecology and behaviour of the species, (iii) to suggest strategies for the long-term survival of the 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.

A view of tropical evergreen forests of Kalakad Mundanthurai Tiger Reserve *Photo : S.K. Srivastava*

In the study sites, natural wetlands were observed to be crucial for the survival of Sarus Cranes. Most nests observed were constructed out of aquatic vegetation in natural wetlands. The only other habitat used by Sarus for nesting was crop fields, mostly paddy fields and rarely corn. Most Sarus used the crop itself as nesting material. Nesting intensity, density of breeding pairs and nests were highest in Uttar Pradesh, followed by Kota and Bharatpur. Birds in Rajasthan showed a distinct dual nesting pattern (February to June and July to October), while nesting was synchronized in Uttar Pradesh (July to September). The factors determining nest initiation are being investigated in



A Sarus Crane nesting on a bund of a paddy field in Etawah, Uttar Pradesh *Photo : K.S. Gopi Sundar*

detail. The crane pairs seemed to track the monsoon in both states. Nest visitation by researchers was not seen to affect increased mortality of eggs. Many pairs in both states managed to hatch, fledge and wean both chicks. Much of the mortality, at all stages of growth, was due to human disturbance.

Colour banding was carried out in both states for the second consecutive year using bands specially made and donated for the project by the International Crane Foundation (Wisconsin, USA). From the preliminary data available, banding did not affect the survival of young cranes. Data on territory size, weaning patterns, diet and behaviour were collected for all marked and several unmarked individuals. Analysis of this data are presently underway.

The data on habitat use and preference were collected for the species for the first time. Information on population characteristics was also collected. In Etawah and Mainpuri, encounter rates were seen to be the highest known for the country (more than two cranes/ km on an average). Winter months (December-February) were found to be the best to determine population characteristics using road counts.

Reasons for the mortality of adult cranes differed between states. In Rajasthan, road accidents, pesticides, poaching, and collision with electricity wires were responsible for deaths, in that order of importance. In Uttar Pradesh collision with electricity wires was seen to be the major reason for the mortality of adult cranes.

The conclusions that may be drawn from studies in the two states was that the conservation of the Sarus Crane in India requires liaison with departments other than those concerned with wildlife conservation. Irrigation practices, farming styles, general land use patterns, collision of cranes with electricity wires and related aspects require attention in order to combat the decline that the Sarus Crane population of India has been experiencing. Conversion of natural wetlands to crop fields will definitely reduce breeding opportunities for crane pairs. Preservation of natural wetlands in the agricultural landscape is of paramount importance to ensure the conservation of Sarus Cranes.

* **Ecology of otters in Corbett Tiger Reserve: Assessment of the impact of Kalagarh hydroelectric project on their habitat use pattern**

Principal Investigator : S.A. Hussain
Researcher : Shri Asghar Nawab
Date of initiation : March 2001
Date of completion : November 20, 2004
Budget allotted : Rs. 7.82 lac

Three species of otters are found in India, *i.e.* the smooth-coated, the Eurasian, and the Oriental small-clawed otter. They are becoming increasingly rare outside national parks and wildlife sanctuaries, and are threatened in many areas due to reduction in prey biomass and habitat. Poaching is a major threat, with otter pelts accounting for approximately 60% of all confiscated animal skins and furs in India. The remaining otter populations are fragmented and are rarely encountered outside protected areas. The lack of baseline data on the ecology of otters is one of the major constraints facing otter conservation today. The project holds

special relevance as the habitat of otters in the Reserve has been fragmented due to the construction of the Kalagarh Multipurpose Hydroelectric Project along the Reserve boundary and the creation of a dam on the Ramganga river. Otters being the top predators are often used as an indicator species to assess the health of wetland ecosystems. This study attempts to assess the impact of dams on otter populations, so as to formulate a model for similar studies elsewhere in the country. The study has the following objectives: (i) to determine the status of otters in the Corbett Tiger Reserve and in the adjacent areas between the Yamuna and the 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 the Ramganga main stream and the Reservoir, and (v) to examine associated threats to otter populations such as parasitic load, cases of poaching and destruction of stream habitats in the region.

The following major questions will be tested during the project period. Is there a difference in the habitat use pattern between the reservoir and the main stream river during different seasons? Is there significant difference in the prey community between these two habitat types? Does prey availability influence habitat use pattern? Is sociality in the otter influenced by the quality of habitats?

Progress : Permission to conduct this study was received from the Chief Wildlife Warden and Chief Conservator of Forest (Planning), Government of Uttaranchal on March 28, 2001. A base camp for the project was established at Kalagarh and field study was initiated. Initially the study was focused on a fourteen km stretch of Ramganga river inside the Corbett National Park. During the study between Dhikala and Gairal 105 plots of 100 x 15m at a regular intervals of 500m along the shoreline was examined for signs of otter presence at both the banks. During this exercise only 25% plots showed signs of otter presence. Of the seveteens parameters examined to study the factors affecting habitat use, eight parameters from both the banks showed significant difference between used and random plots. Major parameters that govern the distribution of otters are adequate shore line vegetation, the presence of a sandy beach, boulders and wide river stretches.

Otter habitat in Corbett Tiger Reserve *Photo : Asghar Nawab*

The number of spraint (scat) piles and grooming sites encountered varied considerably between both the banks. Nineteen spraint piles were recorded of which five were found on the left bank while fourteen on the right bank. Sandy stretches along the bank were the main grooming/basking sites. four such sites were found on the left bank and two on the right bank. A total of six den sites were encountered in this stretch and most of these occurred along the stretch from Dabaria *chaur* Gairal. Of these six dens, five were under boulders, while one was under thick, entwined roots of *Holoptelia integrifolia* and another was a freshly dug out 'oval shaped' den on a sandy bank near Tauliya *chauki*. All the dens were well shaded by the surrounding vegetation, mostly tall grasses like *Saccharum spontaneum*, *Eulaliopsis binata*, *Typha elephantina* and *Phragmites karka*.

* **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 21, 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

Hoolock gibbon (*Hylobates hoolock*) in a fragmented habitat *Photo : Kashmira Kakati*

the home ranges, and (iii) Species diversity in the diet and composition (leaf/fruit).

Progress: (i) Six habituated gibbon groups were followed in the five study sites of Borajan, Takuani, Kakojan, Buridehing and Jeypore RFs, Assam, for a total of 144 days over the year. Each group was followed for 24 days from dawn until they entered a sleeping tree, to collect data on home ranges and diet. The 24 days of observation per group were split into six blocks of four days each, with two such blocks in each of the three seasons (March-June, July-October, November-February). One or more days per group was spent before each observation cycle to locate the group and mark its sleeping position for full-day observations to commence the following morning. (ii) Group scans of activities of all individuals of a group were done at five-minute intervals. The activity categories were – travel/movement, feeding, resting and other (social, sexual, and alarm behaviour). (iii) GPS locations were taken of their travel routes and food trees. Used food trees and other big trees on their travel routes were painted with numbers and their GBHs measured. Food trees were monitored for phenology changes once during each of the six observation cycles (new food trees were added cumulatively with each observation cycle). (iv) Vegetation sampling for assessing quality of the home ranges was started. Sampling is being carried out in 50x20m plots to cover 10% of the area of the home range of each group. Parameters being recorded are - girth at breast height of all stems >10cm, plant species, vine volume (as small, medium or high relative to the size of the tree), canopy cover (with spherical densiometer at the 4 four corners of each plot) and canopy continuity (on a scale of zero to four on the basis of how many sides the canopy of the tree nearest each corner of the plot is touching/close to adjacent canopies). Data collection from the direct observations of the gibbons and quantification of the vegetation parameters was completed and is being analysed.

* **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 analyze 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 biogeographical constructions using GIS.

Progress: The year in review has largely seen the procurement and development of spatial databases from respective government agencies. The digitization work, for various environmental and socio-economic thematic layers of Survey of India toposheets (1:250,000 scale), Forest Survey of India vegetation cover maps (1:250,000 scale), and NBSS & LUP soil resource maps (1:500,000 scale) were completed, processed, and imported into GIS media for further spatial analysis with feedback data from field surveys. FCCs (False Color Composite) were made from WiFS Scene of Central India (IRS-1D LISS III data) for the period April 1999 as well to develop supervised

and rule-based classification of land cover patterns, for which the ground-truthing in the field is currently under way. More remotely sensed satellite images reflecting the seasonal changes in vegetation cover and forest productivity like NOAA - AVHRR and IRS/P4 OCM are being procured.

A preliminary investigation of environmental and geographical features of the region (including topography, drainage, soil, and agro-climate) has revealed fifteen distinct landscape units, *i.e.* Jhabua Hills, Malwa Plateau, Central Narmada Valley, Vindhya Scarplands, Vindhya Plateau, Kaimur Hills, East Maikal Range, South Maikal Range, Seoni-Chhindwara Plateau (Mahadeo Hills), North Vidarbha Uplands, Betul Plateau, Satpura Plateau, Gawilgarh Hills, East Nimar Hills, and West Nimar Hills. These units will, however, remain tentative untill the final validation with field data, and they will serve as the primary sampling units for the intensive fieldwork which was started in March 2002.

The fieldwork involves extensive habitat mapping using GPS, proportional sampling for breeding bird species using modified variable-width line transects, and ground truthing of WiFS-FCC vegetation cover data.

A permanent base-camp was set up at Khawasa in Pench Tiger Reserve, Madhya Pradesh during March, 2002. The field work is currently being carried out in south and south-eastern parts of the Central Indian Highlands in Madhya Pradesh.

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

Investigators: Dr. A.J.T. Johnsingh and Dr. K. Sankar
Researcher: Shri Bhaskar Acharya
Date of initiation : January 2001
Date of completion: December 2004
Budget allotted : Rs. 19.47 lac

The project aims to collect information on dhole (*Cuon alpinus*) status, habitat use and ranging patterns, food habits, behaviour, social organisation, and abundance of prey species in Pench Tiger Reserve, Madhya Pradesh. Fieldwork was initiated on 5th May 2001 and since then, two dhole packs have been identified in the intensive study area of the Tiger Reserve and their movement and activity patterns were under observation untill September 2001. Currently two other packs are under observation, one since December 2001, and the other since February 2002. Dhole scats and kills are being recorded whenever encountered to ascertain the diet of the dholes. Twelve transects the average length of each 2.5 km, have been permanently marked in the intensive study area, on which systematic estimation of dhole prey abundance using the Line Transect Method is in progress. Data regarding the encounter rates and group composition of prey species such as chital (*Axis axis*), sambar (*Cervus unicolor*), nilgai (*Boselaphus tragocamelus*), gaur (*Bos frontalis*), wild pig (*Sus scrofa*) and langur (*Semnopithecus*

Asiatic wild dog (*Cuon alpinus*) resting in Pench Tiger Reserve, Madhya Pradesh *Photo : Bhaskar Acharya*

entellus) are also being recorded using vehicle based counts. Preliminary trends indicate that chital was the most often encountered prey species, and the same trend appears in dhole scats and kills.

* **Evaluation and Refinement of the Pugmark Technique for Individual Tiger Identification and for Tiger Census**

Supervisors: 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

The objective of the project is to develop an analytical algorithm, Computational flowchart and Software for analysis of pugmark.

Progress and Project Achievements: The project was initiated with the idea of developing software for analysis of pugmarks, which can be further used for individual identification and population monitoring of tigers. Shri Sandeep Sharma, the identified researcher was deputed for a six-months course work in programming and information technology at MCITR - C-DAC (Centre for Development of Advanced Computing), Pune. A Windows based software; PUGMARK 1.0 was being developed by him. It is expected that the software will address pugmark based individual identification of felids, identification of problematic animals in big cats-man conflict regions and ranging pattern estimation of tigers and leopards.

This endangered Indian wolf (*Canis lupus pallipes*) population is estimated between two to three thousand in India. *Photo: Y.V. Jhala*

EXTERNALLY FUNDED RESEARCH PROJECTS

U.S. Fish and Wildlife Service

* **Conservation of the Indian wolf**

Principal Investigator: Dr. Y.V. Jhala
Researchers: Shri Bharat Jethva and Ms. Privadarshini K. V. R.
Collaborators: Dr. Olav Oftedal, Dr.Robert Fleischer, Dr. Jesus Maldonado, Smithsonian Institution, USA
Date of initiation : May 1996
Date of Completion : December 2003
Budget allotted : Rs. 64.82 lac

The major objective of this research project is to gain understanding of 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* and Kutch areas in Gujarat, and Ojar area near Nasik in Maharashtra. At the intensive study sites the modern technique of radio-telemetry is being used to collect data on wolves, sympatric carnivores like jackals and hyenas, and prey species like blackbuck and chinkara. Rare and endangered carnivores such as the caracal are also being studied. Practical aspects of human-wolf conflict are a major component of the study.

Our telemetry and intensive monitoring studies suggest that the combined predation by wolves and jackals was responsible for the population regulation of blackbuck in Velavadar National Park. Due to competition with an increasing wild pig population, however, the jackal population in Velavadar National Park, Kutch, has been reduced five fold over the past two years. This drop in carnivore numbers is likely to release the blackbuck population from regulatory predation.

Rabies epidemics have taken a toll of the wolf population in Maharashtra and Kutch. Wolves have shown high resilience by re-colonizing areas, where entire packs had been killed by the disease, within one year. This has been possible due to the wolf population contiguity and their good dispersal capability.

In Kutch there is a paucity of wild prey but a high density and diversity of carnivores such as wolves, hyenas, caracal, jungle cats and desert cats. These high densities are primarily maintained by the traditional land use practice of nomadic and resident pastoralism. These traditional livelihoods and in turn the carnivores are threatened by

intensive agriculture (made possible by electric powered deep bore wells), industrialization and mining projects.

Good progress has been made in understanding the conservation genetics of wolves, feral dogs, hyenas and jackals. Wolf gene pools throughout the world are threatened by hybridization with feral dogs. Even though wolves and dogs coexist at high densities in India our data suggest that such wolf-dog hybrids do not occur in the wild. 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.

* **The relationships among large herbivores, habitats and humans in Rajaji-Corbett National Parks**

Investigators : Dr.A.J.T. Johnsingh, Dr. S.P.Goyal, Dr. G.S.Rawat and Dr. Asha Rajvanshi

Researchers : Shri Christy A. Williams, Ms. Kashmira Kakati, Ms. Aparajita De, Shri Anil Kumar Singh and Shri Joy Das Gupta

Date of initiation : October 1, 1995

Date of completion : September 30, 2002

Budget allotted : Rs. 38.87 lac

The objectives of the project are: (i) to prepare a habitat map for the Rajaji-Corbett area using aerial photographs and Geographical Information System, (ii) to understand the regeneration patterns and distribution of vegetation communities, (iii) to quantify biotic pressures within and along the periphery of this elephant habitat and based on the pressure profile, establish quality grades of habitat, (iv) to quantify densities, population structure, health condition and habitat use by elephant, sambar, chital, barking deer and nilgai in different quality grades of habitat, (v) to evaluate the impact of bhabar grass-cutting on goral habitat and densities, and (vi) to disseminate the findings of the project to the Forest Department through a workshop.

The major progress during the year was report writing. For the vegetation component of the study digital data from the Indian Remote Sensing (IRS) Satellite – I-C were used to prepare the vegetation and terrain maps for the study area. LISS III imagery (Path-Row 96-50, 97-50) of 1998 was used for analysis, and the maps were prepared for digital classification carried out at the Regional Remote Sensing Service Centre, Dehradun. Six forest types, two categories of plantations, and four non-forest types were delineated and mapped between the Yamuna and Kosi rivers. Aspect, terrain types and slope classes were also mapped. These categories were assessed for major wild ungulate habitat in the study area. The vegetation structure was quantified by measuring woody species association, species diversity, evenness and richness. Population structure of various woody species, their dominance in terms of Importance Value Index (IVI) and regeneration status was compared across various associations and plantations.

The two study objectives for ungulates were: (i) to determine the current distribution and abundance of wild and domestic ungulates in relation to habitat and disturbance factors, and (ii) to develop population monitoring protocols for wild ungulates. We determined the status of ungulates in Rajaji NP (820 km^2) and Rajaji-Corbett corridor (250 km^2). The corridor was relatively more disturbed than Rajaji NP. Wild ungulate species selected for this study were goral (*Nemorhaedus goral*), sambar (*Cervus unicolor*), chital (*Axis axis*), barking deer (*Muntiacus muntjak*), nilgai (*Boselaphus tragocamelus*) and wild pig (*Sus scrofa*). In the corridor area along the thirteen trails, which ranged from three to five km, only 41 animals were seen in the decending order of sambar, goral, wild boar, chital and barking deer, whereas 368 pellet groups indicated an abundance order of sambar, goral, barking deer, chital and wild boar. It appears that in disturbed habitats with low animal abundance, pellet encounter rates are the most efficient method of collecting distribution data and abundance estimates. Three methods (direct count, pellet group count and track count) were compared in the Park for developing protocols for monitoring relative abundance of four ungulates (nilgai, sambar, chital and barking deer). It was concluded that density, encounter rate, track index and pellet group count are useful population indices for ungulates, and the order of precision obtained in estimating relative abundance is density, encounter rate, track index and pellet density. Pellet group encounter rates (no/km) indicated more sambar, chital, goral and wild pig in the Park than in the corridor area. Livestock use was more in the corridor area (32 dung/km) than in the Park (16 dung/km).

Based on the individual identification of adult male elephants in the study area (circa 1500 km^2, between rivers Yamuna and Ganga), we estimated the number to be 31. We computed the relative proportions of other age-sex classes to the adult males, and estimated a total of 188 elephants. Ninety percent of the adult males were tuskers, and the adult male to adult female ratio was one male to 1.87 females. This is one of the most even sex ratios reported for Asian elephants. Over 90% of the adult females were accompanied by a young one less than five years old. By following nineteen adult females for over two years, we estimated inter-calving period to be around 4.23 years, and the calf survival in the first year was almost 100%. The only calf that died was run over by a train. Subsequent observations of the collared females suggested that the inter-calving period is probably closer to four years. The high proportion of males, low inter-calving period and high neonate survival indicated that the population was demographically very healthy. More elephants died in train accidents however than due to natural causes, and mathematical models of future population trends indicated that the population's chances of extinction will significantly increase if losses to train accidents increase. Elephant home ranges estimated using 100% Minimum Convex Polygon, ranged from 188 to over 400 km^2. The population used the *Shorea* vegetation significantly less than the other major vegetation types (*Shorea* mixed, Miscellaneous and Mixed plantations). This was due to the lower diversity of elephant food plants in Shorea vegetation when compared to *Shorea* mixed, Miscellaneous and Mixed plantation. Radio-tracking data from female elephants that had young calves at heel, however, indicated a strong preference for the *Shorea* vegetation types. This was due to the fact that very few species that can be lopped as fodder for buffalo, were found in the *Shorea* vegetation type, which therefore, had less disturbance, making it attractive for females with young calves. Thus, females with young calves clearly preferred to trade-off food for safety. Moreover *Shorea* vegetation provides excellent shade. The mean buffalo densities in the home ranges of radio-collared females, which were either pregnant or had young calves at heel, was significantly lower when compared to that of male home ranges. This study has proved beyond doubt that a major influence on ranging and habitat use by elephants is human disturbance. A total of thirty-eight species were recorded as food plants by direct observation. *Mallotus phillippensis* contributed a major portion of the diet, and it was consumed in all seasons. There was little recruitment into the 20-30 cm GBH class for food species like *Ehretia laevis* and *Acacia catechu*. The main forms of elephant-human conflict were crop raiding, elephant deaths in train accidents, and competition for forage. The average cost of damage per raid in the study villages (n=22) was estimated to be around Rs. 1740/- (US $ 35.5 @ Rs. 49.90).

