

Annual Report 2000-2001



भारतीय वन्यजीव संस्थान
Wildlife Institute of India



जहाँ है हरियाली ।
वहाँ है खुशाली ॥



Contents

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K.K. Shrivastava

COVER

Landscape of Western Himalaya

COVER INSET

Wild Dog (*Cuon alpinus*), Gaur (*Bos gaurus*),
Lion Tailed Macaque (*Macaca silenus*), Otter (*Lutra perspicillata*)

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DIRECTOR'S NOTE

During the period 2000-2001 the WII Governing Body met several times to deliberate and finalize the recommendations of the WII Evaluation Committee report. The recommendations contained in the document 'A Vision for the New Millenium' were accepted by the WII Society in January, 2001, and the Institute has begun work on them.

During the year field work of some of the externally funded research projects viz. "Establishment of wildlife forensic capacity at WII", "Evaluating Panna National Park with special reference to the ecology of the Sloth Bear" and "Relationships among large herbivores, habitat and humans in Rajaji-Corbett National Parks" were completed and the Institute is planning to bring out publications from these projects.

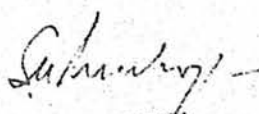
Under the GEF-India Ecodevelopment Project, the Institute organized four thematic training workshops for the seven project sites, and a State level workshop 'Regional Planning for Conservation and Development' was organized at IIM, Ahmedabad, in November, 2000.

WII was assigned the responsibility for coordinating IUCN activities in India, and we worked hard to increase the membership to 25. An eleven-member delegation from India participated in the World Conservation Congress held in Amman (Jordan) in October, 2000, in which three resolutions put forward from India were accepted.

The research study on the Indian Wolf and the Hyena is progressing well, and we hope to get some new insight into the ecology of these animals. In the field of ecotourism, the Institute has taken up collaborative initiatives which will help in developing strategies for action in this important area.

Our partnership with the Indira Gandhi National Forest Academy, Dehradun, to train young probationers in the field of wildlife conservation continues. It was a privilege for the WII to be chosen by UNESCO and the World Commission on Protected Areas of the IUCN to co-ordinate the activities of the project on 'Enhancing the Heritage : Monitoring and Managing for Success in World Natural Heritage Sites'. Under this project three pilot sites in South Asia, viz. Keoladeo National Park, Bharatpur, Kaziranga National Park and Royal Chitwan National Park, have been included.

Briefly, the year was professionally very rewarding, and I should like to thank faculty colleagues and staff of WII as well as all our partners and collaborators for their work.


S.K. MUKHERJEE

THE YEAR AT A GLANCE

The first meeting of the Indian Subcontinent's Regional Orchid Specialist Group was held in Thiruvananthapuram. Training Course on Immobilization and Restraint of Wildlife for PA Managers of U.P. Forest Department was organized. The training course on WINISIS for librarians and a Training workshop for Biosphere Reserve Managers were conducted at WII. A Training Course on Wildlife techniques was conducted for IFS Probationers of the 1999 batch at Kalagarh, Corbett National Park.

Training in the use of wildlife monitoring techniques was conducted for a group of ten frontline staff from the Jammu and Kashmir Department of Wildlife Protection. A training workshop was organised on Ecotourism Planning and Management. A specialization module on Biodiversity Conservation and Wildlife Management for IFS probationers of the 1997 batch was conducted. XXI P.G. Diploma Course in Wildlife Management was completed.

Training Workshop on Ecodevelopment for Biodiversity Conservation was conducted for the spearhead team of the Jaldapara Wildlife Sanctuary, West Bengal.

Semester III of M.Sc. Wildlife Science commenced. Training Workshop on Ecodevelopment conducted for community representatives and NGOs at Jaldapara Wildlife Sanctuary, West Bengal.

A workshop on Problems and Methods in mapping Land-cover/Landuse in Mountainous Terrain was conducted at WII. Management Planning Workshop was conducted at Leh under the collaborative Ladakh Field Research Project with the International Snow Leopard Trust, US Fish and Wildlife Service and the WII.

XXII P.G. Diploma Course in Wildlife Management commenced. XIV Annual research Seminar was held at WII. One-week Course in Wildlife Management for IFS Officers was conducted at WII.

Wildlife week was celebrated at WII.

XVI Certificate Course in Wildlife Management commenced. Workshop on Regional Planning for Conservation and Development in the context of Gir Conservation Area (GCA) was organised at IIM, Ahmedabad. Training Workshop on Habitat Management was conducted in Gir National Park and Wildlife Sanctuary and Velavadar National Park. Workshop on Health Management of Wild Animals was organised for faculty of Indian Veterinary Colleges at WII.

Training course on Wetland Conservation and Management conducted at WII. Training Workshop on Population estimation, Research and Monitoring techniques for Management Planning Officers and forest officials under India Ecodevelopment Programme, at Rajiv Gandhi National Park, Nagarhole, and Sri Chamarajendra Zoological Garden, Mysore was organized.

A course on Legal Issues in Wildlife Management conducted at WII for Diploma Officers and Enforcement personnel of forest, police, customs and intelligence services. A course on Ecodevelopment for Biodiversity Conservation was conducted. XVI Certificate Course in Wildlife Management was successfully completed by all the officer trainees at WII.

A course on Interpretation and Conservation Education was organised. A workshop on Research Priorities in Tropical Rainforests in India was organised at Coimbatore. A two-week course in Wildlife Management for IFS officers was conducted. Eleventh endangered species and zoo management course was conducted by WII at Visakhapatnam.

Workshop on *Uttaranchal main jari-bution ki kheti* was conducted in the Institute's campus. Special course on Wildlife Protection, Law and Forensic Science was conducted for Probationers of Indian Customs and Excise Service.

WORK PROGRAMME : 2000-2001

REGULAR TRAINING COURSES AND ACADEMIC PROGRAMME

- XXI P.G. Diploma Course in Wildlife Management, September 1999- May 2000
- XXII P.G. Diploma Course in Wildlife Management, September 2000- May 2001
- XVI Certificate Course in Wildlife Management, November 1, 2000 - January 31, 2001
- VII M.Sc. Wildlife Science, July 1999 - 2001

SHORT COURSES

- "Wildlife Techniques" Training for IFS Probationers (1999 Batch), April 3-7, 2000
- Training Course on "Immobilization and Restraint of Wildlife", April 17-21, 2000
- NISSAT-WII Training Course on "WINISIS", April 24-28, 2000
- Training Workshop for Biosphere Reserve Managers, April 24 - May 1, 2000
- Specialization Module on "Biodiversity Conservation and Wildlife Management" for IFS Probationers of IGNFA (1997-2000 Batch), May 5-23, 2000
- Training in the "Use of Wildlife Monitoring Techniques", May 19-31, 2000
- One week "Capsule Course in Wildlife Management" for IFS Officers, September 4-8, 2000
- Training Programme for Wildlife Staff on Musk Deer Density Estimation, November 5-7, 2000
- Training course on "Wetland Conservation and Management", December 11-23, 2000
- Course on "Legal Issues in Wildlife Management", January 8-12, 2001
- Course on "Ecodevelopment for Biodiversity Conservation", January 8-February 7, 2001
- Orientation Course on "Remote Sensing and GIS Applications in Forest and Wildlife Conservation", January 22 - February 9, 2001
- Two week "Capsule Course in Wildlife Management" for IFS Officers, February 5-16, 2001
- Eleventh "Endangered Species and Zoo Management Course", February 7-16, 2001
- Interpretation and Conservation Education Course, February 19-28, 2001
- Special Course for Indian Customs and Excise Service Probationers in "Wildlife Protection, Law and Forensics Science", March 5-16, 2001

WORKSHOPS

- Training Workshop on "Ecotourism Planning and Management", May 24-30, 2000
- Training Workshop for the "Spearhead team of the Jaldapara Wildlife Sanctuary", June 30-July 4, 2000
- Training Workshop for the "Community representatives and NGOs at Jaldapara Wildlife Sanctuary", July 5-6, 2000
- Training Workshop on "GIS and Remote Sensing for Management Planning Officers and Forest Officers of seven GEF sites under India Ecodevelopment Programme", July 10-21, 2000
- Training Workshop for the "Community Representatives and NGOs, July 5-6, 2000
- Workshop on "Problems and Methods in Mapping Land-cover/Land-use in Mountainous Terrain", August 7-10, 2000
- Management Planning Workshop, August 25-29, 2000
- Regional Planning for Conservation and Development in the context of Gir Conservation Area, November 7-9, 2000
- Training Workshop on "Habitat Management", November 11-15, 2000
- Workshop on "Health Management of Wild Animals", November 27 - December 8, 2000
- Training Workshop on "Population Estimation" and "Research & Monitoring Techniques" for MPOs and Forest Officials under India Ecodevelopment Programme, December 12-18, 2000
- Training Workshop on Biodiversity Conservation through PA Management, December 26-30, 2000
- Elephant Census Training Workshop, February 10-24, 2001
- Workshop on "Research Priorities in Tropical Rainforests in India", February 27-28, 2001
- Workshop on "Uttaranchal Main Jari-bution Ki Kheti", March 3-4, 2001

SEMINAR

- XIV Annual Research Seminar, September 27-29, 2000

MEETINGS

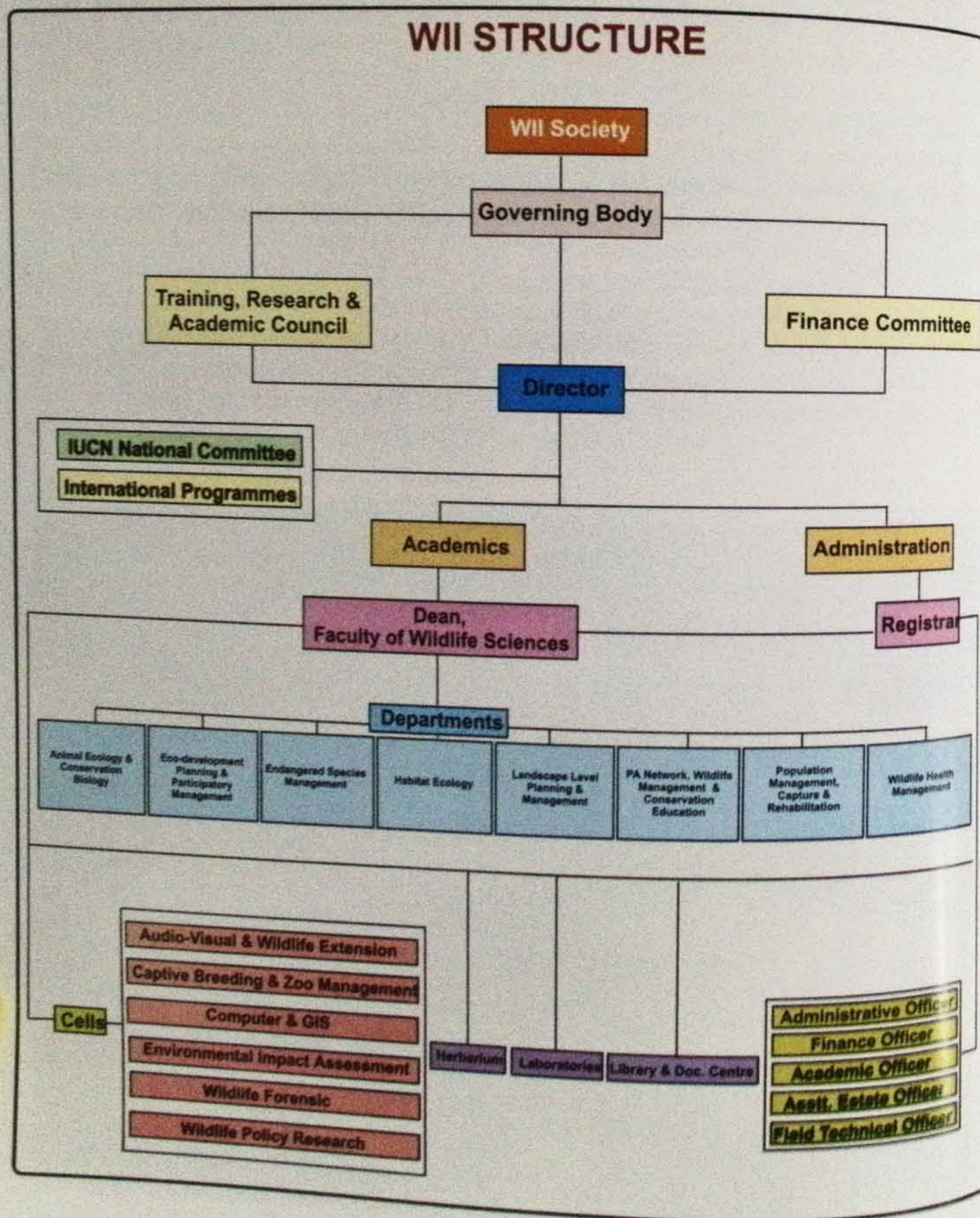
- XXXVI Governing Body Meeting, June 26, 2000
- Building Committee Meeting, July 31, 2000
- XXXVII Governing Body Meeting, September 8, 2000
- V Training, Research and Academic Council (TRAC), September 29-30, 2000
- XXXVIII Governing Body Meeting, October 25, 2000
- VI Finance Committee Meeting, December 22, 2000
- XXXIX Governing Body Meeting, January 8, 2001
- VIII Annual General Meeting of WII-Society, February 5, 2001
- Building Committee Meeting, March 29, 2001



INSTITUTIONAL ORGANIZATION

Based on the recommendations of the WII Evaluation Committee Report, internal re-organization was carried out in March, 2001. By amalgamating three faculty divisions of WII - Wildlife Biology, Wildlife Management and Wildlife Extension, a Faculty of Wildlife Sciences (FWS), headed by the Dean FWS, has been created. Under the Dean FWS there are eight Departments and six Cells. The faculty members have also been re-designated. Scientist SC, SD, SE, SF, SG and H are known as Lecturer, Senior Lecturer, Reader, Senior Reader, Professor and Senior Professor, respectively.

The chart below depicts the WII's structure.



Training & Academics



TRAINING PROGRAMMES

XXI Post Graduate Diploma Course in Wildlife Management

The XXI Post Graduate Diploma Course in Wildlife Management of nine-months' duration commenced on September 1, 1999 and concluded on May 31, 2000. A total of fourteen officer trainees (eight forest/wildlife officers) from different states within India, and one each from Nepal, Bangladesh and Sri Lanka, sponsored under the South Asian Association for Regional Co-operation (SAARC) Fellowship, and one each from Sri Lanka, Palestine and Kazakhstan, under the International Technical Economic Co-operation (ITEC Fellowship Scheme) joined the course.

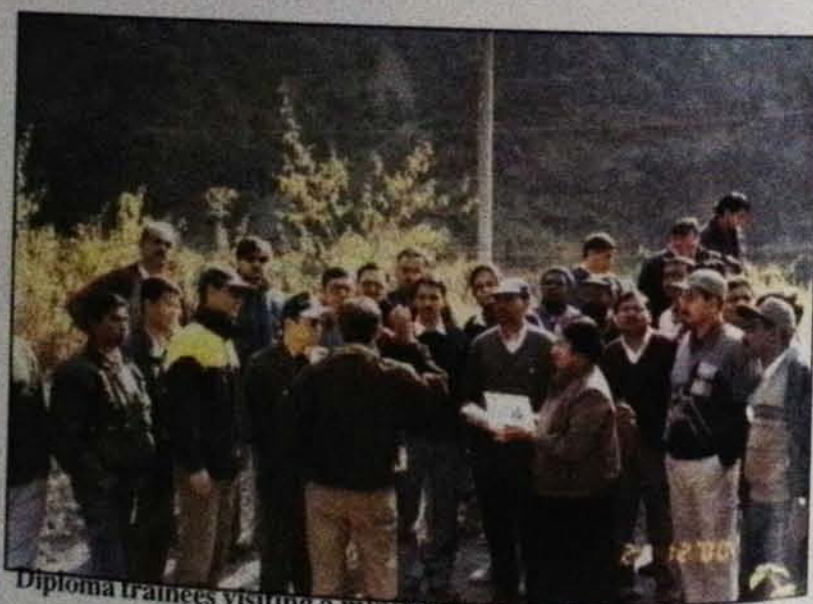
All the officer trainees successfully completed the course. The award for the Top Trainee (Institute Gold Medal and Wildlife Preservation Society Silver Medal) was won by Shri Jagmohan Sharma (Karnataka). He was also judged the Best All Round Wildlifer. He shared the N.R. Nair Memorial Medal for the Best Management Plan with Shri Paramjit Singh (U.P.). Mr. Al-Baba Imad Iddin from Palestine won the Best Foreign Trainee Silver Medal. Shri B. Vijay Kumar (Andhra Pradesh) won Book Prize for the Best Management Term Paper. Shri Rishikesh Ranjan (Maharashtra) and Shri Paramjit Singh, (U.P.) shared the Book Prize for Top Trainee in Wildlife Biology. Shri S.K. Pande, PCCF, Himachal Pradesh delivered the valedictory address and distributed the certificates and prizes to the officer trainees. Dr. N.P.S. Chauhan was the Course Director.

XXII Post Graduate Diploma Course in Wildlife Management

The XXII Post Graduate Diploma Course in Wildlife Management commenced on September 1, 2000. In all fifteen officer trainees have joined the course of which five hail from foreign countries: Sri Lanka, Nepal, Bangladesh, Vietnam and Tanzania under SAARC, Global Tiger Forum

(GTF), and ITEC sponsorships. The GTF has also sponsored three Indian candidates. In this course three veterinary doctors from M.P. have also joined. Shri S.K. Srivastava is the Course Director.

The course is being conducted in modular format with fifteen distinct modules to cater to specific requirements of the forest/wildlife departments of various States/UTs. Four modules have been opened for the 'lateral entrants'. The one-week module on 'Wetlands and Coastal Zone Management' was opened for the lateral entrants from December 11 to 16, 2000. During this module, field visits to Keoladeo National Park, Bharatpur and Bhitarkanika Wildlife Sanctuary in Orissa were organized. A week long module on 'Environmental Impact Assessment, & Social Impact Assessment' which also accepted lateral entrants, was organized from December 18 to 23, 2000. The course objectives were to provide understanding of EIA principles, to enhance skills, to acquire insight into impact identification and mitigation planning approaches and share knowledge for biodiversity



Diploma trainees visiting a mining site

Charles Masuma

conservation. A one-week module on 'Legal Issues in Wildlife Management' was conducted for the lateral entrants as well as Diploma Officers from January 8 to 12, 2001. In this module the participants were acquainted with policies and law at State, National and International levels concerning wildlife/biodiversity conservation. They were also equipped to take up legal protection measures effectively. A one-month module on 'Ecodevelopment for Biodiversity Conservation'



was conducted from January 8 to February 7, 2001. In this, apart from fifteen diploma trainee officers, five lateral entrants (four from Uttar Pradesh and one from Kerala) also participated. In this module, a field visit to Kalakad Mundanthurai Tiger Reserve, Tirunelveli (Tamil Nadu) was organized from January 30 to February 7, 2001, for the lateral entrants.

As a part of the course, an Orientation Tour was conducted in Kolhuchaur, Chauhamb and Sonanadi Wildlife Sanctuary from October 14 to 20, 2000. A full day field trip to Rajaji National Park- Dholkhand, Beribada, Ranipur and Chilla on November 11, 2000 was arranged for trekking, orientation and study of animal behaviour. Techniques Tour to Rajaji National Park- Beribada/ Dholkhand was organized from November 28 to December 9, 2000. Management Tours were conducted in several protected areas, viz., Rajiv Gandhi National Park, Nagarhole, Mudumalai Wildlife Sanctuary, Bandipur Tiger Reserve, Mukurty National Park, Indira Gandhi Wildlife Sanctuary (Anamalai), Parambikulam Wildlife Sanctuary, Eravikulam National Park, Periyar Tiger Reserve, Gulf of Mannar Biosphere Reserve, Guindy National Park, Kanha National Park, Keoladeo-Ghana National Park, captive facilities like Chennai Snake park, Arignar Anna Zoological Park, Vandalur and Madras Crocodile Bank from January 30 to February 28, 2001. A two-day field tour was taken in Corbett National Park to understand various aspects of ecotourism development and planning, from December 29 to 31, 2000. The Management Term Paper Exercise was conducted in Tadoba-Andhari Tiger Reserve from March 16 to 29, 2001. The course is scheduled to conclude on May 31, 2001.

XVI Certificate Course in Wildlife Management

The XVI Certificate Course began on November 1, 2000 and ended on January 31, 2001. There were eight trainee officers in this course, four from India and one each from Bangladesh, Cambodia, Nepal and Vietnam. The Global Tiger Forum sponsored all four foreign candidates for this course.

The orientation-cum-technique tour was conducted in Rajaji National Park. For the management tour the batch visited Dudhwa NP, Kanha NP, Keoladeo NP and Sariska TR with visit to National Zoological Park (Delhi), National Museum of Natural History and WWF-India, New Delhi.

Shri Rupak Dey, IFS, Field Director Dudhwa Tiger Reserve was the external examiner for the *viva-voce*. Shri A.S. Negi, IFS, Chief Wildlife Warden of Uttaranchal was the Chief Guest for valedictory function held on January 31, 2001. All the trainees successfully completed the course. Shri Vijay Kumar Patel (Dadra, Nagar and Haveli) was awarded the Wildlife Conservation Gold Medal for Top Trainee and the Institute's prize for Best All Round Wildlifer. Shri Gulvir Singh (U.P.) was awarded Institute's Prize for Wildlife Management and Mr. An Dara (Cambodia) was awarded the Institute's prize for Best Foreign Trainee. Shri S.B. Banubakode was the Course Director.

SHORT COURSES

Training course on Immobilization and Restraint of Wildlife, April 17-21, 2000. This training course was organized for PA Managers of U.P. Forest Department under the Human Resource Development Programme of the World Bank Forestry Project. Twelve officers of the DCF/ACF rank attended the course. The curriculum included the following topics: (a) Introduction to physiology of capture and stress, (b) Remote injection equipment and darts assembly and disassembly of darts, (c) Pharmacology of immobilization drugs, (d) Demonstration of immobilization on a chital deer and monitoring of



Demonstration of tranquilizing gun and other equipments

Vinod Verma

the animal under anaesthesia including post capture monitoring of the animal, (e) Human safety and medical emergencies, and (f) Discussion and case studies on the immobilization of wild carnivores, elephants and rhinos. Several case studies of rehabilitation of sick and injured animals were also discussed. Dr. P.K. Malik was the Course Director.

NISSAT-WII Training Course on WINISIS, April 24-28, 2000. The training course on WINISIS, a window version of CDS/ISIS was organized at the Wildlife Institute of India, Dehradun in collaboration with the National Information System for Science & Technology (NISSAT), Ministry of Science & Technology, New Delhi. The objective of the course was to develop skills in the use of advanced Micro ISIS and WINISIS in the field of Library and Information services. There were twenty-one participants from sixteen different libraries of schools, colleges, Government institutions and NGOs.

This five-day training course was designed to cover theoretical aspects of the CDS/ISIS software and other related computer software and hardware. Each lecture was followed by hands-on practice, where the participants had an opportunity to understand the commands used in various steps in database designing, searching, sorting, displaying, printing and export/import facility in CDS/ISIS and WINISIS. Shri M.S. Rana was the Course Director.

Training Workshop for Biosphere Reserve Managers, April 24-May 1, 2000. The WII organised a Training Workshop for Biosphere Reserve Managers of the North-Western and North-Eastern Zones of India, sponsored by the MoEF. The objectives of the workshop were to strengthen the field conservation capabilities of the Biosphere Reserve Managers and to enable them to fulfil their mandate of long-term conservation and management. The workshop aimed to train the Biosphere Reserve Managers in the aspects of biological inventory, scientific research, documentation, monitoring, management and sustainable utilization of resources in the Biosphere

Reserves. Eight Biosphere Reserve Managers from the north-western and north-eastern zones of India, two representatives from the MoEF, one scientist from the IIRS, Dehradun, and ten wildlife staff of Nanda Devi Biosphere Reserve participated in this workshop. The Biosphere Reserves represented were: Nanda Devi, Manas, Dibru Saikhowa, and the newly declared Khangchendzonga. The workshop was inaugurated by Prof. K.C. Malhotra and the opening session was followed by two panel discussions and a popular talk. The first panel discussion was on 'Biosphere Reserve - Concept, Practice and Management Challenges' for which the panellists were Dr. K.K. Reddy, Dr. P.K. Hajra and Shri S.K. Mukherjee. The second panel discussion was on 'Community Participation in Biosphere Reserve Management: Issues and Experiences' for which panellists were Prof. P.S. Ramakrishnan, Prof. K.C. Malhotra, Shri N.D. Jayal and Dr. Anil Joshi. The popular talk in the evening was on the 'Application of Remote Sensing and GIS in Biodiversity Characterisation in the Himalayan Landscape' by Dr. P.S. Roy. The rest of the workshop sessions were conducted at Auli near the Nanda Devi Biosphere Reserve. These included formal and informal sessions on various aspects of biodiversity assessment, conservation biology concepts, people's dependency, anthropogenic pressure profiles, management options and the presentation of case studies by participants. Resource persons from the G.B. Pant Institute of Himalayan Environment & Development, IGNFA and Appropriate Technology - India provided inputs and interacted with the participants. A one-day field visit to select areas in the buffer zones of the Nanda Devi



Saussurea obvallata (Bramhakamal): State flower of Uttarakhand in Nanda Devi Biosphere Reserve

Biosphere Reserve was conducted, led by the Director, NDBR. This included visiting nurseries, plantations, reviewing management activities and meeting some villagers of NDBR. The workshop participants felt that this workshop provided much needed training for Biosphere Reserve Managers and helped them in enhancing their knowledge and skills. Dr. S. Sathyakumar was the Course Director.