Six thousand and ninety nine *gujjars* living in 495 *deras* were located unevenly in all the eight ranges of the Park, with higher concentrations in the four southern ranges (Chillawali, Dholkhand, Haridwar and Chilla). The gujjars owned 13,150 heads of livestock, of which nearly 70% occupied the southern ranges of Chillawali and Haridwar. As a result, these ranges suffered from high grazing pressures. Lopped fodder was extracted primarily from October to March, and the estimated quantity of fodder requirement of a sample of *deras* (n=88) was approximately 21,500 tons. *Bhabar* grass (*Eulaliopsis binata*) was an important resource collected by villagers from thirteen villages located on the southern fringe of the Park, within 5.5 km of its boundary. The total *bhabar* extraction yielded 179.1, tons of *baan* (rope), fetching a total income of Rs. 12,60,624 (US $ 25,727) for the thirteen villages in 1999, which gave an average income of US $ 1979 to each village. The growth of three major urban centres: Dehradun to the northwest, Rishikesh to the northeast and Haridwar to the southeast exert enormous pressure on the Park. Similarly the Rajaji-Corbett corridor is under enormous pressure caused by 43 *gujjar deras* in the corridor (Laldhang range 27, Kotdwar range 16) and the villages along the southern boundary (80), and northern boundary (86) and Kotdwar township.

Landmarks: Christy A. Williams, one of the researchers working on the project was selected as the Areas Co-ordinator, Asian Elephant-Rhino Conservation Programme, WWF-International.

* **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

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 chiefly targets plants, birds and large mammals for study. Secondary databases for the distribution of woody plants and forest breeding bird in the western Himalaya have been developed. Species diversity for both birds and plants occurs 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.

A total of 21 districts, 152 tehsils, 167 blocks and 32,490 have been included in the socio-economic database, to produce thematic layers for use in developing an integrated conservation protocol for the Western Himalaya. Analysis reveals that demographic patterns remain almost the same in Himachal Pradesh and Uttaranchal but land-use patterns differ.

The Terminal Workshop of the project through which the salient findings and recommendations of the project will be shared with the PA planners and managers, scientists and researchers in the states of Uttaranchal, Himachal Pradesh and Jammu and Kashmir will be organized in September, 2002.

* **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

This collaborative project was initiated in 1995. Five centres of Indian Wildlife Health Co-operative were created at the Veterinary Colleges located in Jabalpur (Madhya Pradesh), Chennai (Tamil Nadu), Guwahati (Assam), Hissar (Haryana) and Anand (Gujarat) through a Memorandum of Understanding between the agricultural universities and the WII. The colleges designated a faculty member to be the Wildlife Health Co-ordinator (WHC), who would manage the co-operative centres. The WHC's first participated in the nine-month Diploma Course in Wildlife Management at WII, and then received three-months of intensive training in the US, organized by the National Wildlife Health Centre (NWHC), USA. This provided them with groundings in wildlife science, and international exposure with which they will be able to build their Centres. The project has also contributed field vehicles, diagnostic teaching, research and communication equipment. The key goal was to develop good professional relationships with protected area managers, and provide wildlife health services to the park when needed. The WHCs were equipped to develop and teach a wildlife health curriculum for students, teachers and veterinarians to increase the number of trained individuals.

* **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 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)

Researchers (Corbett): Ms. Anjali Ravi and Shri Raman Kumar

Date of Initiation : October 1, 1995
Date of completion : December, 2003
Budget allotted : Rs. 119.91 lac

During the reporting year a still photographer was commissioned to document the wildlife, landscape, geological features (including valley and gorges) and a mosaic of habitats in Panna National Park. It was also emphasized that the still photographer should aim at capturing all these features with emphasis on the changing look of the forest in different seasons. This exercise thus involved location shooting in and around the protected area during the drier and wet seasons. The documentation work was completed in June 2001. In all 156 rolls (135-36, 100 ASA) of transparencies and negatives were produced.

An Interpretation Plan was prepared for Panna. The aim of the plan is to provide direction to the Interpretation Programme. A workshop was organized at the Interpretation Centre at Madla, with the objective of sharing the draft Interpretation Plan. Based on the comments received during the workshop the plan was modified. One of the components of the Interpretation Programme identified was preparation of a website for Panna. The registration of the domain name www.pannatigerreserve.org was completed. The website has been uploaded and the work is in progress.

Under the project, a few publications are to be produced. The first in the series is the Checklist of Birds of Panna. The Bird checklist was prepared after incorporating comments from the Director, Bombay Natural History Society. A comprehensive checklist of the Trees of Panna was prepared in consultation with the Park Director and through a field survey. The finalization of the publication is in progress.

A short Orientation Film that will showcase the incredible beauty, richness and diversity of Panna Tiger Reserve, with a view to attracting more visitors to this relatively unknown forest, was planned under the project. The process of identifying filmmakers to produce a ten to fifteen minute documentary is underway.

An MoU was signed with the Uttaranchal Forest Department, and Shri Rajiv Bhartari was included in the project team as the Principal Investigator.

A planning exercise to determine the approach of the project to achieve the objectives, and execute the components within a time frame was carried out. The photo-documentation of landscapes, plants, local culture, management and wild animals of the Corbett National Park was initiated, with a view to developing a broad collection of slides and print photographs for use in displays and publications. Research on Jim Corbett's life and the heritage from his period, history of the formation and development of Corbett National Park and the cultural aspects of the nearby areas was made. This will help in identifying interpretive themes, and prepare an interpretation plan for the Jim Corbett Museum at Kaladhungi. In addition, an extensive visitor survey was conducted for the Corbett NP, Kaladhungi and Nainital, with the help of questionnaires, to understand visitor characteristics, motivations/expectations, activities and the utilization of interpretation facilities.

WII-USFS 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, 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: The study site 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.

Progress : The project was in its sixth and final year. Field research stations were closed during March-June, 2001 and researchers returned to the Institute, and have mainly spent their time on the analysis of data and writing of draft chapters for the final report-cum-field management guide. Four US counterpart scientists visited WII during August- September, 2001 and provided their inputs in the analysis of data and finalization of project report in six volumes. Volume I addresses the conceptual and scientific basis for the approach, and should be of use to any manager or researcher interested in such an approach anywhere. Volume II covers the wildlife-habitat relationships and include a framework for how to evaluate multiple wildlife species simultaneously, and narrative summaries of life histories of 184 wildlife species selected to represent various criteria of rarity, endemism, management focus, habitat associations, and other factors. Volumes III to VI are intensive case studies of four "conservation areas" selected across India to represent a great diversity of cultural situations, ecological conditions, site histories, and management challenges. The project was scheduled to conclude on December 31, 2001. The project activities, however, particularly the last visit of US scientists to India for the concluding National Workshop were postponed due to a suddenly disturbed situation in the USA.

Findings : Many useful lessons have already been learned from this project, principally the need to think broadly across major landscape areas when managing for native species and communities. This includes the need to co-ordinate data, analyses, and management across different land ownerships and allocations. Cumulative effects in buffer areas or zones of influence outside the existing protected areas, or even along international borders, are also to be taken into account when developing site-specific management plans. An integrated resource, too, management approach at all spatial scales is seen as the best way to avoid conflicts in resource use and to plan for appropriate ways to conserve biodiversity in managed forests.

SPONSORED PROJECTS

Gujarat Forest Department funded through the World Bank

* **Impact monitoring of the India Ecodevelopment Project on Gir PA**

Consultants: Shri S.K. Mukherjee, Dr. Y.V. Jhala, Dr. P.K. Mathur, Dr. A.J.T. Johnsingh, Dr. Ravi Chellam, Shri Qamar Qureshi, Dr. S.P. Goyal and Dr. K. Sankar
Researchers: Dr. Nita Shah, Mr. S. Mukherjee, Mr. C. Dave, Mr. K.S. Chauhan and Mr. Yogendra Jhala
Date of initiation : February 20, 2001
Date of completion : August, 2002
Budget alloted: Rs. 34.82 lac

Objectives: The major objective of the consultancy was to: (i) evaluate and monitor the impact of management activity of the ecodevelopment project on ecological indicators, (ii) develop, demonstrate and implement an ecological monitoring programme for Gir PA that includes monitoring (a) carnivores, (b) herbivores, and (c) habitat and vegetation, and (iii) to transfer this monitoring technology to PA management in the form of designed protocol and training through field data collection.

Achievements: The project is in its final report preparation phase. Protocols for monitoring the lion population using whisker patterns in a mark-recapture framework have been developed. This protocol was used to collect data for estimating lion population in Gir and is set up so as to enable long term monitoring. If implemented this experimental design will provide annual population estimates and long term data on survival, mortality and dispersal of individual lions. Seven lionesses from different prides were anesthetized (using Meditomedine and Ketamine), radio-collared and monitored for collecting data on critical demographic parameters. These lionesses will need to be monitored for three years to obtain data on birth rates, litter sizes, inter-litter intervals, cub survival and mortality, and dispersal – data critical for the management of any endangered species.

A lion cub investigating a spotting scope used for individual identification of lions for population monitoring *Photo : K.S. Chauhan*

Monitoring protocols for ungulates in Gir were developed. Permanent line transects to implement this monitoring were cut and marked, data were collected from these transects to develop appropriate models for ungulate population estimation. Protocols for indicator birds, protocols for vegetation and land use monitoring were developed using remote-sensing and GIS. Forest Guards were trained in the use of instruments such as telemetry, GPS, and compass, needed for implementing monitoring and in data collection protocols by direct involvement in the field. A framework for the monitoring of management activities was also developed.

Funded by LEAD

* **Development of a framework for tourism and conservation in the Corbett Binsar Nainital (CBN) region of Uttaranchal**

Investigators : Shri Rajiv Bhartari (WII), Shri Dhananjai Mohan (IGNFA), Dr. Pushkin Phartiyal (UAA-CDS), Ms. Elizabeth Atkinson (LEAD), Dr. Nandita Jain (TMI), Dr. Sejal Worah (WWF UK)
Date of initiation : January 2001
Date of completion : June 2002
Budget allotted : Rs. 6.00 lac

An eighteen-month LEAD Fellows project aimed at "Development of a Framework for Tourism and Conservation in the Corbett Binsar Nainital (CBN) region of Uttaranchal" was initiated in January 2001, funded by LEAD International. This project and associated activities by local partner organizations have led to the launch of a broad-based "CBN Ecotourism Initiative".

Initially, a training workshop was organized to identify individuals/ organisations as partners, to develop skills and explore funding support and commitment for activities, Subsequently, twenty consultations were organized with different stakeholder groups – villages, businesses, Forest Department, Tourism Department, institutions and NGOs. All consultations were structured in a similar manner and followed a common method. Representatives from consultations were invited to a multi-stakeholder workshop. Subsequently, a framework was developed in a dedicated planning session with partner organizations.

Presentations on the findings of the project were made at the South Asia Regional Conference held in Sikkim and before the Government of Uttaranchal. A status survey, for conservation and ecotourism in Nainital and Ramnagar Forest Divisions, was undertaken by Shri Rajiv Bhartari and Dr G S Rawat to assess the vegetation cover and wildlife, particularly the distribution of tiger and the impacts. The trekking routes and document extent of tourism activity in the Kunjakhara - Patkot area were evaluated. A visitor survey was conducted at Binsar Wildlife Sanctuary and a survey of CBN Resorts and Tour Operators was initiated. Four villages have been selected for community based tourism on the basis of ecosystems, tourism activities and chances of success in partnership with local organizations and the preparation of CBN Tourism Plans is in progress.

The participatory process adopted for the development of the framework has led to an increase in awareness regarding ecotourism, made linkages and partnerships between individuals and organizations, and generated commitments. Local partner organizations performed several activities including a training workshop on ecotourism for staff, a nature guide training course at Binsar WLS, an ecotourism study tour for the trained nature guides and the formation of a web site. The Framework document once finalized will serve as a basis for future policy and initiation of internal changes in ongoing programmes within Government Departments, NGOs and the Private Sector. It will also serve as the basis for the development of a variety of project proposals for funding from both internal and external sources.

PROJECTS INITIATED

WII Grant-in-aid projects

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

Investigator : Dr. Ravi Chellam
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 habitat, seasons, 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.

Progress : The project began in June 2001 and a JRF was appointed. Two technical assistants were also appointed in Feb 2002. (i) The equipment necessary for the project including telemetry has been bought, with funding from an external source. Other equipment was bought with money obtained from the WII. A motorcycle was also purchased. The field station was set up in Churna and the equipment necessary to run it was also purchased. (ii) Field work began on 1 February 2002 after permission was obtained from the Madhya Pradesh Forest Department. Seven transects were laid randomly after gridding the area, each of two km length. The transects were cut and permanently marked. The researcher and two technical assistants have been walking these transects. All transects have been walked from five to twelve times each. A total of 102 km of transects has been walked in two months. An estimation of density of the most common prey species of the leopard is as following: Chital-3.45/ sq km, Sambar-2.39/sq km, Nilgai-0.39/sq km, Langur-10/sq km.

(iii) Five Track plots of about 1.5 sq. m. each were set up near each transect. They are being monitored, and pugmarks seen on them recorded for later analysis of indirect evidence of leopard activity. (iv) Collection of carnivore scats: Animal trails and jeep tracks were walked and scats of dhole, tiger and leopard were collected. A total of about twenty scats have been collected so far. (v) Quantification of kills: In all eight kills made by dhole, tiger and leopard were observed. Data pertaining to species and sex of the prey, rush distance, predator identity, drag distance and mode of killing have been collected.

Findings: During the preliminary analysis of the transect data it has been found that the density of ungulates seems to be low. A larger number of replicates need to be run to obtain more precise densities of the wild ungulates.

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

Investigators : Shri S.K. Mukherjee and Dr. S.P. Goyal
Researcher : Smt. Rina Rani Singh
Date of initiation : July 2, 2001
Date of completion : July 1, 2006
Budget allotted : Rs. 42. 60 lac

After the completion of the WII-USFWS collaborative project, entitled "Establishment of Wildlife capabilities at Wildlife Institute of India", we realized a need to develop techniques to identify widely traded parts and products of ivory, rhino horn, bones of major species and antler.

The objectives of the project were to: (i) develop morphometric, chemical and DNA-based techniques to identify species from bones of major animals such as tiger, leopard, chital, sambar, barking deer and swamp deer, (ii) 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, (iii) Investigate source-area of Asian elephant ivory, (iv) Determine characteristics of rhino horn, and (v) Establish species characteristics and keys to identify antler of deer species.

Initially, it was aimed at procuring reference samples, mainly from Forest Departments and Zoos, and developing techniques for identifying species and their source of origin from bone, antler, tusk and rhino horn requiring the use of some sophisticated equipment *e.g.* X-ray fluorescence (XRF), X-ray diffraction (XRD), mass spectrometer. Therefore, inventories for available facilities were made at different institutions such as Jawahar Lal Nehru University (JNU), National Physical Laboratory (NPL), and Indian Agriculture Research Institute (IARI). Mr. R.K. Kale, Professor of JNU, helped in the interpretation of isotopic data. At the Nuclear Research Laboratory, IARI, Dr. P.S. Dutta suggested the use of a Strontium isotope since they do not have a triple counter. It was suggested that the study be carried out in the Physical Research Laboratory, Ahmedabad, where all the three isotope studies (C^{12}/C^{13}, N^{14}/N^{15} and Sr^{86}/Sr^{87}) can be done simultaneously. Spectral spectroscopy can be undertaken at NPL, New Delhi, and the Instrument Research and Development Establishment (IRDE) at Raipur, Dehradun.

Morphometric antler data were recorded for physical features, measurements and branching angles for chital (n=10), sambar (n=10) and barking deer (n=2). There are morphometric variations in antlers of different species. The barking deer antler is morphometrically and visually very different from the antler of chital and sambar. The antlers of chital and sambar are different in their angles and also in cross-sectional structure, the core area of a sambar antler is more porous than the chital antler. Multivariate statistics will be used to identify antlers of various species. Scanning Electron Microscope examination were done at various places for ivory (n=4), antler of chital (n=3) and sambar (n=3), elephant bone (n=1), and camel bone (n=1).

The best magnification for this kind of sample is $6.25X10^3$ and consistency was noted in one portion of a sample. The micrographs of species showed the difference in structural morphology. In fact, changes were noted in different portions (oputer, cortex and core) of the sample of a species. The antler of sambar has a uniform mosaic packing but this uniformity was not found in the antler of chital. An analysis of line intensity using Sigma Scan Pro programme indicated more uniformity in ivory than in antler.

Training of thirteen days was undertaken by Smt. Rina Rani Singh, researcher at the National Bureau of Fish Genetic Resources, (NBFGR) Lucknow, for the extraction of DNA, and to learn techniques for analysis such as micro-satellite and Random Amplified Polymorphic DNA (RAPD).

* **Social organisation and dispersal in Asiatic lions**

Investigators : Dr. Ravi Chellam and Shri B.J. Pathak, IFS, Conservator (Wildlife) Junagadh Circle.
Researcher : Ms.V. Meena
Date of initiation : March, 2002
Date of completion : March, 2007
Budget allotted : Rs. 62.40 lac

The main objectives of this study are to investigate the factors that influence social organisation 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 of the lion population.

Progress : The project has been on for less than a month during the reporting period. The researcher during this time has been reading the literature and preparing to commence fieldwork.

* **A quantitative analysis of incidental sea turtle captures and mortalities during commercial shrimp trawling in the coastal waters off Orissa, India**

Investigators : Shri B.C. Choudhury and Dr. Bivash Pandav
Other Collaborators: Department of Fisheries, Government of Orissa and Wildlife wing of Orissa Forest Department
Researcher : Shri Gopi G.V.
Date of initiation : October 2001
Date of completion : November, 2002
Budget allotted : Rs. 5.56 lac

This project is being carried out in collaboration with the Director of Fisheries, Government of Orissa and the Wildlife wing of the Orissa Forest Department. An indigenous Turtle Excluder Device (TED) developed by the Central Institute for Fisheries Technology (CIFT) was used to carry out experimental trawling from January to April 2002 using a fisheries department trawler. A base camp was established in the Fisheries Department Complex at Paradeep and the trawler was primarily based at Paradeep fishing harbor. Experimental trawling was carried out in three designated zones: Zone I – Coastal waters off Gahirmatha (between Dhamra river mouth and Barunei), Zone II – Coastal waters off Paradeep (between Barunei and Jatadhara River mouth), and Zone III – Coastal waters off Devi River mouth (between Devi River mouth and Konark). In total 77 experimental trawls were carried out in these three zones using the CIFT-TED. In zone I, twelve experimental trawls were carried out with TED and ten without TED. In zone II, 29 experimental trawls were carried out with TED and fifteen without TED. In zone III, eleven trawls were carried out with TED.

The CIFT-TED had no mortality of turtles. Catch loss through the CIFT-TED opening observed during the study was very low (0 – 7% of the total catch). The data analysis and final report writing is in progress. The project is scheduled to be completed in November 2002 and the report is to be submitted to the Ministries of Commerce, Agriculture, Environment and forests, the UNDP and IUCN – Marine Turtle Specialist Group.

* **Conservation genetics of Marine turtles on the mainland coast and islands of India**

Investigators : Shri B.C. Choudhury and Shri Kartik Shanker, WII; Shri Ramesh K. Aggarwal and Shri Lalji Singh, Centre for Cellular and Molecular Biology, Hyderabad
Date of initiation : August 2001
Date of completion : July 2004
Budget allotted : Rs. 26.92 lac

The Wildlife Institute of India, Dehradun, and the Centre for Cellular and Molecular Biology, Hyderabad, conducted a study on Olive Ridley turtles on the East Coast of India in 1999. The WII-CCMB study demonstrated that the Ridley turtles on the East Coast of India are ancestral to contemporary global populations of Olive Ridley. This population seems to have served as a source for recolonisation or replacement of populations both in the Pacific and the Atlantic oceans. This work is now being extended to marine turtles throughout India, including the entire Indian mainland coast and offshore islands of Andaman and Nicobar and Lakshadweep.

This study will document mitochondrial DNA haplotypes and microsatellite markers for marine turtles on the Indian coast. Olive Ridleys and Leatherbacks are wide ranging pelagic species, and it is necessary to trace their feeding grounds to ensure protection at all stages in their life cycle. Secondly, a comprehensive database of haplotypes will help in the identification of the source of turtles killed in various deep-sea fisheries. The role of this project is to contribute to this long-term objective, which is critical to sea turtle conservation, by building a database of genetic markers for marine turtles in this region. Population genetic analysis will be carried out using microsatellite markers. Comparisons between nuclear microsatellite markers and mitochondrial markers will be used to test for differences in gene flow between males and females in different regions. Understanding the biology of these animals will help in framing appropriate conservation strategies. Currently, samples have been collected from Nicobar, Lakshadweep, Tamil Nadu, and Gujarat. DNA isolation is in progress.

* **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 2003
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 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.

Fieldwork was initiated with an autumn reconnaissance survey of the Askot Musk Deer Sanctuary and surrounding areas to locate suitable continuous altitude gradients. The Goriganga and Darma valleys were surveyed. The Chiplakot region in the middle Goriganga valley was identified as the intensive study site. This area provides a gradient from 800 metres to above 4500 metres with high contrast North and South facing slopes. There is a wide range of vegetation types including sal forests, subtropical forests, chir pine (*Pinus roxburghii*) temperate oak dominated forests, temperate deciduous forests, alpine meadows and scrub. Intensive sampling for bird and plant composition, diversity and rarity is scheduled to begin in the summer of 2002.

* **Conservation ecology of an isolated population of Gaur in Trishna Wildlife Sanctuary, Tripura**

Investigators: Dr. A.K. Gupta and Dr. K. Sankar
Researcher: Shri Sabyasachi Das Gupta
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 the status, distribution, population structure, habitat use and food plants of endangered mammals in the Trishna Wildlife Sanctuary (TWS), (ii) prepare vegetation and land cover maps of TWS, (iii) identify major threats to the endangered mammals, and (iv) suggest management recommendations for the conservation of the target species. Between January and March 2002 purchase procedures for the acquisition of satellite imagery LISS III (digital data), the Survey of India topo-sheets, and Forest Cover maps for the entire study area (194.708 sq. km) were initiated.

During the initial reconnaissance fieldwork in TWS, (i) information on park administrative boundary and various infrastructures were recorded using the Global Positioning System (GPS) and (ii) methods for quantifying vegetation, food plants and animal abundance were planned. It has been decided to lay six line transects in the study area covering major vegetation types in order to study the density, distribution and population structure of target species (gaur - *Bos gaurus*, hoolock gibbon - *Bunopithecus hoolock*, capped langur - *Trachypithecus pileata*, pig-tailed macaque - *Macaca nemestrina* and Phayre's leaf monkey *T. pheyrei*) through the seasons.

Rhododendron barbatum *Photo : G.S. Rawat*

SPONSORED PROJECTS

Funding Agency: Ministry of Environment and Forests

* **Studies on animal-habitat interactions in the buffer zones of the Nanda Devi Biosphere Reserve**

Principal Investigator: Dr. S. Sathyakumar
Co-Investigator: Dr. G.S.Rawat
Technical Assistant: Shri Ramesh Negi
Date of initiation: February 2002
Date of completion: February, 2005
Budget allotted : Rs. 4.49 lac

Objectives: (i) Assess the status of wildlife habitats along gradients of human use, (ii) Study the distribution, abundance and habitat use patterns of large mammals and pheasants, (iii) Identify threats to large mammalian and pheasant species and their habitats and suggest possible mitigation for long-term conservation and management.

Activities carried out: Following the approval of this project and release of the first year's budget by the MoEF in July 2001, necessary planning and preparatory work related to the initiation of this project were undertaken. This included the selection and appointment of a Technical Assistant in February 2001, and obtaining permission from the Uttaranchal State Forest Department. Fieldwork is scheduled to begin from April 2001.

UPFD-TERI Consultancy Project

* **Ecological, social and hydrological factors affecting the management of wetlands systems in Uttar Pradesh, with special reference to Vijaya Sagar and associated water bodies in Mohaba district, Okhla and associated water bodies in Ghaziabad district, Bakhira Bird Sanctuary and Nawabganj Bird Sanctuary.**

WII Faculty Consultants: Shri B.C. Choudhury, Dr. S.A. Hussain, Dr. Ruchi Badola and Dr. K. Sivakumar
Field Biologist: Shri Sarat Chandra Tripathy

This project was awarded to the Wildlife Institute of India, Dehra Dun, with an overall project outlay of Rs.6,00,000 The MoU for this project was signed on February 6, 2001 following which an inception report was submitted in March 2001. Subsequently, a Field Biologist was appointed to assist in the fieldwork and the project was formally initiated. The fieldwork for the project was initiated during the winter months of 2001-2002. The following activities were taken up during the reporting year.

Review of wetland status in Undivided Uttar Pradesh: As a major task in the project, based on literature survey and secondary source of information, the first report was prepared and submitted to the Forest Department in January 2002. This review identified important wetlands of undivided Uttar Pradesh with their conservation significance. This work was undertaken from September to December 2001.

Fieldwork at four wetland sites : After collecting literature-based secondary information on the four identified sites *i.e.* Vijaya Sagar, Okhla, Bakhira and Nawabganj Bird Sanctuaries, fieldwork was initiated from November 2001. The field personnel and consultants have made a total of around eighty man-days of field visits upto March 2002. The progress achieved so far with respect to each component and future plan of action is given below.

(a) Mapping of wetlands: Survey of India Topographic sheets on the scale of 1:50,000 that cover the four wetland sites were procured and digitized in GIS domain. Digital remote sensing data for the above mentioned sites have been ordered so as to prepare the land-use maps of the area and to understand the hydrological regime, thus to develop a plan for maintaining the flushing mechanism of the wetlands.

(b) Biological and ecological information: Floral and faunal inventories for all the four sites for the winter season have been completed and an assessment of rare and endangered flora and fauna in these wetlands has been compiled. The extent of use of these wetlands by migratory waterfowls has been examined. The extent of invasive species (weeds) abundance for the winter season has been done.

(c) Hydrological assessment: Hydrological factors affecting these wetlands have been critically examined. All these wetlands are monsoonal and depend to some degree on supplementation from

other water inundations through canals. While such connectivity has either been destroyed or altered, even the Critical Minimum Water Level (CMWL) during the pinch period at all the four wetlands is further depleted because of other anthropogenic and developmental work-related water abstraction. Coupled with natural evapo-transpiration such leaching of water is detrimental to the wetlands. The quantum of such abstraction versus requirements is being calculated.

To estimate the water requirement of each wetland, meteorological data for the last thirty years have been procured from the Metrology Research Division, Pune and data for the recent years is being procured from the IMD, Delhi. This information is vital for developing the hydrological budget and requirements.

The scope of the project to include water quality analysis for the four sites was extended. Data from secondary sources has been collected. The Institute is in communication with the Central and State Pollution Control Board (CPCB and SPCB) to procure information on water quality. Okhla is the most polluted urban wetland, whereas the other three wetlands are relatively less polluted but highly eutrophic in nature.

(d) Socio-economic analysis: For the socio-economic factors affecting these wetlands demographic and socio-economic data from the Commissioner of Census, New Delhi, for the years 1991 and 2001 were procured. Around eighteen, seventeen and 153 villages are dependent on Vijaya Sagar, Nawabganj and Bakhira respectively. Dependent cluster villages for each wetland have been identified through field visits to the wetland sites. A questionnaire for conducting a Rapid Rural Appraisal (RRA) has been designed and tested.

(e) Tourism and visitor-use analysis: Existing tourism infrastructure and profiles for each site have been critically examined. While all these wetlands are visited by tourists no systematic record of visitor numbers. Their expectation and proper interpretive and education activities are lacking. A basic requirement of such a visitor plan has been under preparation, keeping in mind the ecotourism policy of the Government in Protected Areas.

(f) Threat assessment: An assessment of anthropogenic and other disturbances in the form of visitors to the wetlands and other socio-economic dependency such as fishing, biomass removal, cultivation, agricultural runoffs and extraction of water for agricultural and domestic use, has been initiated. Apart from these items, an NGO profile of the surrounding areas has been prepared to develop a mechanism to involve them in the proposed conservation initiatives of these wetlands.

(g) Photo-documentation: The comprehensive photo documentation of the wetland habitat, its flora and fauna and other related factors of all the four wetlands for the winter season has already been compiled. The dry summer season photo documentation remains incomplete.

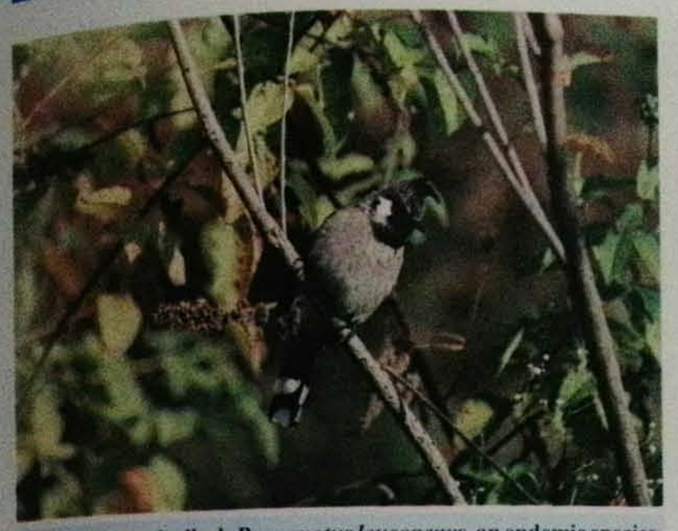
(h) Evaluation of current management effectiveness: Current management effectiveness in the four sites as proposed in the management plans have been critically examined through an in-house workshop, and a SWOT analysis has been conducted. The physical and administrative boundary of the PAs as proposed in the plan, *i.e.* the required ecological boundary of the wetlands has been examined, so as to rationalize the boundaries that will minimize impacts, and help to retain the ecological characteristics of the wetlands. The emphasis of the plans needs to be shifted from the current concept of only "infrastructure development" to the maintenance of "ecological characters and values". Suggestions are underway to include visitor and user friendly programmes in the plans that are wetland friendly while enhancing the awareness and knowledge of visitors on wetlands.

Department of Science & Technology Project

* **Acoustic signals in two avian species: their characterization and importance**

Project Co-ordinator : Dr. Sushant Chowdhury
Project Scientist : Dr. Anil Kumar
Date of initiation: January 28, 2002
Date of completion : January 27, 2005
Budget allotted : Rs. 10.96 lac

The project aims to record and analyze acoustic signals of two species of bulbuls, the Red-vented bulbul *(Pycnonotus cafer)* and the Himalayan bulbul *(Pycnonotus leucogenys)*. Physical characterization of calls and songs will be related to the socio-biological aspects to understand the role of communications in species isolation and survival. So far several calls and songs were recorded by using an audio-recorder. The songs are being converted from analog to digital format. The digital recorder proposed in the project is still in the process of being purchased. The computer and software for the analysis of acoustic signals, however, have been procured and installed. Permission for undertaking research in the Rajaji and Corbett National Parks has been sought from the Chief Wildlife Warden, Uttranchal.



The Himalayn bulbul, *Pycnonotus leucogenys*, an endemic species to the lower Himalaya, use beautiful songs for mate acquisition
Photo : Anil Kumar

Indira Gandhi Institute of Development Research, Capacity 21 project

* **Valuation and Evaluation of the Management Alternatives for the Bhitarkanika Mangrove Ecosystem, Orissa, India**

Principal Investigators : Dr. Ruchi Badola and Dr. S.A. Hussain
Researchers: Dr. Hemant K. Sahu, Ms. P. Semwal and Ms. Kalpna Ambastha
Date of initiation : April 2001
Date of completion : November 2002
Budget allotted : Rs. 13.40 lac

The Bhitarkanika mangrove ecosystem is the second largest mangrove forest on mainland India approximating around 672 km^2 is now limited to a 115 km^2 area which is protected as a Wildlife Sanctuary. This deltaic, estuarine-mangrove system harbours the highest diversity of Indian mangrove flora, the largest known rookery of the Olive Ridley sea-turtles in the world, the last of the three remaining populations of salt-water crocodiles in India, the largest known population of king cobra, water monitor lizard, one of the largest heronry along the east coast of India and one of the highest concentrations of migratory waterfowl. It also has the largest diversity of estuarine and mangrove obligate fish and prawn. The mangrove and associated forests provide the subsistence requirement of timber, fuelwood, tannin, honey, and thatch roof for the local people and fodder for the local communities. The loss of the mangrove from Bhitarkanika is mainly due to human encroachment and reclamation of land for agriculture and unsustainable resources, using practices such as aquaculture activities and mechanised fishing in the area. Recent development activities such as the construction of jetties, roads and the proposal for a major port at Dhamra threaten the existence of this ecosystem. Declaration of the mangrove forests of Bhitarkanika a Protected Area (PA) has affected the local people living around this forest due to lost access to their life support systems. On the other hand the unsustainable resource use in the area is a major threat to its continued existence. The resulting scenario is one of conflict between the forest department and the local people, fuelled by the man-animal conflict. The Indira Gandhi Institute of Development Research under its Capacity 21 project programme funded the above mentioned project with the aim to develop strong conservation strategy for the Bhitarkanika based on economic valuation of the major ecological services provided by this ecosystem and taking local people's need and aspiration into consideration.

The major objectives of this project were: (i) estimate the use values and ecological services provided by the Bhitarkanika mangroves ecosystem, (ii) quantify the extent of dependency of local communities on Bhitarkanika and identify marginalized stakeholders, and (iii) examine the attitude of local communities towards the present management and proposed alternative to mangrove resources.

One additional objective of this project is to derive a predictive model to assess the extent of inundation due to sea level rise on the Bhitarkanika mangrove ecosystem.

Progress: Permission to carry out this study was acquired from the Orissa Forest Department in April

2001. A base camp was established in Daangmal in the Bhitarkanika Sanctuary. The fieldwork was initiated in October 2001. Initially secondary data on 35 socio-economic parameters from 403 villages located within Bhitarkanika Wildlife Sanctuary were collected. Out of the 35 parameters 28 parameters believed to be characterizing villages were subjected to Factor Analysis. Only 336 villages were taken up for the analysis. The remaining 67 of the total 403 villages were dropped as these were uninhabited and hence had no direct impact on the park area. Factor analysis was used to identify a few items, which explains most of the variance observed in a larger number of variables. Seven components, having Eigen values greater than one were identified, from the correlation matrix. From this matrix 35 villages were selected for extensive survey. For each village ten percent of the housing units were picked up randomly for the household and attitude survey in each of the selected villages. The survey is in progress.

To estimate the utilization values and ecological services provided by the Bhitarkanika mangrove ecosystem. There are four ecological services provided by the mangrove ecosystem, *i.e.* nutrient retention, land accretion, storm abatement and fish and shellfish production. These were identified for the valuation, and field data collection is underway. LISS III remote sensing data from the NRSA, Hyderabad was procured and False Colour Composite of the Bhitarkanika area was generated; ground-truthing is in progress to prepare a resource map.

WII-HPFD Project

The Himachal Pradesh Forest Department (HPFD) entrusted a short-term (one-year) assignment to the Institute so as to formulate the following two Conservation Projects :

(a) Conservation of Flora and Fauna in and around the GHNP;

(b) Conservation of Endangered Wildlife Species in Himachal Pradesh

The Government of India, while sanctioning the Parvati Hydroelectric Project Phase II in Himachal Pradesh, stipulated that the Wildlife Institute of India will formulate the above two conservation projects in consultation with the HPFD. The Principal Chief Conservator of Forests (Wildlife), HP and the Director, WII signed a Memorandum of Understanding (MoU) on March 20, 2002. Prior to the signing of this MoU, the participating faculty members, Dean, FWS and Director from the Institute side and the Chief Conservator of Forests (Wildlife), and PCCF (Wildlife), HP from the HPFD side had three meetings for deciding the Terms of Reference, expected output and other negotiations. The HPFD has agreed to provide an amount of Rs. 55.0 lac to the Institute towards the above assignment. The Institute has involved a multi-disciplinary team for the preparation of the above projects and will also avail itself of the services of select external resource persons. The actual work of this consultancy assignment was scheduled to commence on April 1, 2002.

The Institute completed nine research projects and one consultancy. During the reporting year there were fourteen ongoing projects. Three faculty members were awarded Ph. D. degree and three theses have been submitted and award is awaited. Fourteen research articles were published in peer reviewed national journals and eleven in peer reviewed international journals. The details of various manuals, reports, books and other publication are listed under the section titled Publications.

ORGANISATION

COLLABORATIONS

USDA Forest service

The project had secured a no-cost extension of one year beyond its term of five years ending November 23, 2000. The final phase of fieldwork was completed by June 2001. Four USDA Forest Service scientists visited the WII for a period of three weeks during August-September 2001 to work with their WII counterparts in shaping the field guides for each of the four project sites. The work was planned to be presented in a National Workshop to be conducted later at a mutually agreed slot. Following the unfortunate events on September 11, 2001 in the United States, however, the fate of further activities became uncertain. It was agreed that in view of the circumstances of further extension over an appropriate period would be considered by the collaborators.

Interaction of USDA and WII scientists working to develop field guides for four sites *Photo : V. Verma*

IUCN Indian National Committee

During the Year 2001-2002 the Wildlife Institute of India continued to be the Secretariat of the Indian National Committee for the IUCN. Supported by the MoEF, the Secretariat of the Indian National Committee co-ordinated and facilitated the following activities:

IUCN's Sustainable Use Programme – Asia: Biodiversity Conservation Strategy for the Himal Region : The three members' consortium of Indian Institute of Forest Management (IIFM), Bhopal, Wildlife Institute of India (WII), Dehradun, and GB Pant Institute of Himalayan Institute Environment and Development (GBPHIED), Almora, initiated the work for which the IUCN South Asia contributed an initial grant of US $ 13,500. The following projects were begun by the collaborating consortium:

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

IUCN's Sustainable Use Initiative : The IUCN Indian National Committee Secretariat co-ordinated the organization of a workshop on "Sustainable Fisheries in India" for the Sustainable Use Initiative group for South Asia. This workshop was organized in Goa from September 27 to 29, 2001 in which the premier fisheries organizations of India, the marine product export development authority, universities involved in fisheries research and several NGOs participated, to review the existing policy framework on fisheries resource exploitation and its sustainability in India.

Bye-Laws of the Indian National Committee for the IUCN : The three-member committee consisting of WWF-India, New Delhi, INTACH, New Delhi and CEE, Ahmedabad finalised the bye-law for the Indian National Committee for the IUCN. After circulating the bye-laws to all members, it has now been approved by the IUCN headquarters in Switzerland.

Membership Drive : During the year 2001-2002 the Indian National Committee facilitated the

membership drive with the inclusion of Atappaddy Hills Development Society, Agali (Kerala), Gujarat Ecological Education and Research Foundation, Gandhingar (Gujarat), Wildlife Protection Society of India, New Delhi, Gujarat Ecological Society, Vadodara (Gujarat), Gujarat Institute of Desert Ecology, Bhuj-Kutch (Gujarat), and Nature, Environment and Wildlife Society, Kolkata, as new members. The IUCN organizational membership has now gone up to 21 in India. To facilitate the exchange of ideas and coordination between the members an IUCN Indian National Committee membership directory has been made during the year.