Specialization Module on Biodiversity Conservation and Wildlife Management, May 5-23, 2000. A three-week specialization module on Biodiversity Conservation and Wildlife Management was organized by the WII for the IFS Probationers (1997-2000 batch) undergoing training at the Indira Gandhi National Forest Academy, Dehradun. Fifteen IFS Probationers who opted for this specialization module 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, Human Dimensions in PA Management, Habitat Management in Tropical Ecosystems, Grassland Management, Primate/Lion/Crocodile/ Elephant/Snow Leopard/Sea Turtle Conservation, Wildlife Health, *Ex-situ* Conservation, GIS Applications, Wildlife Legislation, Management Planning, Wildlife Interpretation and Human-Wildlife Conflict Mitigation were included. A guest lecture on 'Handling Stray and Rogue animals' was delivered by Shri S.Pal Chowdhury. A field visit to Corbett Tiger Reserve was also organized. Shri Anil Bhardwaj was the Course Director.

One-week Capsule Course in Wildlife Management for IFS officers, September 4-8, 2000. A one-week capsule course in wildlife management for IFS officers was organised as a part of their compulsory training programme. This course was sponsored by the MoEF, Government of India and was attended by eighteen officers from six states. The main objective of the course was to acquaint forest managers with the broad principles of wildlife management and their relevance to mainstream forestry. Many practicing foresters and wildlife managers were invited as resource persons. The main emphasis was on involving the participants in several interactive and guided discussion sessions. Special sessions on maintaining a

professional cutting edge in response to challenges, wildlife forensic and wildlife health care, were conducted during this course besides covering the general issues in wildlife management. Dr. B.K. Mishra was the Course Director.

Training Programme for Implementing Officers of Shiwalik Watershed Project of Punjab Forest Department, Dehradun, October 9-13, 2000. One special training programme was conducted in Participatory Biodiversity Conservation in Watershed Areas for the implementing officers of the Shiwalik Watershed Project of Punjab Forest Department. This programme was an addition to the previous training activities of the department. The participants in this training programme were not only from the forest department, but other development agencies too. Moreover, the programme discussed issues of Biodiversity Conservation outside the Protected Areas. Shri Anil Bhardwaj co-ordinated the programme.

Training Programme for Wildlife Staff on Musk Deer Density Estimation, Kedarnath Wildlife Division, Chamoli, November 5-7, 2000. Based on the request from the U.P Forest Department, a training programme on Musk Deer Density Estimation was organised for the wildlife staff of the Kedarnath Wildlife Division, Chamoli District, Uttar Pradesh at Shokharakh in the Kedarnath Wildlife Sanctuary. Twenty wildlife staff comprising Deputy rangers, wildlife guards and watchers were trained by Dr. S.Sathyakumar and Dr. B.S.Adhikari in Silent Drive Count Method - a technique used for estimating the Musk Deer density and population of a given area. Reading material in Hindi was provided to the participants.

Orientation Course on Remote Sensing and GIS Applications in Forest and Wildlife Conservation, January 22 - February 9, 2001. This Orientation Course was jointly organized by the WII and the Indian Institute of Remote Sensing, Dehradun, for the officers of the Uttar Pradesh Forest Department under the Uttar Pradesh Forestry Project. Seven officers attended the course in which the following six components were covered: (i) Principles of Remote Sensing, (ii) Visual Interpretation of Remote Sensing Imageries, (iii) Introduction to GIS and Spatial Analysis, (iv)

Introduction to ARC/INFO, (v) Digital Interpretation for Vegetation Mapping, and (vi) GIS Applications in Wildlife Conservation and Management. Visits were also organized to the Forest Survey of India, the Survey of India and the Rolta-India office in Dehradun for a demonstration of GIS and Image Processing Software. Dr. V.B. Mathur and Dr. Sarnam Singh co-ordinated the course from WII and IIRS, respectively.

Two-week Capsule Course in Wildlife Management, February 5-16, 2001. This course for IFS officers, sponsored by the Ministry of Environment and Forests, Government of India was conducted at the Institute. There were twelve participants from Tamil Nadu, Karnataka, Maharashtra, Himachal Pradesh and the Andaman and Nicobar Islands. The group was taken to the Corbett Tiger Reserve to discuss and demonstrate various management issues. Shri Rajiv Bhartari was the Course Director.

Eleventh Endangered Species and Zoo Management Course, Visakhapatnam, February 7-16, 2001. This course, the eleventh in the series, was conducted by the WII in its efforts to train zoo professionals in modern techniques and concepts on the *ex-situ* management of animals, especially endangered species. The special theme for this course was "Collection Policy and Co-ordinated Breeding". It was attended by ten trainees from eight State Forest Departments, representing ten institutions. The course consisted of lectures and discussions with several faculty members including Shri Pushp Kumar, former PCCF, A.P., Shri P.R. Sinha, Member Secretary, CZA, Shri S.K. Patnaik, Chief Conservator of Forests (Wildlife), Orissa, Dr. Goutam Narayan of the Pygmy Hog Captive Breeding Project, Ms. Sally Walker, Secretary, Zoo Outreach Organisation, Coimbatore, Shri S.K. Niraj, Regional Deputy Director (Wildlife Preservation), Mumbai, Dr. Adit Pal, National School of Architecture, New Delhi, Veterinary Officers from Hyderabad and Mysore zoos, and three faculty members of the WII. During the course, field visits were



Participants learning to use puppet as a medium of non-formal education

made to the Nehru Zoological Park and the Chilkur Deer Park, Hyderabad. During field visits, the participants interacted with Shri A.V. Joseph, Director, Nehru Zoological Park, and Shri S. Balakrishna, Conservator of Forests, A.P.

On the special theme "Collection Policy and Co-ordinated Breeding", Dr. Ravi Chellam and Shri B.C. Choudhury of the WII, Shri S.K. Patnaik, and Shri P.R. Sinha discussed the principles and concepts related to the inventory of animals, formation of regional groups, management of surplus and excess animals. A lecture based on experiences in compiling studbooks was delivered when the need for accurate record keeping was emphasized.

Some of the participants gave presentations which were related to their experiences and also the organisations they worked for. Dr. Ravi Chellam was the Course Director.

Interpretation and Conservation Education Course, February 19-28, 2001. This course was organised at the WII. The objectives of the course were to: (i) teach the participants to appreciate the need for environmental awareness and education, (ii) understand the value of basic interpretive principles in disseminating conservation awareness, (iii) use interpretation as a management tool, (iv) show them a range of communication techniques, to enhance awareness and understanding of environmental issues, and (v) enable them to pass on their acquired skills and knowledge to others. In all, eight participants (one each from the West Bengal Forest Department, HNB Garhwal

University, WWF-Mumbai, four from NGOs based in Dehradun, and Vishakhapatnam, and one from the WII) participated.

The course began with the participants defining Interpretation and Conservation Education, and the scope for incorporating it within the parameters defined by their job description. Strong emphasis was given to practical training so that participants could learn and practice a number of approaches used to present ideas and information, enabling them to acquire skill and confidence in effective communication.

The participants were exposed to a wide range of interpretive techniques, such as the use of a puppet as a medium of non-formal education, awareness raising, designing and layout of exhibits, publication designing, nature trail layouts, organisation of nature camps, the handling of media, outreach activities, waste recycling, and the production of handmade paper.

The faunal diversity of India, conservation initiatives and crises and a case study on conservation education in Periyar Tiger Reserve gave the participants the opportunity to appreciate the importance of Interpretation and Conservation Education in a wider perspective.

Besides theory sessions, the participants were taken for a field trip to Rajaji National Park and Malsi Deer Park, where they were exposed to the geological features, the Shiwalik ecosystem, tracks and signs, evidences of human impact, vegetation and management problems. Smt. Bitapi C. Sinha was the Course Director.

Special Course for Indian Customs and Excise Service Probationers in "Wildlife Protection, Law and Forensic Science", Dehradun, March 5-16, 2001. This fourth special two-week course for Probationers of Indian Customs and Central Excise Service, Group A (52nd Batch) was organized at the WII and attended by twenty-one probationers. The main aim of the course was to acquaint enforcement personnel with the policies and laws at State, National and International levels concerning wildlife/biodiversity conservation, and to equip them with enough knowledge of Forensic Science to take up legal protection measures in a

proper and effective manner. This course also offered an insight into the various Acts relevant to wildlife protection, and equipped the enforcement personnel for effective prosecution of different cases. Selected references and some key books were provided for the participants as resource material. The officers were taken on a tour of the Dudhwa Tiger Reserve. They also learnt the various aspects of control of Wildlife Trade and Legislation through classroom lectures and panel discussions by WII faculty members and invited experts. Dr. A.K. Gupta was the Course Director.

ACADEMIC PROGRAMMES

VII M.Sc. (Wildlife Science)

The VII M.Sc. (Wildlife Science) course began on July 19, 1999. Semester I (July-December, 1999) was successfully completed by all twelve students. Semester II started on January 10, 2000. During Semester II, different course units were covered for theory papers. Laboratory and field practicals were also carried out. Select guest professors were also invited to teach. The students underwent field tours to Keoladeo Ghana National Park and the National Chambal Sanctuary for wetland techniques, Van Vihar National Park for chemical immobilization techniques, Madhav National Park, Karera, Bustard Sanctuary, and the Ghatigaon Sanctuary for conservation practices. After their Semester II examination in June, they undertook the High Altitude Ecology Tour to Kedarnath Wildlife Sanctuary followed by a vacation.

During the Semester II vacation, all the students planned their field dissertation (to be carried out in Semester IV) and visited their respective potential study areas.



Radio-collaring a jackal in Velavadar National Park



During Semester III, the students went on a field tour to North East India to learn about shifting cultivation practices in Meghalaya, wildlife management practices in Kaziranga National Park, and captive management in the Guwahati Zoo and Pygmy Hog Breeding Centre. The Semester III examinations were conducted in October and November 2000. The students made presentations on the Elective Topics during the Semester III examination.

During the reporting period, the students finalized their M.Sc. dissertation topics, submitted their proposals and made presentations on their proposed studies. They began their field studies in

November, expecting to continue until May 2001. The list of M.Sc. Dissertation topics is given in Table 1.

Wildlife Preservation Trust International Award: Gitanjali Banerjee, M.Sc. student, was awarded a fellowship under the Wildlife Preservation Trust International Award for her proposed study on the Great Indian Rhinoceros in India by the Wildlife Preservation Trust International, New York. She was invited to attend the Species Survival Fund Leader Fellows Meeting in Guatemala and an educational training programme in the U.S.A from November 5 to 23, 2000.

Table 1 : List of M.Sc. (Wildlife Science) Dissertation Topics

Student's Name	Dissertation Topic	Supervisor(s)
Ambika, A.	Home range, ranging patterns and abundance estimation of golden jackal in the Bhal region, Gujarat	Dr. Y.V. Jhala
Anoop, K.R.	Factors affecting, habitat selection and feeding habits of smooth coated otter (<i>Lutra perspicillata</i>) in Periyar Tiger Reserve, Kerala.	Dr. S.A. Hussain
Devcharan, J.	Density, biomass and habitat occupancy of ungulates in Bhadra Tiger Reserve, Karnataka.	Dr. A.J.T. Johnsingh
Gitanjali, B.	Habitat use by great one-horned rhinoceros (<i>Rhinoceros unicornis</i> L.) and other sympatric species in Kaziranga National Park, Assam.	Sh. B.C. Choudhury Dr. G.S. Rawat
Padmawathe, R.	Patterns of species composition and distribution among vascular epiphytes in low-lying semi-evergreen forests of Arunachal Pradesh.	Dr. G.S. Rawat Sh. Qamar Qureshi
Roopali, R.	Social behaviour and communication among wild lion-tailed macaques (<i>Macaca silenus</i>) in the Indira Gandhi Wildlife Sanctuary, Tamil Nadu.	Dr. A.K. Gupta
Sandeep, S.	Evaluation of pugmark census techniques.	Sh. V.B. Sawarkar Dr. Y.V. Jhala
Smitha, B.	The impact of land use change on litter beetle and ant communities in a coffee-dominated landscape in Chickmagalur District, Karnataka.	Dr. Jagdish Krishnaswamy
Soumya, P.	Fruit removal, seed dispersal and demography of <i>Emblia officinalis</i> at Rajaji National Park, Uttaranchal.	Dr. Ravi Chellam Dr. Jagdish Krishnaswamy
Sumanta, B.	Resource selection and resource partitioning among wild ungulates in the tropical semi-arid forest of Ranthambhore National Park, Rajasthan.	Dr. S.P. Goyal Dr. K. Sankar
Dhanushki, S.	Ranging, activity pattern and habitat use by blackbuck and nilgai in Velavadar NP, Gujarat.	Dr. V.B. Mathur Sh. Qamar, Qureshi Dr. Y.V. Jhala
Latt, T.N.	Seasonal change in social structure, behaviour and habitat use by sarus crane in the semi-arid region of North-Western India.	Sh. B.C. Choudhury Dr. S.A. Hussain



Ph.D. Programme

During the year under report three Ph.D. degrees have been awarded, four doctoral theses have been submitted and five researchers have registered for a Ph.D. programme in various universities. The details are given in Table 2.

Table 2 : Status of Doctoral Research in the WII (2000-2001)

No.	Thesis Title	Name & University	Supervisor *Co-Supervisor
Degree Awarded			
1.	Livestock grazing and conservation of biodiversity in the high altitude ecosystem - An integrated landscape management approach.	Dr. Badrish S. Mehra Saurashtra University	Dr. P.K. Mathur
2.	Habitat characterisation in Great Himalayan National Park (GHNP) using Remote Sensing and Geographical Information System technologies with special emphasis on geobotanical aspects.	Dr. Suneet Naithani HNB Garhwal University	Dr. V.B. Mathur
3.	A study on the Himalayan Bio-geography for conservation planning.	Dr. J.S. Kathayat Kumaon University	Prof. Y.P.S. Pangtey *Dr. G.S. Rawat
Thesis Submitted, Award Awaited			
1.	Amphibian species assemblages of the wet evergreen forests of southern Western Ghats of India and the effect of forest fragmentation on their diversity.	Shri Karthikeyan Vasudevan Utkal University	Dr. S.K. Dutta
2.	Conservation and management of Olive Ridley sea turtle (<i>Lepidochelys olivacea</i>) population along the Orissa coast.	Shri Bivash K. Pandav Utkal University	Dr. S.K. Dutta
3.	Reptilian species distribution in response to habitat fragmentation and microhabitats in the rainforests of southern Western Ghats, India.	Shri N.M. Ishwar F.R.I. Deemed University	Dr. Ravi Chellam
4.	A study on the breeding biology of the Nicobar Megapode <i>Megapodius nicobariensis</i> .	Shri K. Sivakumar *Work done in SACON and thesis submitted from WIL. Bharathiar University	Dr. Ravi Sankaran
Registered			
1.	Interactions between forage, recruitment and activity patterns of blackbuck (<i>Antelope cervicapra</i>)	Ms. K.V.R. Priyadarshini Saurashtra University	Dr. Y.V. Jhala
2.	The feeding ecology of the dhole or Asiatic wild dog (<i>Cuon alpinus</i>) in Kanha Tiger Reserve, Madhya Pradesh.	Shri Bhaskar Acharya Saurashtra University	Dr. A.J.T. Johnsingh
3.	Status and ecology of leopard (<i>Panthera pardus</i>) in relation to prey abundance, land use patterns and conflict with human in Garhwal Himalaya.	Shri Devendra Chauhan F.R.I. Deemed University	Dr. S.P. Goyal
4.	Characterization of bone, ivory, rhino horn and antler to deal wildlife offence cases.	Ms. Rina Rani Singh F.R.I. Deemed University	Dr. S.P. Goyal
5.	Assessment of tree diversity, successional changes in <i>jhum</i> influenced forest ecosystem of South Garo Hills, Meghalaya in north-east India.	Shri Ashish Kumar F.R.I. Deemed University	Sh. V.B. Sawarkar * Dr. P.S. Roy * Sh. Ajai Saxena

WORKSHOPS, SEMINARS, CONFERENCES AND MEETINGS

Ecotourism Workshops

In recent years the major increase in tourism to natural areas and associated environmental and socio-cultural impacts has brought out the need for effective visitor management. The involvement of the private sector and the local communities in regional tourism planning and development has grown. The Institute initiated a series of training workshops for stakeholders in conservation and ecotourism in order to create greater awareness, and to galvanize debate regarding issues connected with tourism in natural areas. Three Training Workshops on Ecotourism Planning and Management were organized by the WII in collaboration with other agencies actively involved in this field (Table 3). The workshops received a favourable response and attracted 82 participants from various sectors - protected areas, forest department, forest corporations, tourism development corporations, ecotourism ventures, tour operators, resort owners, nature guides, NGOs, community representatives and scientific institutions. The first workshop in the series was held from May 24 to 30, 2000, in collaboration with the Australian Conservation and Training Institute (ACTI), at Dehradun. The Australia-India Council provided financial support to ACTI for the workshop. It was conducted by Dr. Rik Thwaites, Lecturer (Ecotourism), Charles Sturt University, Ms. Carole Chisholm Shaw, Executive Officer ACTI, and Ms. Kate MacMaster, Programme Officer ACTI. Dr. Sejal Worah from WWF-International, Dr. Nandita Jain from Mountain Institute, and Shri Sandeep Sengupta from Jungle Lodges and Resorts Ltd. provided additional resource inputs.

The workshop represents a new initiative by the WII towards capacity building in the field of ecotourism among various stakeholders. There were forty-two participants from fourteen States including the Chief Wildlife Wardens of UP and the Andaman and Nicobar Islands. The participants represented an equally balanced distribution of forest officials, PA managers, NGOs and tourism officials. Ms. Julie Ann Guivarra, the Second Secretary Australian High Commission, New Delhi presented the certificates to the participants. The workshop was followed by a two-day field visit to the Corbett Tiger Reserve where the participants had discussions with Shri Mohammad Ahsan, Field Director Corbett Tiger Reserve, and Shri K. Thomas, DFO Ramnagar.

The orientation workshop provided an opportunity for the participants to learn about the concepts of ecotourism, and become familiar with tools for planning and management through several case studies from India and abroad, film and slide shows, participatory exercises and discussions. It also provided a valuable opportunity to network with other professionals in the field. These workshops were co-ordinated by Shri Rajiv Bharti.

Table 3 : Training Workshops on Ecotourism Planning and Management

I	May 24-30, 2000, Wildlife Institute of India, Dehradun	Australian Conservation & Training Institute, Australia	Mountain Areas - States in the Himalayas and with hilly regions	42
II	October 16-20, 2000 Kabini River Lodge, Karapur, Karnataka	Jungle Lodges & Resorts Ltd., Karnataka	Southern States of Kerala, Karnataka, AP and Tamil Nadu and other States	17
III	January 17-21, 2001 Claidges Corbett Hideaway, Garjia, Corbett National Park	The Mountain Institute - Asia Region Programme	Stakeholders in the Corbett-Binsar-Nainital region Bilingual with inputs both in Hindi and English	23

Training Workshop for the Spearhead Team of the Jaldapara Wildlife Sanctuary, West Bengal, June 30-July 4, 2000. Under the current GOI-UNDP project "Sub-programme for Protected Area Management at Jaldapara" this training workshop on "Ecodevelopment for Biodiversity Conservation" was conducted. A spearhead team consisting of frontline staff from



Planning of an ecotourism programme

different levels starting from Van Shramik to Assistant Conservator of Forests, has been constituted in the PA to carry out planning and implementation of an ecotourism programme. The purpose of this training was to provide necessary skills and attitudes to this spearhead team. Staff of adjoining PAs: Gorumara NP, Mahananda WLS, and Neora Valley NP also attended the training. The skills and information provided through this training were further strengthened through a field visit of the spearhead team to Kalakad-Mundanthurai Tiger Reserve and Periyar Tiger Reserve where they were able to see how the concepts of ecotourism were being implemented in the field.

Training Workshop for the Community Representatives and NGOs at Jaldapara Wildlife Sanctuary, West Bengal, July 5-6, 2000. This training programme was conducted under the GOI-UNDP project "Sub-programme for Protected Area Management at Jaldapara." The objective of this training was to make the representatives of local Ecodevelopment Committees and select NGOs aware of the concepts of ecotourism. This two-day training also had representatives of two local NGOs: Nanda Devi Foundation and Green Brigade, in addition to representatives of local communities. The training programme was conducted in a participatory mode.

Training workshop on GIS and Remote Sensing for Management Planning Officers (MPOs) and forest officers of the seven GEF-India Ecodevelopment Project sites, Dehradun, July 10 - 21, 2000. This training programme was organized at the WII. In it Management Planning, Ecodevelopment Planning

and Regional Planning issues and processes were discussed, and a broad planning framework was evolved. The first thematic workshop on "Remote Sensing and GIS Applications" was organized by the WII from July 17 to 21, 2000. An overview of the Remote Sensing, GIS, GPS, Database Design techniques was given to the participants from the India Ecodevelopment Project Sites. Dr. V.B. Mathur co-ordinated this training programme.

Workshop on "Problems and Methods in Mapping Land-cover/Land-use in Mountainous Terrain", Dehradun, August 7-10, 2000. This workshop was conducted in the WII campus. It was a joint initiative of WII, ATREE (Ashoka Trust for Research in Ecology and the Environment, Bangalore), and the GIS cell of the Ecological Economics Unit of ISEC (Institute of Social and Economic Change, Bangalore). Other participants were from IRMA and NTGCF, Anand, Gujarat and RRSSC and IIRS, Dehradun. Dr. Manoj Arora of Roorkee University delivered a special lecture on fuzzy logic and neural networks in vegetation classification. This workshop brought together a group of specialists and users using RS-based mapping and other spatial analysis techniques to map land-use/land-cover in some of the forested and ecologically sensitive areas in the uplands of India, specially the Himalayas and the Western Ghats. The objective of the workshop was to provide a forum for the users to discuss conceptual issues and method constraints that they have encountered in their respective projects and find workable strategies / solutions to improve the quality of work. The topics covered were diverse and ranged from traditional techniques, rule-based classification in mountainous terrain, neural networks and fuzzy logic in land-use/land-cover classification to social and economic drivers of land-use change. Dr. J. Krishnaswamy co-ordinated this workshop.

Management Planning Workshop, Leh, August 25-29, 2000. The Institute organized a Management Planning Workshop under the Collaborative Ladakh Field Research Project - a collaboration between the International Snow Leopard Trust (ISLT), US Fish and Wildlife Service (USFWS), and the WII. The workshop was attended by a representative of the Chief Wildlife Warden, Jammu & Kashmir, Wildlife



Warden, Leh and two Range Officers of the J&K Wildlife Department, Director WII, four faculty members from WII - Shri V.B. Sawarkar and Drs. V.B. Mathur, Yash Veer Bhatnagar, B.S. Adhikari, representative from the Ladakh Autonomous Hill Development Council, Forest Department, Leh, ISLT, Snow Leopard Stewardship Programme, USFWS, Employment Directorate, Leh, DC Office, Animal Husbandry, Tourism Department, and two prominent local NGOs.

The workshop participants deliberated on the conservation values of the Ladakh region, discussed the management planning process, and made presentations on research and conservation initiatives on such crucial issues as people wildlife conflicts and the impact of grazing as assessed from scientific studies. A framework of the management plan for the Hemis National Park, which outlines its primary conservation values, objectives and issues that need to be tackled in a management plan for the area was also developed. The workshop participants strongly felt that the snow leopard is a flagship species of the fragile Trans-Himalayan ecosystem, so every effort must be made to revive the Snow Leopard Scheme of the Government of India. Initiatives backed up with resources must be implemented for conservation of the snow leopard and its associated prey species. Dr. V.B. Mathur and Dr. Yash Veer Bhatnagar co-ordinated this workshop.

The XIV Annual Research Seminar, September 27-29, 2000. Shri J.C. Daniel, Chairman TRAC, chaired the XIV Annual Research Seminar (ARS). The faculty and researchers of the Institute presented a total of 34 papers. More than 200 delegates from all over the country and few delegates from foreign countries including Sri Lanka, Nepal, Tanzania, Vietnam and Bangladesh attended the ARS.

The following were adjudged the top five presentations:

Name	Topic of Presentation
K.S. Gopi Sundar	An analysis of pre-nesting diurnal activity budget of sarus crane.