Due to several other pre-occupations, the annual meeting of the Indian National Committee for the IUCN could not take place during the year .

WII-USFWS Collaborative Projects

The following WII-USFWS collaborative projects (Phase-II) initiated in September 1995 completed six years of their tenure in September 2001.

1. Identify potential areas for conserving biodiversity in the Indian Himalayas.
2. Evaluation of Panna National Park with special reference to the ecology of the sloth bear.
3. The relationships among large herbivores, habitat and humans in the Rajaji-Corbett National Park.
4. Impact of Fragmentation on the biological diversity of rain forest small mammals and Herpetofauna of the Western Ghats Mountains, South India.
5. Establishment of a Wildlife Forensic capacity at the Wildlife Institute of India.
6. Development of an Indian Co-operative Wildlife Health Programme and Technical Assistance with WII's Wildlife Health Research.

As several collaborating scientific exchange programmes, however, could not take place during the terminal year, the projects were given a no-cost extension for a period of one year up to September 2002. Two projects, namely (i) "Impact of Fragmentation on the biological diversity of rain forest small mammals and Herpetofauna of the Western Ghats Mountains, South India", and (ii) "Evaluating Panna National Park with special reference to the ecology of the sloth bear" completed their activities during the reporting year and organized project finding sharing workshops for the benefit of PA management authorities in the concerned states where the research studies were conducted.

Two other projects "Conservation of the Indian Wolf" and "Planning and Development 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.

UNDP

* **Sea turtles and their nesting beaches along the Andhra Pradesh coast, India – A status survey**

Investigator : Shri B. C. Choudhury
Researcher : Shri Basudev Tripathy
Date of initiation : May 2, 2000
Date of completion : May 31, 2001
Budget allotted : Rs. 2.64 lac

Objectives: (i) identification of major nesting sites of sea turtles, and to quantify the nesting concentration along the Andhra Pradesh coast, (ii) assessment of the sea turtle population density traversing the offshore waters along the Andhra Pradesh coast, (iii) documentation of incidental catch and other mortality intensity along the coastline of Andhra Pradesh, (iv) assessment of biotic and abiotic factors, which are detrimental to the nesting population, nesting beaches and the survival of sea turtles, (v) formulation of conservation action plan for sea turtles nesting along the Andhra Pradesh coast, and (vi) creation of an NGO network for collecting information on the nesting, mortality and fisheries interface with respect to sea turtles and to conduct an education and awareness campaigns.

Findings/achievements: Though sporadic nesting of the Olive Ridley sea turtle all along the Andhra Pradesh coast was recorded, there are a few major

sporadic nesting habitats along Bahuda, Goutami Godavari and Krishna River and Pulicat lake mouth where sea turtle nesting is significant. There is evidence of significant beach alteration through beach sand mining near major nesting sites, which constitutes a major threat to the sea turtle nesting sites along the Andhra Pradesh coast. The study also documented significant mortality of sea turtles due to incidental capture during mechanized fishing operations and other fishing activities. The survey suggests control of mortality and safeguarding the identified major nesting sites as the conservation and management strategy for sea turtles along the coast of Andhra Pradesh. The non-government organization's participation in sea turtle conservation was found to be extremely important. Therefore, along with the Forest and Fisheries department, involvement of the local NGOs was identified as a necessity for conservation and management of sea turtles along the Andhra Pradesh coast. The report has been submitted to the UNDP, Government of India, Ministry of Environment and Forests and to the Forest and Fisheries Department of Andhra Pradesh, for implementation.

A green turtle while approaching the beach for nesting
Photo : Basudev Tripathy

A National Sea Turtle Workshop was conducted from April 9 to 10, 2001 at Bhubaneshwar with the participation of stakeholder agencies. Over 125 participants reviewed the situation of the marine turtle conservation scenario in India and recommendations were made for consideration by various ministries. The proceedings of the workshop were published in March 2002.

* **Marine Turtles and their nesting beaches in Lakshadweep Islands, India – A Status Survey**

Investigators : Shri B.C. Choudhury and Dr. Kartik Shanker
Researchers : Shri Basudev Tripathy
Date of initiation : June 1, 2001
Date of completion : June 30, 2002
Budget allotted : Rs. 2.50 lac

Objectives: (i) Documentation of occurrence and nesting of different species of marine turtles in the islands, (ii) Documentation of nesting intensity of marine turtles in different inhabited and uninhabited islands, (iii) Documentation of the situation in nesting and foraging habitats of marine turtles in Lakshadweep, (iv) Assessment of threats to the marine turtle population in different islands, (v) Formulation of conservation measures for the marine turtle population inhabiting the lagoons and migrating to the island beaches for nesting, and (vi) Creation of a networking of government and non-government organizations, who will work for conservation and management of marine turtles in the island group of Lakshadweep.

Findings: Occurrence and nesting of three species of sea turtle was recorded on the island coasts of which the green turtle was found to be the most dominant, particularly during the monsoon when significant nesting of green turtles in the uninhabited islands of Suheli valiakara, Tinnakara and Parali was observed. It was documented during the survey that the Olive Ridley and Hawksbill turtle nest sporadically on the island beaches throughout the year. The study reported evidence of significant beach alteration through beach sand mining, beach armouring using tetrapods and concrete structures near the major nesting sites. Developmental activities such as human habitation close to the beach, and disturbances due to lighting, pose additional threats to the sea turtle nesting sites in Lakshadweep islands. The killing of adult green turtle for oil and juvenile hawksbills as tortoise curio is still a practice in the islands. The survey suggests a ban on poaching and killing of turtles and other suitable conservation and management strategy for sea turtles of Lakshadweep. A workshop organized by the WII in Lakshadweep focused on the immediate need for conservation and management of marine turtles, and the promotion of community participatory sea turtle based eco-tourism. An

outcome of the workshop was the realization that non-government organization's participation in sea turtle conservation will certainly be helpful in saving the sea turtle, population in the Lakshadweep islands. The report is to be submitted to the UNDP, Government of India, Ministry of Environment and Forests, and to the Administration of Union Territory of Lakshadweep (Department of S&T and E&F) for implementation of a sea turtle conservation strategy and action plan in which the Wildlife Institute of India is going to play an important role.

* **GOI-UNDP Sub-Programme on "Wildlife Protected Area Management in Jaldapara"**

This Sub-Programme under the Environment Programme Support of the Country Co-operation Framework implemented by the Wildlife Institute of India aimed at assisting the Forest Department, Government of West Bengal to update and implement an integrated management and ecodevelopment plan in Jaldapara Wildlife Sanctuary. This project was undertaken in partnership with the local community and other stakeholders including local participating institutions. During the reporting period two significant studies have been completed in this project. The Gender Impact Assessment study was undertaken simultaneously with the overall impact assessment of the sub-programme undertaken by UNDP through its Junior Programme Officer. Findings of this study suggest that even though very small in reach, this project served as a good example of the recognition and implementation of the changing relationships between the community and the forest department and the impact it can have on the overall role of conservation. It also emphasized and reinforced the need for gender mainstreaming in such a project. It also showed that, with a little support and initiative, women can play a very important role in conservation. But integral to this is the search for alternatives – livelihood and fuel. The other study completed under this project reviewed the physical progress of the Sub-Programme as well as processes such as equity, participation and sustainability in the project implementation since the inception of the project in October 1999. This study also reviewed both the environmental benefits as well as the improvement in the wellbeing of the local residents achieved under the project. It was found that the awareness and motivation of the local partners towards ecodevelopment has been considerably raised under this project. Though the impact of the Sub-Programme cannot be separated from the one made through the overall conservation efforts of the Forest Department and the local people, the UNDP Project certainly had significance in facilitating the process. Dr. B.K. Mishra was the Programme Co-ordinator:

UNESCO

* **UNESCO-UNF Project on Enhancing our Heritage: Monitoring and Managing for Success in World National Heritage Sites**

The UNESCO World Heritage Centre (WHC) in collaboration with IUCN World Commission of Protected Areas (WCPA), The Nature Conservancy, the University of Queensland and the WWF International with funding support from United Nations Foundation (UNF) and United Nations Fund for International Partnership 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.

Fifteen 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 and Keoladeo National Park in India and the Royal Chitwan National Park in Nepal. The project is being implemented through Regional Partner Institutions, which are working with the project manager, site manager and other stakeholders to plan and undertake assessments of management effectiveness, and to develop

monitoring programmes in consultation with the overall project management team. The Government of India granted approval for the inclusion of Kaziranga National Park and Keoladeo National Park as the two pilot sites for this project and for the Wildlife Institute of India to be the Regional Partner institution for this project.

In order to initiate the project activities, the institute organized planning workshops in Keoladeo National Park, Bharatpur from November 21 to 23, 2001 and in Royal Chitwan National park, Nepal from November 27 to 29, 2001. The institute is in the process of signing up contracts with UNESCO, University of Queensland and Memorandum of Understanding (MoU) with the three pilot sites for implementation of the project activities. Dr. V.B. Mathur has been designated as the Nodal Officer for this project.

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

The United Nations Educational, Scientific and Cultural Organization (UNESCO) has given a planning grant to the Ministry of Environment & Forests, Government of India, to develop a ten-year World Heritage 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 in their timeframe and budget requirement under this project jointly to the Wildlife Institute of India and the Ashoka Trust for Research in Ecology and Environment (ATREE), Bangalore. The WII and ATREE are in the process of signing a MoU and the project planning work is expected to be completed by Dec. 2002. Shri V.B. Sawarkar and Dr. Vinod B. Mathur from Wildlife Institute of India, and Dr. J. Krishnaswamy and Shri M. Dabhas from ATREE are co-ordinating this project.

Ford Foundation

* **Building Partnerships for Biodiversity Conservation in Rajaji National Park**

To bring back the situation of park- people interface conflicts around Rajaji NP, a pragmatic approach for biodiversity conservation was initiated under the FORD Foundation supported project entitled "Building Partnerships for Biodiversity Conservation in Rajaji National Park". The overall objective of this project was to build upon the strengths of stakeholders, and create an enabling environment where the conflict resolution of biodiversity conservation regarding people's interest could be easier. The project has been able to generate new capacities and mutual confidence between the local people and the park management. Training for different enterprise developments were organized in varied clusters of villages under this project. Eco-Guide Training course was one such training organized for selected community representatives and PA staff as part of the enterprise development programme. The PA Management has provided openings to trained youths from different EDCs by issuing an order which makes it mandatory for every visitor to the park to be accompanied by a trained guide. A training course on Bee-keeping was also organized for selected community representatives by Khadi and Village Industry Commission, Dehradun, for providing alternative subsidiary incomes to the fringe communities and thereby reducing their dependence upon the PA. In Bullawala village, trained youths have organized themselves to form a self-help group and have started working on bee keeping.

Joining hands with the UNESCO Club, Doon Valley (East) and the Ideology Foundation through a medical-cum-eye Camp during September 2001 in Bullawala village was a significant milestone for building collaborations in the project. The camp which benefited some 5000 patients of Bullawala and nearby villages through a one-day Medical checkup by about twenty reputed doctors with different specializations followed by one-month consultation, 25 eye operations and distribution of medicines-all free of cost, generated a new trust among partners in working together for the cause of conservation and local development. Dr. B.K. Mishra was the project co-ordinator

Funding Agency: Indo-Norwegian Institutional Co-operation Programme

* **Institutional Co-operation Programme in Natural Resource Ecology and Management between the Wildlife Institute of India and the University of Tromso, Norway**

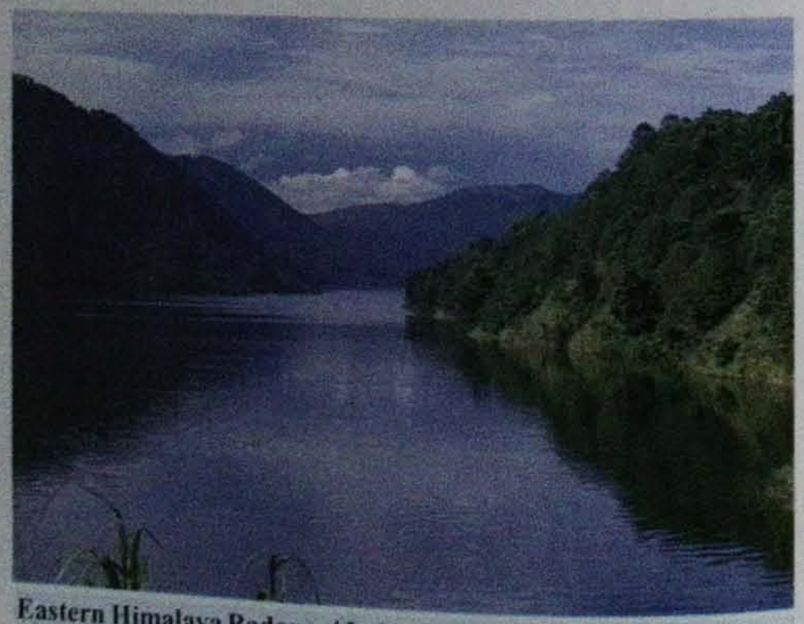
Nodal Officer: Dr. S.Sathyakumar
Investigators: Dr. G.S.Rawat, Dr. S.Sathyakumar, Dr. Y.V.Bhatnagar, Dr. A.J.T. Johnsingh and Dr. R.S. Chundawat
U.T. Collaborator: Dr. J.L. Fox
Research Associates: Dr. Anjali Awasthi, Dr. Sanjay K. Singh
Date of initiation: February 1, 2002
Date of completion: January 31, 2005
Budget allotted: Rs. 15.40 lac

Field of Co-operation: This research and education co-operation aims to promote the sustainable use and conservation of pasture resources in rangeland environments through investigations of livestock wildlife interaction and biomass production in pastures. Investigations will be jointly supervised by faculty of the co-operating institutions. This co-operation also includes a Faculty and Student Exchange Programme between the WII and the University of Tromso for teaching and research assignments.

Primary Research Topics to be addressed: (i) Pastoralism and wildlife conservation in the Indian Himalaya, (ii) Habitat differentiation and diet analysis of wild and domestic ungulates in the Himalaya, (iii) Carrrying capacity assessments of livestock and wildlife

Proposed Areas of Co-operation: (i) Upgrade equipment in the WII Research Laboratory for advanced food habit analysis, (ii) Assessment of state-of-knowledge and research approaches to wild-domestic ungulate interaction and rangeland management in India's Himalayan region, (iii) Formulate and conduct one three-year project and three short-term research investigations addressing interactions between wild and domestic ungulates in the Himalaya, (iv) Assist ongoing WII research programmes addressing similar issues in the Himalaya.

Activities carried out: The Letter of Grant for this programme was received in Dec. 2001, and the first installment of the budget in Feb. 2002. During the reporting period, necessary planning and preparatory work related to the initiation of this project were undertaken and that included the recruitment of two Research Associates in March 2002.



Eastern Himalaya Badapani Lake ***Photo : S.K. Srivastava***

SERVICES

Consultancy Projects

Memorandum of Understanding with Engineers India Ltd. (EIL), *January 2001.* The WII signed the Memorandum of Understanding with Engineers India Ltd. (EIL) for a consultancy project on Ecological Impact Assessment of the proposed Diesel Hydro processing Unit, Bongaigaon, Assam. The field work for this project was undertaken during February 2001. The final technical report "*Ecological Impact Assessment of the Proposed Diesel Hydro Processing Unit in Bongaigaon Refinery Complex, Assam*" was submitted to EIL in June, 2001.

Flaring of gases at Bongaigaon Refinery and Petrochemicals Ltd. ***Photo : Asha Rajvanshi***

Memorandum of Understanding with Bharat Petroleum Corporation Ltd. (BPCL), *January 2001.* The WII signed the Memorandum of Understanding with Bharat Petroleum Corporation Ltd. (BPCL) for the consultancy on Impact Assessment of Mumbai-Manmad Pipeline Extension Project (up to Manglya) on Wildlife Values. After preliminary studies of project documents of feasibility reports, field based studies were conducted during April and May with active support from Shri Neel Gogate, Technical Assistant in WII Project who volunteered to assist in this study. The final report "Impact Assessment of Mumbai-Manmad Pipeline Extension Project (upto Manglya) on Wildlife Values" was submitted to BPCL in September, 2001.

Funding Agency: Department of Wildlife Protection, Jammu and 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. 3.0 lac

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

Activities carried out: During the reporting period, the researcher was recruited then discussions were held between the supervising faculty and the researcher regarding the study design, method and work plan. Necessary planning and preparatory work related to the initiation of this project were undertaken. Field work was initiated in February 2001 during which the researcher carried out reconnaissance of the study area and selected an intensive study area. Regular field work to address the objectives is scheduled from April 2001 onwards.

WII-World Bank-CEC Collaborative Project

WII-World Bank-Canadian Environmental Collaborative (CEC) project initiated in 1999 for the development of environmental guidelines for planning road projects was completed. The project report was technically reviewed by the experts at the World Bank and finally published as a book "Roads Sensitive Habitats and Wildlife: Environment Guideline for India and South Asia". This book was released by the Hon. Vice President of India, Shri Krishna Kant on October 3, 2001 at Vigyan Bhawan function organized by the Ministry of Environment and Forest to give the Rajiv Gandhi Conservation Award to the WII. The

book has received considerable appreciation and good review comments from the south Asian region and other parts of the world.

TERI-UPFD

* **To assess man-animal conflicts in Uttar Pradesh, including elephant damage in the areas of Barkot, Rajaji and Landsdowne, 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 alloted: Rs. 6.00 lac

Progress : Most of the relevant literature pertaining to the human-wildlife conflict problems has been collected and reviewed to cover various aspects of the project study. Maps of the study areas have been prepared. We have covered the Rajaji National Park, Barkot, Pauri, Lansdowne, Thalisen, Corbett and Dudhwa tiger reserves, and part of Chamoli and Pauri district, and collected primary and secondary data.

In and around Barkot, Rajaji national park and Landsdown, the assessment of human casualties and crop damage by elephant has been completed. Elephant frequently visit different areas, e.g. Goltappar, Ghamandpur, Jakhan, Rani Pokhari and Sainkot blocks of Barkot Forest range of Dehradun Division, especially during summers after crossing the river Jakhan in the west of the division, where they cause extensive damage to crops. Earlier there used to be a few incidences of crop damage by straying elephants in the 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 Vikas Khand (Gohari Range), elephants have caused extensive damage to wheat, rice and vegetable crops. Also in Bailwala and Bindasene villages, rice, maize and mundwa crops are severely damaged by elephant. Extensive damage is reported to four kharif crops, *i.e.* maize (*Zea mays*), groundnut (*Arachis hypogea*), bajra (*Pennisetum typhoides*) and jowar (*Sorghum vulgare*), and two rabi crops, *i.e* wheat (*Triticum aestivum*) and gram (*Cicer arietenum*). Agricultural crop damage by wild pigs in and around Dudhwa and Corbett tiger reserves has also been evaluated. The crop damage problem on the peripheries of Corbett Tiger Reserve covering Dhara, Dhela, Jhirna and Kalagarh villages are being covered to study the nature and extent of the problem. Although the damage caused to agriculture crops is being caused by elephant, pigs, and monkeys, it is difficult to separate the damage caused by the individual species to these crops.

Study on tiger-human conflicts in Katarniaghat, leopard-human conflicts in Pauri, Chamoli, Pithoragarh and Thailisen is in progress. Based on Forest Department information, 140 humans have been killed by leopards alone in Pauri Garhwal since 1988.Over the years, the number of leopard victims ranged two to 22 per year. Blocks Pabau and Pauri are severely affected. In Pabau alone, leopards killed 28 human between 1996 and 1997. It appears that around Pabau, the high survival rate of cubs and acquired hunting behaviour by thier mother could be one of the reasons of high incidences of human predation. The Pabau area is surrounded by relatively good forest and provides good cover for increasing leopard population. Of the 126 leopard victims, 66% were females. In the hills, females have the responsibility for all the work, thus there is a higher probability of their encountering leopards than males.

Village-wise locations of man-leopard and tiger conflicts with demographic information are also being compiled and mapped. Field work in the leopard affected areas of Chamoli, Puari and

Thailisen is continuing. An assessment of monkey-human conflicts in Lucknow and Almora has also been done. Information on the occurrence of these conflicts is being collected in specially designed formats. All related information available at the departments has been collected. Based on this information a survey of highly affected areas, results are being compiled to establish facts and management implications.

* **Development of Biodiversity Information Module for Uttar Pradesh and Uttaranchal 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 Systems Ltd., (SISL) for the Uttar Pradesh Forest Department (UPFD), and Uttaranchal Forest Department (UAFD). The FMIS being developed, or the UPFD and UAFD seeks to improve the current information management procedures and to make use of information technology in departmental 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 Project 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 Forest Department.

* **Protected Area Management Guidelines and Training Contract including Regional Planning and Regulations under India-Ecodevelopment Project**

The WII entered into a contract with the Director, Project Tiger, MoEF in April, 2000 to provide consultancy services under GEF-India Ecodevelopment Project. A team of twelve members of the WII faculty worked on this 21-month consultancy assignment and submitted the final report in December, 2001. During the period under review the Institute organized a training programme on Environmental Impact Assessment and a national workshop on 'Regional Planning for Conservation and Development' besides providing technical assistance to the managers of the seven project sites in management plan preparation. As a part of this assignment the institute also prepared a CD-ROM, the salient feature of which is that it contains, (i) A Guide for Planning Wildlife Management in Protected Area and Managed Landscapes, and (ii) A Guide for Ecodevelopment Planning for Biodiversity Conservation. Besides this, it contains valuable resource material on Regional Planning, Environmental Impact Assessment, Spatial Database, and the range of management issues and strategies being adopted in the seven India Ecodevelopment Project sites. Thematic maps from the spatial database in the GIS domain, developed as part of this assignment for Buxa Tiger Reserve, Periyar Tiger Reserve, Pench Tiger Reserve, Ranthambore Tiger Reserve, and the Rajiv Gandhi National Park, have also been included in this CD-ROM. This is useful to Protected Area Planners, Managers, Trainers and Frontline staff, Scientists and the NGO community who will find the resource material contained in it of direct relevance to their work.

* **GOI–UNDP Olive Ridley Conservation Programme**

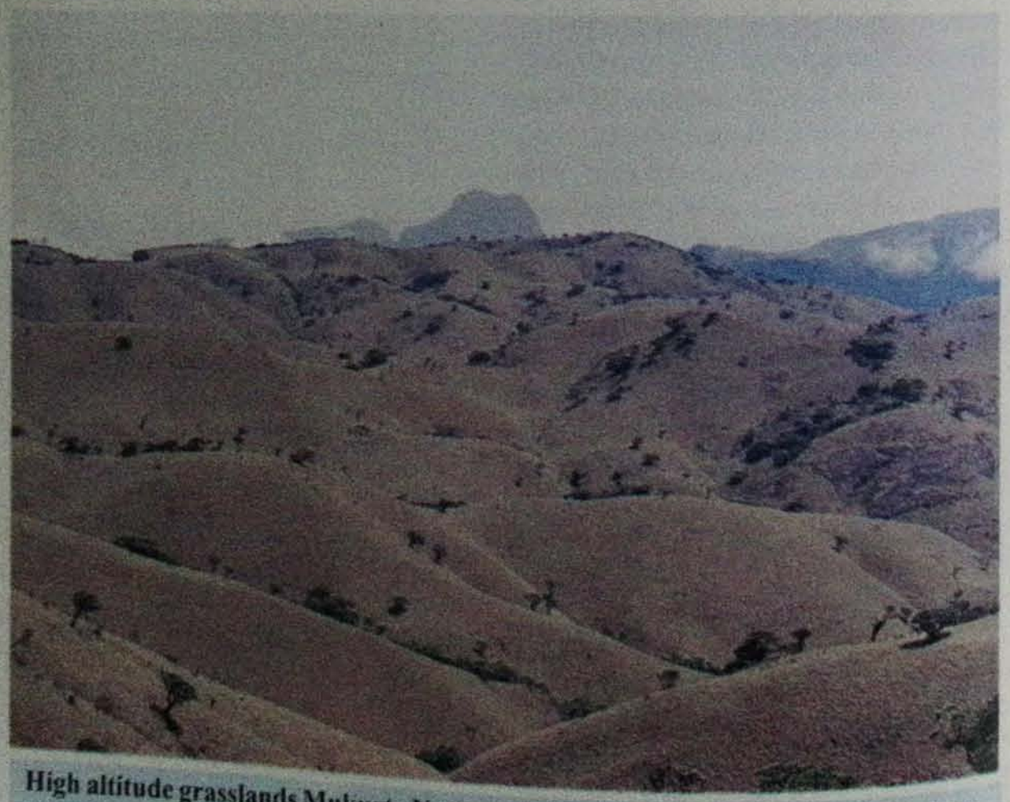
Investigators/Nodal Officer : Shri B.C. Choudhury
Collaborators : Various coastal state agencies
Date of initiation : January 2000
Date of completion : June 2002
Budget allotted : US $ 3,00,000

Objectives: (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 the conservation of marine turtles along the Indian coastline.

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

Surveys: Most of the sea turtle survey project work allotted to various agencies in maritime states was completed during the period. These were West Bengal by NEWS, Andhra Pradesh by WII, Tamil Nadu by SACON, Kerala by THANAL, Maharastra and Goa by BNHS, Gujarat by GIDE, Andaman & Nicobar by ANET and Lakshadweep by WII. Survey work is in progress in Orissa and Karnataka. These survey results have documented important nesting sites in West Bengal, AP, TN, Kerala, Maharastra and Goa, Gujarat, Andaman & Nicobar and Lakshadweep.

Consultancy and Sub contracts: The rapid assessment of the impact of the Orissa Cyclone on Sea Turtle nesting beaches, community-based conservation of marine turtles by Kalpavriksh, Sea pollution at microlayer in West Bengal, Marine and coastal legislation review by EVIRO Legal, Delhi and GIS and Satellite based Mapping of Sea Turtle nesting beaches by ORSAC have been completed during the reporting year.



High altitude grasslands Mukurty National Park ***Photo : S.K. Srivastava***

Teaching provided to other institutions in Dehradun:

S. No.	Institution	Name	Date	Topic
1.	IGNOU	Sh. M.S. Rana	April 1, 2001	Library Management and Administration
2.	Welham Boys' School under the National Environmental Awareness Programme (NEAP) of Friends of Doon	Dr. Asha Rajvanshi	April 7, 2001	Environmental Pollution: Causes and abatement measures.
3.	M.Sc. Environmental Management course , FRI Deemed University	Dr. Asha Rajvanshi	April 9, 2001	Introduction to Environmental Impact Assessment as a planning tool.
4.	FRI Deemed University	Shri V.B. Sawarkar	April 10, 2001	Conservation framework.
5.	M.Sc. Environmental Management course, FRI Deemed University	Dr. Asha Rajvanshi	April 24, 2001	Regulatory instruments and EIA framework in national context.
6.	IIRS	Dr. Asha Rajvanshi	April 26, 2001	Traditional approaches in EIA.
7.	IGNOU	Sh. M.S. Rana	May 13, 2001	Library Classification
8.	IGNFA	Shri V.B. Sawarkar	June 4, 2001	Conserving wildlife in managed forests and wildlife management planning
9.	IGNFA	Sh. S.K. Srivastava	June 4, 2001	Ecotourism
10.	IGNFA	Sh. S.K. Srivastava	June 6, 2001	Wildlife Protection Act - Critical analysis
11.	M.Sc. Environmental Management course, FRI Deemed University	Dr. Asha Rajvanshi	June 7-8, 2001	Evaluation of EIA methods for impact analysis.
12.	LBSNAA, Mussoorie	Sh. S.K. Srivastava	June 8, 2001	Environment - Panel
13.	Forest Survey of India	Dr. V.B. Mathur	June 21, 2001	Preparation of Management Plans Using Remote Sensing and GIS technologies
14.	IGNFA	Shri V.B. Sawarkar	June 25, 2001	Conserving wildlife in managed forests and wildlife management planning
15.	IGNFA	Sh. S.K. Srivastava	June 28,2001	Wildlife Protection Act - Critical analysis
16.	Indian Institute of Remote Sensing	Dr. V.B. Mathur	July 02, 2001	GIS applications in wildlife conservation
17.	IGNFA	Shri V.B. Sawarkar	July 3, 2001	Conserving wildlife in managed forests and wildlife management planning
18.	IGNFA	Shri V.B. Sawarkar	July 5, 2001	Conserving wildlife in managed forests and wildlife management planning
19.	IGNFA	Sh. S.K. Srivastava	July 6, 2001	Ecotourism
20.	Rajaji Ford Foundation Project	Dr. S. Chowdhury	July 14, 2001	Project Elephant – aim and Objectives
21.	Forest Survey of India	Dr. V.B. Mathur	Aug. 16, 2001	Remote Sensing & GIS applications in forest and wildlife management
22.	SFS College (Two week course on "Project Formulation & Environmental Impact Assessment" for in-service S.F.S Officers)	Dr. Asha Rajvanshi	Aug. 16, 2001	Theory and practice of EIA

23.	Regional Training Institute, Raipur. (for Group B officers/staff of Ordnance factories and allied establishments)	Dr. Asha Rajvanshi	Aug. 21, 2001	Environmental Impact Assessment and Auditing
24.	IGNFA	Sh. S.K. Srivastava	Aug, 22, 2001	Wildlife Protection Act - Critical analysis
25.	IGNFA	Shri V.B. Sawarkar	August 28, 2001	Conserving wildlife in managed forests and wildlife management planning
26.	IGNFA	Sh. S.K. Srivastava	Aug, 30, 2001	Ecotourism
27.	IGNFA	Sh. S.K. Srivastava	Sept. 10, 2001	Wildlife Protection Act - Critical analysis
28.	IGNFA	Sh. S.K. Srivastava	Sept. 11, 2001	Ecotourism
29.	IGNOU	Sh. M.S. Rana	Sept. 16, 2001	Library Information Services
30.	IGNFA	Dr. Ruchi Badola	Sept. 19, 2001	Ecodevelopment and stakeholders
31.	Indian Institute of Remote Sensing	Dr. V.B. Mathur	Sept. 26, 2001	Remote Sensing and GIS applications in Environment Impact Assessment
32.	Forest Survey of India	Dr. V.B. Mathur	Sept. 27, 2001	Application of Information Technology in Wildlife Conservation
33.	IGNFA	Shri V.B. Sawarkar	Oct. 9, 2001	Conserving wildlife in managed forests and wildlife management planning
34.	MKP(PG) College	Dr. S. Chowdhury	Oct. 9, 2001	Chemical restraint methods in wild animals
35.	M.K.P. Postgraduate College	Dr. V.B. Mathur	Oct. 13, 2001	Ecological basis of Wildlife Management
36.	IGNOU	Sh. M.S. Rana	Oct.14, 2001	Library Automation
37.	Regional Training Institute, Raipur (for officers and staff of DRDO offices in the country)	Dr. Asha Rajvanshi	Oct. 16, 2001	Environmental Impact Assessment: Concepts and practices
38.	Forest Survey of India	Dr. V.B. Mathur	Oct. 17, 2001	Remote Sensing and GIS applications in forest and wildlife management
39.	M.Sc. Environmental Management course, FRI Deemed University	Dr. Asha Rajvanshi	Oct. 22, 2001	Relevance of EIA in forest resource conservation.
40.	M.Sc. Environmental Management Course, FRI Deemed University	Dr. Asha Rajvanshi	Oct. 29, 2001	Public participation in EIA: Process overview
41.	IGNFA	Shri V.B. Sawarkar	Oct. 30, 2001	Conserving wildlife in managed forests and wildlife management planning
42.	M.Sc. Environmental Management course, FRI Deemed University	Dr. Asha Rajvanshi	Oct. 30, 2001	EIA Practices: Presentation of case studies and lessons learnt
43.	IGNFA (For Indian Forest Service Officers attending the Advanced Forest Management Training Course)	Dr. Asha Rajvanshi	31-10-01	Environmental Impact Assessment: Tool for Resource Conservation and Decision Making
44.	IGNOU	Sh. M.S. Rana	Nov. 3, 2001	Library Cataloguing
45.	IGNFA	Dr. A.K. Gupta	Nov. 9, 2001	Indian Forest Service - New challenges and Issues - Panel Discussion

46.	Forest Research Institute	Dr. V.B. Mathur	Nov. 19, 2001	Application of Information Technology in Spatial Database Development
47.	SFS	Sh. S.K. Srivastava	Nov. 20, 2001	Wildlife Protection Act - Critical analysis
48.	Garhwal Rifles Regiment Officers Mess, Garhi Cantt.	Dr. V.P. Uniyal	Nov. 24, 2001	Experience of Expedition and Biodiversity of Nanda Devi National Park
49.	Bija Vidyapeeth and Navdanya	Dr. V.P. Uniyal	Nov. 25, 2001	Importance of Pollinators and their Identification in the Ecosystem
50.	IGNFA	Shri V.B. Sawarkar	Nov. 26, 2001	Conserving wildlife in managed forests and wildlife management planning
51.	SFS	Sh. S.K. Srivastava	Nov. 27, 2001	Wildlife Trade and CITES.
52.	IGNFA	Shri V.B. Sawarkar	Dec. 4, 2001	Conserving wildlife in managed forests and wildlife management planning
53.	IGNFA	Shri V.B. Sawarkar	Dec. 10, 2001	Conserving wildlife in managed forests and wildlife management planning
54.	IGNFA	Sh. S.K. Srivastava	Dec. 10, 2001	Ecotourism
55.	IGNFA	Sh. S.K. Srivastava	Dec. 11, 2001	Wildlife Protection Act - Critical analysis
56.	IGNFA	Dr. A.K. Gupta	Dec. 11, 2001	Application of Ecodevelopment
57.	SFS College	Dr. A.K. Gupta	Dec. 12, 2001	Wildlife Research-Relevance of Wildlife Research in Conserving Biological Diversity
58.	SFS College	Dr. A.K. Gupta	Dec. 14, 2001	Joint Forest Management –Issues and Challenges
59.	Forest Research Institute	Dr. V.B. Mathur	Feb. 8, 2002	Development of Management Information Systems: Lesson Learnt
60.	ICFRE	Dr. S. Chowdhury	Feb. 8, 2002	Spatial and demographic issues of elephant conservation and management: a case study
61.	IIRS	Shri Anil Bhardwaj	Feb. 19, 2002	Basic concepts of Ecodevelopment
62.	IIRS	Dr. B.K. Mishra	Feb. 22, 2002	"Community Participation in Ecodevelopment Programmes" and "Stakeholders" Analysis in Ecodevelopment Planning"
63.	Indian Institute of Remote Sensing	Dr. Ruchi Badola	Feb. 25, 2002	Gender issues in ecodevelopment Stakeholders Analysis
64.	Forest Survey of India	Dr. V.B. Mathur	Mar. 14, 2002	GIS applications in wildlife conservation

Teaching provided to other institutions

S. No.	Institution	Name	Date	Topic
1.	Kumaun Mandal Vikas Nigam	Smt. Bitapi C. Sinha	Sep. 6-9, 2001	Interpretation – Introduction and role in PA, interpretive services, thematic interpretation, signs and exhibits, nature trail, nature guide qualities and expectations
2.	Chinmaya College, Hardwar	Dr. Ruchi Badola	Oct. 12, 2001	Joint Forest Management
3.	Kalagarh Forest Training School	Smt. Bitapi C. Sinha	Nov.19-26, 2001	Quality of a Mahout as a guide for wildlife tourism
4.	Assam, FD (Kaziranga NP)	Dr. S. Chowdhury	Jan.2, 2002	Elephant census techniques for NE

FACILITIES

Environmental Impact Assessment Cell

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

Attachment of students for training in EIA: A request was received from the Dean, FRI Deemed University, to provide opportunities for attachment to the students of the M.Sc. Environmental Management course of FRI Deemed University with the EIA Cell during the semester break for their summer training. In response to this request, four students received their summer training under the supervision of Dr. Asha Rajvanshi from June to August 2001. During their attachment with the EIA Cell the students worked on the following topics for their dissertations, (a) Miss Bedoshruti Sadhukhan: "Integration of Biodiversity Considerations in EIA in South Asian Countries", (b) Miss Vijita Kumari: "Environment Impacts of Mining projects in India and the Prospects of Reclamation", (c) Mr. Amit Parashar: "Status of Monitoring and Auditing in Environment Impact Assessment in South East Asian Countries", (d) Mr. Navinder Jeet Singh: "Role of Public Participation in EIA Process, in South and South East Asia".

Ongoing initiative of a short term EIA

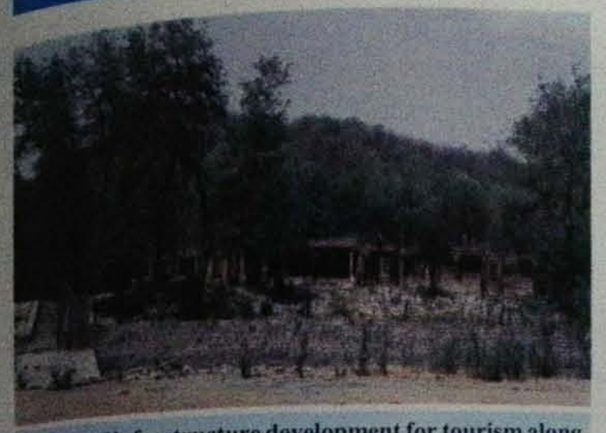
Ecological assessment of the impact of developmental projects and associated land use changes on the Corbett landscape: In response to directives from the MoEF to conduct short-term EIA studies to evaluate the impact of development projects on select Protected Areas, this study was initiated with funding support received from the MoEF.

The selection of Corbett landscape for this study is based on its intrinsically high conservation value. The Corbett NP, the first national park set up in India, forms a critical refuge for the north western population of the elephant and the tiger. Over the years the growing pressures from increasing human and livestock populations, development of tourism infrastructure, urbanization and linear expansion of roads, have led to habitat degradation and fragmentation. The proposed Kotdwar-Ramnagar road along the southern boundary of the reserve is likely to have a major impact on the wildlife values of the CTR.

The study is aimed at addressing the following objectives: (i) Identify existing and potential sources of the threats to the conservation values of the study area, (ii) Develop ecological baseline of the study area for prediction of the impacts of proposed road development initiatives, (iii) Assess the implications of tourism expansion and urbanization on conservation values, (iv) Develop rapid methods for ecological impact assessment in PAs.

A comprehensive literature search and stakeholder consultation was carried out to understand the nature of key threats to the Corbett Tiger Reserve. The southern and eastern boundaries of the reserve were identified as liable to pressure from existing and proposed sources such as road development, increasing population pressure, urbanization and tourism infrastructure expansion. Field studies have been initiated in this area along the Kotdwar-Ramnagar route between the Pakhro-Kalagarh, Kalagarh-Khara, and Ramnagar-Mohan road sections. The traffic pressure profile of the different sections is being determined. Habitat use in each of these sections is being assessed to determine the relative occurrence of animals in the area. Studies on vegetation were undertaken to obtain descriptive data on habitat status. Resource pressure was assessed in a section of the Ramnagar-Mohan route using firewood collection as an indicator. The pattern of urbanization and tourism infrastructure expansion between Ramnagar and Mohan is being analyzed with habitat use studies to understand threats to animal movement between the Reserve and the adjoining Kosi river valley forests. The final report is likely to be ready by December 2002. The study is being undertaken by Miss Malvika Onial, Project Personnel in the project, under the joint supervision of Dr. Asha Rajvanshi and Dr. V.B. Mathur.