Aparajita Hajra	Analysis of vegetation and terrain characteristics in Rajaji-Corbett National Parks.
N.M. Ishwar	Habitat associations of the rainforest reptiles of the Western Ghats.
M.K.S. Pasha	Status, distribution and conservation of the gaur (<i>Bos gaurus</i>) in India.
Aparajita Datta	Seed dispersal by hornbills in a tropical forest in Arunachal Pradesh.

All five researchers were given book awards worth Rs. 750/- each. Dr. Ravi Chellam, the Research Co-ordinator organized and co-ordinated the ARS.

Workshop on Advanced Statistical Methods, October 2-7, 2000. A workshop was conducted on advanced statistical methods for M.Sc. students, researchers and faculty members of the WII. Dr. Y. V. Jhala co-ordinated the workshop and the resource persons were Dr. S.A. Paranjape, and Dr. S. Purohit from the Department of Statistics, Pune University. Topics covered included Matrix Algebra, Principal Component Analysis, Factor Analysis, Cluster Analysis, Survival Analysis, Discriminant Analysis, Canonical Correlation, and Time Series Analysis. Individual consultation for M.Sc. and other research projects regarding experimental design and analysis was also given. Over thirty participants attended the workshop.

Regional Planning for Conservation and Development in the context of Gir Conservation Area, IIM, Ahmedabad, November 7-9, 2000. The Institute organized this three-day workshop in collaboration with the Gujarat Forest Department as part of the assignment under the current GEF-India Ecodevelopment Project. It was well attended with representation from senior planners, administrators, decision makers, entrepreneurs, scientists, managers, NGOs and elected representatives of people. Shri Suryakant Acharya, Hon. Vice-Chairman, State Planning Commission, Gujarat State, chaired the workshop. Shri Kanjibhai Patel, Hon. Forest Minister, Gujarat, was the Chief Guest on this occasion, while Shri Dileep Sanghani, Hon. MP (Lok Sabha) was the Guest of Honour.



P.K. Mathur

Hon. Forest Minister, Gujarat State and Hon. Vice Chairman, State Planning Commission, Gujarat State, at the workshop

Participants deliberated on themes of rationalization of PA boundaries and mechanisms of broadening participation, inter-agency co-operation and integrated planning. Prof. P.M. Shingi of IIM, Ahmedabad summarized the workshop proceedings in the concluding session. A larger bioregion for GCA was recommended and the urgent need to foster co-operation among various stakeholders, capacity building and a greater cooperative arrangement amongst institutions was highlighted.

A compendium, containing background information on the GCA, invited papers and published papers relevant to the workshop theme, was distributed to the participants. Dr. P.K. Mathur co-ordinated the workshop.

Training Workshop on Habitat Management in Gir NP & WLS and Velavadar NP, November 11-15, 2000. A five-day training workshop, on the specialized theme of habitat management for field practitioners representing GEF-India Ecodevelopment Project sites, was organized in Gir NP and WLS and Velavadar NP. Nine participants (ACFs and DCFs) from Buxa TR, Gir NP and WLS, Periyar TR and Palamau TR attended the workshop. Drs. P.K. Mathur, Y.V. Jhala and Ravi Chellam from the WII provided theory and field inputs. In addition to this, invited resource persons representing the GEER Foundation, Gujarat Institute of Desert Ecology and Gujarat Forest Department also gave their valuable insights. Broad issues of habitat management in different PAs were discussed with

special emphasis on the management of water, grazing, weed, fire, grasslands and wetlands. Habitat evaluation and monitoring techniques were also discussed. Requirements and management of habitat for select endangered species were especially mentioned. Participants also made site-specific presentations and thus took an excellent opportunity to interact amongst themselves and with the resource faculty. The workshop was co-ordinated by Dr. P.K. Mathur.

Workshop on Health Management of Wild Animals, November 26-December 12, 2000. One of the activities included in the proposal for Phase II of the Wildlife Health Component of the WII-FWS Collaborative project is organizing a workshop for faculty of Indian veterinary colleges, to provide support for the teaching of wildlife health, as well as services to state forest departments and protected areas managers. The original goal of establishing five regional centres organized as the Indian Wildlife Health Co-operative was reached, and this undertaking sought to increase the number of knowledgeable personnel who could collaborate within each region. This workshop was attended by 29 participants from the faculty of fifteen veterinary colleges.

The workshop was designed to give the participants a good introduction and grounding in wildlife science, including ecological principles, wildlife biology, and wildlife management techniques. A total of 33 talks were given by 22 members of the WII faculty. In the initial week of the workshop, field work, practical demonstrations, and lectures were organized.



Vinod Verma

Workshop participants in Gir National Park and Wildlife Sanctuary

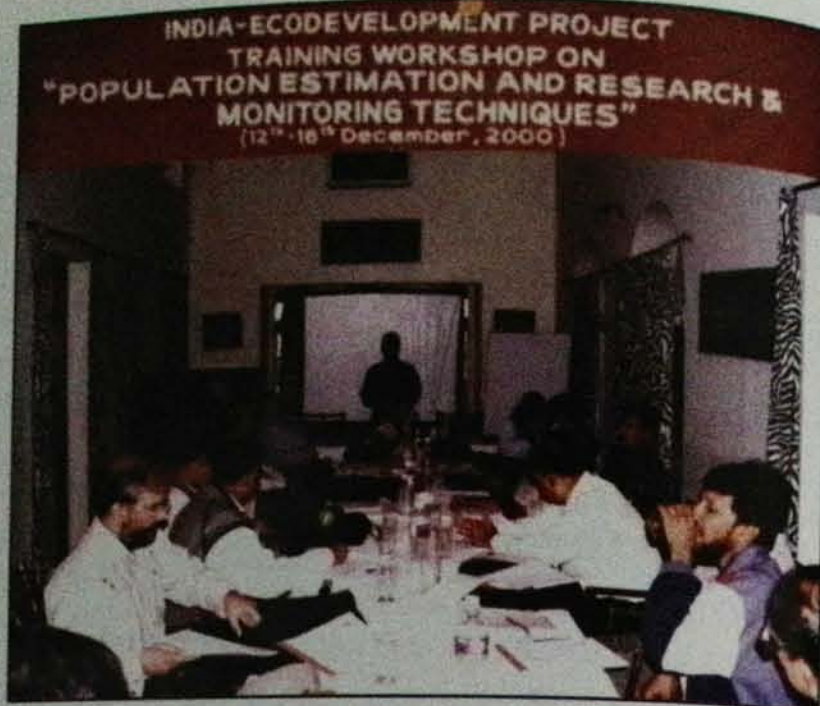


The emphasis of the second week was on integrating the material from the first week with the participant's existing broad knowledge of veterinary medicine, and its application in wildlife science. The sessions began with a presentation by the Chief Guest, Shri H.S. Panwar, on wildlife health needs. Over the next five days, lectures were presented by all members of the IWHC, three foreign scientists, with a number of other workshop participants acting as resource persons. An afternoon practical session on "Library and Internet Searching Methods" was organized.

An informal evening session was also held with the participants to solicit their ideas on the needs and potential directions to advance future wildlife health programmes in India. A valedictory ceremony was held at the end of the workshop, with certificates presented to the participants and resource materials for each college.

Although a formal workshop evaluation was not made, the participants made several observations about the workshop, specifically: (a) Good presentation of biology and management information provided by the WII faculty, (b) The integration of the veterinary information into their existing knowledge base, (c) The practical session on internet information searching, (d) The extensive resource materials provided, and (e) The opportunity to meet colleagues with similar interests from other colleges. Dr. P.K. Malik co-ordinated the workshop.

Training Workshop on Population Estimation and Research and Monitoring Techniques for MPOs and Forest officials under IEP, at Rajiv Gandhi National Park, Nagarhole, and Sri Chamarajendra Zoological Garden, Mysore, December 12-18, 2000. This thematic workshop was organized as part of the GEF-India Ecodevelopment Project by the Institute in collaboration with the Karnataka Forest Department at Rajiv Gandhi National Park, Nagarhole and Sri Chamarajendra Zoological Garden, Mysore. Senior field practitioners from



India-Ecodevelopment training workshop in progress

Karnataka and Kerala participated in the workshop. Different approaches for population estimation of wild animals plus research and monitoring protocols were discussed. Examples from the GEF sites and relevant field exercises were also carried out.

Shri V.B. Sawarkar, Shri S.K. Srivastava and Shri A.K. Bhardwaj were the main resource faculty from the WII. Invited resource persons were from the Indian Institute of Science, Bangalore; KFRI, Kerala, SACON, Coimbatore and Karnataka Forest Department, Shri S.K. Chakrabarti, PCCF, Karnataka inaugurated the workshop. Shri S.K. Srivastava and Dr. Ravi Ralph, CF (WL) Mysore co-ordinated the workshop.

Training Workshop on Biodiversity Conservation through PA Management, Jaldapara Wildlife Sanctuary, December 26-30, 2000. The above training was part of the current UNDP project in Jaldapara Wildlife Sanctuary on Integrated Wildlife Protected Area Management. The focus of the project in Jaldapara is on the processes, institution, and capacity building in implementing integrated conservation and development. WII's role has been critical here not only as the executing agency but also for capacity building. A spearhead team consisting of frontline staff and NGO representatives was constituted, and training on "Ecodevelopment for Biodiversity Conservation" was conducted in the month of June,



2000. This was followed by training of community representatives in July, 2000 in "Community Participation and Biodiversity Conservation". The present training programme at the WII was a continuation of the efforts of capacity building at Jaldapara Wildlife Sanctuary. It was attended by fourteen frontline staff and officials of the Jaldapara Wildlife Sanctuary. The programme was co-ordinated by Shri Anil Bhardwaj.

Elephant Census Training Workshop in Arunachal Pradesh, February 10-24, 2001. This training workshop was organised at three sites in Arunachal Pradesh, namely: Seijusa, Pashighat and Miao, on the invitation of Project Elephant Directorate, MoEF, GOI and the Wildlife Wing of Arunachal Pradesh Forest Department. From the Institute, Dr. Sushant Chowdhury co-ordinated this field level training programme. The two-day training workshop at the above three places was attended by more than ninety participants from forest guards to senior officers. The training workshop highlighted the basic skills for an undertaking an elephant census on a pre-designed data sheet. Identification of elephants based on morphological characteristics, and their categorization according to size classes and sex, were the salient features of the training. Emphasis was placed on the need to undertake pre-census work for an improved picture of elephant distribution during the dry season before undertaking the actual census. The actual census of elephant in the state was carried out on March 19-20, 2000, the results of which are being collated.

Workshop on Research Priorities in Tropical Rainforests in India, Coimbatore, February 27-28, 2001. This MoEF funded workshop was organized by the WII in collaboration with SACON. More than eighty participants from various institutions, organizations, NGOs and forest departments representing rainforest sites joined and deliberated. The main objective was to know the status of various research studies undertaken in rainforest sites on matters concerning fauna, identify the gaps in knowledge, prioritize the species/ taxa of immediate conservation concern, and identify appropriate institutions/ organizations for accomplishing such goals. During the two-and-a-half-day workshop forty papers, covering

practically all the taxonomic groups and sites of immediate concern, were presented. This was followed by a panel discussion to arrive at suitable recommendations. Dr. A.J.T. Johnsingh gave a presentation on "The Cats of the Western Ghats". Dr. A.K. Gupta from the WII and Dr. Ajith Kumar from SACON co-ordinated the workshop which was conducted by Dr. Ravi Chellam.

Workshop on Uttaranchal Main Jadi-Bution Ki Kheti, Dehradun, March 3-4, 2001. The Institute in collaboration with the Vaidya Chandra Prakash Cancer Research Foundation (VCPCRF) Dehradun, organized a two-day workshop on the policies related to cultivation, storage and distribution of medicinal plants in Uttaranchal. Over ninety people including policy planners, farmers, traders, botanists, and herbal doctors participated in the workshop. Financial assistance was given by VCPCRF, IDRC New Delhi and the Council for Advancement of People's Action and Rural Technology (CAPART), New Delhi. The workshop was inaugurated by the Hon. Forest Minister of Uttaranchal, Shri Matbar Singh Kandari. The deliberations of the workshop were finalized through four major working groups: (i) Policy related to registration and clearing of medicinal herbs cultivated by farmers, (ii) Production techniques of seed, storage and nursery development, (iii) Collection and storage, and (iv) Sale and establishment of co-operative society.

Workshops, Seminars, and Meetings Attended by WII personnel

First Meeting of the Indian Subcontinent Regional Orchid Specialist Group, Palode, Thiruvananthapuram, April 15-17, 2000. This meeting was held at the Tropical Botanic Gardens and Research Institute, Palode, Thiruvananthapuram, coinciding with a grand orchid and bamboo festival. Over fifty participants and orchid lovers attended the meeting, and several of them presented status report on the orchids of their respective region. Dr. G.S. Rawat, (Member, IUCN/SSC Orchid Specialist Group) made a presentation on the 'Current status of Orchids in the North-West Himalaya' and highlighted the gaps in the information and conservation efforts for orchids in this region.



Workshop on the Role of Science and Technology in the Development of Uttarakhand, Almora, April 21-22, 2000. This workshop was organized by the G.B. Pant Institute of Himalayan Environment and Development, in collaboration with the Department of Science and Technology, for the scientists and policy planners working in the Himalayan region. Shri S.K. Mukherjee and Dr. G.S. Rawat attended this workshop and discussed the role of the WII in human resource development in the field of Natural Resource Management in this region.

National Workshop on Forestry Planning through GIS, Calcutta, April 27, 2000. The West Bengal Forest Directorate invited Dr. V.B. Mathur and Shri S.K. Mukherjee to participate in the National Workshop on Forestry Planning through GIS at Calcutta on April 27, 2000. Dr. Mathur made a presentation on 'Information Technology Applications in Spatial Database Development in the Forestry Sector'.

Workshop on Management of Environmental Impacts in Hydropower and River Valley Projects, New Delhi, May 9-12, 2000. The Institution of Engineers (India) and the Water and Power Consultancy Services (WAPCOS) organized this workshop, whose objective was to discuss the complexities of issues related to assessment and management of environmental impacts of hydropower projects. The workshop provided a forum for critical review of the current trends and practices in EIA and the implementation of environmental safeguards in order to maximize the efficacy of environmental planning for economic benefits without jeopardizing the ecological assets of the project environment. Dr. Asha Rajvanshi was invited to participate in the National Workshop as one of key speakers in the technical session on 'Biodiversity Issues in Hydropower Projects'. She presented a paper "Hydropower Projects and Challenges to Wildlife Conservation in India: An Overview". She was also invited to serve as a panellist in a discussion on 'Effective Environmental Management'.

Meeting of the Standing Committee of Experts in Biological Sciences, Lucknow, May 10, 2001. The National Centre for Antarctic and Ocean Research (NCAOR), the Department of

Ocean Development (DOD), Government of India, organised a meeting of the Standing Committee of Experts in Biological Sciences under the Chairmanship of Dr. S. Sivaji, CCMB, Hyderabad, at the National Botanical Research Institute, Lucknow. This meeting was held to review the scientific programmes in biological and environmental sciences and to evolve the future scientific programmes in these areas. Dr. S. Sathyakumar, Principal Investigator of WII's work in Antarctica, participated in this meeting and gave a presentation of the research work carried out by the WII in Antarctica during 1994-1997 and also presented the research plan for future work. It has been decided that the WII will participate for three consecutive years after a gap of five to six years to carry out its project: "Long-term monitoring programme for birds and mammals of the Indian Ocean and Antarctica".

National Panel on Wildlife and Forests, Bangalore, May 31-June 2, 2000. Drs. J. Krishnaswamy, Y.V. Jhala and Ravi Chellam participated in this brainstorming meeting sponsored by the British government and convened by the Ranthambhore Foundation. They especially contributed to sessions on monitoring and research.

Workshop on Foresters Outside Forests, Dehradun, May 1, 2000. Dr. A. K. Gupta, Dr. V.B. Mathur and Shri S.K. Mukherjee attended the one-day workshop on "Foresters Outside Forests" organised by the Indira Gandhi National Forest Academy, Dehradun. Dr. Gupta also chaired one of the workshop sessions.

All India Seminar on Environmental and Social Issues in Water Resource Development, Lucknow, June 5-6 2000. This seminar was jointly organized by the Institution of Engineers (India). The objective was to bring together practicing engineers, planners, environmental consultants, researchers, and NGOs to identify the challenges in the development of water resource projects, and also the implementation of concrete remedial measures for environmental and social impacts. Dr. Asha Rajvanshi and Dr. Yogesh Dubey from the WII attended the conference. During the seminar, they presented a paper: 'Environmental Impact Assessment of Teesta Hydropower Project, Sikkim with Special Reference to Butterfly Conservation'.



Workshop on a Decade of JFM-Retrospection and Introspection, New Delhi, June 19-20, 2000. This international workshop was organized by the MoEF at Vigyan Bhawan, New Delhi, India. Dr. A. K. Gupta presented a paper, and also worked as a facilitator for the session on "Protected Areas and JFM".

Project Development Workshops, Mumbai, July 15 & September 12-13, 2001. Dr. Ruchi Badola provided expert assistance in reviewing the projects submitted to the Indira Gandhi Institute for Development Research, Mumbai, under the World Bank funded 'India: Environmental Management Capacity Building' project at these workshops.

National Consultation on Conservation of High Altitude Wetlands, Leh, Ladakh, July 24-29, 2000. Dr. S.A. Hussain attended this national consultation organised by the World Wide Fund For Nature, India. He briefed the participants on the current research activities of the Institute for making the high altitude wetlands of Ladakh a priority for conservation. Besides this, he assisted in drafting the Action Plan for the conservation of the Tso Moriri, Tso Kar, and Pangong lakes.

Training Programme on "Arc/Info 8", New Delhi, July 31-August 4, 2000. Dr. N.K. Gupta and Shri Panna Lal, Computer Personnel, attended a training programme on "Arc/Info 8" organized by ESRI India, NIIT GIS Limited, New Delhi.

International Training Workshop on 'Forestry Research Strategy Formulation, Planning and Management', Kuala Lumpur, August 1-5, 2000. Dr. V.B. Mathur and Dr. Asha Rajvanshi participated in this international training workshop organized by the University Putra Malaysia, Kuala Lumpur. They presented a paper on 'Forest Resources and Forestry Research in India' there.

XXI International Union of Forestry Research Organization (IUFRO) World Congress in Kuala Lumpur, Malaysia, August 7-12, 2000. The XXIst International Union of Forestry Research Organization (IUFRO) World Congress with the theme 'Forests and Society: The Role of Research' was organized by the Forest Research Institute, Kuala Lumpur, Malaysia. Dr. V.B. Mathur was

invited to chair a session on 'Wildlife and its habitat', and to present a paper on 'Planning for conservation of biological diversity: Lessons learnt from Sri Lanka'. He also presented a poster paper on 'Developing an Integrated Protected Area (IPAN) System for Biodiversity Conservation: Lessons Learnt'. Dr. Asha Rajvanshi was also invited to present her paper "Wildlife Conservation Amidst Development: Challenges in Indian scenario" in this international congress. The WII has been able to contribute and benefit through networking with IUFRO through the participation of its faculty members in the IUFRO World Congress since 1990.

Workshop on Forestry for Poverty Reduction: Policy, Legal and Institutional challenges, New Delhi, August 24, 2000. Dr. A.K. Gupta attended the workshop on "Forestry for Poverty Reduction: Policy, Legal and Institutional Challenges" at the World Bank, New Delhi, and presented a paper on behalf of the working group on 'Legal Framework'.

Training Workshop on Butterflies, Bees and other Pollinators: Their Role in Biodiversity Conservation and Food Security, Dehradun, September 4-6, 2000. Dr. V.P. Uniyal attended this workshop which was organized by Navdanya Agro Ecology and Biodiversity Conservation Centre, Dehradun.

International Symposium on Galliformes, Nepal 2000, September 24-30, 2000. This symposium was organised by the World Pheasant Association, Department of National Parks and Wildlife Conservation (HMG/Nepal), King Mahendra Trust for Nature Conservation, IUCN/SSC Pheasant and Partridge, Quail and Francolin Specialist Groups, and Bird Conservation - Nepal, at Kathmandu. From the WII Dr. S. Sathyakumar, K. Ramesh and R. Suresh Kumar participated in this Symposium. One oral presentation and three posters based on the WII's research on pheasants in Western Himalaya and Eastern Himalaya were presented.

International Symposium on Habitat Conservation: Fresh Vision - 2000 and Beyond, Sawai Madhopur, October 1-2, 2000. Dr. V.B. Mathur was invited to participate in the



International Symposium organized by the Ranthambhore Tiger Reserve. He made a presentation on 'Strategies to mitigate human-wildlife conflict'.

World Conservation Congress, Amman, Jordan, October 4-11, 2000. The triennial World Conservation Congress of the International Union for Conservation of Nature and Natural Resources (IUCN) was held in Amman, Jordan, during October 2000. This was a meeting of members of IUCN where the Government State Members, Government Institutional Members, and Non-Governmental Organizations which are members of IUCN participate with several specialists who are members of different commissions of IUCN. From India, Ministry of Environment & Forests as Government State Member, Shri Karthikeyan V. Sarabhai as Vice Chairman of Indian National Committee for the IUCN, BNHS, IBWL, Development Alternatives, NTGCF, INSONA, WWF-India, INTACH, and the Wildlife Institute of India all participated in this Congress. Beyond the statutory function of the Amman Congress, it served to highlight key challenges for the new millennium. The Indian delegation played a key role in several group meetings, including chairing some sessions. The resolutions developed on the Indian Tiger, Tibetan Antelope, Gangetic Dolphin and migratory Sea Turtles during the RCF 2000 in New Delhi were ratified at the World Conservation Congress.

Shri S.K. Mukherjee, Member Secretary of the Indian National Committee for the IUCN was also invited by the Director General, IUCN to be the Member Observer during elections at the Amman World Congress.

Shri S.K. Mukherjee and Shri B.C. Choudhury participated as part of Indian delegation in the World Conservation Congress. Three resolutions were proposed from India and all were passed for action.

Workshop on National Biodiversity Strategy Action Plan, Coimbatore, October 10-11, 2000. Dr. A. K. Gupta participated in the workshop as a member of "Wild Animal Thematic Group" at SACON, Coimbatore. Dr. Ravi Chellam attended

as a member of the Technical and Policy Core Group of the NBSAP and is co-ordinating activities of this Thematic Group.

Stakeholders Workshop on Alleged Adverse Impact Assessment upon tiger and elephant habitat due to opencast mining operation in selected areas of Bihar, Ranchi, October 16, 2000. Dr. Sushant Chowdhury participated in this second workshop of the series organized by the World Bank and Chemproject Consultant (P) Ltd. The first one took place in Delhi on March 15, 2000. Dr. Chowdhury presented the case study of iron-ore mining in Singhbhum forests and its impact on elephant habitat. He emphasized the greater need for implementation of environmental norms, discharge regulation, monitoring and restoration.

National Seminar on Biodiversity 2000: Options to Development, GBPIHED, Almora, November 2-3, 2000. Dr. V.B. Mathur was invited to participate in the National Seminar on Biodiversity 2000: Options to Development organized by the G.B. Pant Institute of Himalayan Environment and Development (GBPIHED), Almora and to present his paper, 'Information Technology Applications in Biodiversity Conservation'.

Meeting of the IUCN/SSC Otter Specialist Group, OTTER-ZENTRUM, Hankensbüttel, Germany, November 5, 2000. Dr. S.A. Hussain, member of the IUCN/SSC Otter Specialist Group attended this meeting. He was the rapporteur for the meeting where the future of otter conservation world-wide was discussed.

International Workshop on How to Implement IUCN/SSC Otter Action Plan 2001, OTTER-ZENTRUM, Hankensbüttel, Germany, November 6-9, 2001. Dr. S.A. Hussain attended this workshop which was also attended by forty-one scientists and conservationists from eighteen countries world-wide working in the field of otter conservation to discuss possibilities for an effective implementation of the second edition of the IUCN/SSC Otter Action Plan.



Training Course on Global Positioning System and its Application, November 13-17, 2000. Dr. Navneet Kumar Gupta from the Computer Section participated in this course organized by the Indian Institute of Remote Sensing, Dehradun.

Workshop on identification of Ecosystems and Habitats of Conservation Value outside PA network, Dehradun, November 17, 2000. Dr. A.K. Gupta and Shri S.K. Srivastava participated in the workshop organized by TERI at IGNFA, Dehradun, as resource persons cum panellists. They provided ideas for the development of a strategy for conserving the remaining ecosystems/habitats in the erstwhile UP State.

IInd Annual South Asian Environment Assessment Conference, Dhaka, November 20-23, 2000. Dr. Asha Rajvanshi was invited by the Regional Co-ordinator of the South Asian Regional Environmental Assessment Programme of IUCN Asia to make a presentation in the technical session of the above conference. She presented a paper "Public Participation for Promoting Sustainable Development: The Indian EIA Experience" there.

Stakeholders Workshop on Conservation of Asian Elephant in the Nilgiri - Eastern Ghats of India, Bangalore, November 24-25, 2000. Shri S.K. Srivastava participated in the stakeholders' workshop on conservation of Asian Elephant in the Nilgiri - Eastern Ghats of South India at Bangalore organized by WWF-India. Suggestions were provided by him towards conservation vision, corridor augmentation and restoration, alleviating elephant-human conflict, monitoring populations and facilitating anti-poaching strategies, and proposed the co-ordination of all stakeholders.

National Seminar on Information Technology Applications in Forestry, IIFM, Bhopal, November 28-29, 2000. Dr. V.B. Mathur was invited to participate in this National Seminar

organized by the Indian Institute of Forest Management, Bhopal, and to present his paper "Application of Information Technology in Wildlife Conservation: Recent Experiences".

National Workshop on Ecodevelopment, Tirunelveli, December 8-9, 2000. This workshop, organised by Tamil Nadu Forest Department, was attended by Dr. Ruchi Badola and Shri A.K. Bhardwaj. The focus of the workshop was on evolving strategies for the future sustainability and monitoring of ecodevelopment programmes going on in Kalakad-Mundanthurai Tiger Reserve.

Workshop on the management of elephant corridors in south India, Theppakadu, Mudumalai Wildlife Sanctuary, December 21-22, 2000. The Salim Ali Centre for Ornithology and Natural History organized this workshop with fund support from the Project Elephant, MoEF, and GOI. As resource person Dr. Sushant Chowdhury presented a case study, "Landscape corridors for elephant movement and conflict resolution in north Bengal". He also emphasized the need for corridor identification based on its attributes and function to avoid wasteful management investments. Shri S.K. Srivastava also attended the workshop and made a presentation on "Legal Implications in the Elephant corridor management of Mudumalai - Eastern Ghats Sector".

Conservation Assessment and Management Prioritization (CAMP) Workshop on Medicinal Plants, Pokhara, Nepal, January 18-21, 2001. This workshop was organized by the South Asia Regional Office of Medicinal and Aromatic Plants and His Majesty's Government of Nepal, Department of Forests and Soil Conservation, funded by the International Development Research Centre (IDRC), New Delhi. There were 48 participants from ten countries that included Bangladesh, Bhutan, Canada, Denmark, France, India, Nepal, Pakistan, Sri Lanka and the United Kingdom. Dr. G.S.

Rawat, who is a member of the IUCN / SSC Medicinal Plant Specialist Group participated in the workshop and shared his experiences with the medicinal plants traded from India-Nepal border.

Thematic Workshop on Biodiversity Policies and Laws relating to UP, Kalagarh, January 18, 2001. Shri S.K. Srivastava participated in the workshop organized by TERI at Kalagarh in the Corbett Tiger Reserve. He informed those present of the existing conservation laws and proposed Biodiversity Act in the context of various resources available in the PAs and managed forests of Uttaranchal State.

Forest Ministers Conference, Coimbatore, January 29-30, 2001. Dr. A.K. Gupta, Shri B.C. Choudhury, Shri M.S. Rana and Shri S. Wilson participated in this conference and set up exhibits reflecting achievements of the WII in the field of wildlife research and training.

Training Course on Lessons Learnt from Externally-aided Forestry Projects, FTI, Jaipur, January 30 - February 2, 2001. Forestry Training Institute (FTI), Jaipur, invited Dr. V.B. Mathur to give a professional view in the training course for IFS officers on the theme "Lessons Learnt from Externally-aided Forestry Projects". He made a presentation on "Information Technology Applications in MIS/GIS: Experiences in Maharashtra and Uttar Pradesh".

Workshop on Trees Outside Forests, IIFM, Bhopal, January 31-February 2, 2001. Shri Anil Bhardwaj and Shri S.B. Banubakode attended this FAO sponsored workshop organized by IIFM, Bhopal.

IUCN's Sustainable Use Initiative, January 2001. The IUCN has set up a Sustainable Use Specialist Group under the Species Survival Commission to examine issues relating to the sustainable use of natural resources by mankind. This policy research has been termed 'the sustainable use initiative programme'. Shri Ashis Banerjee, then Member-Secretary of INTACH has been nominated by the IUCN as the Interim Chairman for the sustainable use initiative group for South Asia. This group had already organized

a preliminary consultative meeting in February 2001 at IIFM, Bhopal.

The IUCN Sustainable use initiative technical advisory committee has developed an analytical framework for assessing factors that influence sustainability of use of wild living natural resources, which has recently been approved by the Steering Committee of the SUSG. A workshop was held at Jacksonville, USA (White Oak Workshop) to evolve a mechanism for operating the framework. On invitation from this group, Shri B.C. Choudhury of the Institute participated in this workshop during January, 2001.

Two-day Consultative Meeting for Evaluation and Monitoring of World Heritage Sites in the South Asian Region, Paris, February 1-2, 2001. Shri S.K. Mukherjee, Director, WII attended this meeting organized at UNESCO Headquarters, Paris. The World Heritage Bureau of UNESCO had chosen WII to evaluate values of some identified world heritage sites in South Asia. WII's proposal to establish benchmark studies and staff training for monitoring at WHS was accepted.

National Geospatial Data Infrastructure (NGDI) Workshop, New Delhi, February 5-6, 2001. Dr. V.B. Mathur participated in the workshop on National Geospatial Data Infrastructure (NGDI): Towards a Road Map in India. He also contributed in the deliberations of the working group on 'Applications in Natural Resource Management'.

Workshop on "E-commerce Tools and Technologies" Dehradun, February 10, 2001. Computer/GIS staff attended a one-day workshop on "E-commerce Tools and Technologies" organised by the Computer Society of India, Dehradun.

Training Course on Sustainable Development: Concepts and Issues, MGSIPA, Chandigarh, February 13-17, 2001. Dr. V.B. Mathur gave professional help in the training course for IFS officers on the theme 'Sustainable Development: Concepts and Issues' organized at Mahatma Gandhi State Institute for Public Administration, Chandigarh. He made a presentation on 'Need for creating a biogeographically representative network of protected areas for biodiversity conservation'.

Meeting for approval of management plans for select PAs in Gujarat, Gandhinagar, February 16, 2001. Dr. P.K. Mathur attended the meeting convened by the CWLW, Gujarat at Van Chetna Kendra, Gandhinagar for consideration and approval of draft management plans for four PAs in Gujarat. Plans for Hingolghadh Nature Education Sanctuary, Jessore WLS, Rampara WLS and Kutch GIB WLS were discussed. Concerned field managers of these PA sites made presentations on plans prepared by them; subsequently the participating members deliberated and took appropriate decisions on approval/revision of the draft management plans.

National Seminar on New Challenges in Taxonomy in 21st Century for utilization and conservation of plant diversity, Dehradun, February 20, 2001. This seminar, organized by the Association for Plant Taxonomy, was held at the Northern Circle office of the Botanical Survey of India in Dehradun. Dr. G.S. Rawat, Life Member of the Association, attended the seminar and participated in various sessions.

FSI-FAO Expert Consultation on Global Forest Survey at New Delhi, February 27-28, 2001. The Forest Survey of India, Dehradun organized a two-day expert consultation on Global Forest Survey in collaboration with FAO. Dr. P.K. Mathur participated in this meeting and made a presentation on "Wildlife/Biodiversity Considerations for Inclusion in Forest Surveys".

World Commission on Protected Areas (WCPA) South Asia Workshop in Kathmandu, Nepal, February 27- March 2, 2001. The World Commission on Protected Areas (WCPA) South Asia Workshop on "Protected Area Landscape in South Asia" was organized by the WCPA South Asia, IUCN Nepal, World Heritage Convention in collaboration with the Ministry of Forests and Soil Conservation, Government of Nepal in Kathmandu. The objectives of the workshop were: (i) Review the current status of PA management in the region and recommend strategies for enhancing their conservation, (ii) Appraise the progress of implementation of the Regional Action Plan for PAs in South Asia (RAPSA), (iii) Review the status of Natural Heritage Sites in South Asia and identify

prioritized steps for their effective conservation, (iv) Formulate recommendations for the Fifth World Parks Congress, and (v) Enhance the working relations between WCPA and IUCN Secretariat in the region.

Over seventy five professionals from Bangladesh, India, Nepal, Pakistan, Maldives and Sri Lanka participated in this workshop. The Indian delegation was headed by Shri P.K. Sen, Director, Project Tiger, Government of India, and had ten representatives from State Governments, Scientific Institutions and NGOs. Dr. V.B. Mathur and Shri B.C. Choudhury represented the WII. India's country paper "Conserving Protected Areas and Natural World Heritage Sites: A Challenge to the Humanity in 21st Century" was presented by Shri P.K. Sen. Dr. V.B. Mathur presented a paper on "Protected Areas in South Asia: Issues and Strategies". The workshop recommendations *inter-alia* included one recommending the WII as the lead agency for formulating a project document for the "Training of Trainers" programme which should undertake capacity building programmes in collaboration with IUCN-WCPA South Asia. Under the UNESCO World Heritage Site (WHS) Management Effectiveness Project, WII has been identified as a co-ordinator for South Asia.

UNESCO-FRI Training Workshop on Herbarium Conservation Techniques, FRI, Dehradun, March 10-30, 2001. Dr. V.B. Mathur and Dr. G.S. Rawat gave professional help in this workshop organized by the Forest Research Institute, Dehradun. Dr. Mathur made a presentation on the 'Application of information technology for documenting flora of a region - A case study of Maharashtra State'. Dr. Rawat made a presentation on the 'techniques of preserving high altitude plants'.

Terai Arc Tiger Conservation Planning Workshop, Kalagarh, March 19-24, 2001. Dr. A.J.T. Johnsingh attended this workshop conducted in Corbett Training Centre at Kalagarh. Tiger Conservation Programme, WWF - India, WWF - Nepal and WWF - US, arranged this workshop. He gave a ten-minute presentation on "Tiger Conservation in Indian subcontinent with reference to Terai Arc".

Courses, Training, Study Tours and Visits

Training programme, April 27-30, 2000. Dr. A.J.T. Johnsingh conducted a training programme for about two hundred villagers representing one hundred and thirteen VECs. Values of KMTR were highlighted, and their possible role in the conservation of KMTR was emphasised. There was plenty of enthusiasm among the participants, and their response was encouraging.

WII-IGNFA Collaborative Training Programmes for IFS Probationers, April-May 2000. WII and IGNFA conducted Training in Wildlife Techniques for the IFS Probationers (1997 and 1999 batches) at Corbett Wildlife Training School, Kalagarh, Corbett National Park. During this techniques tour, the probationers were shown animal tracks and signs and trained in vegetation sampling and analysis, wildlife habitat evaluation and habitat utilization methods. They were also taught to assess the impact of *Gujjar dera* on wildlife habitats and animal density estimation, and monitoring techniques such as block counts, line transect sampling, roadside monitoring and dung counts.

The probationers took active part in discussions in the field and at base camp on various techniques, analyses, results and their interpretation and also on various conservation and management challenges. The 1999 batch probationers were trained during April 3-6 and the 1997 batch probationers were trained from May 18 to 23. WII Faculty members, Dr. S.Sathyakumar and Dr. B.S. Adhikari with IGNFA faculty trained the 1999 batch. Shri V.B. Sawarkar, Dr. B.S. Adhikari and Shri Karthik Vasudevan provided training for the 1997 batch.

Visit to Corbett Tiger Reserve, May 15-16, 2000. Dr. A.J.T. Johnsingh went with Shri A.S.Negi IFS to the northern boundary of the Corbett Tiger Reserve to discuss with the staff the methods of monitoring the tiger population.

Training in the Use of Wildlife Monitoring Techniques, May 19-31, 2000. During May 2000 a group of ten frontline staff from the Jammu and Kashmir Department of Wildlife Protection were trained in wildlife monitoring techniques based on

the Snow Leopard Information Management System (SLIMS) developed by the ISLT.

Visit to Corbett Falls near Corbett Tiger Reserve, June 24-26, 2000. At the request of Uttar Pradesh Forest Department, Dr. G.S. Rawat visited Corbett Falls near Corbett Tiger Reserve to help in developing a Nature Trail and the identification of plants/interesting vegetation patches in the area.

Visit to Rajiv Gandhi National Park (RGNP), Nagarhole, July 17-21, 2000. Shri V.B. Sawarkar and Shri S.K. Srivastava visited RGNP together and raised planning issues, held meetings with the Field Director, Dr. Ravi Ralph. Shri M.K. Appayya, former Chief Conservator of Forests and Chief Wildlife Warden, Karnataka, who has written the draft management plan for the RGNP, Nagarhole, and Dr. K. Kushalappa, GEF Project Co-ordinator for Karnataka. The plan was discussed and further suggestions were made.

Visit to Kanha National Park (KNP), Madhya Pradesh, September 18-22, 2000. On an invitation from Director KNP, Dr. G.S. Rawat visited KNP to review the current grassland management practices in and around Kanha and to suggest alternative management regimes, if any. The field staff were taken to various meadows and grassland areas to discuss the management issues, including control of weeds, protection, and systematic recording of fire frequency.

Visit to the Munsariy Block of Pithoragarh District, October 25-November 12, 2000. Dr. G.S. Rawat visited the Munsariy Block of Pithoragarh District (northern fringes of Askot Wildlife Sanctuary) during October and November 2000 to provide technical assistance to the field staff of the National Tree Grower's Co-operative Federation Ltd. in carrying out the inventory and survey of forests and wildlife in the area.

Nature Walk, Chilla, December 12, 2000. Dr. A.J.T. Johnsingh went to Chilla Wildlife Sanctuary to take twenty-five IFS probationers on a Nature Walk.

Training programme for staff of Kuno Wildlife Sanctuary, December 19-20, 2000. The WII has been actively involved in the survey of potential sites for the re-introduction of Asiatic lions, and the choice of Kuno WLS as the most suitable site. Since 1993 the WII has been involved both in field visits and in an advisory capacity with the M.P. Forest Department in dealing with issues related to the management of Kuno.

In December 2000, four faculty members of WII: Drs. A.J.T. Johnsingh, S.P. Goyal, Ravi Chellam and Jagdish Krishnaswamy, visited Kuno and conducted a training programme in techniques for monitoring prey and predator populations for the local field staff. The course was conducted in Hindi and had a major field component. The WII was also instrumental in obtaining a grant from a conservation NGO (Wildlife Trust of India) to provide for bicycles and watches to the field staff. They will use these while carrying out the monitoring exercises. These road-based exercises have been designed in collaboration with the local forest officials. The monitoring exercises are to be carried out twice every month.

Since February 2001, the WII has been supervising attempts to capture crop-raiding nilgai from the ravines of Chambal en masse and their translocation, release and monitoring with the objective to boost the prey populations at Kuno WLS. These efforts have been funded by the M.P. Forest Department. Nilgai were captured using a drop net.

Visiting class of B.Sc. (Forestry and Wildlife Management) from M.K.P. (P.G.) College, Dehradun. The M.K.P. (P.G.) College is currently running a vocational course in Forestry and Wildlife Management at first-degree level. A visiting group comprising students of II and III year B.Sc. (Forestry and Wildlife Management) visited the Institute on February 20, 2001. Each batch had specific teaching inputs as requested earlier by the college. These were on population estimation of wild animals, habitat management, vegetation assessment, wildlife health, chemical capture of wild animals and wildlife photography. Students also



Visiting class of B.Sc. forestry and wildlife management from M.K.P. (P.G.) College, Dehradun

visited different facilities: library and documentation centre, herbarium and laboratory. Teaching was provided by Institute faculty: Drs. P.K. Mathur, S.P. Goyal, P.K. Malik, B.S. Adhikari, K. Sankar and Shri S. Wilson, AV Technician. Dr. Malik also gave a demonstration of different equipment used in the chemical capture of wild animals while S. Wilson demonstrated the use of different audio-visual equipment. Dr. Neelam Ghildiyal and Dr. Kaur, Senior Lecturer of M.K.P. (P.G.) College accompanied the visiting class. Dr. P.K. Mathur co-ordinated the visit.

Study Tour on Captive Elephant Management in South India, February 3-12, 2001. A study tour to South Indian elephant camps was organised for the frontline staff of the Jaldapara Wildlife Sanctuary under the current GOI-UNDP Project entitled "Strengthening wildlife management and ecodevelopment planning capabilities in Jaldapara Wildlife Sanctuary". Eleven staff members participated in this tour. The group, led by Dr. B.K. Mishra, visited the elephant camps at Mudumalai Wildlife Sanctuary of Tamil Nadu and Kodanard Forest Division of Kerala to study the management of captive elephants and their care. On their way, the group also visited Arignar Anna Zoological Park at Chennai. Shri Anil Bhardwaj also joined the group in the Kodanard sector of the tour.

The objectives of the study tour were to: (a) teach the participants about various aspects of the management of captive elephants in South India, (b) acquaint the participants with various aspects of managing other captive animals in zoo, and (c) study designs of various animal enclosures used in zoos.



Visiting group of front line staff from Dudhwa Tiger Reserve (DTR), February 12-14, 2001.

A group of fifteen Range Forest Officers and other front line staff from Dudhwa Tiger Reserve visited the WII. Shri Ashish Tiwari, Deputy Director, DTR accompanied the visiting group. Shri S.K. Mukherjee, Director, addressed the visiting group and highlighted the need for professional and on-site training to meet the requirements of emerging challenges in the field of wildlife conservation. Dr. P.K. Mathur provided an overview of current challenges and approaches for wildlife management. Other select faculty members: Drs. V.B. Mathur, S.P. Goyal, P.K. Malik, K. Sankar and B.S. Adhikari also gave their views. Dr. P.K. Mathur co-ordinated this visit.

International Training Course on Community-Based Tourism, Bangkok, February 19 - March 16, 2001.

Shri Rajiv Bhartari was awarded a fellowship by the Ford Foundation to participate in the International Training Course on Community-Based Tourism for Conservation and Development held at the Regional Community Forestry Training Centre (RECOFTC), Bangkok. The objective of

the course was to equip participants with skills to assess potential, and to plan for Community-Based Tourism using participatory approaches and tools.

Field Training Workshop for the Frontline staff of Sariska Tiger Reserve, Rajasthan, March 26-27, 2001.

At the request of the Rajasthan Forest Department to assess the prevalence (if any) of Foot and Mouth Disease (FMD) in and around Sariska Tiger Reserve, Rajasthan, Dr. P.K. Malik and Dr. K. Sankar of the Institute visited Sariska Tiger Reserve between March 26 to 27, 2001. The entire park area was surveyed by the visiting team with Forest officials to look for any symptoms of FMD in domestic livestock as well as wild ungulates. No wild or domestic animal appeared with FMD symptoms. A team of forty frontline staff of Sariska was given training during the workshop conducted on March 26-27, 2001 on the following aspects: Wildlife health monitoring techniques, control and prevention of wildlife diseases, biology of major wildlife species, collection and preservation of biological samples, reporting observations and handling of carcasses.

The Institute conducted 3 regular courses, continued one M.Sc. Wildlife Science course, 16 short courses, 15 workshops, 9 meetings and an Annual Research Seminar during the reporting year. Faculty members of Institute also participated in a large number of workshops, seminars and conferences conducted by other organisations.



Cateleya sp.

S. Wilson

Research

COMPLETED PROJECTS

* Ecology of Gaur in Pench Tiger Reserve, Madhya Pradesh

Investigators: Dr. K. Sankar and Shri Qamar Qureshi

Researchers: Shri M.K.S. Pasha and Shri G. Areendran

- Date of initiation : 29.11.1995
- Date of completion : 31.03.2001
- Total budget allotted : 18.03 lacs

The major objectives of the project were to collect information on density, distribution, population structure, feeding habits, habitat use, ranging patterns and social organization of gaur and predation on gaur in the Pench Tiger Reserve, Madhya Pradesh. Satellite imagery LISS III (digital data), Survey of India topo-sheets, soil and geological maps (1:50,000 scale) were procured. Information on PA boundary, various administrative units were also recorded through Global Positioning System (GPS) technology. The maps were digitized and incorporated in GIS domain. Ground truthing was carried out for the validation of the spatial information: soil type, geology, geomorphology, ground water potential areas, vegetation, land cover and various PA infrastructures. A thirty-six layer database in GIS domain has been prepared that includes fifteen general maps, eight animal distribution maps and twelve thematic maps and a False Color Composite (FCC) of PTR. This spatial database will form the basis for monitoring changes in gaur habitat during subsequent years.

Line transects and vehicle transects were used to study the density, distribution and population structure of gaur and other major ungulates in different vegetation types across seasons. Three gaurs (two females and one male) were radio-collared to study the habitat use and ranging pattern. Information on gaur food habits was collected by direct field observation.

The group size and composition of gaur varied between seasons ranging from two to twenty animals. The mean group size of gaur during summer, monsoon and winter was 3.7 ± 0.14 , 5.9 ± 0.57 , and 7.0 ± 0.37 , respectively. The radio-telemetry studies revealed that an adult male had

an annual home range of about 250 km² whereas a cow had a 150 km² range. The observed sex ratio of gaur in the intensive study area varied seasonally. The male: female ratio in summer, monsoon and winter was 73:100, 56:100 and 62:100, respectively. The ratio of cow: calf during summer, monsoon and winter was 28:100, 8:100 and 3:100 respectively. In total 77 species were recorded as gaur food plants. The study showed that gaur is a general feeder but it browses in the dry season and prefers to graze during the monsoon. Their chief diet includes shoots and foliage of trees, shrubs and buds, fruits like *Diospyros melanoxylon* and *Aegle marmelos*, tender shoots of bamboo, herbs and the bark of *Tectona grandis*. The major predator of gaur is the tiger (*Panthera tigris*). The leopard (*Panthera pardus*) is also known to prey on calves and yearlings of gaur. Illegal fishing in Pench reservoir, forest fires, cattle grazing and anthropogenic pressure in and around the Tiger Reserve are some of the major threats to the gaur population. This is an annual phenomenon which is man-induced during the dry season. The fires were to a large extent detrimental to ground-dwelling flora and fauna. The environmental stochasticities coupled with these anthropogenic pressures are the focus of immediate attention for the management authorities in the park. The management recommendations as mentioned in the final report of the completed study will be of immense help to the PTR authorities in the effective conservation of gaur in PTR and other similar habitats in central India.

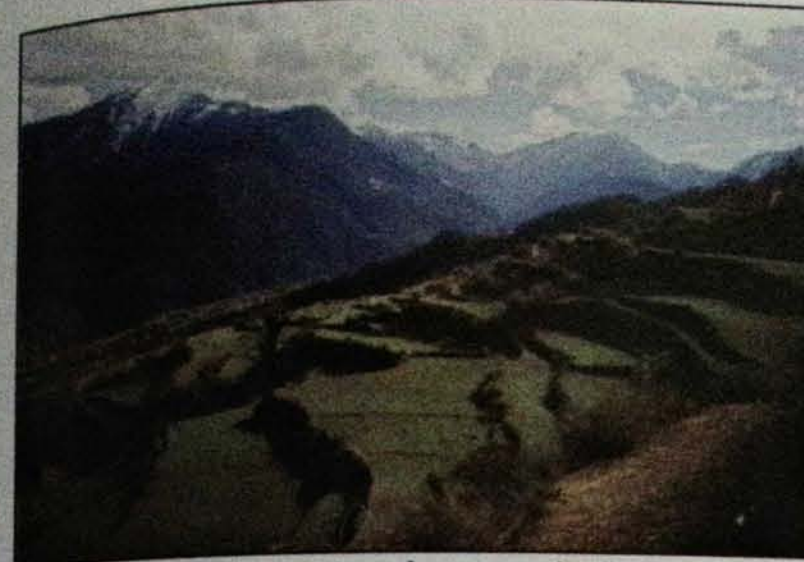
* A Study on the Conservation Status of High-Altitude Forests in Garhwal Himalaya with Special Reference to Land-use Practices and Tourism

Investigators: Dr. G. S. Rawat and Dr. Asha Rajvanshi

Researchers: Shri Sanjay K. Uniyal and Ms. Anjali Awasthi

- Date of initiation : 01.12.1995
- Date of completion : 31.03.2001
- Total budget allotted : 16.57 lacs

The report on the first phase of the project (Vegetation and production potential of Tehri Dam Submergence Area) was submitted, and three



Increased cultivation on steep slopes: a major factor for forest degradation in Bhagirathi Valley

papers from the said work were communicated to various journals for publication. The second phase of the project was launched in 1996. There are two major tasks in the second phase: (i) Study of the structure and composition of high-altitude forests, (ii) Assess the impacts of anthropogenic pressures and land-use practices on high-altitude forests and wildlife. Several questions pertaining to each of these tasks have been addressed during the study.

During this reporting period the major accomplishments were as follows:

Mapping of Vegetation types and land use categories using Remote Sensing Data in the Bhagirathi Valley (Study Area): Data collected on various vegetation parameters using stratified random samples in the field were analyzed using TWINSpan package to delineate different communities. In order to produce the vegetation map for the study area, a combination of TWINSpan output, information on environmental variables and Remote Sensing (RS) data obtained from IRS LISS II was used. Unsupervised classification of RS data yielded as many as 80 classes. A 'hybrid' approach, i.e. a combination of unsupervised and supervised classification was followed to merge these classes into ten distinctly identifiable categories. Delineation of chir pine (*Pinus roxburghii*) from the rest of the conifers and secondary scrub from the alpine scrub was not possible based only on remote sensing data. Therefore a 'rule based classification' was developed to overcome such problems. Masking and re-coding of particular pixel values minimized the effects of shadow and clouds. Finally six forest types and six

non-forest classes were delineated and mapped. Following the above approach the errors in vegetation maps were minimized. The final map depicts several forest areas, which are important from a conservation point of view as well as various land use categories.