Advisory support to MoEF : The WII continued to provide advisory services to the MoEF on



Impact of infrastructure development for tourism along Ramnagar-Mohan road, Dhikuli *Photo : Malvika Onial*

matters related to the environmental appraisal of development projects. The WII is represented on the Expert Committee for mining projects. In this capacity the WII is advising the Environment Division of the MoEF in the evaluation of EIA reports on mining projects for decision making with respect to environmental clearance. The WII was also called upon to assist the MoEF in the site appraisals of the captive mine of the M/s Chola Cement in the Guntur district of Andhra Pradesh and the Bodai-Daldali Bauxite mine of the Bharat Aluminium Company in the Kawardha village of the Raipur district of Chattisgarh.

Conservation Genetics Laboratory

The conservation genetics laboratory became fully functional with the appointment of Dr. Dinesh K. Sharma as a Research Associate attached to this laboratory on a full time basis. This laboratory developed under the auspices of the ongoing research project "Conservation of the Indian Wolf" with collaboration and assistance from the Smithsonian Institution had the primary objective of addressing conservation genetics objectives of the wolf project. Dr. D. K. Sharma was trained at the Conservation Genetics Laboratory, Smithsonian Institution in DNA and molecular techniques. Two visits by Dr. Robert Fleischer and one by Dr. Jesus Maldonado, conservation geneticists from the Smithsonian Institution, helped deal with teething problems. Good progress has been made under the conservation genetics objectives of the wolf project. Several samples of wolves, feral dogs, hyenas, and jackals have been extracted, and PCR products screened for further analysis. The services of this laboratory are now being used for other conservation genetics related objectives of different research projects.

A main achievement of this laboratory was to discover that there are three extant wolf lineages in India. The plains wolf ranging over much of peninsular India and the Himalayan wolf ranging from Himachal to eastern Nepal represent lineages that had diverged from the rest of the worlds' wolves between 500-800 thousand years ago.

Wildlife Policy Research Cell

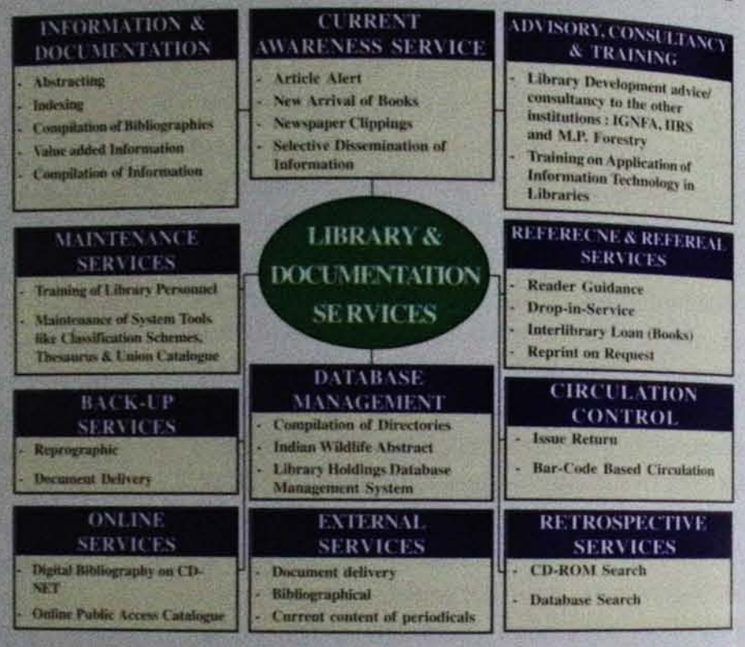
In response to a need for providing researched and collated information on issues of conservation and management of wildlife and its habitat in the country, thus facilitating the wildlife policy and action plan formulation process, a Wildlife Policy Research Cell (WPRC) was established in March, 2000. The mission of the WPRC is to (i) Identify and assimilate wildlife conservation and management issues, practices and approaches at the regional, national and state levels, (ii) Provide a forum to discuss and confront issues related to wildlife conservation, (iii) Create a learning resource centre related to wildlife conservation and management to facilitate policy making and disseminate information through best practice guides and occasional papers, (iv) Link up the above with capacity building and interpretive programmes, and (v) Recommend approaches for mitigation of PA-People-Wildlife conflicts.

During the period, two Project Associates who were appointed to work on the collection of information on "Developing innovative strategies to deal with Man-Animal conflict" left the WPRC for better prospects. In the absence of any Research Associate/ Project Associate no further progress has been carried out the Nodal Officer of the Cell, however, continued with the collection of certain basic information and conducting the training course with focus on various legal implications.

The Himalayan wolf represents an ancient wolf lineage surviving only in Indian and Nepal Himalayas. *Photo : Dinesh Sharma*

The Library and Documentation Centre

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



The L & DC possesses approximately 20000 books, 10000 newspaper clippings, 7000 maps/ toposheets, and more than 5000 bound volumes of old and rare journals. The library also maintains a good collection of scientific paper numbering 8500. It subscribes to more than 320 periodicals. During reporting period, 745 books, proceedings, theses and reports, 387 scientific papers and reprints and 1130 press clippings have been added to the library collection.

The L & DC is fully computerized, using LIBSYS Library Management Software, UNESCO'S CDS/ISIS Software, CD Server, Barcode and related technologies. For optimum resource use by researchers, students, officer trainees and other users, fourteen computer terminals available in the library premises and the Faculty desks have been inter-connected with a LAN. Being connected to this library facility, the users have privileged access to all in-house databases like books, reprints, Indian wildlife abstracts the map/toposheet collection, press clippings, specialized bibliographic databases on Musk Deer, application of telemetry in wildlife, wildlife and protected area management in Madhya Pradesh, and so on. Users also have access to CD-ROM databases such as Wildlife Worldwide 1935, E-CD and CAB Spectrum 1973 which are available on the LAN.

During the reporting period four students of Library Science were trained on Library Automation aspects by the L & DC staff under the internship programme. Over 1,34,302 pages of photocopies of scientific documents were provided to users. Approximately 500 reference queries were answered including 100 from outside, and more than 20,000 bibliographic references were provided to the users with 43 documents procured on inter-library loan from nearby libraries. For strengthening the library collection and its services, an evaluation of library services was also conducted at different levels to provide a better service to the user.

Services provided during 2001-2002

Sl. No.	Services	Numbers
1.	Photocopy exposure	1,34,302
2.	Books Issued	4,276
3.	Database search request	123 clients
4.	Inter library Loan	43 documents
5.	Document delivery	53 Clients
6.	Document procurement request (Articles from INSDOC and other libraries)	128

Revenue Generation from services during 2001-2002

Sl.No.	Services	Amount (Rs.)
1	Bibliographical and Document Delivery Service	4,455.00
2.	Photocopying Service	9,383.00
3.	WII Publications	2,28,454.00

Volumes Added to Library Collection during 2001-2002

S.No.	Type of documents	Numbers
1.	Books and Monographs	745
2.	Journals (bound Volumes)	291
3.	Newspaper clippings	1130
4.	Reprints	387

WII Research Laboratory

The research laboratory provides technical input in 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 required for the analysis of various physio-chemical parameters of plant, soil and water samples. Teaching classes followed by practicals for several ongoing courses were conducted at the laboratory on 'Instrumentation and Analytical Techniques' during the reporting period. 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.

Four research projects, three M.Sc. dissertations and one consultancy project utilized the analytical facility of the WII laboratory for plant and soil samples and for carnivore scat analysis. In total 1192 samples were analysed in the laboratory, of which 472 were plant samples (crude protein, ash content, sodium, potassium, calcium, phosphorus, ADF, NDF, lignin, cellulose), 170 soil samples (N_2, organic carbon), and 550 scat samples. The laboratory staff provided technical input in capturing and handling animals in the field, demonstration of various traps, camera traps, mist netting for birds, electric fence and radio telemetry equipment to various training programmes. The laboratory staff provided training to the staff of Corbett Tiger Reserve, Uttaranchal, in the collection and preservation of biological material.

A permanent meteorological station was installed two years ago in the Chandrabani campus. The laboratory staff regularly collect data on rainfall, temperature, humidity, wind velocity and direction. The highest and lowest temperature recorded during the reporting period was 40 °C (June) and 3 °C (January) respectively. The total annual rainfall recorded was 1553.5 mm.

Herbarium

One of the staff members assisted in plant and data collection from the Changthang plateau of Eastern Ladakh (during July to August, 2001) and in a wetland survey in Vijayasagar WS, Bakhera WS, Okhla WS and Nawabganj WS of Uttar Pradesh during January and February 2002, and prepared a checklist of plants. Another staff member visited Digboi and adjacent sanctuaries for a food plant survey of the Hollock Gibbon, collected and brought 170 specimens, of which 41 species were of Ficus alone. During the reporting period thirty plant species was added to the campus flora. This year, a total of 1720 plant species were identified from different protected areas, e.g. Bandipur TR, Corbett TR, Bandavgarh TR, Rajaji NP and Chamba District, H.P.

The herbarium section displayed a poster on 'Orchids' and took part in the workshop "Second meeting of the Indian subcontinent Regional Orchid Specialist Group (ISROSG)" at the Wildlife Institute of India, Dehra Dun, from April 17 to 19, 2001.

Teaching input from the Herbarium section were provided on Techniques and Uses of a herbarium for the Certificate Course and the Eco-guards training Course. Participants of the Eco-guards training course were taken for botany in the campus and botany introduced to the method of identification and uses of plants. On World Environment Day students from St. Mary's Convent School, Clement Town, were introduced to the plants of Malsi deer Park, Dehradun, and a small write-up on 56 common plants of Malsi deer park was prepared, mainly on the classification of the plant kingdom, plant life and uses.

The collection of seeds for carpological museum is in progress. The herbarium staff also assisted in different courses of the WII in various field exercises and vegetation analysis. The herbarium staff also provided input for different projects of the Institute.

During the reporting year the WII herbarium received visitors form different institutions, such as Officers from the Bhutan Forest Department, Students of the Diploma Course in Biodiversity Conservation, FRI Deemed University, Dehra Dun, Students of B.Sc. Botany from Baroda University, Gujarat, and Dr. M.K. Yagnik, Pro-Vice Chancellor, Saurastra University, Rajkot..

Computer/GIS Facility

Training: The Computer/GIS Centre of the WII conducted computer training courses for the students, researchers, staff and officer-trainees of the PG Diploma and Certificate Courses in wildlife management. Input was given on concepts of the computer, LAN/internet, software packages, e.g. MS Windows 95/98, MS-Office, SPSS and S-Plus, and specialised software packages related to wildlife research. Hands on training was also given on the Geographical Information System, Remote Sensing and GPS technology.

Campus-Wide Networking: The campus-wide networking of the institute has been completed. This network constitutes of fibre optics cable as backbone for connecting the four office buildings i.e. Institutional Block, Administrative Block, Teaching Block and the Library. Within each building, enhanced Cat5 UTP (Unshielded Twisted Pair) cable is used to connect the computers to the network through network switches with data throughput capability of 10/100 mbps. The new LAN cabling is capable of supporting 320 nodes.

Hardware and Software Procurement/ Upgradation: During 2001-2002, the computer facility of the Institute was further strengthened by the procurement of new hardware/software from the WII grant-in-aid and other projects.

Items procured: Two Compaq Proliant ML 370 internet servers, nine Compaq Pentium III PCs, a Pentium 4 PC, a Polaroid film scanner, three HP scanners, a HP LaserJet 2100M laser printer, two HP Deskjet printers, two internal and one external CD writers, an external CDROM drive and seventeen APC UPS of 500/650VA.

In order to meet the ever-increasing demand for disk space for data storage, additional hard disk drives of 18GB each (SCSI, duplexed) for the existing two file servers, 10GB and 20GB for GIS SUN workstation and three hard disk drives of 10GB each for existing PCs have been procured. The existing three 386 systems have been upgraded to Intel Pentium III systems through the buy-back system.

The Institute procured Linux based ALICE software package for the internet/proxy/mail/ firewall services.

A five user Leap Office network and ISM office 2000, a complete Indian language software for office developed by CDAC (Centre for Development of Advanced Computing), Pune, was procured. Computer-Based Training (CBT) CDROMs developed by Pentamedia Graphics Ltd. have also been procured.

Intranet Service: In order to enhance effective internal communication and to keep track of institutional activities, the WII intranet facility has been developed through in-house programming efforts. This facility was inaugurated by Shri T.R. Baalu, the Hon. Minister of Environment and Forests, Government of India, during his visit to the WII on March 27, 2002.

Application of GIS/RS/GPS in Research Projects: Geographic Information System (GIS), Remote Sensing (RS) and Global Positioning System (GPS) technology is being used in almost all the research projects of the institute for wildlife research and conservation. During the current year, 24 research projects used GIS/RS/GPS technology.

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 linkages with researchers, protected area managers and planners and also with other data centres, and (iii) facilitate research and training activities in wildlife by providing bibliographic references on protected areas, habitat types and animal species.

During 2001and 2002, the main thrust of the activities was on compilation of reports and bibliographies on the various aspects of wildlife of India as well as the collection of data, input and their validation as a regular activity. The Protected Area Database was updated further and at present there are 579 Protected Areas including 89 National Parks and 490 Wildlife Sanctuaries in India, covering 154,502.61 km^2 which is 4.7% of the total geographical area of the country. Species database was corrected and updated by adding information on the distribution of mammalian species in various protected areas. The bibliographic database was updated by the addition of current literature published on Indian wildlife in the various issues of journals and periodicals received during the said period. Currently the Trainees Database have a record of 432 Diploma and 302 Certificate officer trainees besides information on other courses, *e.g.* Ecodevelopment for Biodiversity Conservation, Custom and Central Excise, and M.Sc. in Wildlife Science etc.

The National Wildlife Database Cell assisted the GIS Cell in developing PA Atlas and PA location maps by providing co-ordinates and other related information. Database Cell also assisted in bringing out the Executive Summary "Wildlife Protected Area Network in India: A Review 2002", which was circulated during the 21st meeting of the Indian Board for Wildlife, New Delhi, on Jan. 21, 2002.

More than two hundred and fifty user queries were answered and output in various formats was provided.

Wildlife Forensic Cell

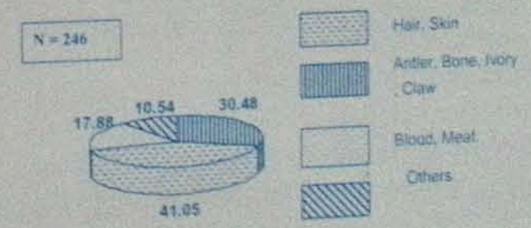
The Wildlife forensic Cell aims are to develop and standardize techniques for identifying species from various biological products reported in trade, and to provide assistance to various law enforcement agencies for implementing the Indian Wildlife (Protection) Act, 1972. Species identification work is being undertaken based on external morphological characteristics, light microscopy, scanning electron microscopy, crystallography, double diffusion, iso-electric focusing and so on.

Of the total 84 cases received between April 2001 and March 2002, there were 39 cases from Forest Department (46.98%), 20 cases from Police Department (24.09%), 08 cases from Court (9.6%), 4 case from Customs (4.8%), 10 cases from the government of India (12.04%) and 3 cases from others (3.61%). The biological material received under the wildlife offence cases includes 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.

The majority of the samples was received from Madhya Pradesh, and this is due to the active involvement of forest and police officers to control Wildlife Poaching.

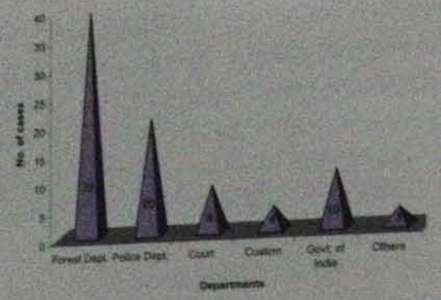
In view of various pending cases related to meat that require the use of DNA based technique, we initiated establishing a Wildlife Forensic DNA Facility at WII. We also collaborated with the DNA Typing Unit, Central Forensic Science Laboratory (CFSL), Bureau of Police Research and Development (BPRD), Kolkata for developing species-specific DNA probe and profiles. A Memorandum of Understanding has been signed with BPRD for preparing DNA profiles of various species at CFSL, Kolkata.

At WII various techniques such as PCR-RFLP, mitochondrial DNA analysis will be standardized



Material received from various Enforcement Agencies

for identifying species. With the close cooperation of Zoological Parks at New Delhi, Mysore, Chennai and Kanpur, it has been possible to procure sixty three reference tissue samples of fourty species which includes 24 mammals and sixteen birds during the reported period. At present we have tissue sample repository of 188 species. Shri C.P. Sharma, the Laboratory Technician who was on study leave for his Master Course in Forensic Science from Punjabi University, Patiala, sponsored under Wildlife Institute of India-US Fish



Department-wise distribution of the Wildlife Offence cases referred to WII

and Wildlife Service collaborative project, has rejoined us after successfully completing the course.

Various Officers from the Forest Research Institute, State Forest Service College, Indira Gandhi National Forest Academy, Madras Veterinary College, National Institute of Immunology and Ministry of Environment and Forest visited the Wildlife Forensic Laboratory.

Audio Visual and Wildlife Extension Cell

The Audio Visual and Wildlife Extension Cell of the Institute caters to varied requirements of the academic activities, training programmes, workshops and seminars by providing the support of audio-visual equipment. The Cell is maintaining 16mm films and video films, synchronised programmes, and other audio-visual equipment. The unit screened shows of nine projector-synchronised programmes of the Institute "we are nature, nature is our world" during the reporting period on different occasions. Necessary help was rendered to about fifty visiting classes/groups from different schools, colleges, institutions, and VIPs who visited the Institute's Campus. Film shows were arranged for most of the groups.

The Audio Visual and Wildlife Extension Cell provided all types of audio-visual support to the regular courses and the various other activities of the Institute. All the necessary support of a public address system, audio-visual equipment for classroom and seminar hall, audio recordings of the proceedings during the workshops were made. Other supports were made to screen 16mm films, video films, audio visual programmes, still photography coverage and various other technical help required during the courses organised by the Institute.

The number of slides and prints were reclassified as required for quick retrieval and 25 print albums were added to the collection. About 400 transparencies were added to the slide library of the Institute. About 20,000 slides and 6000 prints with their negatives are being maintained in the unit.

Support was also provided to forensic cell to photograph the samples of material received for ientification. AV & WE Cell was also given the responsibility of organising exhibitions on Biodiversity Conservation at Dehradun and Haridwar during Wildlife Week in association with Uttaranchal Forest Department.

Newsletters

As part of the information dissemination programme, WII published the following:

- WII Newsletter Volume 8 No.1 Spring 2001
- WII Newsletter Volume 8 No.2, Summer 2001
- WII Newsletter Volume 8 No.3, Autumn 2001

World Environment Day

World Environment Day was celebrated in the Institute's campus with great zeal and enthusiasm on June 5, 2001. About 100 children of different age groups and class groups from the WII community participated in these activities. The programmes included Butterfly watch, Plant watch, Recycling of waste paper, Cyber Essay Competition, Nature Card competition and Rangoli competition.

In order to motivate the children, the best nature cards were auctioned after prize distribution and the money collected was given to the child who had prepared the card.