Time Series Analysis of Bhagirathi Catchment with respect to land-use practices using Remote Sensing data: The high-altitude forests in the study area were assessed in terms of resource use by the local people and

sustainability of various land-use practices. Recent changes in the land cover induced by anthropogenic as well as natural factors were investigated in the field and corroborated with remotely sensed data. The 1:50,000 scale toposheets published by the Survey of India (SOI) to extract baseline information on contours, land-use categories, drainage, and road network was used. Satellite data obtained from IRS LISS II for the years 1988 and 1995 were overlaid in GIS domain to detect the rate and extent of changes in different land cover categories. The results show that there was a loss of about 33% forest cover between 1963 and 1988. The changes under different forest types could not be detected by comparing SOI sheets and 1988 RS data. Such a comparison was possible using the RS data of 1988 and 1995. It was found that the pine forests had increased by 50% within seven years. The broad-leaved forests, however comprising oak and its associates had decreased by about 30%. The greatest changes were detected under scrub vegetation, i.e. an increase by about 58% within seven years. The area under habitation including cultivation had increased by around 70% between 1963 and 1995.

The socio-economic study revealed that the local people prefer broad-leaved species for fodder and fuel wood. This leads to opening of the canopy and the conversion of forests into scrub vegetation. The present land-use practices have also favoured pine forests, particularly on steeper slopes. The processes and trends of these conversions are being examined in detail and will be incorporated in the final report. The final report will be submitted in April 2001.



- * **Developing a Scientific Model Management Plan for a Marine Protected Area (M.G. Marine National Park, Wandoor, Andmans) and draft Guidelines for Coastal and Marine Protected Area Management.**

Investigators: Shri Ajai Saxena and Shri B.C. Choudhury

Researcher: Shri Sarang Kulkarni

- Date of initiation : 02.03.1998
- Date of completion : 31.03.2001
- Total budget allotted : 6.81 lacs

This project aims to prepare a management plan for Mahatma Gandhi Marine National Park (MGMNP), Wandoor, Andaman & Nicobar Island, based on researched information gathered on its resources, biodiversity values and threat assessment. MGMNP holds a key position among other marine protected areas in India for its high marine as well as terrestrial biodiversity. The significant feature of MGMNP is the presence of diverse coral reefs and high diversity of coral fauna in the region. An extensive survey carried out in MGMNP coral reefs to assess the floral and faunal diversity with the help of SCUBA diving and snorkeling recorded over thirty species of new coral for the Andaman and Nicobar Islands, of which three species are new to the Indian Ocean. Despite the protection, there has been a marked decline in coral reef health over the past few years due to anthropogenic factors. Increasing deforestation in the catchments of MGMNP has led to high sedimentation, which is one of the major factors in the degradation of a coral reef. Sedimentation traps were deployed at line intercept transect locations to estimate the sedimentation rate. Coral reef status and community structure assessed in 1999 and 2000 was supplemented with further surveys during 2001 in the surrounding areas with the help of line intercept transect and manta tow board method. A socio-economic survey was completed to understand the dependency of people residing around MGMNP. During the year all targeted work with respect to biological, ecological and socio-economic values were collected and the fieldwork was completed. It is now proposed to conduct a stakeholder's workshop to develop a participatory and consensus based management plan that focuses its attention on protection of

specific areas and eco-compatible use of other areas within the framework of Wildlife (Protection) Act 1972 that will safeguard the ecological integrity of MGMNP.

Sponsored by Central Zoo Authority

- * **Preparation and maintenance of studbooks for five endangered species**

Investigators: Dr. Ravi Chellam and Shri B.C. Choudhury

Researcher: Ms. Anupama Koliyal

- Date of initiation : 01.10.1999
- Date of completion : 31.03.2001
- Total budget allotted : 2.07 lacs

The objective of this project was to compile and produce studbooks for the Indian tiger, Asiatic lion, Lion-tailed macaque, Greater one-horned rhinoceros and Golden langur. Draft studbooks have been submitted to CZA for review and much of the finalization work is also done. The final versions of the five studbooks will be produced by June, 2001.

The major problems faced in this project have been the lack of marking of the animals in Indian zoos, the inadequate record keeping and the low priority accorded to record keeping. CZA has been informed of these problems.

Funded by the Institute of Terrestrial Ecology, U.K.

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

Investigators: Dr. A.J.T. Johnsingh, WII, Dr. Leon Durbin, Institute of Terrestrial Ecology, U.K.

Researcher: Shri Bhaskar Acharya

- Date of initiation : 01.06.1998
- Date of completion : 31.07.2000
- Total budget allotted : 26.10 lacs

The main objectives of the project were to determine the food and habitat requirements of the dhole, its relationships with its prey species, other sympatric carnivores and domestic animals, the relationships between pack members, and the genetic diversity within the population.



Data was collected on the diet of the dhole packs, social organization and interactions, movement patterns and ranging behaviour. The abundance, encounter rates and composition of prey animals were also recorded. Chital (*Axis axis*) appeared to be the major prey of dholes in this Tiger Reserve. Chital was also the most frequently encountered prey species on transects.

ONGOING PROJECTS

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

Investigator: Shri B.C. Choudhury

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

- Date of initiation : 01.02.1998
- Total budget allotted : 21.11 lacs

The field investigation at the two study sites in Rajasthan and Uttar Pradesh continued during the reporting year. The primary focus of work during the year was to assess the breeding success of the sarus crane *vis-à-vis* impact of biotic and abiotic factors. An additional focus during this period was to assess the movement patterns of adults, juveniles and chicks through color banding and monitoring of sarus cranes at two study sites.

The two study sites: Kota, Rajasthan (semi-arid region) and Etawah in Uttar Pradesh, exhibited different rates of breeding success. Etawah with its mosaic of natural wetland and grassland contributed to a greater breeding success compared to the Kota site where the breeding success was impeded by scanty water availability and severe anthropogenic impacts. The diurnal home range of the sarus crane in Etawah was small with plenty of natural forage available compared to Kota where all ages and sizes class of sarus had to cover a larger home range to meet their needs.

The achievement of the project during the year was the successful color banding of all ages and sizes of sarus crane, and the documentation of differential breeding success in relation to quality and quantity of Sarus habitat.

- * **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
- 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.

The intensive fieldwork in this project is being carried out in Panna Tiger Reserve (PTR), Madhya Pradesh. Tiger occupies an array of habitats and its response in terms of its survival or extinction depends on the quality of its habitat. The past records indicate that tiger has been most vulnerable in the dry forest habitats which forms nearly 40% of the tiger range in the country. This project has generated information on the responses of tiger in a dry forest habitat to the distribution, densities, and composition of its major prey and to different habitat conditions. Five radio-collared tigers were monitored and information on reproduction, home ranges, movement patterns, food habits and habitat use was collected. Major prey species of tiger were also radio-collared and monitored. Prey availability was estimated using line transects. Estimated prey density of 32/km², excluding langur, is relatively low in PTR, when compared to other high-density tiger areas. In the study area, sambar (9.16/km²), nilgai (6.02/km²) and chital (10.8/km²) were the most abundant prey. But contribution of medium sized prey (chital and pig) to the biomass is very low (20%) when compared to other high density tiger habitats. The study found that the distribution of tigers in PTR is closely related to high prey density areas of two species of deer – chital and sambar – and not to nilgai a potentially ideal prey

because of its large body size. Because tiger has evolved as a specialized forest edge predator, its strategies are more cued to deer than to prey such as nilgai and chinkara which are largely found in open habitats. Although nilgai contribute substantially to the prey biomass, it plays a limited role in the ecology of tigers in Panna TR. Home ranges of tigers in Panna TR, especially those of females, are larger than other populations studied in the subcontinent. This is attributed to the low density of suitable prey and biotic disturbances. As a result, Panna TR supports less number of tigers than it could do otherwise. The study indicates that chital and sambar are prey of tiger but these deer species need managerial inputs so that the Reserve can support a much larger population of these prey enabling the tiger to reach its optimum density.

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

Investigator: Dr. S.P. Goyal

Researcher: Shri Devendra Singh Chauhan

• Date of initiation : 18.12.1999

• Total budget allotted : 5.26 lacs

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

Leopard-man conflict surveys were conducted in Pauri and Lansdowne sub-divisions and classified into low, medium and high conflict areas. Of the 554 villages surveyed in Pauri Tehsil, 17% are affected by leopard-human conflict. Recently fourteen conflict cases were examined during the study and it revealed that 62.5% incidents were around degraded forest/scrub. Analysis of secondary data collected from the Forest Department on leopard victims revealed that most of them were female (65%) and less than twenty years old (70%). Leopard attacks on humans vary significantly in different seasons. It was interesting to note that the leopard preferred to attack in areas of isolated

houses as 60% cases were three-hundred metres away from the main village clusters.

A total of three hundred and twenty leopard scats from different areas of Pauri Garhwal were collected for determining food habits in relation to various conflict zones. Various methods for estimating leopard and prey abundance using six monitoring trails were standardized. It was found that track plots prepared every five-hundred metres are reasonably good for monitoring leopards and low density of wild prey species. Hair samples of twenty four leopards killed as man-eaters by the Forest Department have been collected to determine the level of relatedness among these individuals based on DNA techniques.

A long-term research project for understanding behavioural ecology and reproductive biology of the leopard has been formulated to ascertain ecological reasons for such high conflicts in Pauri Garhwal and to suggest measures to minimize them.

Spatial maps prepared for various levels of leopard-man conflicts have helped to delineate the areas having severe problems. Based on the information collected on predation on humans in relation to habitat, a simple manual in Hindi for public awareness on, "How to minimize leopard-human conflicts?" has been developed. Work on correlating leopard-human conflicts with habitat attributes using remote sensing is in progress and this would enable the identification of habitat factors responsible for such high conflicts.

* **An Ecological Study of Sympatric Hornbills and Fruiting Patterns in a Tropical Forest in Arunachal Pradesh**

Investigators: Dr. G.S. Rawat and Shri Pratap Singh

Researcher: Ms. Aparajita Datta

• Date of initiation : 01.12.1997

• Total budget allotted : 16.39 lacs

The primary objectives of this project were to: (i) study the phenology and seed dispersal pattern of important hornbill food trees, (ii) determine the diet of sympatric hornbills and identify the plant species which depend on hornbills for seed dispersal, (iii) study the ecology of sympatric hornbills in terms of nest site selection, foraging behaviour and patterns

of distribution, and (iv) carry out the status survey of hornbill species in Arunachal Pradesh

The study is being carried out in the Pakhui Wildlife Sanctuary, East Kameng district of Arunachal Pradesh. The following were the major achievements during the study period:

(a) **Phenological patterns:** Data on the phenological cycle of major fruit trees were analysed. Overall flowering was unimodal with a major peak before the monsoon in March and April (relatively dry hot season), though there was a minor peak in November and December. Overall fruiting peaked between April and July. Fruit scarcity occurred during 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 *Livistonia jenkinsii* showed supra-annual fruiting. *Polyalthia simiarum* (Annonaceae) had two fruiting peaks a year. The flowering and fruiting peaks of wind-dispersed species and bird-dispersed species were dissimilar. All larger arillate capsular fruit species belonging to the Meliaceae and Myristicaceae ripened between March and May, while fleshy berries of the Lauraceae, Annonaceae, and other families ripened between July and December. The peak of fruit abundance of bird-dispersed species occurred between May and July, which also coincides with the breeding season of resident frugivorous birds such as hornbills, barbets and hill myna.

(b) **Hornbill Diet:** Hornbills were recorded to consume fifty-three plant species (including eight fig species and three liana species) mainly belonging to the Lauraceae, Meliaceae, Annonaceae, and Myristicaceae. The three major food types were non-fig fruits (berries, drupes, arillate dehiscent capsular fruits), figs, and animal matter such as beetles and crabs. Data analysis is currently in progress to look at diet breadth, selectivity, overlap between the three sympatric species, the Great hornbill (*Buceros bicornis*), Wreathed hornbill (*Aceros undulatus*), and Oriental pied hornbill (*Anthracoceros albirostris*).

(c) **Seed Dispersal:** The effectiveness of three species of hornbills as seed dispersers was examined. It appears that hornbills are possibly sole dispersers of several large-sized fruits of some plant species. Seeds



Seeds dispersed by hornbills

Aparajita Datta

regurgitated by hornbills are viable and germinated more successfully compared to control seeds in five of the food species, while in others there was no detectable difference. The relatively long gut-retention time of ingested fruits and the propensity of hornbills to move away from fruiting trees after harvesting fruit suggested that they disperse seeds away from the parent trees. Seed deposition patterns under nest and roost trees are spatially contagious compromising the quality of dispersal due to increased seed predation and density dependent mortality.

Data on the breeding biology, nest site selection and communal roosting are being analysed. The three hornbill species showed a high degree of nest tree species selectivity for a single tree species *Tetrameles nudiflora*, an emergent deciduous softwood tree that is relatively common in lowland foothill forests. The great hornbill uses significantly larger cavities than the two smaller species. Cavity size seemed to be the main variable that separated the three species in nest site choice.

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

Investigator: Dr. N.P.S. Chauhan

Researchers: Shri Harendra Bargali and Shri Naim Akhtar

• Date of initiation : 20.02.1998

• Total budget allotted : 14.64 lacs

The project aims to study the ecology and management of problematic sloth bears in North Bilaspur forest division. The objectives of the project are to prepare habitat maps and quantify vegetation composition and structure within each habitat, assess

the distribution and population density of sloth bear in the study area, quantify habitat use and ranging patterns of sloth bear using radio-telemetry, assess seasonal changes in the sloth bears' dietary intake, evaluate human-bear conflicts and formulate recommendations for their mitigation. The study will help in developing conservation and management plans for sloth bears in this region.

The data analysis, compilation and report writing is in progress and will be completed by November 2001.

In the Pendra and Marwahi ranges of the study area, the forests are highly fragmented and scattered. There are chains of rocky outcrops with boulders which provide very good den sites for bears, but habitations surround most of these. The data on vegetation composition and structure were collected using line transects. The data are being analysed to develop vegetation and land-use maps and for change detection using satellite imageries and thematic maps.

In the entire forest division, 122 villages out of 178 are affected by bear-human conflicts. A total of 395 cases of human mauling and killing took place in this division from 1973 to 1998. Although human casualties occurred in all months, there were more cases in August, September, October and January. In most encounters, human beings were seriously injured, particularly in the face, scalp, eyes, ears, leg and arm muscles, and in some cases died. Among victims, injuries on hands and legs were mainly due to biting, whereas the injuries on forehead, face and the rest of the body were mainly caused by claws. In six cases, injuries were found on body. There were nine and twenty-one cases of head, body and leg, hand injuries respectively. Eleven cases were recorded in which bears attacked by charging on hind legs. In one case of human killing, bears ate the body first from hip and thigh and then other parts. Sixteen casualties occurred when mother and cub(s) were together; twelve attacks occurred when bears were alone and nine cases occurred when bears were in group of two or three. Except in one case, only one bear from the group attacked the victim. Information on attacking behaviour of the sloth bear and nature of human injuries was collected. In twenty-two cases, the sloth bear charged spontaneously running on fore and hind legs, pushed down their victims throwing

saliva and then repeatedly attacked.

From April to June, 1999, six sloth bears were radio-collared in Pendra and Marwahi ranges. Later two radio-collars fell off, and presently four bears with collars are being monitored to study their habitat use, activity and ranging patterns.

Since most of the natural habitat for bears in this area has been lost, there seems to be no future for the bears in the area. Therefore, relocation of these bears to some suitable area, for example Achanakmar Sanctuary, could be done on an experimental basis. From the baseline information on land-use patterns, changes in vegetation cover and bear ecology, a comprehensive management strategy to mitigate this human-bear conflict will be evolved and submitted as an outcome of this study.

EXTERNALLY FUNDED RESEARCH PROJECTS

US Fish and Wildlife Service-Phase II

* Identifying potential areas for conserving biodiversity in the Indian Himalayas

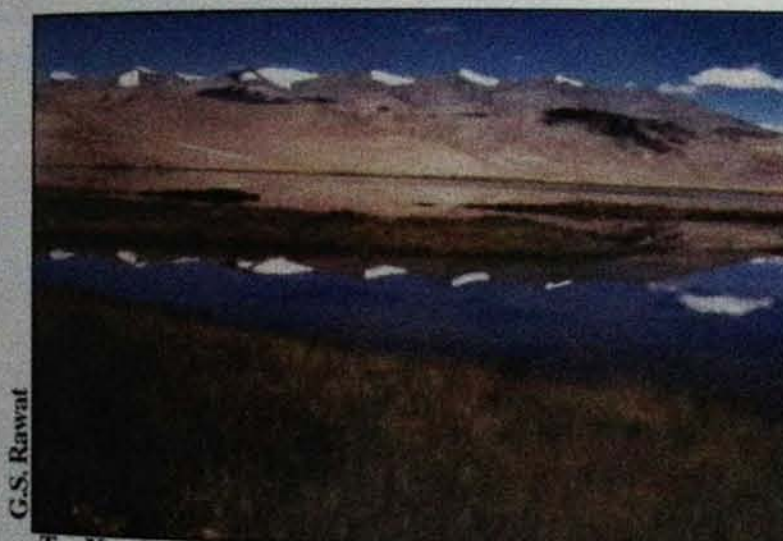
Investigators : Dr. V.B. Mathur, Dr. R.S. Chundawat, Shri Qamar Qureshi, Dr. Y.V. Bhatnagar (WII), Dr. Don Hunter (US Geological Survey, Midcontinental Ecological Science Centre, Fort Collins, USA) and Dr. Rodney Jackson (International Snow Leopard Trust, Seattle, USA)

Researchers : Shri Rashid H. Raza, Ms. Meera A. Ommen and Shri R. Jayapal

• Date of initiation : 01.10.1995
• Total budget allotted : 45.61 lacs

The project was initiated with the goal of assessing the adequacy of the protected area network in the Indian Himalayas, 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 targeted 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. The project has also tried to develop techniques based on Remote Sensing (RS) and GIS combined with field surveys to identify areas of high conservation importance. Studies on the avifaunal component have revealed that the broad-leaved habitats across the altitudinal gradient have a highly distinct bird composition while the conifer habitats have a more generalized bird composition. A low elevation element, a mid-mountain and a high altitude element in the bird species distribution is clearly discernible in Western Himalayas. Species diversity shows a distinct hump-shaped pattern both at local and regional scales, but differs in peaks – between 2600 and 2700 metres in Kedarnath Musk Deer Sanctuary and between 1500 to 2000 metres in Western Himalayas. Bird diversity shows a tendency to be higher in areas of



Tso Kar Basin, Eastern Ladakh

intermediate vegetation diversity. Vegetation composition alone can predict bird community composition with structure being of low importance. The socio-economic component of the study has characterized the demographic and land use patterns in the Western Himalayan states of Uttaranchal and Himachal Pradesh. A total of 21 districts, 152 tehsils, 167 blocks and 32,490 villages have been included in the socio-economic database and the data are being subjected to statistical analyses: Profile Analyses (summary statistics and graphical exploration), Pattern Analysis (factor analysis and hierarchical clustering), and Correlation Analysis (rank correlations and association measures). The report of the project will be finalized by December, 2001.

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

Investigators: Dr. A.J.T. Johnsingh, Dr. S.P. Goyal, Dr. G.S. Rawat, Dr. Asha Rajvanshi (WII), and Dr. Paul Krausman, (School of Renewable Natural Resources, University of Arizona, USA)

Researchers: Shri A. Christy Williams, Ms. Aparajita Hajra, Shri Anil Kumar Singh, Shri Joy Das Gupta

• Date of initiation : 01.10.1995
• Total budget allotted : 38.88 lacs

The objectives of the project are : (i) Prepare habitat maps for Rajaji-Corbett National Parks using remote sensing and quantify vegetation composition and structure within each habitat, (ii)

Determine the distribution patterns of goral and elephant, and estimate densities, (iii) Quantify biotic pressures exerted by gujjars and villagers and establish grades of habitat for goral and elephant based on these pressures, (iv) Quantify habitat use and ranging patterns of goral and elephant using telemetry, (v) Determine nutritional compositions of diets, and (vi) In association with objectives 1-5 describe patterns of distribution of other ungulate species such as barking deer (*Muntiacus muntjac*), chital, sambar (*Cervus unicolor*), wild pig (*Sus scrofa*), and nilgai (*Boselaphus tragocamelus*).

Progress : During the five years of work, we concentrated our activities on collecting information on habitat characteristics, elephant population structure and habitat use, abundance and distribution of ungulate species and socio-economic aspects of the people in and around Rajaji-Corbett National Parks. As proposed in the project, goral was not radio collared as there was a delay in procuring radio transmitters. Final report of the project is being compiled and it is planned to conduct a one-day workshop for the forest department in the first half of December 2001.

Findings: Digital data received from the Indian Remote Sensing Satellite – IC (IRS – IC) were procured and analysed at Regional Remote Sensing

Service Centre, Dehradun, to prepare the vegetation and terrain maps as components of GIS database. The vegetation of the intensive study area (Rajaji-Corbett corridor) was analysed for community composition, diversity and structure for all the three layers: canopy (tree), lower storey (shrub), and ground (grasses and herbs). Characteristic species, importance value indices for trees, density and abundance values for all woody species have been documented. It was found that most of the old and recent plantation areas were infested by exotic weeds such as *Lantana camara*, *Cassia tora* and *Parthenium hysterophorus*. Areas under old *Dalbergia sissoo* plantation, however, showed signs of natural regeneration and recovery towards a dry deciduous forest. Regeneration status of important elephant food plants such as *Mallotus philippinensis*, *Dendrocalamus strictus* (bamboo), *Grewia elastica*, *Bridelia retusa* and *Bauhinia variegata* have been assessed.

Information on elephant demography and elephant movement was collected in relation to disturbances and habitat use. We used mark re-sight methods and estimated a population of about 188 elephants (95% CI= 139-248) in Rajaji-Motichur forests and the adjoining forest areas to the west of the Ganges River. We calculated an inter-calving period of 4.23 years which was similar to the inter-calving reported from other studies in India. Monitoring of seven radio collared elephants for a period of one to two years indicate that male and female home ranges varied from 188 to 407 km² and 183 to 326 km² respectively. Females with young calves used areas with lower cattle densities. This indicated that females had to choose between secure and undisturbed areas and areas with higher food densities and diversity.

Chital, sambar, barking deer, goral, nilgai and wild pig are the major prey species for tiger in this area. We compared three methods (direct, pellet and track counts) for developing simple protocols for monitoring abundance of these species. Discriminate function analysis of track measurements of ungulates (n=397) was done and tracks were successfully differentiated. The correlation of track index with encounter rate has given better results than the pellet groups in getting

comparable results in direct counts. This might be due to the uniform distribution of tracks as compared to the pellet groups.

Biotic influences by Gujjar on habitat was determined for evaluating long-term implications on park habitats. Around 66 to 70 per cent Gujjar *deras* and livestock are primarily located in the southern part of Rajaji National park and are unevenly distributed across eight ranges. As a result, the southern part of RNP faces maximum grazing pressure. The Gujjar used to migrate in past but the process of migration is now almost non-existent. Data revealed an exponential growth of 50% in the Gujjar population during a decade.

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

Investigators: Dr. Ravi Chellam, Shri B.C. Choudhury (WII), Dr. Ajith Kumar (SACON), and Dr. Barry Noon, Department of Fishery and Wildlife Biology, (Colorado State University)

Researchers: Shri N.M. Ishwar, Ms. Divya Mudappa and Shri Karthikeyan Vasudevan

- Date of initiation : 01.10.1995
- Total budget allotted : 40.81 lacs

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 Kalakad-Mundanthur 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 (i) and (ii) 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.

Much of the fieldwork under this project in KMTR and Anamalais was completed in the previous year itself. During April and May 2000, a survey of small carnivores using camera traps was conducted in the rainforest fragments of the Anamalais. All the three researchers were occupied for most of the year with the data entry and analysis. Karthikeyan Vasudevan submitted his Ph.D. thesis entitled "Amphibian species assemblages of the wet evergreen forests of Southern Western Ghats and the effect of forest fragmentation on their diversity" in December 2000 at Utkal University, Bhubaneswar, Orissa. N.M. Ishwar submitted his Ph.D. thesis in February 2001 at FRI Deemed University. The title of his thesis is, "Reptilian species distribution in response to habitat fragmentation and microhabitats in the rainforests of southern Western Ghats, India". Divya Mudappa is in the final stages of completing her Ph.D. thesis (on small carnivores).

Divya Mudappa attended the Third International symposium-workshop on frugivores and seed dispersal held at Sao Pedro, Brazil in August 2000. She presented a paper, "The brown palm civet as a frugivore in the tropical rainforests of the Western Ghats, India". She then proceeded to work with Dr Noon, the American collaborator at Colorado State University, refining her data analysis and writing the results.