Wildlife Week Celebration

This year many activities were conducted during wildlife week. The programmes included Inter-school Wildlife Quiz Competition, Visit of the children of WII staff families to Malsi Deer Park Drawing and Painting Competition for schools around Clement Town area, and Screening of films. The film on "Monsoon –India's God of Life" was

Children studying plants by first hand experience in natural surroundings on World Environment Day *Photo : V. Verma*

screened followed by an interview with a renowned film-maker, Shri Shekhar Dattatri, a lecture by Shri Mahesh Rangarajan on "Wildlife conservation in India in the 21st century: Past legacies, future promises", followed by a thought provoking question and answer session; the talk was followed by two movies, first on "Shores of Silence" by Shri Mike Pandey, and the second on "Bird Sanctuaries of Uttar Pradesh". It was followed by interaction with filmmaker Shri Himanshu Malhotra.

The students of St. Mary's School were taken to Malsi Deer Park for wildlife/nature interpretation and doing various activities. In all eighty students and five teachers participated. Besides other conservation messages, that message of removing pollutants was also driven home as everybody left the Malsi Deer Park only after collecting the plastic, burning it and leaving the park better than before. A visit to the Rajaji National Park was organized for the families of WII staff. Eighteen families visited Rajaji NP and many of them saw work in a forest and wilderness area for the first time.

OTHER ACTIVITIES

Campus Development

The construction of Seminar Hall-cum-Interpretation Centre at the WII is in progress: the building caters for a Seminar Hall of and approximately 690 sq.m. area with a seating capacity of 400 people. The building also houses an interpretation centre with attached store, entrance lobby, pantry and light refreshment area, AHU room, electrical panel room, control room, AV equipment room with back projection facility, acoustic treatment and a fire alarm system is also covered in the scope of this work. A separate approach road leading to the hall is also envisaged.

Construction activity is progressing well and on schedule.

Sports

The Institute participated in the X All India Forest Sports held at Faridabad, Haryana between March 12 and 16, 2002. About fifty teams from various States, UTs and Institutions participated in the tournament. The WII with a contingent of thirty players participated in cricket, carrom, lawn tennis, table tennis, shot put, rifle shooting, badminton and a quiz. The Institute won events up to the semifinals in men's senior veteran lawn tennis and women badminton singles, and to the quarterfinals in senior veteran table tennis and women's singles carrom.

Superannuation

Shri S.K. Mukherjee, Director WII, retired on superannuation on March 31, 2002.

Joined

Dr. Mehar Singh, IFS joined as Registrar and Shri A.K. Pathe joined the Institute as AEO by transfer on deputation on Foreign Service.

Repatriated

Shri A.K. Bhardwaj, IFS, has been repatriated to his parent department on completion of his deputation period at the Institute.

Passed away

The two WII members, namely Shri Amar Nath, (Driver) and Shri Man Singh, (Driver) passed away on September 14, 2001 and December 2, 2001 respectively.

Activities of the Vigilance Unit

As laid down by the Central Vigilance Commission, Government of India, a Senior Faculty Member discharges the functions of the Chief Vigilance Officer for the Institute. The

activities of the unit are laid down procedures. During the reporting period, there were no cases pending, contemplated or decided.

Distinguished Visitors

The Science Team of the ongoing WII-USDA Forest Service Project including Dr. Bruce G. Marcot, Dr. Martin G. Raphael, Dr. John F. Lehmkuhl and Dr. Richard Holthausen visited the Institute for three weeks during August and September, 2001.

From April to June, 2001, students from Udaipur

Prof. (Mrs.) C.H. Ashton, daughter of Sir Harry Champion visiting WII Library *Photo : V. Verma*

University, a group from Pune University, Students from Indian Public School, Dehradun, Army School Clement Town, Dehradun and Doon Activity Centre, Dehradun, visited the WII.

Shri N.R. Krishnan, Former Secretary, MoEF and Consultant (Expenditure Reforms Commission), had a discussion with authorities and faculty members on expenditure reforms.

From July to September, 2001 Dr. Mazen Ali Nazi, (Director), Zyed Complex for Herbal Research and Traditional Medicine, and Dr. Sassan Behjat from the Ministry of Health, UAE, IFS officers of XIII and XIV Professional Skill Upgradation course at the IGNFA, IFS Officers of the 1991 batch, who were undergoing a short term course at IGNFA under the Forestry Training Project (FTP) in collaboration with DFID and the officer trainees of Rangers Course 2001-2002 undergoing training at the Forestry Training Institute, Haldwani, visited the Institute.

From October to December 2001, students of North East Regional Institute for Science and Technology, Arunachal Pradesh, IFS Officers of various courses from IGNFA, Students from SFS College, Coimbatore, Tamil Nadu, and a class from Kerala University, visited the Institute.

From January and March 2002, Prof. (Mrs.) C.H. Ashton, daughter of Sir Harry Champion, foresters' class from J&K, P.G. students from IIFM, Bhopal, students from RIMC, Dehradun, Forest Guard Trainees from Sundernagar, H.P., Korean delegation, visited the Institute.

The Hon. Union Minister for MoEF Shri T.R. Baalu, the Hon. Minister of Forests, Wildlife, Environment and Urban Development, Uttaranchal State, Shri Nav Prabhat visited the Institute on March 27, 2002.

Asha and Hemendra Panwar Award

The first "Asha and Hemendra Panwar Award for outstanding performance" for the year 2000 was given to Shri M.S. Rana, Librarian of the Institute by the Hon. Union Minister for Environment and Forests, Shri T.R. Baalu. The award consists of Rs. 8,000/- cash with a medallion and a citation.

This award was given to Shri Rana for his technical competence, innovative ideas, dedicated efforts and able leadership qualities, which have helped the WII to establish a modern Library and Documentation Centre that offers a range of value added services, and is widely acknowledged as a 'role model'.

The Hon. Union Minister for Environment & Forests Shri T.R. Baalu presenting the first Asha & Hemendra Panwar Award to Shri M.S. Rana, Librarian *Photo : V. Verma*

Hindi Essay Competition

A Hindi essay competition was held in the Institute on October 12, 2001 to celebrate Hindi fortnight. The topic of the competition was *"Sarkari Kamkaj mein Hindi ke Upyog ki Gati Dhimi Kyon? Ise Gatiman Karne ke Upay"*. A total of thirteen officials and staff members participated in the competition.

Shri K.K. Shrivastava, Editor, came first, while Shri M.D. Gupta, UDC, and Ms. Padma Rani, LDC, were in second and third places respectively in the competition. Prizes and the certificates were given by the Hon. Minister of Forests, Wildlife, Environment and Urban Development, Uttaranchal State, Shri Nav Prabhat, in a ceremony held on March 27, 2002, at the Institute. The Hon. Union Minister for Environment and Forests, Shri T.R. Baalu, presided over the ceremony.

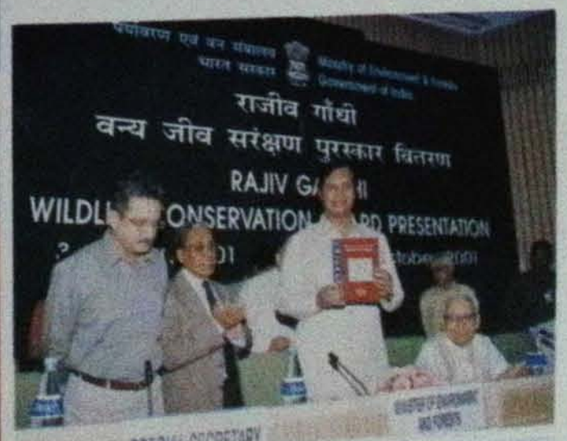
The Hon. Minister of Forests, Wildlife, Environment and Urban Development, Uttaranchal, Shri Nav Prabhat, giving First Prize to Shri K.K. Shrivastava *Photo : V. Verma*

Rajiv Gandhi Wildlife Conservation Award

The Ministry of Environment and Forests, Government of India, selected the Wildlife Institute of India for the prestigious Rajiv Gandhi Wildlife Conservation Award (Institutional category) for the year 1999, for the outstanding contribution made by the WII in the field of wildlife conservation. The Honourable Vice-President of India presented this award on 3rd October, 2001, at Vigyan Bhawan, New Delhi.

The following two publications of the Institute were also released on this occasion:

1. Roads, Sensitive Habitats and Wildlife.
2. Ecodevelopment: Training of Trainers Manual



Glimpses of Rajiv Gandhi Wildlife Conservation Award Ceremony

सत्यमेव जयते

CITATION

WILDLIFE INSTITUTE OF INDIA, DEHRADUN

Established in 1982 with the mandate to support nature conservation and foster the development of wildlife science in the country, the Wildlife Institute of India was made an autonomous institution of the Ministry of Environment and Forests, Government of India in 1986. In less than two decades of its existence, it has made significant contributions to the country's conservation agenda through its innovation and comprehensive training, research, academic programmes and advisory services.

Wildlife Institute of India's research initiatives on rare, endangered and flagship species, especially snow leopard, tiger, elephant, rhino, lion, wolf and marine turtle, have led to the development of species conservation action plans. Wildlife Institute of India's ecological studies on lesser known taxa, *viz.*, herpetofauna, butterflies and bird communities has led to the identification and understanding of centres of bio-diversity hotspots and endemism in the Western Ghats and Northeast India. Wildlife Institute of India has been instrumental in building analytical capacity in the field of wildlife forensics which has helped in investigating wildlife crimes. Wildlife Institute of India has also been at the forefront of developing allied disciplines in conservation, *viz.*, wildlife genetics, wildlife health, nature interpretation, environmental impact assessment, participatory management and ecodevelopment which have helped in the scientific planning and management of the country's wildlife resources.

The Institute research and training expertise has been effectively utilized to build up and strengthen the managerial capacity amongst the client organizations primarily engaged in the task of bio-diversity conservation for India as well as other countries of the world. The Wildlife Institute of India has established an impressive array of linkages with a number of conservation organizations, both at national and international level, which has helped the country to achieve a rightful position within the global conservation community. The Institute has also sensitized the personnel of several other organisations, notably the Army, Police, Revenue Intelligence and Customs, to the various wildlife conservation issues. It is a matter of pride that the Wildlife Institute of India has attained eminence as a Centre of Excellence in the South and South East Asian regions.

In recognition of the outstanding contributions made by the Wildlife Institute of India, the Rajiv Gandhi Wildlife Conservation Award (Institutional Category) for the year 1999 is given on this day.

(T.R. BAALU)
Minister of Environment and Forests
Government of India

Dated: October 3, 2001

Perspective 2002-2003

Capacity building is among the major activities of the Institute with the 9 month Post Graduate Diploma Course and the 3 month Certificate Course for wildlife professionals are the most important among the training courses. The decision of the Ministry of Environment and Forests, Government of India to fully fund the training cost to a capacity of 20 officers from within India in each of the courses from the year 2002-2003 onward will make a major difference, enabling the Institute to conduct training at full capacity.

The reconstituted Training, Research and Academic Council (TRAC) of the Institute has provided a Landscape based approach to wildlife research to address and integrate conservation issues across the mosaic of interacting Landuse. It is hoped that the concept and principles will be put to practice as they hold the key to conservation success.

It is planned to introduce appropriate revision to the syllabus of the M.Sc. Course in Wildlife Science in order to keep abreast with changing concepts, principles, techniques, technology and ground realities in wildlife, science and practice. It is hoped that the Institute's proposal for Deemed University status will be approved by the University Grants Commission.

Pastoralism is the main stay of livelihood of people in Trans-Himalaya. Under the Institutional Cooperation Programme in Natural Resource Ecology between the Institute and the University of Tromso, Norway we will upgrade our Research Laboratory for advanced food habit analysis. We plan to make an assessment of state-of-knowledge and research approaches to wild-domestic ungulate interactions and rangeland management in India's Himalayan region.

The Secretariat of the Indian National Committee will continue to coordinate and facilitate projects being conducted in the Himalayan region by the Wildlife Institute of India, the GB Pant Himalayan Institute of Environment and Development, Almora and the Indian Institute of Forest Management, Bhopal under IUCN's Sustainable Use Programme-Asia: Biodiversity Conservation Strategy for the Himalayan Region.

It is planned to undertake conservation assessment of Terai Arc Landscape that stretches from Yamuna river in the west to the Valmiki Tiger Reserve in the east in Bihar. Mega-herbivores such as elephant and rhinoceros once ranged across this tract that also constitutes significant habitat of the critically endangered tiger, swamp deer and several species of plants and wild animals that are obligates of terai. Fragmentation of habitats and increasing biotic pressures constitute major issues. We believe that practical conservation measures will emerge from such assessment. We hope to secure external funding support.

We plan to complete the revision of the Protected Area Network Report, Standardize several forensic techniques and complete species identification manuals.

The collaborative research project with USDA Forest Service, and all except one project with the US Fish and Wildlife Service will conclude at the end of the year 2002. The partnership with these agencies has been long and professional rewarding. The research outcome is expected to make a significant contribution to wildlife conservation in India.

The construction of auditorium with a capacity to accommodate 400 persons will be completed and hopefully we will have resources to furnish it fully including state-of-the art audio-visual facility. We will continue to forge our linkages with scientific institutions, universities, line agencies, NGOs within India and abroad that contribute directly or indirectly to ecological security of this country thereby enabling the Wildlife Institute of India in attainment of its vision, mission and mandate.

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Chanakyapuri
New Delhi-110 21

4-8. Five non-official persons from amongst eminent Members Scientists/Naturalists/ Conservationists for a period of three years to be nominated by the President from time to time who are members of WII-Society.
(The present membership tenure is valid upto 24.2.2005)
(a) Shri Samar Singh,
(Former Director General, WWF-India)
P-1, Hauz Khas,
New Delhi-110 016
(b) Shri H.S. Panwar,
(Former Director, WII)
B-22, South City,
Gurgaon-122 001
(c) Dr. R. Sukumar,
Centre of Ecological Sciences,
Indian Institute of Science,
Bangalore-(Karnataka)
(d) Dr. Kanchan Chopra,
Institute of Economic Growth,
University Enclave,
New Delhi
(e) Shri S.B. Singh,
(Former Chief Wildlife Warden Meghalaya)
House No. 18/494, Indira Nagar
Lucknow-226 016

9. Financial Advisor & Joint Secretary to the Government of India,
Ministry of Environment & Forests.
a) Joint Secretary & Financial Advisor
Ministry of Environment & Forests,
Paryavaran Bhavan, 'B' Block,
CGO Complex, Lodi Road,
New Delhi - 110 003

10. Chief Secretary, Government of Uttaranchal or his/her nominee not below the rank of Secretary to the State Government.
a) The Chief Secretary
Government of Uttaranchal
"Sachivalaya"
Dehradun-248 001

11-16 Chief Wildlife Warden in the State Govt. of Uttaranchal (permanent member) and five Chief Wildlife Wardens on a regional rotational basis at a time for a period of three years as per Table given below: -

17. Addl. Director General (WL) & Director Wildlife Preservation,
Ministry of Environment & Forests,
Paryavaran Bhavan, B-Block,
CGO Complex, Lodi Road,
NEW DELHI - 110 003

18. Director General,
Indian Council of Forestry Research and Education,
New Forest,
DEHRADUN - 248 006

19. The Chairman,
Training, Research and Academic Council, WII
Special Invitee

20. Dr. V.B. Mathur
Professor
Wildlife Institute of India,
Post Box 18, Chandrabani,
DEHRADUN - 248 001

21. Director
Wildlife Institute of India,
Post Box 18, Chandrabani,
DEHRADUN - 248 001
Member-Secretary

Training, Research and Academic Council (TRAC)

1. **Chairman**
Shri R. Rajamani, Retd. IAS &
Former Secretary, MoEF
8-2-585/A/I, Road No. 9,
Banjara Hills,
Hyderabad – 500 034

2. **Member**
Shri H.S. Panwar,
Former Director, WII
M-22, South City,
Gurgaon-122 001

3. **Member**
Dr. Asad R. Rahmani,
Director
Bombay Natural History Society,
Museum Compound,
Shaheed Bhagat Singh Marg,
Mumbai-400 023

4. **Member**
Dr. R.K. Sinha,
Professor and Head,
Department of Zoology,
Patna University
Patna

5. **Member**
Prof. V.C. Soni,
Department of Biosciences,
Saurashtra University,
Rajkot

6. **Member**
Prof. P.C. Bhattacharya,
Head of Department of Zoology,
Guwahati University
Guwahati

Ex-Officio Members

7. **Member**
The Director Wildlife Preservation,
Government of India,
Ministry of Environment & Forests,
CGO Complex, Lodi Road,
New Delhi – 110 003

8-20 Chief Wildlife Wardens on a regional rotational basis at a time for a period of three years: -
Northern Region - Himanchal Pradesh, Delhi
Eastern Region - Jharkhand, West Bengal
Central India - Madhya Pradesh
Western Region - Rajasthan, Maharashtra
North-Eastern Region - Sikkim, Arunachal Pradesh, Tripura
Southern Region - Karnataka, Andhra Pradesh
Permanent Invitee - Uttaranchal

21. **Member**
The Director,
Salim Ali Centre for Ornithology and Natural History (SACON),
Anaikatty P.O.
Coimbatore-641 108

22. **Member**
The Director,
Botanical Survey of India,
Kolkata.

23. **Member**
The Director,
Zoological Survey of India
Kolkata.

24. **Member**
The Member-Secretary,
Central Zoo Authority,
New Delhi.