A survey of rainforest fragments in Kerala for reptiles and amphibians commenced in February 2001 and is scheduled to be completed by June 2001. This survey aims to identify rainforest fragments in Nelliampathy hills, Munnar and Thenmala hills for sampling herpetofauna and to validate the models developed using the data from Anamalais. Methods that have been adopted are similar to the ones already used in KMTR and the Anamalai hills and include quadrats (which will be laid following the protocol of Adaptive Cluster Sampling), stream and forest transects. At least six rainforest fragments have been identified for sampling in the Munnar area and these were

interspersed with tea and eucalyptus plantations. An integral part of this survey is the photo-documentation of the species and landscapes encountered. This is a continuation of the photo-documentation that was undertaken earlier in KMTR and Anamalais.

The fragments sampled were in the altitude range of 1500 to 2100 metres. It is interesting that many species of amphibians recorded from here are the same as those recorded from similar altitudes in Anamalais. A species of Bufonid and Rhacophorid collected from the Munnar Forest Division are likely to be new species. The rare endemic reptile *Salea anamallayana* was encountered very frequently in these forest fragments.

The future plans for this project include the completion of the survey, digital archiving of all the images, and planning for a CD-ROM on the



Cnemaspis sp. found in tropical rainforests of Western Ghats

Saranakumar

herpetofauna of the rainforests in the southern Western Ghats. The publication of the final report, and scientific papers in peer-reviewed journals, and workshops in Tamil Nadu and Kerala, in collaboration with the state forest

departments to deliver the research results and recommendations for conservation action are also envisaged.

* **Conservation of the Indian Wolf**

Investigators: Dr. Y.V. Jhala

Researchers: Dr. Dinesh K. Sharma, Shri Bharat Jethva and Ms. K.V.R. Priyadarshini

- Date of initiation : 15.03.1995
- Total budget allotted : 64.66 lacs

The major objective of this research project is to gain an 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.



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 modern techniques of radio-telemetry are being used to collect data on wolves, sympatric carnivores like jackals and hyenas, and prey species such as blackbuck and chinkara. Rare and endangered carnivores like the caracal are also being studied. Practical aspects of human-wolf conflicts such as the one that occurred in eastern Uttar Pradesh where a wolf was responsible for the death of over fifty children, and economic damage caused by wolves at Hindustan Aeronautical Ltd. at Ojar have been studied in depth. Mitigation measures have been suggested. A problem wolf translocation exercise was successfully done from HAL premises last year. The translocated wolf was equipped with a radio-collar and monitored for over seven months in its new territory.

Dr. D.K. Sharma, Research Associate of the wolf project, was trained at the Conservation Genetics Laboratory of the Smithsonian Institution in molecular genetics techniques. To achieve the conservation genetics objective of the project a small genetics laboratory was established at the WII. Currently the facility is capable of extracting DNA, conducting PCR, and screening products on agrose and PAGE gels.

In the Bhal area, a radio-telemetry study suggests jackals to be a major limiting factor for blackbuck calf recruitment. Wolf and jackal predation on blackbuck adults and calves is believed to be regulating the blackbuck population of Velavadar National Park. This finding has relevance for managing over-abundant blackbuck populations in the country. In Kutch, the study suggests that wolves, hyenas, and jackals exist at relatively high densities. These high-density carnivore populations are maintained by the large livestock population of Kutch. Wolves subsist primarily by predating goat and sheep, while hyenas subsist by scavenging cattle carcasses and predating on village dogs. 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.

This research project has received funding from US-India Fund allocations of the U. S. Fish and Wildlife Service, National Geographic Society, Center for Field Research (Earthwatch), Flora and Fauna International, and National Fish and Wildlife Foundation.

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

Investigators: Dr. A.J.T. Johnsingh (WII) and Dr. Clifford G. Rice (Washington State Department of Fish and Wildlife, Olympia, WA, USA)

Researcher: Shri K. Yoganand

- Date of initiation : 01.10.1995
- Total budget allotted : 42.19 lacs

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 WII 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 bear census in India.

During previous years various aspects on the behavioural ecology of the sloth bear in Panna National Park have been reported. Fieldwork continued for the fifth year, tracking radio-collared bears and conducting habitat studies. During the monsoon, estimation of food plant and social insect colony abundance in the study area was carried out along with monitoring variations and abundance of bear sign in the study area, which will help to validate if this method could be used for bear population monitoring. All the fieldwork was completed by October 2000. Faecal analysis, data entry, analyses and writing of the final project report is being carried out now. An extension and training workshop will be held in Panna during September 2001 to disseminate the results of the study, to train wildlife managers in methods of evaluating bear habitat and monitor populations, and discuss other conservation issues facing sloth bears.



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

Investigators: Shri S.K. Mukherjee and Dr. S.P. Goyal

Co-investigator: Dr. K. Sankar

Researchers: Dr. Archana Bahuguna and Dr. S.P. Rajkumar

Project Biologist: Ms. Rina Rani Singh

- Date of initiation : 01.10.1995
- Total budget allotted : 54.37 lacs

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

During five years of study, we concentrated our activities for developing techniques to identify species based on hair structure and we covered around a hundred species out of more than three-hundred mammal species. Attempts have been made to procure hair samples of the remaining species. Once the manual of identifying species from hair is finalized, this will be sent to various Central and State Forensic laboratories along with protocols to undertake wildlife offence cases. One of the challenges faced by us is to process seized tissue samples for species identification, as most of the samples are not properly preserved. In view of the difficulties faced by the forest department for proper preservation of tissue samples in the field due to lack of proper facilities, a simple technique has been standardized which is suitable for remote forest areas. A manual (English and Hindi) for preserving tissue samples for electrophoretic work will be sent to various users.

All manuals: (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, and (iv) Epidermal derivatives in the Wildlife Trade – with special reference to identifying species from claws and beaks – are in process of being finalized. These will be made

available to various enforcement agencies as well as Central and State Forensic laboratories.

To continue developing various wildlife forensics techniques, a new project entitled "Characterization of species from bone, tusk, rhino horn and antler to deal with wildlife offence cases" has been sanctioned by TRAC of the WII.

* **Development of an Indian Wildlife Health Cooperative (IWHC) programme**

Investigators : Dr. Pradeep K. Malik (WII) and Dr. F. Joshua Dein (National Wildlife Health Centre, Wisconsin, USA)

- Date of initiation : 01.10.1995
- Total budget allotted : 58.80 lacs

Much of the efforts in last five years were concentrated on establishment of five centers in the Veterinary Colleges of Anand, Chennai, Hissar, Guwahati and Jabalpur. In affirmation of the original goals of IWHC, all five centers are providing diagnosis and investigation of disease outbreaks, information exchange, education and consultation to wildlife managers. A few of the examples are given as below:

- Diagnosis of FMD virus, Serotype 'o' in free ranging gaur in Tamil Nadu.
- Epidemiology of helminths in wild and domestic ungulates in Mudumalai Wildlife Sanctuary.
- Investigation of mortality in Peafowl due to Chlorpyrifos in agricultural areas of Haryana.
- Investigation of mortality in captive wild felids due to Sero-fibrinous pneumonia, Renukaji Lion Safari, Himachal Pradesh.
- Investigation diagnosis of mortality in wild buffaloes in Kaziranga National Park due to Pasteurellosis.
- Workshop on "Monitoring Health of Free Ranging Animals" for frontline staff in Panna National Park, Madhya Pradesh.

A small project on "Retrospective Survey of Diseases in Free Ranging and Captive Wild Animals" was initiated to collect secondary data of mortality in wild fauna in both free ranging and captive wildlife in India. The collected data being compiled will be available to PA managers for better preventive measures against infectious diseases in wildlife.

A two-week workshop on "Health Management of Wild Animals" was also organized for the faculty members of Veterinary Colleges, to provide support for the teaching of wildlife health as well as services to state forest departments and protected area managers. The course was attended by 29 faculty members from fifteen Veterinary Colleges in India.

* Planning and Development of Interpretive Facilities in Panna National Park and Corbett National Park

Project Coordinators: Shri U.K. Bhattacharya and Shri B.C. Choudhury
Site Co-ordinators (Panna): Smt. Bitapi C. Sinha and Field Director, Panna Tiger Reserve

Site Co-ordinators (Corbett): Shri B.C. Choudhury and Field Director, Corbett Tiger Reserve

USFWS Counterparts: Gary Stolz (Refuge Manager, US Fish & Wildlife Service, Texas, USA) and Gayle Hazelwood (Chief of Interpretation, Martin Luther King, Jr. National Historic Site, Atlanta, USA)

- Date of initiation : 01.10.1995
- Total budget allotted : 119.91 lacs

The process of Interpretation Planning for both Panna and Corbett Tiger Reserves continued during the reporting year. The progress of work for the Corbett Tiger Reserve was slow due to the administrative adjustments related to the creation of the new state of Uttaranchal. Work related to collection of materials, however for the Kaladhungi Museum was begun and several international and Indian visitors to the museum who had some association with Jim Corbett were contacted for their contributions to the museum.

During the reporting year, discussions with the Uttaranchal Forest Department has been initiated for the inclusion of Shri Rajiv Bhartari as Site Co-ordinator for works related to the Corbett Tiger Reserve.

With respect to Panna Tiger Reserve, the renovation work of the Nature Interpretation Centre with ancillary cafeteria-cum-kiosk and guard hut, have progressed considerably to make it suitable for

interior exhibits. In addition to installing hoarding at Khajuraho, bilingual signages that tells visitors what to do and what not to do, have been installed. These signages are basically to test the efficacy of materials to withstand the harsh weather of Panna Tiger Reserve. The material that withstands the weather best will be used for all future signages.

The field researcher at Panna Tiger Reserve has completed the compilation of an inventory of resources that could be interpreted. The inventory of resources is now in preparation.

The photo documentation work with respect to landscape, geological features, habitats and the flora and fauna of Panna National Park was initiated. This exercise intends to create a photo resource library to be used in project as well as in future.

In the capacity building sector, a core group of frontline staff of Panna National Park were shown interpretation facilities at Van Vihar National Park, Manav Sangrahalaya and Sanchi Heritage Sites. On the publication of resource material, a checklist of birds for Panna National Park has been completed and is ready for production.

USDA Forest Service

* Management of Forests in India for biological diversity and forest productivity – A New Perspective

Investigators: Shri V.B. Sawarkar, Dr. P.K. Mathur, Shri Ajai Saxena, Shri D.V.S. Khatri, Shri Sugato Dutt, Shri Sanjay Srivastava (WII); Dr. Bruce Marcot, Mr. Richard Holthausen, Dr. John Lehmkuhl, Dr. Martin Raphael, Mr. Tom Darden (USDA Forest Service), Shri Dhananjay Mohan (IGNFA) and Shri P.C. Tyagi (FSI)

Researchers: Dr. Anjana Pant, Shri Harish Kumar, Shri Ashish Kumar and Shri T.K. Sajeev

- Date of initiation : 18.01.1996
- Total budget allotted : 134.56 lacs

The objectives of the project are : i) To assess, document and map as appropriate for the kinds, extent and distribution of plant and animal diversity in selected forest sites through rapid survey methods

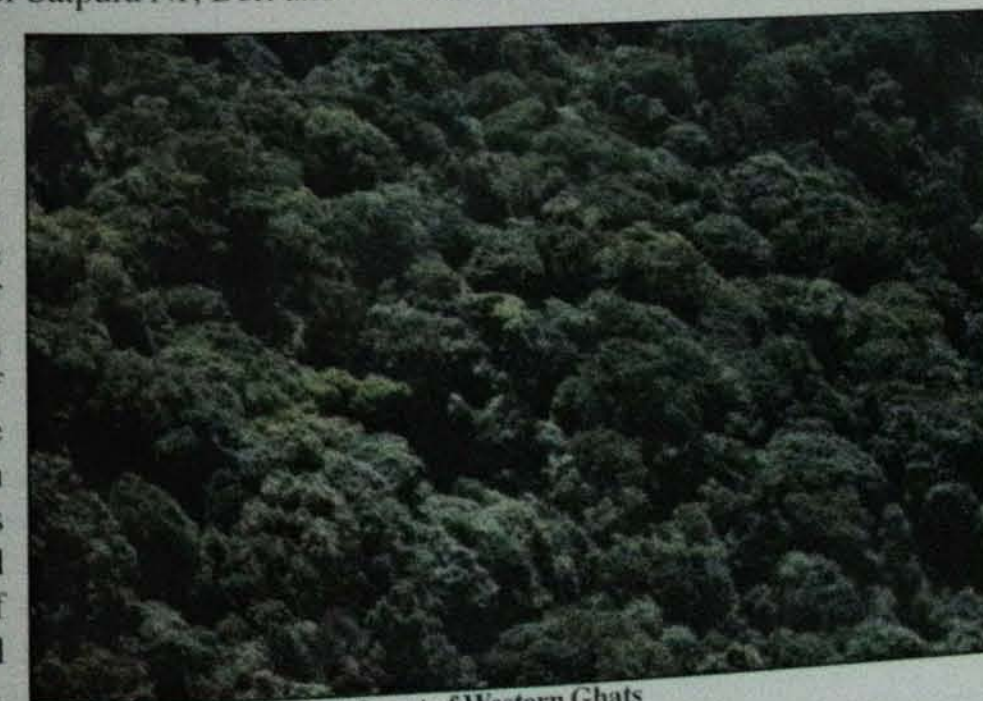
(ii) Use the existing status and habitat relationships information to set up baseline information, (iii) On a stand to landscape level perspective, evaluate the impact of the existing variety of forestry practices, use of forest based resources by local people including the methods of harvests and collection, fires, operation of varied concessions and rights on micro-habitat elements, key habitats, species, communities, the overall forest productivity and diversity, (iv) To rapidly assess 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. These 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 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) Conduct workshops and seminars to share experience and disseminate knowledge.

The Study Sites: The study sites are (i) Garo Hills Conservation Area (GCA) comprising the Balphakram NP, Siju WLS and outlying Reserve and Community forests in Meghalaya, (ii) the Terai Conservation Area (TCA) that comprises Dudhwa Tiger Reserve and forests of north and south Kheri Forest divisions in UP, (iii) the Satpura Conservation Area (SCA) consisting of Satpura NP, Bori and Pachmarhi WLS, managed forests of Hoshangabad, north, west and south Betul forest divisions of MP besides the Melghat Tiger Reserve and managed forests of east, west and south Melghat divisions of Maharashtra, and (iv) the Anamalai Conservation Area (ACA) that includes the Anamalai WLS and managed forests of Kodaikanal and Dindigul divisions of Tamil Nadu. These sites represent a

diversity of ecological, managerial, socio-cultural and economic challenges necessary for testing a range of technological templates and options, the development of management tools and the final product in the form of field guides. The following are the accomplishments during the period under report:

Landmarks: (i) Biological and social impact assessments are in operation. For the first time areas on a landscape scale have thus been taken up for rapid assessments, (ii) The project framework is geared to demonstrate operational strategies for the maintenance of biological diversity in the field which especially address the production forests and a new approach to establishing wildlife habitat relationships undertaken for the first time, (iii) Field level workshops and a national level workshop conducted to demonstrate the working of the new perspective, (iv) Field staff trained in the techniques of data collection under the rapid assessment system, (v) Contribution to development of chapters and section on conservation of biological diversity and wildlife in the proposed National Code for Forest Working Plans initiated by the Government of India.

ACA: Vegetation assessment was conducted in nested plots on transects. Five metre diameter plots were used to estimate habitat use by large mammals from their indirect evidence. Line transect and point count methods were applied to study changes in avian communities. Sixteen new species of birds were recorded, two of which are endemic to Western Ghats. Mapping in the GIS Domain continued.



A view of evergreen rainforest of Western Ghats

S.K. Srivastava

GCA: Work focussed on landscape composition. Sub-units based on boundaries of PAs, managed forests, community lands and administrative units were considered. IRS 1D Satellite, LISS III digital data for February 2000 was used to generate maps of vegetation/land-use classes. Potential areas for conservation priorities are being identified. The objective is to establish the most appropriate habitat connectivities with PAs being central to such conservation strategy.

SCA: The Melghat tiger reserve area is being mapped in several layers of GIS domain. Impact of five silvicultural practices on thirteen tree species of specific importance was accomplished. Analysis is being done to relate vegetation change to habitat use of larger mammals.

TCA: Seventeen vegetation/land-use categories were delineated. Seven main vegetation types were identified for assessment. Sampling was undertaken in relation to patch size and patch-species area curve. Assessment of 601 quadrates was accomplished. The frequency, density, basal area, IVI of 96 tree species were worked out. Grassland management experiments continued with focus on two sympatric grassland obligate species, the swamp and the hog deer. The field data on above-ground biomass (ABC) for different grass species under different treatments is being analysed.



S. Wilson

Phaius tancarvilleae

Collaborative Ladakh Field Research Project (CLFRS)

* **A collaborative project of WII, the International Snow Leopard Trust, and US Fish and Wildlife Service**

Investigators: Dr. V.B. Mathur, Dr. Yash Veer Bhatnagar, Shri Qamar Qureshi, Dr. R.S. Chundawat (WII), Dr. Rodney Jackson (International Snow Leopard Trust) and Dr. Don O. Hunter (US Geological Survey, Midcontinent Ecological Science Centre, USA)

Team Members:

Research Components: Dr. G.S. Rawat, Dr. B.S. Adhikari (Vegetation), Dr. C.P. Kala (Traditional Health Practices), Dr. V.P. Uniyal (Insects), Shri S.P. Vijayakumar, Shri K. Vasudevan, Shri B.C. Choudhury (Herpetofauna), Shri Pratap Singh, Shri R. Jayapal (Birds), Dr. Yash Veer Bhatnagar (Large Mammals), Dr. S.A. Hussain, Dr. R.K. Singh (High Altitude Wetlands), Shri R. Jayapal (People-Wildlife Conflicts)

Workshops: Dr. Yash Veer Bhatnagar, Dr. S. Sathyakumar (Snow Leopard Information Management System and Techniques Training Workshop), Shri S.K. Mukherjee, Shri V.B. Sawarkar, Dr. V.B. Mathur, Dr. Yash Veer Bhatnagar (Management Planning Workshop)

- Date of initiation : 01.10.1999
- Total budget allotted : 15 lacs

The project duration is two years and it started in October 1999. The Wildlife Institute of India has had a long-standing interest in Ladakh; the primary region of focus, however, was mostly the Hemis NP. This area has been receiving continued research attention from the WII since the early 1980s and aspects pertaining to the biology of bharal and snow leopard plus the distribution of other wildlife have been studied in detail. From 1997 to 1999 the Institute conducted short surveys on the vegetation, birds and mammals of Ladakh in some regions under the Himalayan Biodiversity Project. Some equally important areas in Ladakh and other taxa occurring there, however, received little attention in terms of research and conservation

efforts from the Institute and other organizations in general. It was therefore proposed to take up such areas and cover hitherto less studied aspects for biodiversity conservation in the region. Baseline surveys conducted during 2000 are to be continued until September 2001. Based on the results in the initial two years it is proposed to continue research in a more focussed manner on selected issues. It is hoped that the multidisciplinary research and training will significantly contribute in enhancing knowledge of the region and aid in the identification of gaps in PA coverage in Ladakh. This could ultimately lead to the development of a comprehensive conservation action plan for Ladakh Trans-Himalaya. The basic objectives of the project are as follows: (i) To establish baseline status and distribution of different taxa from selected regions of Ladakh and gather 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 begin the implementation of select conservation initiatives.

A series of baseline surveys were undertaken by WII scientists and researchers between June and August 2000 on eight components: vegetation, medicinal plants, insects, herpetofauna, birds, mammals, wetlands, and people-wildlife conflicts. The surveys have revealed aspects of species presence and distribution, including range extensions, and possibly some new descriptions.

The vegetation survey described species composition and vegetation cover along about 760 km long 'gradsect' from the Rohtang pass in the Pir Panjal range through Lahul, Changthang, to the Karakoram range in Nubra and also parts of the

Kargil mountains. Distinct physiognomic units and communities from the various latitudes and altitude gradients have been described, including vegetation along high passes and high altitude lakes. Forty-three practitioners in local medicine called 'Amchis' were interviewed, under the traditional health practices survey, to gather information on the local medicinal plants, their status, uses and any other information about the practice of traditional medicine in Ladakh. The use of 286 plants, 38 animals and five minerals has been documented during the survey.

The insect and herpetological survey covered a wide range of altitude and plant communities from 2,800 to 5,500 metres. A variety of sampling techniques was tested. Approximately thirty families of insects, representing seven insect orders

have been identified so far and the species level identification is still in progress. A preliminary analysis of vegetation-insect community associations has also been carried out. The herpetofauna

survey has identified six species of amphibians and reptiles belonging to six genera and five families. Descriptions of the species include data on morphometrics, habitat and distribution.

The bird survey covered the stretch from Eastern Ladakh to the Zaskar region in the south, a region hitherto less studied. The survey recorded 97 of the 110 breeding bird species reported so far from Ladakh. The altitudinal distribution and habitat relationships of these species have been described plus some new breeding records and range extensions. Significant threats to bird communities have been enumerated.

Under the large mammal survey over 1200 km in Eastern Ladakh was conducted by vehicle to locate populations of endangered species on the Tibetan



Yellow swallow tail, a Himalayan butterfly

V.P. Uniyal

argali, Tibetan gazelle, chiru, wild yak, and kiang. A survey of the Nubra region was undertaken to assess the status and distribution of the endemic Ladakh urial, and the feral population of the Bactrian camel within the Karakoram wildlife sanctuary. Issues pertaining to the conservation of these endangered large mammals were identified.

The wetland team surveyed six high-altitude lakes (Tso Moriri, Tso Kar, That Sang Karu, Kiyun Tso I, Kiyun Tso II and Pangong Tso) and major river systems (Indus, Nubra, Shyok, Zaskar and Suru) for their physicochemical properties. Water samples were analyzed on the spot for conductivity, total dissolved solids, salinity, pH, dissolved oxygen, nitrate, nitrite, ammonia, phosphate and sulfite. Information on the distribution and abundance of breeding birds along the lakes, and the status of otters along the rivers was collected for relating to habitat quality.

Under the Socio-economic survey, livestock depredation by wild predators in the Zaskar region was investigated and it was found that the Tibetan wolf was the primary predator in the region but that brown bears were also involved in some depredation cases.

Information regarding wildlife population and status from the PAs of Ladakh is very scarce and invariably outdated. We recognized that this emerged from lack of trained manpower and funds with the Jammu and Kashmir Wildlife Department, which is primarily responsible for collecting such information from their PAs. In order to overcome this limitation to some extent a group of ten frontline staff from the Jammu and Kashmir Department of Wildlife Protection were trained from May 19 to 31, 2000, in the use of wildlife monitoring techniques based on the Snow Leopard Information Management System (SLIMS) developed by the ISLT. After two days of lectures on various aspects of wildlife monitoring, hands-on training was provided when the entire team surveyed the Shang catchment of the Hemis NP.

There is urgent need to discuss pertinent conservation issues relating to wildlife conservation in the Indian Trans-Himalaya and to develop guidelines for

formulating Management Plans for the PAs in the Greater Himalaya and Trans-Himalaya, with special reference to snow leopard areas. As per the perceived need for scientific management of PAs in the Indian Trans-Himalaya, the WII conducted a Management Planning Training Workshop in Ladakh in August 2000. The programme for this workshop included three days of presentations and discussions by various resource persons regarding the conservation issues, existing scientific knowledge, and management options. This was followed by a field trip to the Hemis NP by the team to obtain hands-on experience of the issues. National and international experts on the region, local government and non-government organizations participated in the workshop.

The final report of the first year's work has been compiled, and proposals are being reviewed for the work during the second year. It has been decided to include three new research components during 2001 – fish fauna of streams and rivers in Ladakh, brown bear survey with people-brown bear conflicts in Zaskar, and vegetation mapping in Ladakh. In addition the wetland component includes work on breeding birds on selected lakes in Ladakh.

FREEP-KMTR Project

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

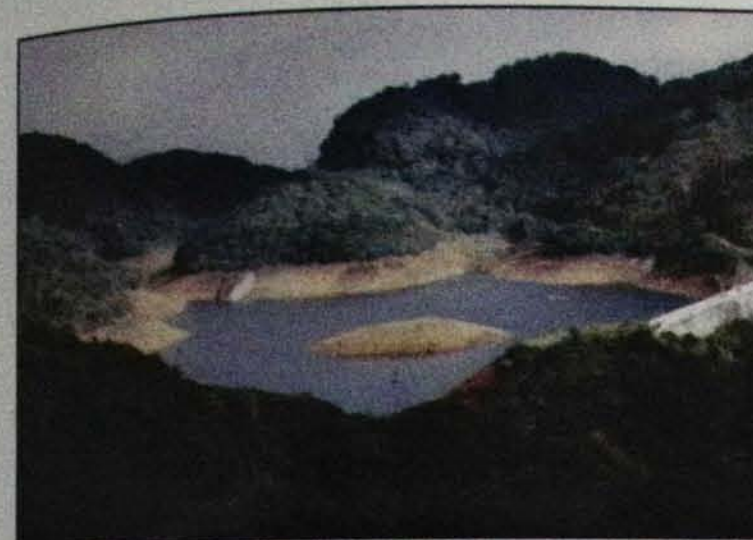
Investigators : Shri S.K. Mukherjee, Shri V.B. Sawarkar, Dr. A.J.T. Johnsingh, Shri S.K. Srivastava, Dr. A.K. Gupta and Shri S.B. Banubakode

Researcher : Ms. Jayanti Ray

• Date of initiation : 01.03.2001

A six-month project under World Bank assisted FREEP Project has been initiated to consolidate available studies on the biodiversity of KMTR and its various social, ecological and cultural values, and to assist the Field Director in revision and upgrading of the Management Plan. On the basis of a consultative dialogue it is proposed to develop prescriptions for managing various biotic as well as socio-economic pressures on the park and assist in the consolidation of the management plan. It is also

envisaged that the ecodevelopment concept be made a permanent feature of management in the future, taking into consideration the experience gained so far. A special feature would be to develop a long term HRD perspective as well as to integrate the PA management concerns into regional (cross



A view of evergreen rainforest of KMTR

boundary) issues and regulations pertaining to the southern Western Ghats of which the park is an integral entity.

PROJECTS INITIATED

WII Grant-in-Aid Projects

*** Current Distribution of Hog Deer (*Axis porcinus*) and its Status in India - Phase I**

Investigator: Dr. V.B. Mathur

Researcher: Ms. Tanushree Biswas

The project was initiated in May 2000. The objectives of the project are: (i) to assess the present distribution range of Hog Deer (*Axis porcinus*) and its status in India, and (ii) to identify potential habitats for this species. As part of the distribution status survey, the researcher surveyed five districts in Uttar Pradesh from June to July, 2000. As the project has a Remote Sensing component, the researcher was deputed to take a short course in 'Remote Sensing/GIS Applications in Forest Management' at the IIRS, Dehradun. Consequently, survey work was initiated in North-East India covering the states of West Bengal,

Assam, Tripura, Arunachal Pradesh and Manipur. The report of the project will be finalized by December 2001.

*** 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, Dr. Ravi Chellam and Dr. Jagdish Krishnaswamy

Researcher: Shri R. Jayapal

The project commenced in February 2001. The project aims to study interaction among biological, environmental, and socio-economic factors to find an integrated

spatial protocol for conservation planning in the Central Indian Highlands. We opted for birds as the reference taxon, and ecological biogeography of Central Indian avifauna is intended to be studied at the primary data level to investigate the ecological and environmental correlates of their distribution patterns. These correlates will be the basic constructs of the spatial protocol. Socio-economic parameters (human demography, economic profiles, and land-use patterns – forestry and agriculture) and environmental parameters (topography, drainage, climate, soil resources, and natural vegetation) are the supplementary thematic data that will aid biological (avian) pointers in developing the spatial conservation protocol. This protocol will be used to assess the existing PA network and to identify gaps in it, to prioritize potential new sites for conservation, and also to evolve alternatives to the existing conservation framework. The duration of the study is five years, and the study area spans three states: Madhya Pradesh (seven Forest Circles and forty Forest Divisions), Maharashtra (three Circles and thirteen Divisions), and Chhattisgarh (one Circle and five Divisions).

Developing spatial and aspatial databases for Central Indian Highlands for different components is the primary objective in the first phase of the study. Towards this aim, several spatial data were

S.K. Srivastava

procured in this period. Twenty topographic maps of 1:250,000 scale, 35 digitally enhanced vegetation maps, also of 1:250,000 scale, and fifteen sheets of soil resource maps at 1:500,000 scale for Central India were obtained from the concerned government agencies. Digitization of all these spatial data, that will enable us to produce various thematic layers, is under way. We are also in the process of acquiring long-term data (from 1960 onwards) on climatic variables for all the stations located in the Central Highlands. Furthermore, we have already begun procuring remotely sensed spatial data from the National Remote Sensing Agency. The satellite imageries for which orders have been placed include WiFS (1C) scenes for 1998-2001, IRS 1D - LISS III data for October-November 2000, IRS/P4 OCM data, and NOAA - AVHRR imageries for September-November 2000.

Once the digitization is completed, various thematic layers will be produced in the GIS domain and spatially homogeneous units will be identified therein to evolve a sound sampling scheme for collecting primary data on bird distribution. We intend to complete this process prior to undertaking field surveys.

* **Ecology of the Asiatic wild dog or dhole (*Cuon alpinus*) in Central India**

Investigators: Dr. A.J.T. Johnsingh and Dr. K. Sankar
Researcher: Shri Bhaskar Acharya

This project was initiated in January, 2001. The study aims to collect information on distribution, population status, home range, habitat use, and food habits of the dhole in Kanha National Park, Madhya Pradesh. Between January and March 2001, a Research Fellow has been appointed, literature on dhole, leopard and tiger and its important prey species has been collected, and various equipment required for the project have been ordered. The Institute has requested the Government of Madhya Pradesh to grant necessary permission for the initiation of the project in Kanha National Park.

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

Investigator: Dr. S.A. Hussain
Researcher: Shri Asghar Nawab

This project was initiated in March, 2001. Three species of otters are found in India, viz. the Smooth-coated, the Eurasian, and the Oriental small-clawed otter. All three species are becoming increasingly rare outside the 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 rarely encountered outside protected areas. Lack of baseline data on the ecology of otters is one of the major constraints facing their conservation. This project proposes to study the ecology of the Eurasian otter in Corbett Tiger Reserve. 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 top predators, are often used as indicator species to assess the health of wetland ecosystems. This study attempts to assess the impacts of making of dams on otter populations, so as to formulate a model for similar studies elsewhere in the country. This study has the following objectives: a) determine the status of otters in the Corbett Tiger Reserve and in the adjacent areas between Yamuna and Sharada river system, b) identify the factors governing their distribution, c) examine habitat use patterns along the Ramganga main stream and the reservoir, d) compare the feeding habits of otters between Ramganga main stream and the Reservoir, and e) to examine the associated threat to otter populations such as parasitic load, cases of poaching, and destruction of stream habitats in the region.

A Technical Assistant has been appointed to do the field research.

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

Investigators: Dr. A. K. Gupta, Dr. Ravi Chellam and Shri Qamar Quershi
Researcher: Ms. Kashmiri Kakati

This project began in January 2001. The objectives of the project are to determine: (i) The demographic characteristics of gibbon populations living in forest fragments; and whether these populations in the forest fragments are breeding at rates similar to those in relatively undisturbed and continuous forest, (ii) The sizes and characteristics of the home ranges occupied by gibbon groups in these fragments, (iii) Any observable difference in the patterns of home range use for example travel routes, distance travelled in the fragments as compared to that in the continuous forest, and (iv) How hoolock gibbon feeding behaviour changes in response to degradation of a forest area.

Twelve reserve forests in the Digboi, Doomdooma and Dibrugarh forest divisions, Assam, were surveyed for gibbon presence. One village

woodlot was also visited where a gibbon group was found. One to four days were spent in each of the surveyed sites. Whenever gibbon calls were heard, attempts were made to home in on the groups. When a group was found, the number of members, age class and sex (definite identification for adults only), were determined.

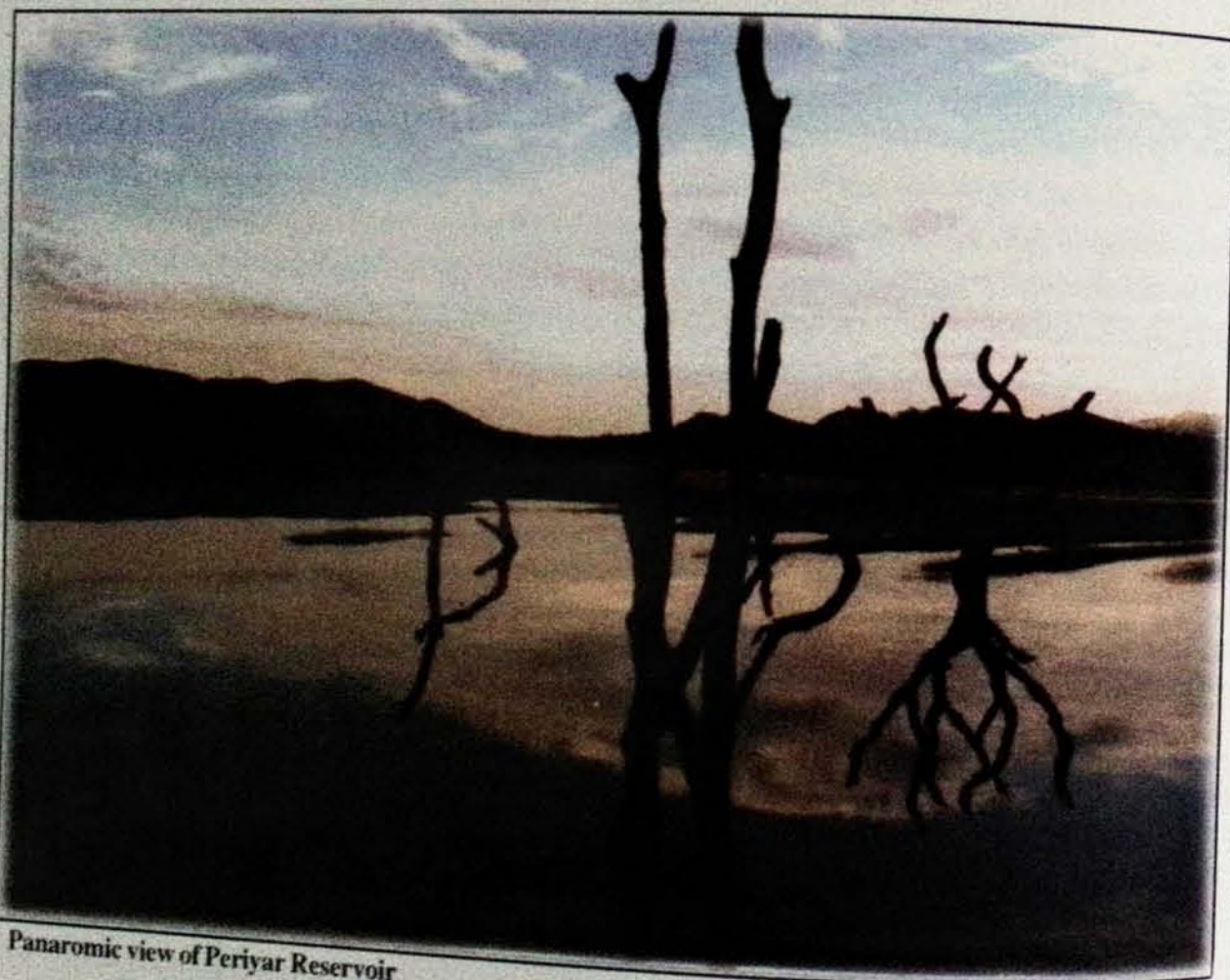
Six gibbon groups have been selected in five study sites for intensive sampling. Between January and March 2001 each group was followed for an average of five days from the time of locating them until they climbed up a tree to sleep or contact was lost. GPS locations were taken of their travel routes and food trees. Food trees and other big trees on their travel routes have been tagged. Trails were cut through the undergrowth and marked to grid the intensive study areas. Regular seasonal observations of the six gibbon groups, which are the focal groups in the five intensive study sites, will be carried out at the rate of eight days/group every season from April 2001. At the end of the intensive study, a comprehensive survey of forest fragments is planned to evaluate the conservation status of the hoolock gibbon in these forest divisions.

The Institute completed 5 research projects and initiated 5 projects. During the reporting year there were 15 ongoing projects of which 10 were externally funded. Two researchers and one staff members were awarded Ph.D. degree and four theses have been submitted and award is awaited. Twenty five research articles were published in peer reviewed national journals and ten in peer reviewed international journals. The details of various manuals, reports, books and other publications are listed under the section titled Publications.



S. Wilson

Dendrobium fimbriatum



Anoop K. R.

Panaromic view of Periyar Reservoir

Organisation



COLLABORATIONS

Collaboration with the National Geographic Television

The National Geographic Television initiated collaboration with the Wildlife Institute of India and Shri B.C. Choudhury is the faculty member working in this collaboration for experimenting the use of "Cittercam", equipment developed to record underwater behaviour of aquatic animals. The collaboration experimented with fixing the Cittercam on the Indian Gharial at the Katerniaghat Wildlife Sanctuary (KTGWS), Uttar Pradesh. Its use was first tried out at the Kukrail Gharial Conservation Centre, following which an attempt was made to capture an adult Gharial at KTGWS and fix the Cittercam so as to document the underwater activities of the Gharial as well as its basking and nesting behaviour. National Geographic Television also filmed India's efforts in Gharial rehabilitation and the morphometric dimension of some large sized Gharial which will help National Geographic Television to reconstruct the world's largest fossil crocodile from a skull recently discovered in the sub-Saharan desert. The above-mentioned work was conducted in March 2001, based on which the National Geographic Television is to release a film entitled "Supercrocs" some time in December 2001.

UNDP

GOI-UNDP Project on Strengthening Wildlife Management and Ecodevelopment Planning Capabilities in Jaldapara under Sub-Programme on Wildlife Protected Area Management in West Bengal

Under the first phase of UNDP Project Management Plans and Ecodevelopment Plans were prepared for 16 selected Protected Areas of the country through capacity building of Planning Officers of these sites and by providing technical support for plan preparations. Based on the experiences of this project, the current Sub-Programme on Wildlife Protected Area Management was initiated in October 1999 for Jaldapara Wildlife Sanctuary (West Bengal). The

programme is trying to implement an integrated management and eco-development plan in this PA, so as to develop a management planning model for protected areas which can be replicated. During this year there could be significant achievements in capacity building of the staff and the local communities under this project. Three training programmes were organized – two for staff and one for local communities. Selected Frontline staff and a few NGO motivators were trained in the concepts and skills of Ecodevelopment. This trained spearhead team was taken to Kalakad-Mundanthurai and Periyar Tiger Reserve for a field visit so as to supplement the training inputs with field experience. This trained spearhead team has initiated the process of microplanning in different villages around the sanctuary, and so far eight microplans have been prepared. The process of institution building was simultaneously started by this team and so far village level institutions in the form of eco-development committees have been established in eight villages. The process of institution building is going on in other twelve villages. At PA level and at State Level two institutions in the form of co-ordination committees have been constituted, so as to decentralise the decision making process as well as integrate the concerns of local stakeholders with the park management.

Another training programme was conducted for the local communities in microplanning during November 2000 and the participants were taken to Corbett Tiger Reserve for field exposure. Another target group for capacity building was the elephant *mahavats*. A field visit was organized for them to learn the skills of captive elephant management in Mudumalai Wildlife Sanctuary of Tamil Nadu and Kodanad Elephant Camp of Kerala. This was during March 2001.

Another important component of the programme has been PA Protection activities. Under this a network of roads (about 200 KMs.) has been upgraded, which is crucial for the protection of important species like rhino, elephant and other herbivores. The programme has also identified important areas of research which will provide necessary baseline information to be used for improved habitat management.



US-Fish and Wildlife Service

The following WII-USFWS projects (Phase – II) initiated in the September 1995 completed five years of their tenure in September 2000.

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

The mid-term review committee in October 1998 had recommended these projects' duration to be extended at no cost-extension up to September 2001, when the WII-USFWS collaborative grant No. 14-48-0009-95-934 will come to an end. All the WII-USFWS projects (Phase-II) have now been extended up to September 2001 and the respective project investigators are now completing the final reports of the projects.

Two other projects "Conservation of the Indian Wolf" and "Planning and Development of Interpretation Facilities for selected Protected Areas in India", which are operational under separate agreements will continue until December 2003. The Indian Wolf project, which was to be completed by December 2001, has been extended up to December 2003, with an additional grant of Rs. 7.5 lakh by the USFWS. The details of work conducted under each component of the project have been provided in the research section.

USDA

During the reporting period the WII-USDA Forest Service project entered its last phase. The project secured a no cost one-year extension beyond the

agreed period of five years which ended on November 23, 2000. This has enabled the project to move towards completion of fieldwork that in some cases could not progress well due to unforeseen problems. It is anticipated that the fieldwork will be completed by May or June 2001, to be followed by joint work on field guides by the respective teams of Indian and US scientists and managers. It is hoped that the findings will contribute significantly to landscape-based conservation planning and management.

IUCN World Conservation Union

Indian National Committee of IUCN Secretariat: During the Year 2000-2001, 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 IUCN had initiated this programme with the objective of linking people with nature, particularly with respect to resource use in a sustainable manner. The priority-identified region has been the Himalayas for which a planning workshop was held in Bangladesh during January, 2000. Four IUCN members in India: Indian Institute of Forest Management (IIFM), Bhopal, INTACH, New Delhi, WII, Dehradun, and G.B. Pant Institute of Himalayan Environment and Development (GBPIHED), Almora, participated in this planning workshop held in Dhaka, Bangladesh. Since the Himal region in Asia consists of Pakistan, India, Nepal and Bangladesh, (in the planning workshop) an indicative activity for India was discussed and an amount of US \$ 27,500 has been allocated for the year 2000-2001 to initiate activities in India. In December, 2000, four member-organizations namely IIFM, WII, INTACH and GBPIHED agreed to collaborate in developing a proposal within the overall ambit of 'HIMAL' strategy. The planned activities under this programme are the documentation of habitat and resource use in the Himalayas. The details of work to be carried out by the collaborative members are as under:



- Medicinal Plant Use – G.B. Pant Institute of Himalayan Environment and Development, Almora.
- Indigenous Knowledge of Resource use – Indian Institute of Forest Management, Bhopal.
- Ecotourism in the Himalayas – Wildlife Institute of India, Dehradun.

In addition, WII has also taken the responsibility of documenting high-altitude livestock grazing patterns and its sustainability in the Himalayas.

Since the work is to be conducted in the sensitive Himalayan region, however, a formal agreement is to be made amongst the collaborating member organizations after discussing the matter at the IUCN National Committee meeting, and with subsequent approval of Government of India.

The IUCN, South Asia, organized a meeting at Kathmandu, Nepal to take stock of actions by Indian collaborators in the Himal Project. Two collaborating members IIFM and INTACH participated in this meeting.

Review of IUCN World Bank Policy on Forestry: The World Bank has developed a forest sector policy. The Indian National Committee organized a consultative meeting to review the World Bank Policy on Forestry on April 13, 2000 in New Delhi. The Inspector General of Forests, Additional Inspector General of Forests (Wildlife), Director, Forest Survey of India, Director, Indira Gandhi National Forest Academy, Director, Indian Institute of Forest Management, WWF-India, and several other eminent foresters participated in this meeting. The opinions expressed by the participants were collated and communicated by the Indian National Committee Member-Secretary (Director, WII) to the Regional Director of IUCN.

SERVICES

CONSULTANCY PROJECTS

Development of Biodiversity Information Module for Uttar Pradesh Forest Department

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), 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). The FMIS being developed for the UPFD seeks to improve the current information management procedures and to make top priority the use of information technology in UPFD activities, particularly the use of state-of-the-art database management system and GIS technology. The BIM will address the information management needs of the *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 four member WII team finalized the 'Conceptual' as well as the 'Detailed' design and 'Development and Implementation Strategies' of the Biodiversity Information Module.

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. In this project WII is: (i) Reviewing and updating PA Management Plans, (ii) Providing training to Management Planning Officers (MPOs) of the seven project sites, (iii) Organizing specialized training workshops, and (iv) Developing guidelines to incorporate PA concerns into regional planning process. A team of twelve members of the WII faculty is working on this twenty-one month assignment. A training programme for Management Planning Officers (MPOs) and other field officers of the seven GEF India Ecodevelopment Project sites was organized at WII from July 10 to 14, 2000. In this programme Management Planning, Ecodevelopment Planning and Regional Planning issues and processes were discussed, and a broad planning framework was evolved. The first thematic workshop on "Remote Sensing and GIS Applications" was organized by the WII from July 17 to 21, 2000. Instructions on the Remote Sensing, GIS, GPS, Database Design were provided to the



participants from the India Ecodevelopment Project Sites. The second thematic workshop on "Habitat Management" was organized by the WII in the Gir Conservation Area, Gujarat, from November 11 to 15, 2000. As part of this training workshop, the participants also visited the Velavador National Park near Bhavnagar. In this workshop, twelve resource persons were invited to instruct on the various habitat management issues and practices. For addressing the issues of integration of Protected Area Management Plans in the Regional Perspective, a workshop on "Regional Planning for Conservation and Development in the context of Gir Conservation Area" was organized by the WII in the Indian Institute of Management (IIM), Ahmedabad, from November 7 to 9, 2000. The workshop was chaired by the Deputy Chairman, Gujarat State Planning Board and ninety participants representing parliamentarians and legislators, administrators, planners, senior forest and wildlife managers, scientists, NGOs and local communities took part. The third thematic workshop combining themes of "Research and Population Estimation" was organized by WII in Nagarhole National Park, Karnataka from December 18 to 22, 2000.

In early 2001, the Institute will be organizing the remaining three thematic workshops with a national level workshop on regional planning at New Delhi in August, 2001. The WII Project team members have provided technical assistance to the managers of the seven project sites in matters related to management planning.

Mapping of PA and surrounding areas in Pench Tiger Reserve, Madhya Pradesh

A one-year consultancy assignment on Mapping of the Protected Area (PA) and surrounding areas in Pench Tiger Reserve (PTR), Madhya Pradesh, under the India Eco-development Project was awarded to the Wildlife Institute of India, Dehradun, in September 1999, by the Madhya Pradesh Forest Department. The task included the preparation of baseline maps of the PTR and surrounding areas, consisting of features relevant to PA management and eco-development activities. Satellite imagery LISS III (digital data), Survey of India topo-sheets, soil and geological maps (1:50,000 scale) were procured. In addition to this, information on PA boundary, various administrative units, infrastructure and animal census data was obtained from PTR authorities and also through the Global Positioning System (GPS) technology. The maps were digitized

and incorporated in GIS domain. Ground truthing was carried out for the validation of the field information: soil type, geology, geomorphology, ground water potential areas, vegetation and land cover, and various PA infrastructures.

A 36-layer database in GIS domain that includes fifteen general maps, eight animal distribution maps, and twelve thematic maps and a False Color Composite (FCC) of PTR have been prepared. This spatial database will form the basis for monitoring changes in subsequent years and will also be of great use in the preparation of the management plan of PTR. The draft final report of the project was submitted in September 2000.

Building Partnerships for Biodiversity Conservation in Rajaji National Park

The project, "Building Partnerships for Biodiversity Conservation in Rajaji National Park", which started during 1996 with funding support from FORD Foundation is basically aimed at building the capacities of the frontline staff and local communities to help in conservation of biodiversity at Rajaji National Park. The project is also trying to create a platform where different stakeholders can come together and work in partnership for the protection of the park and the development of the communities residing on the fringes of the park. During the past three years, the project has been able to generate new capacities and mutual confidence between the park management and the local people, which has further been translated into the formation of eco-development committees in six pockets which aim to work both for the well-being of the park and limited local development.

As a step forward the project is trying to bring in new partners for the integrated conservation and development of the area. During September 2000 a beginning was made in this direction through a medical camp organized jointly by UNESCO Club, Dehradun, Indology Foundation, Dehradun, Rajaji Park Management, and Wildlife Institute of India, Dehradun. This camp was organized in village Ganeshpur in which more than four thousand patients were treated by a team of about fifteen doctors, each with different specializations. The camp was followed by Eye Operations for about twenty patients. This step is likely to offer a system whereby these two new partners may come forward to provide medical facilities to the communities in the periphery of Rajaji National



Park at periodic intervals. Efforts are being continued to get a few more partners for the conservation development initiatives in this area to develop a model of how conservation development linkages can be established in and around Protected Areas.

GOI-UNDP Sea Turtle Project - An Update

The GOI-UNDP Sea Turtle Project, which is being co-ordinated by the WII, was initiated in January 2000 with a rapid assessment survey of the impact of the super-cyclone in Orissa. Since then, surveys for nesting and mortality of sea turtles have been taken up in all the coastal states and in the Andaman and Nicobar Islands by various agencies. Other projects that have been initiated include a review of legislation of coastal issues, community based conservation, the use of GIS to characterize nesting beaches in Orissa, and the satellite telemetry of Olive Ridleys in Orissa. The project also includes a national workshop to evolve a conservation action management plan, and a workshop on education and awareness on sea turtles and coastal issues.