25. **Member**
A representative of Indian Council of Forest Research and Education (ICFRE),
Dehradun

26. **Member**
The Dean, Faculty of Wildlife Science
Wildlife Institute of India,
Dehradun

27. **Member**
The Chairman,
Internal Research Advisory Committee,
Wildlife Institute of India,
Dehradun

28 **Member**
The Registrar,
Wildlife Institute of India,
Dehradun

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

Finance Committee

1. **Chairman**
The Director General of Forests,
Ministry of Environment & Forests,
Govt. of India,
Paryavaran Bhavan, B-Block,
CGO Complex, Lodi Road,
NEW DELHI - 110 003

2. Shri R. Rajamani, IAS (Retd)
(Former Secretary, MoEF)
8-2-585/A/I, Road No. 9,
Banjara Hills,
HYDERABAD-500 034

3. Shri S.C. Sharma, IFS
Addl. Director General of Forests (WL),
Ministry of Environment & Forests,
Govt. of India,
Paryavaran Bhavan, B-Block,
CGO Complex, Lodi Road,
NEW DELHI - 110 003

4. Shri S.B. Singh,
(Former Chief Wildlife Warden, Meghalaya)
House No. 18/494, Indira Nagar
LUCKNOW-226 016

6. Shri Y.S. Bhave, IAS
Joint Secretary & Finance Advisor,
Ministry of Environment & Forests,
Govt. of India,
Paryavaran Bhavan, B-Block,
CGO Complex, Lodi Road,
NEW DELHI - 110 003

7. The Dean
Faculty of Wildlife Sciences
Wildlife Institute of India,
DEHRADUN

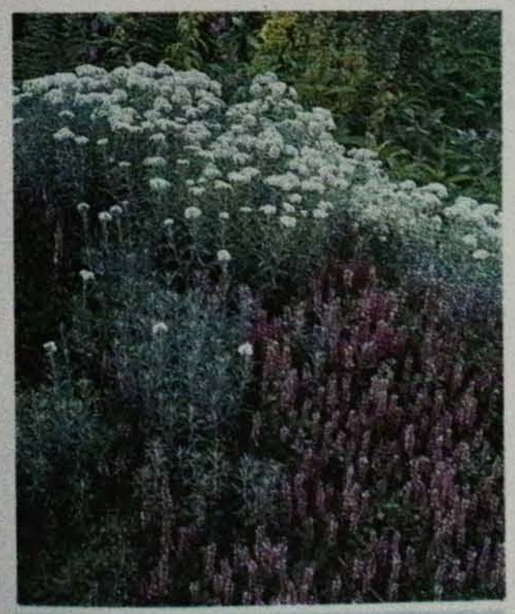
8. **Member-Secretary**
The Director,
Wildlife Institute of India,
DEHRADUN

Building Committee, WII

1. **Chairman**
Director General,
Indian Council of Forestry Research & Education, P.O. New Forests,
DEHRADUN - 248 006

2. Chief Engineer
Member
(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,
Post Box 18, Chandrabani,
DEHRA DUN - 248 001



Golden rods and everlastings in Valley of Flowers *Photo : G.S. Rawat*

Audit Certificate

I have examined the Receipt and Payments Accounts, Income and Expenditure Account for the year ended 31st March 2002 and the Balance Sheet as on 31st March 2002 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

Place: New Delhi
Date: 21st January 2003

WILDLIFE INSTITUTE OF INDIA

Balance Sheet as on 31-3-2002

FUNDS & LIABILITIES	As on 31-3-01	Additions during 2001-2002	As on 31-3-2002	ASSETS	As on 31-3-2001	Additions during 2001-2002	As on 31-3-2002
Excess of income	35808703.79	(-) 2788106.76	33020597.03	Land	6607214.65	0.00	6607214.65
Pension Fund	8544181.25	11969896.00	20514077.25	Trees	2432709.00	0.00	2432709.00
	800722.00		800722.00	Avenue Plantations	3219312.15	218968.00	3438280.15
GP Fund	12920436.49	2677668.44	15598104.93	Campus Development	6727487.31	108539.00	6836016.31
Amount Capitalised	254718253.07	20924493.00	275642746.07	Lab equipment	2129224.07	2000.00	2131224.07
CGEGIS Refund	0.00	0.00	.0.00	Furniture & Fixtures	10153628.44	913748.00	11067376.44
Security Deposit	1055726.95	(-) 644548.00	410878.95	Vehicle	5739810.50	47373.00	5787183.50
Payment received for research equipment for Siberian Crane Project	82202.00	0.00	82202.00	Library books	12666380.28	530064.00	13196444.28
				Office Equipment	5693884.90	322771.00	6016655.90
				Camp Equipment	558771.34	0.00	558771.34
To Advance receipt				Photographs & Photos	2189930.20	16000.00	2205930.20
of printing	391700.00	0.00	391700.00				
of Eco-dev. Project				Materials and supplies	3863727.95	0.00	3863727.00
To advance for conducting				Educational films	1080432.35	0.00	1080432.00
zoo mgmt. course,99	172139.00		172139.00	Journals & Periodicals	18641590.00	4004100.00	22645690.00
Acquisition of land				Training equipment	25235241.24	3641101.00	28876342.24
around National Park	25000.00		25000.00	Boundary Wall	1446200.59	0.00	1446200.59
CZA Mgmt Course 01	611500.00	(-) 491732.00	119768.00	Boundary fencing	817934.93	0.00	817934.93
Telematary Workshop	117191.00	0.00	117191.00	Building complex	126040210.00	10219153.00	136259363.00
CZA-Value of exhibit design	200000.00	0.00	200000.00	Architectural & supervision fee	7474451.85	900686.00	8375137.85
CZA Studbook project	207000.00	0.00	207000.00	DG Set	1970326.00	0.00	1970326.00
Tropical Rain Forest	315000.00	2,07,961.00	107039.00	EPABX	1026000.00	0.00	1026000.00
Workshop				AC Plant	2716710.00	0.00	2716710.00
Zoo Mgmt.Crs. 02	0.00	5,00,000.00	243527.00	advance for expeneses	436546.00	(-)235650.00	200896.00
		(-) 2,56,473.00		(trainig)			
Hostel Caution Money	0.00	90000.00	90000.00	Advance for expr to staff	2187205.00	(-) 543787.00	1643418.00
				Loan & advance to staff	2440779.20	(-) 492939.00 (+) 9600.00	1957440.00
				Staff quarters	3175520.00	0.00	3175520.00
Carried Over			**347742692.23**	**Carried Over**			**276332943.45**

Brought Forward	**347742692.23**	**Brought Forward**			**276332943.45**
		Road & culvert	1724111.00	0.00	1724111.00
		Tennis court	530852.32	0.00	530852.32
		Auditorium	856592.00	0.00	856592.00
		Closing stock of steel & Cement Etc.	1008973.90	(-) 720590.00 (+) 201240.00	489622.90
		Closing balance (Training)	5805689.40	0.00	3465039.84
		Closing bank balance	10859213.54	0.00	819478.74
		closing cash balance	33640.20	0.00	57440.20
		F.D.R	10350000.00	555000.00	10905000.00
		FDR (Training)		2500000.00	2500000.00
		Loan to Envis Project (trai	0.00	180000.00	180000.00
		Grant-in-aid accrued but not received	0.00	4900000.00	4900000.00
		G.P.F			
			800722.00		800722.00
		Bank balance	6921436.49	(-) 6314331.56	607104.93
		MPSEB Bond	1800000.00	0.00	1800000.00
		Kotak Mahindra Fund	1500000.00	0.00	1500000.00
		Tata Guilt Fund	1499000.00	996000.00	2495000.00
		ICICI	0.00	4500000.00	4500000.00
		FDR	1200000.00	1500000.00	2700000.00
		HDFC	0.00	1996000.00	1996000.00
		PENSION FUND			
		Bank balance	844181.25	13969896.00	14814077.25
		FDR	7700000.00	(-) 20,00,000.00	5700000.00
		Training cost accrued but not received	437375.00	(-) 40000.00 (+) 257900.00	655275.00
		CONSULTANCY PROJECTS(B)			
		Closing balance	5426740.50	0.00	7413431.10
GRAND TOTAL	**347742692.23**	**GRAND TOTAL**	**315969755.55**		**347742692.23**

The above balance sheet to the best of our belief contains a true account of the Funds, Liabilities, Property and Assets of the Institute.

(S.S. Lamba)
Finance Officer

(Dr. Mehar Singh)
Registrar

(V.B. Sawarkar)
Director

WILDLIFE INSTITUTE OF INDIA

Receipts & Payments Account for the Year 2001-2002

RECEIPTS		Current year	PAYMENTS	PLAN	NON PLAN	Current year
To Opening balance:			By salaries	13100571.00	7132010.00	20232581.00
Cash in hand	33640.20		By Bonus	0.00	236009.00	236009.00
Cash in bank	10859213.54	10892853.74	By Honorarium	0.00	2950.00	2950.00
Balance in bank (trainee a/c)		5805689.41	By Fellowship	1042089.00	0.00	1042089.00
To Grant in aid (Plan)	50000000.00		By Wages	593263.00	0.00	593263.00
Dept. of Envt & Forests (Non Plan)	12200000.00	62200000.00	By Travel expenses	2087158.00	0.00	2087158.00
To Training cost received during the year		2689352.00	By New paper & Magazine	31710.00	0.00	31710.00
Outstanding Trg cost rcvd during year		40000.00	By publicity & Advt	169183.00	0.00	169183.00
To adv. for expenses(staff)		543787.00	By Medical	1810559.00	0.00	1810559.00
Other Receipts (training)		341704.00	By operational expenses	4276143.00	0.00	4276143.00
Short Courses receipt		1802788.43	By stationary		877772.00	877772.00
Outstanding advance for expenses received(training)		235650.00	By Over time allowances	0.00	390525.00	390525.00
Interest-Bank Account (training)		169836.00	By Research Projects	2048795.00	0.00	2048795.00
To interest credited by bank		363449.00	By Postage and telegram	165358.00	0.00	165358.00
To G.P.F:			By sports goods	129579.00	0.00	129579.00
Opening balance GPF		6921436.49	By telephone and TC	1017977.00	0.00	1017977.00
Opening balance EPF		800722.00	By Electricity & Water	0.00	2488275.00	2488275.00
Refund of Kotak Mahindra		15,00,000.00	By printing & binding	42520.00	0.00	42520.00
Tata Guilt		14,99,000.00	By LTC	43409.00	0.00	43409.00
UTI		40,00,000.00	By refund security deposit	644848.00	0.00	644848.00
Receipts during the year		29,97,833.00	By Festival advance	0.00	9600.00	9600.00
Interest	15923.00		By Uniforms	82675.00	0.00	82675.00
	14999.71		By Payment of award to staff	0.00	0.00	100350.00
	18000.00		By Land scaping	30940.00	0.00	30940.00
	13,773.00		By WII Revenue to Pension Fund	0.00	0.00	10143356.00
	12,001.00		By stipend and M.Sc. Expend.	755972.00	0.00	755972.00
MPSEB	1,97,887.00		By legal expenses	37500.00	0.00	37500.00
UTI	3,99,469.93		By publication	534132.00	0.00	534132.00
Kotak	1,73,095.80		By training cost on course			4939980.00
Tata Guilt	1,61,063.00	10,06,212.44	By government contribution to pension fund		1061208.00	1061208.00
TO PENSION FUND:			By maintenance of vehicles	490245.00	0.00	490245.00
Opening balance		8,44,181.25	By POL for vehicles	1069509.00	0.00	1069509.00
Amt Transferred from revenue of WII		101,43,356.00	By Laboratory chemicles	406614.00	0.00	406614.00
Receipt during the year		10,61,208.00	By Estate Security	2052677.00	0.00	2052677.00
FDR		20,00,000.00	By Income Tax Salaries	0.00	0.00	1143084.00
Interest		9,68,731.00	Income Tax (Contractor)	0.00	0.00	177306.00
To Loans and Advances to staff			Trade Tax	0.00	0.00	118102.00
HBA	327288.00		Income Tax (TDS)	0.00	0.00	245055.00
Conveyance advance	165651.00		Zoo Course 2001	0.00	0.00	491732.00
Carried Over		**118827789.76**	Zoo Course 2002	0.00	0.00	256473.00
			Tropical Rain Forest	0.00	0.00	207961.00
				32663426.00	**12198349.00**	**62685174.00**

Brought Forward		**118827789.76**	Forensic Lab	**32663426.00**	**12198349.00**	**62685174.00**
Fan advance	0.00		By Loan refund to AIC No. 8	13287.00	0.00	13287.00
Cycle Adv.	0.00	492939.00	By avenue plantation	0	0.00	4000000.00
To M.Sc course fee		621510.00	By Cement	218968.00	0.00	218968.00
TO MISC RECEIPTS:			By Furniture and fixtures	201240.00	0.00	201240.00
Guest House Rent	360189.00		By lab equipment	913748.00	0.00	913748.00
Seminar & workshop	209538.00		By Office equipment	2000.00	0.00	2000.00
Sale of tender	21500.00		By training equipment	322771.00	0.00	322771.00
H.L.fee	181619.00		(Computer)	3641101.00	0.00	3641101.00
Misc receipts	7724.00		By photographs & photograph equipment	16000.00	0.00	16000.00
Sale of WII Products	178199.00		By Library books	530064.00	0.00	530064.00
Lab testing charges	62700.00		By Jouranals & Periodicals	4004100.00	0.00	4004100.00
Bus charges	98476.00	1119945.00	By Campus Development	108529.00	0.00	108529.00
To Steel		720591.00	By construction of buildings	10219153.00	0.00	10219153.00
To Cement		0.00	By Architectural & Mngt. fee	900686.00	0.00	900686.00
CONSULTANCY PROJECT A/C:			By Earthcare BBC	0.00	0.00	97310.00
Opening balance		5426740.50	By purchase of vehicle	47373.00	0.00	47373.00
Receipts during the year		12924346.00	NTCGCF Project Refund	0.00	0.00	276231.00
INSTITUTIONAL CHARGES:			Cash in hand			57440.20
Forensic Lab	400000.00		FDR against letter of credit			555000.00
WII-Bandhavgarh Project	149000.00		Bank balance with UBI			819478.74
Project Cost Nanda Devi	175000.00		By Bank balance with UBI			3465039.84
WPA			(training a/c)			
ICIMOD	93129.00		FDR (Training)			25,00,000.00
Institutional Charges	**446613.00**	**1263742.00**	Loan to ENVIS (Training)			1,80,000.00
Hostel Caution Money		90000.00	**G.P.F:**			
Loan from account no.8		4000000.00	Investment in UTI			40,00,000.00
Security Deposit			HDFC			19,96,000.00
Income Tax on salaries		1143084.00	Tata G			24,95,000.00
Income Tax (Contractor)		177306.00	KMMF			15,00,000.00
Trade Tax		118102.00	ICICI			45,00,000.00
Income Tax (TDS)		245055.00	FDR			15,00,000.00
To Zoo Course 2001		0.00	Payment during the year			21,27,099.00
To Zoo Course 2002		5,00,000.00	Bank balance (closing)			6,07.104.93
EMD Forefeited			**PENSION FUND:**			
Earth Care BBC		97310.20	Expenditure during the year			2,03,399.00
CZA Value of Exibt Design			bank balance (closing)			148,14,077.25
CZA Study Book			**CONSULTANCY PROJECT A/C:**			
Tropical Rain Trust Workshop			Payments during the year			*10937655.40*
To Rajiv Gandhi Award money		100000.00	Closing balance (bank)			*7413431.10*
			Consultancy projects			
Grand Total		**147868460.46**	**Grand Total**			***147868460.46***

The above balance sheet to the best of our belief contains a true account of the Funds, Liabilities, Property and Assets of the Institute.

(S.S. Lamba)
Finance Officer

(Dr. Mehar Singh)

(V.B. Sawarkar)
Director

WILDLIFE INSTITUTE OF INDIA

Income & Expenditure Account for the Year 2001-2002

EXPENDITURE	Current year	Previous year	INCOME		Current Year	Previous Year
To salaries & allowances	20232581.00	19718209.00	By Grant - in - aid	62200000.00		6,40,00,000.00
To Bonus	236009.00	2,25,731.00	Dept of envt & forests			
To Honorarium	2950.00	23,750.00	Less:transfer to	(-) 20924493.00	41275507.00	
To fellowship	1042089.00	11,58,473.00	capital expr			4,63,96,446.00
To Wages	593263.00	17,37,310.00	By Training cost		2689352.00	24,37,364.00
To Travel exps	2087158.00	31,76,940.00	By Other Receipt(training)		341704.00	11,56,700.00
To New Paper & Magazine	31710.00	35,344.00	By Int on trainee a/c		169836.00	1,43,972.00
			By Int on bank deposit		363449.00	21,52,931.00
To Publicity & Advt	169183.00	1,25,933.00	By Receipt of Short courses (training)		1802788.44	
To Medical	1810559.00	15,17,780.00	By panal interest		0.00	--
To Operational Expr	4276143.00	69,30,346.00	By Income Tax Refund		0.00	19,419.00
To Seminor & workshop	0.00		By Misc. receipts		1119945.00	7,87,717.00
To Stationary	877772.00	6,35,693.00	By Training cost accrued		257900.00	1,77,375.00
To Rent	0.00		but not received			
To Postage & telegrams	165358.00	1,43,452.00	By WII receipts(instt charges)		1263742.00	33,71,568.35
To Sports goods	129579.00	39,270.00	By M.Sc course fee		621510.00	6,01,670.00
To Telephone & TC	1017977.00	10,31,889.00	By consultancy project		12924346.00	1,55,16,399.00
To Electricity & Water charges	2488275.00	1987847.10	Receipt during the year			
			To earth BBC		97310.20	
To printing & binding	42520.00	73,945.00	Grant-in-aid accrued but not		4900000.00	
To Govt contr. to pension fund	1061208.00	26,35,74.00	received			
			By EMD Forefeited		0.00	16,000.00
Leave salary and Pension contr.	0.00	43,455.00	By balance of Project cost (Sh Pratap Singh) lapsed to		0.00	88,590.30
To LTC	43409.00	16,16,52.00	Govt. Account			
To Audit fee	0.00	--	By balance of GHNP Project		0.00	76,092.00
To WII PF Trust	0.00	8,00,722.00	lapsed to Govt. Account			
To Sri Lanka refund	0.00	1,90,250.00	To Excess of Expenditure		2788106.76	
To EcoTourism Course	0.00	25,573.00	Over Income			
Carried Over	**36307743.00**	**40047138.00**	**Carried Over**		**70615496.40**	**72942243.65**

Brought Forward	**36307743.00**	**40,047,138.00**	**Brought Forward**	**70615496.40**	**72942243.65**
To conveyance charges	0.00	1,340.00			
To NTGCF Project refund	276231.00				
To Winsis workshop	0.00	12,000.00			
To Entertainment charges	0.00	15,527.00			
Research Project	2048795.00	2,81,400.00			
To Old Condemned Computer Written off	0.00	6,19,498.00			
To IUCN Contribution	0.00	36,146.00			
To Stipend of M.Sc.	755972.00	1,85,800.00			
To OTA	390525.00	3,63,310.00			
To Legal Expr	37500.00	1,25,250.00			
To Training cost	4939980.00	32,66,744.00			
To Repair & maintenance of vehicle	490245.00	7,81,345.00			
To POL for vehicle	1069509.00	14,91,665.00			
To Lab chemicals	406614.00	1,14,481.00			
To Estate Security	2052677.00	18,82,530.00			
To Land scaping	30940.00	7,68,486.00			
To Publication	534132.00	3,02,743.00			
To consultancy project expenses	10937655.40	1,10,85,022.35			
To Earthcare BBC	97310.00	--			
To uniforms	82675.00	--			
To Rajiv Gandhi Award Exp	350.00				
To Forensic Lab	13287.00	--			
To WII Revenue & Pension Fund	10143356.00	--			
To Excess of income over expenditure					
Total	**70615496.40**	**7,29,42,243.65**	**Total**	**70615496.40**	**7,29,42,243.65**

The above Income Expenditure sheet to the best of our belief contains a true account of the Funds, Liabilities, Property and Assets of the

(S.S. Lamba)
Finance Officer

(Dr. Mehar Singh)
Registrar

(V.B. Sawarkar)
Director

WILDLIFE INSTITUTE OF INDIA

Permanent Assets as on 31-3-2002

PARTICULARS	Opening Balance 2001-2002	Additions during	Total As on 31-3-2002
Land	6607214.65	0.00	6607214.65
Trees	2432709.00	0.00	2432709.00
Avenue Plantations	3219312.15	218968.00	3438280.15
Campus Development	6727487.31	108529.00	6836016.31
Lab equipment	2129224.07	2000.00	2131224.07
Furniture & Fixtures	10153628.44	913748.00	11067376.44
Vehicle	5739810.50	47373.00	5787183.50
Library books	12666380.28	530064.00	13196444.28
Office Equipment	5693884.90	322771.00	6016655.90
Camp Equipment	558771.34	0.00	558771.34
Photographs & Photos	2189930.20	16000.00	2205930.20
Materials and supplies	3863727.95	0.00	3863727.95
Educational films	1080432.35	0.00	1080432.35
Journals & Periodicals	18641590.00	4004100.00	22645690.00
Training equipment	25235241.24	3641101.00	28876342.24
Boundary Wall	1446200.59	0.00	1446200.59
Boundary fencing	817934.93	0.00	817934.93
Building complex	126040210.00	10219153.00	136259363.00
Archit. & supervision fee	7474451.85	900686.00	8375137.85
DG Set	1970326.00	0.00	1970326.00
EPABX	1026000.00	0.00	1026000.00
AC Plant	2716710.00	0.00	2716710.00
Staff quarters	3175520.00	0.00	3175520.00
Road & culvert	1724111.00	0.00	1724111.00
Tennis court	530852.32	0.00	530852.32
Auditorium	856592.00	0.00	856592.00
Total:	**254718253.07**	**20924493.00**	**275642746.07**