Impact Monitoring of India Ecodevelopment Project on Gir National Park and Sanctuary

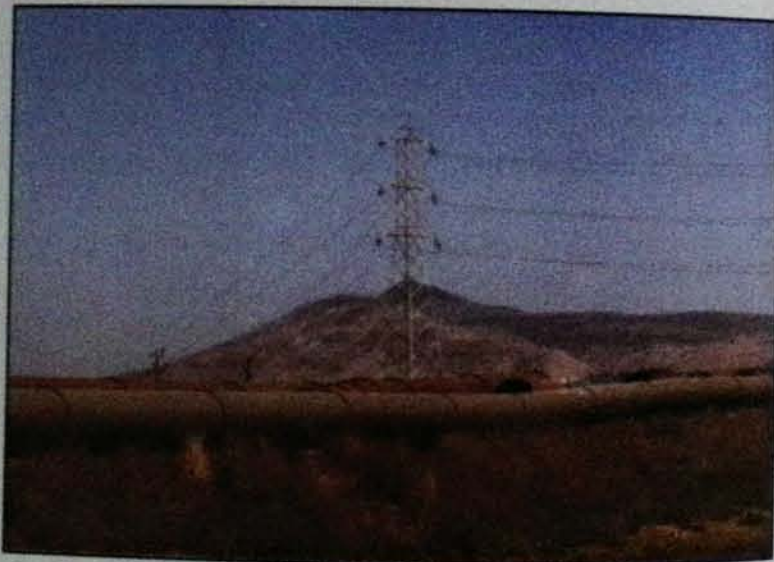
This is a sixteen month project and is likely to be extended. The project was initiated from February 2001. The source of funding is World Bank through Gujarat Forest Department. The major objective of the consultancy project is to develop, demonstrate, and implement a protocol for Gir PA that enables monitoring of: (i) Carnivores, (ii) Herbivores, (iii) Habitat and Vegetation, (iv) Impact of Management activities, and (v) to transfer this monitoring technology to the PA management staff in the form of designed protocol and training through field data collection.

A major thrust of the project is to develop a population and demographic monitoring protocol for the endangered Asiatic lion. This is aimed to be achieved through sighting-re-sighting population estimation and by radio-telemetry monitoring of 8-ten lion prides. The monitoring scheme is so designed to keep the pulse of the lion population of Gir.

Ten faculty members of the WII are consultants on this project which is being co-ordinated by Dr. Y. V. Jhala.

Ecological Impact Assessment of the Proposed Diesel Hydro Processing Unit, Bongaigaon, Assam

The WII was offered a consultancy project on the above subject by the EIL. The Memorandum of Understanding between the WII and EIL was signed on January 4, 2001, to accomplish the following scope of work: (i) Assess the impacts of the proposed diesel hydro processing unit in Bongaigaon refinery complex, Assam, on forests and wildlife, (ii) Suggest preventive and ameliorative strategies for mitigating impacts on biodiversity. The field work for the above study commenced in February 2001. The final report is in preparation.



Asha Rajvanshi

Impact of pipeline project on wildlife habitats

Impact Assessment of Mumbai - Manmad Pipeline Extension Project (up to Manglya) on Wildlife Values

Bharat Petroleum Corporation Ltd. offered a consultancy assignment to the WII to undertake the above study. The MoU between the WII and BPCL for the above study was signed on January 24, 2001, with the specific objective to evaluate the impacts of this linear pipeline expansion project on terrestrial and aquatic wildlife habitats and species. Field studies are likely to begin in April 2001.

WII-World Bank-CEC Collaborative Project

A joint project between the WII and the Canadian Environmental Collaborative (CEC), with funding



support from the World Bank, was initiated in 1999 to develop environmental guidelines for roads and sensitive habitats. The report, prepared by a three member WII team, has been technically reviewed and approved by the experts and it has been decided to publish it as a book for wider use by the scientific community and personnel of the transportation sector.

Integrating Biodiversity into National Environmental Assessment Process: Best Practices and Country Case Studies

The UNEP, UNDP and GEF have commissioned worldwide case studies under the Biodiversity Planning Support Programme to assess the strengths and weakness of the integration of biodiversity into environmental assessment processes at the national level. A series of country status reports will be used as a basis for developing best practice guidelines to help national biodiversity planners move towards effective integration of biodiversity into environmental assessments in their own countries. Dr. V.B. Mathur and Dr. Asha Rajvanshi were commissioned by the UNEP to develop the case study for India. Their report 'Integrating Biodiversity into Environmental Impact Assessment: A National Case Study from India' was accepted by the UNEP, and they have been invited to participate in the International Workshop

in Zambia in May 2001 to discuss the case studies and develop best practices for the integration of biodiversity into impact assessment.

National Biodiversity Strategy and Action Plan

The National Biodiversity Strategy and Action Plan (NBSAP) is a major conservation planning effort of the MoEF, GOI, and is unique in being implemented through Kalpavriksh, a conservation NGO. A completely decentralised approach has been adopted for achieving the goals of this initiative. A Technical Policy Core Group (TPCG) has been formed to conceptualise the strategy, and to guide and give information on a regular basis to the various implementing agencies, which number more than seventy. Dr. Ravi Chellam has been chosen to serve on the TPCG. Apart from providing his regular inputs to the process as a member of TPCG, he has also been given the primary responsibility for guiding the planning process in Uttaranchal state, Wild Animal Diversity and Terrestrial Ecosystems, thematic working groups, Gangetic Plains, eco-region, and Munsiri and Nahin Kalan, sub-state sites. A few more faculty members have also been contributing to the NBSAP process in a variety of ways.



S. Wilson

Arachnis sp.



TEACHING INPUTS PROVIDED TO OTHER INSTITUTIONS IN DEHRADUN

S. No.	Institutions	Name	Date	Topic
1.	IGNFA	Sh. V.B. Sawarkar	May 8, 2000	Conserving wildlife in managed forests
2.	IGNFA	Sh. V.B. Sawarkar	May 15, 2000	Integrated approach to management planning
3.	Forest Survey of India	Dr. V.B. Mathur	June 26, 2000	Application of Remote Sensing and GIS in preparation of Wildlife Management Plans
4.	IIRS	Sh. V.B. Sawarkar	June 28, 2000	PA management for biodiversity conservation
5.	Indira Gandhi National Forest Academy (IGNFA)	Sh. S.K. Srivastava	June 29, 2000	Policy and Legal Issues in Forestry
6.	IGNFA	Sh. S.K. Srivastava	July 7, 2000	Habitat Management in Protected Areas of S.India
7.	IGNFA	Dr. A.K Gupta	July 14, 2000	Buffer Zone Management
8.	IGNFA	Dr. A.K Gupta	July 18, 2000	Primate Conservation in India
9.	IGNFA	Dr. Ruchi Badola	July 19, 2000	Role of socio-economic studies in ecodevelopment
10.	IGNFA	Dr. A.J.T. Johnsingh	July 19, 2000	Conservation of large mammals in India
11.	Forest Survey of India	Dr. V.B. Mathur	July 20, 2000	Application of Remote Sensing and GIS in Wildlife Conservation Studies
12.	IGNFA	Dr. Ravi Chellam	July 27, 2000	Zoo Management issues in India
13.	IGNFA	Sh. S.K. Srivastava	Aug. 1, 2000	Wild Life Protection Act - Critical analysis
14.	Indian Military Academy	Dr. A.J.T. Johnsingh	Aug. 16, 2000	Large mammal conservation
15.	IGNFA	Sh. V.B. Sawarkar	Aug. 22, 2000	Managing forests for biological diversity
16.	IGNFA	Sh. S.K. Srivastava	Aug. 22, 2000	Wild Life Protection Act - Critical analysis
17.	IGNFA	Sh. S.K. Srivastava	Sept. 22, 2000	Wild Life Protection Act - Critical analysis
18.	ICFRE	Dr. Ruchi Badola	Sept. 26, 2000	People's participation and related issues for biodiversity conservation
19.	IGNFA	Sh. V.B. Sawarkar	Oct. 4, 2000	Wildlife conservation in managed forests
20.	IGNFA	Dr. Asha Rajvanshi	Oct. 13, 2000	EIA: Concepts and Practices



21.	IGNFA	Sh. V.B. Sawarkar	Nov. 20, 2000	Wildlife conservation in managed forests
22.	Forest Survey of India	Dr. V.B. Mathur	Nov. 20, 2000	Application of Remote Sensing and GIS in preparation of Wildlife Management Plans
23.	IGNFA	Sh. S.K. Srivastava	Nov. 20, 2000	Wildlife Protection Act - Critical analysis
24.	IGNFA	Sh. S.K. Srivastava	Nov. 21, 2000	Ecotourism
25.	SFS College	Dr. Asha Rajvanshi	Nov. 27, 2000	Environmental Impact Assessment: Prospects and Problems
26.	IGNFA	Sh. V.B. Sawarkar	Nov. 29, 2000	Landscape-based planning approach for wildlife management
27.	IGNFA	Dr. Asha Rajvanshi	Dec. 6, 2000	EIA Theory and Practice
28.	IGNFA	Sh. S.K. Srivastava	Jan. 19, 2001	Human habitation in Protected areas
29.	SGRR (PG) College	Dr. P.K. Mathur	Feb. 5, 2001	Development of different personality traits : Availing such opportunities of camps
30.	SGRR (PG) College	Dr. Ruchi Badola	Feb. 10, 2001	Conservation issues and conflict management
31.	Indian Institute of Remote Sensing	Dr. Ruchi Badola	Feb. 12, 2001	Stakeholders and participatory rural appraisal
32.	IGNFA	Sh. V.B. Sawarkar	Feb. 15, 2001	Wildlife in working plans
33.	MKP (PG) College	Dr. Ruchi Badola	Feb. 16, 2001	-
34.	Forest Survey of India	Dr. V.B. Mathur	Feb. 19, 2001	Application of Information Technology, Remote Sensing and GIS in Natural Resource Management
35.	MKP College	Sh. S. Wilson	Feb. 20, 2001	Nature photography and Audio-visual Use
36.	SFS, College	Sh. S.K. Srivastava	Feb. 22, 2001	'CITES' and 'Wildlife Legislation and Acts'
37.	MKP (PG) College	Dr. Ruchi Badola	Feb. 26, 2001	Conflict management
38.	MKP (PG) College	Dr. Ruchi Badola	Mar. 12, 2001	Teamwork
39.	St. Jude's School	Dr. Ravi Chellam	Oct. 2000	The conservation status of Asiatic lions and wildlife conservation in India
40.	Ann Mary School	Dr. Ravi Chellam	Oct. 2000	The conservation status of Asiatic lions and wildlife conservation in India



TEACHING INPUTS PROVIDED TO OTHER INSTITUTIONS

1.	Gurukul Kangri Univ. Haridwar	Dr. S. Chowdhury	Sept. 25, 2000	Endangered species conservation and management in India
2.	Centre for Environment Education, Ahmedabad	Dr. Ravi Chellam	Nov. 10, 2000	The ecology and conservation of Asiatic lions
3.	Bhavnagar University	Dr. Y.V. Jhala	Nov. 2000	Role of long-term research for conservation of the Bhal ecosystem
3.	HCM, Rajasthan Institute of Public Administration	Dr. Ruchi Badola	Dec. 19-20, 2000	Gender issues
4.	FTI, Jaipur	Sh. S.K. Srivastava	Jan. 23, 2001	Legal issues in wildlife management
5.	College of Forestry and Hill Agr., G.B.P. Univ. of Agr. & Tech., Ranichauri	Dr. Ravi Chellam	Mar. 30, 2001	WII's research mandate and research activities and wildlife conservation in India

FACILITIES

ENVIS CENTRE ON WILDLIFE AND PROTECTED AREAS

The Environmental Information System (ENVIS) Centre at the Wildlife Institute of India was established in September 1997 and is part of the ENVIS Network of the Ministry of Environment and Forests, Government of India. This centre deals with general matters pertaining to 'Wildlife' and in particular those relating to 'Protected Areas'. In response to the long standing need for a compilation of contact addresses of the network of National Parks and Wildlife Sanctuaries in the country, the ENVIS centre brought out the fifth ENVIS Bulletin on 'Directory of Wildlife Protected Areas in India'. The bulletin contains the contact addresses of all 87 NPs and 482 WLS in the country, including those in the newly created states of Jharkhand, Chattisgarh and Uttaranchal. The internet edition of the bulletin has also been brought out and is available at <http://www.wii.gov.in/envhome/eindex.htm>. The internet edition also contains the names of the PA managers. The fifth issue of ENVIS bulletin was sent to over 1500 individuals in India and abroad.

Dr. V.B. Mathur, ENVIS Project Co-ordinator and Dr. D.P. Rath, ENVIS Project Associate attended the meeting of the Scientific Advisory Committee of ENVIS held at MoEF, New Delhi on 7th June,

2000 and made a presentation on the activities of the WII ENVIS Centre.

The centre also processed 82 queries from different individuals/organizations at the national and international levels. The homepage of this centre is also being maintained and all the issues of the ENVIS bulletin published so far are available at the site <http://www.wii.gov.in/envhome/eindex.htm>.

NATIONAL WILDLIFE DATABASE CELL

The objectives of the computer-based National Wildlife Database are, (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 2000 and 2001, the main thrust of the activities was on data collection, input and its validation. As on 31st March, 2001, there are 573 PAs including 89 NPs and 484 WLS in India covering an area of 1,53,809 km², which is 4.68% of the total geographic area of the country. The bibliographic database was also updated and cross-checked, and it now has over 13,900



references. The database cell provided assistance in the preparation of various technical reports and bibliographies, and made a major contribution in bringing out the ENVIS bulletin 'Directory of Wildlife Protected Areas in India'. More than three hundred user queries were answered and outputs in various formats were provided.

COMPUTER AND GIS FACILITY

During 2000-2001 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. The computer centre conducted training courses on the use of computers and various software packages to the officer trainees of Wildlife Management Courses: Diploma and Certificate, and for faculty, researchers, students and staff of the Institute.

Campus-Wide Networking: The institute is in the process of upgrading its existing Local Area Network (LAN), which is on thin ethernet cable. The new campus-wide networking will have fibre optics cable as the backbone for inter-connecting the four office buildings, including the new institutional block. Within the building, enhanced Category 5 UTP (Unshielded Twisted Pair) cable will be used to connect the computers to the network through LAN switches with data throughput capability of 10/100 Mbps. The new LAN cabling will be able to support 320 nodes.

The Institute's Computer/GIS Centre also moved to a spacious location in the new institutional block. The new Computer/GIS Centre has a separate computer classroom, user room and a server room. Additional space has been provided for the GIS/Remote Sensing laboratory and DTP facility.

Hardware and Software Procurement/Upgrading: During this financial year an IBM Pentium III PC and Thinkpad notebook has been procured. Three HP Laserjet 2100TN laser printers, an HP Deskjet 840C printer, eleven APC UPS of 650/1000VA and three 5KVA, two 3KVA and a 1KVA Vinitec UPS system for the Computer/GIS centre have been procured on buy-back of six old TVSE (Aegis) UPS systems. The existing five 386/486/Pentium systems have been upgraded to Intel Celeron and Pentium III systems

on a buy-back scheme. Two 20GB HDD were bought for enhanced data storage in the GIS laboratory and DTP room. An optical character recognition (OCR) software package, Fine Reader 4.0 standard has been bought for the DTP facility.

Training: The Computer/GIS Centre conducted training courses for the students, researchers and officer-trainees of the wildlife management courses. Training was conducted on concepts of the computer, LAN/internet, software packages: MS Windows 95/98, MS-Office, SPSS, and S-Plus and specialised software packages related to wildlife research. Training was also conducted on Geographical Information System (GIS), Remote Sensing (RS) and Global Positioning System (GPS) technology by giving hands-on training on software packages Arc/Info and ArcView for GIS and ERDAS Imagine for digital image processing of remotely sensed data.

Visitors: A large number of visitors came to the Computer/GIS Centre of the institute to learn about various applications and also about recent developments in computer hardware/software. Some of the VIPs visiting the centre during the year were: Chief Minister of the newly formed Uttaranchal state, Secretary to Ministry of Environment and Forests, Government of India. Besides these, participants of workshops conducted by the institute, officer-trainees of IIRS, FSI, IGNFA and SFS College, students of IIFM, Bhopal, and range officers of state forest departments also visited the Computer/GIS Centre.

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. Currently, 21 projects are using GIS/RS/GPS technology.

LIBRARY AND DOCUMENTATION CENTRE

The Library and Documentation Centre (L & DC) at the WII is a major repository of literature relevant to wildlife science and management in the Indian sub-continent. It is not only acquiring, organizing and disseminating all relevant worldwide literature



on biodiversity conservation and related fields, but also serving the user readership through specialized library and information services like the current awareness service, compilation of bibliographies and abstracts. It is also establishing and maintaining links with other national information system in India and abroad to ensure the free flow of information at national and international level.

The L & DC possesses approximately 20,000 books, 200 conference proceedings, 350 theses and dissertations, 120 standards and more than 5500 bound volumes of old and rare journals. The library also maintains a collection of over 8000 scientific papers. It subscribes to 321 periodicals. During 2000 and 2001 a thousand books, proceedings, theses and reports, 350 scientific papers and reprints, 550 press clippings, and six new periodicals 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, eighteen computer terminals are available in the library premises, and the faculty desks have been inter-connected with a LAN. Being connected to the library facility, the users can access all in-house databases on books, reprints, Indian wildlife abstract, map/toposheet collection, press clippings, specialized bibliographic databases on Musk Deer, Application of telemetry in wildlife, and Wildlife and Protected Area Management in Madhya Pradesh. Users also have access to CD-ROM databases such as Wildlife Worldwide, and E-CD. CAB Spectrum is also available on the LAN. The L & DC provides a variety of library and information services to the user.

During this year, over 1,33,672 pages of photocopies were provided to users, 20,000 documents borrowed, 500 reference queries answered including 100 from outside, and more than 28,000 bibliographic references were given and 58 documents procured on inter-library loan. 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 2000-2001

Sl.No.	Services	Numbers
1.	Photocopy	1,33,672 pages
2.	Books Issued	3826
3.	Database search request	115 clients
4.	References Provided	28033
5.	Inter library Loan	58 (books)
6.	Document delivery	76 Clients
7.	Document procurement request	55 (Reprints)

Revenue Generation from services during 2000-2001

Sl.No.	Services	Amount (Rs.)
1.	Bibliographical Reference	527.00
2.	Photocopying Service	10,237.00
3.	Document delivery	5,067.00

Volumes Added to Library Collection during 2000-2001

Sl.No.	Types of document	Numbers
1.	Books and Monographs	703
2.	Journals (bound Volumes)	254
3.	Newspaper clippings	1,370
4.	Reprints	327
5.	Maps	53

THE RESEARCH LABORATORY

The WII research laboratory provides inputs for research projects, various ongoing courses, consultancy projects, teaching, training, and analytical work. The laboratory is equipped with various basic and modern equipment required for the analysis of various physio-chemical parameters of plant, soil and water samples. The laboratory can handle the analysis of twenty nine parameters for water samples, eighteen for plant sample, and seventeen for soil samples. Sample solution is also being prepared in the laboratory for trace metal analysis of water, soil, plant material, and animal tissue through AAS/SCP instruments.

During this year the instrumentation facility in the laboratory has been improved with the purchase of a new UV-VIS spectrophotometer and dry block digester. Five research projects, three M.Sc. dissertations and one consultancy project utilized the analytical facility of the WII laboratory for plant



samples and carnivore scat analysis. In total 875 samples were analyzed in the laboratory, of which 580 were plant samples (crude protein, ash content, sodium, potassium, calcium, phosphorus, ADF, NDF, lignin, cellulose), five soil samples (N_2 , organic carbon), forty water samples (pH, calcium, magnesium, sodium, potassium, phosphorus) and 250 scat samples. The laboratory staff provided technical information on capturing and handling animals in the field, demonstration of various traps, electric fence and radio-telemetry equipment in various training programmes. The laboratory also provided services to M.P. Forest Department for the capture and translocation of nilgai under the 'Lion translocation programme in Kuno Wildlife Sanctuary, Madhya Pradesh'. Teaching classes followed by practical work for various ongoing courses were conducted in the laboratory on 'Instrumentation and Analytical Techniques'. These included herbivore pellet and carnivore scat analysis, age and sex determination of animals, osteology of mammals, and analysis of water samples for various parameters.

A permanent meteorological station was established in 1999 in the Chandrabani campus. The laboratory staff regularly collects data on rainfall, temperature, humidity, wind velocity and direction.

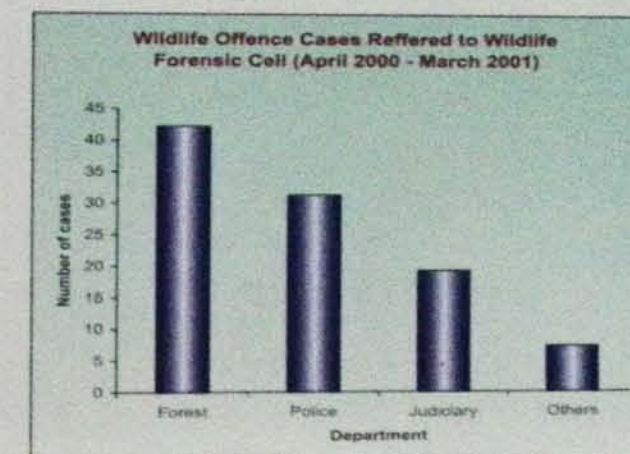
ENVIRONMENTAL IMPACT ASSESSMENT CELL

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.

WII continued to provide advisory services to MoEF on matters related to environmental appraisal of development projects. The WII is represented on the environmental appraisal committee of MoEF for mining projects. In this capacity the WII is advising in the evaluation of projects. Additionally, WII is represented on the sub-group formed by MoEF for the appraisal of mining sites.

WILDLIFE FORENSIC CELL

The major mandate of the Wildlife Forensic Cell is to develop and standardize techniques for identifying species from biological products, and to assist various enforcement agencies in dealing with wildlife offences. Eighty-three wildlife offence cases were received during 2000 and 2001, of which 42.2% cases were from the Forest Department, 31.3% cases from the Police Department, 19.3% cases from the Judiciary and 7.3% cases from others such as Customs. Seized wildlife parts received were skin (229 samples), shawl (82 samples), meat (40 samples), bone (19 packets), antler (16 samples), tusk (14 samples), paint brush (14 samples), hair (13 packets), claw (4 samples), horn (3 samples), blood (3 vials), and other items (27 samples) such as axe, log, stone, hoof, bloodstained mud etc. 69.9% per cent of cases were from the states of Madhya Pradesh (31 cases), Uttaranchal (18 cases) and Uttar Pradesh (9 cases).



Shri C. P. Sharma, Laboratory Technician of Wildlife Forensic Cell was granted two years study leave to acquire a specialized postgraduate degree in Forensic Science at Patiala University. Initiatives are being taken to establish Wildlife Forensic DNA facility to analyse some cases which cannot be solved with routine standardized techniques. The Wildlife Forensic facility was visited by participants of a number of training courses, organized by the Wildlife Institute of India, for State Forest Colleges, and Indira Gandhi National Forest Academy, as well as others.



WILDLIFE POLICY RESEARCH CELL

The Wildlife Policy Research Cell (WPRC) was established in March 2000 with the mission: (i) Identify and assimilate wildlife conservation and management issues, practices and approaches at the regional, national and state level, (ii) Provide a forum to discuss and confront issues related to wildlife conservation, (iii) Create a learning resource centre related to wildlife conservation and management to facilitate policy making and disseminate information through best practice guides and occasional papers, (iv) Link up the above with capacity building and interpretive programmes, and (v) Recommend approaches for the mitigation of PA-People-Wildlife conflicts. The WPRC organized a discussion forum on 'Strategies for Mitigating Man-Animal Conflict' during the XIV Annual Research Seminar in September 2000. Over 150 participants deliberated on this issue, which was moderated by Shri Mahesh Rangarajan, the noted policy analyst.

HERBARIUM

The herbarium staff of WII visited Tadoba-Andhari Tiger Reserve (TATR), at the request of the Director, TATR for the grassland survey and collection. A report was submitted with suggestions for the management of grasslands of TATR. The herbarium staff also assisted in the Biodiversity characterization in the Western Himalayas under DOS-DBT project. During 2000 and 2001 a total of 1509 plant specimens were identified from different protected areas. A checklist of plants was prepared for Balphakram NP, Nokrek Biosphere Reserve, Siju WLS, Bagmara WLS, and Tura of Garo Hills, Meghalaya.

Herbarium staff participated in a workshop on the medicinal plants of Uttarakhand with special reference to their cultivation, harvesting, storage, processing and marketing. An exhibition of medicinal plants (herbarium) and a poster display was made for the workshop. A separate database for medicinal plants of Uttarakhand has been developed.

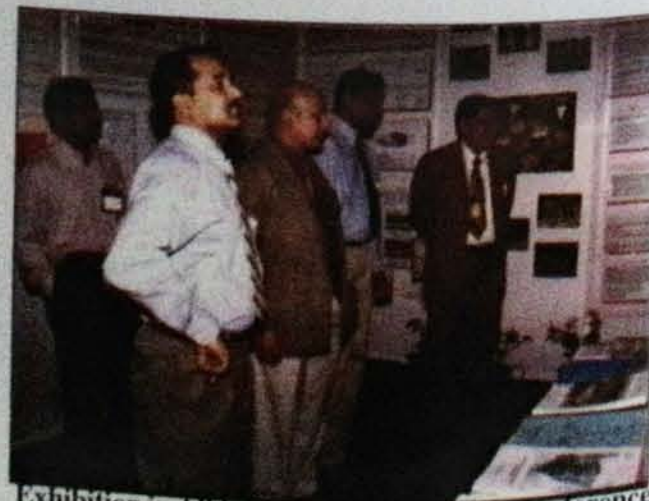
The herbarium has started a collection of 'Lichens' and 'Seeds' from Himalayas and has been registered with Index Herbariorum, USA and an acronym 'WII' has allotted. Herbarium staff also assisted in various field exercises for training courses and in vegetation analysis.

During the reporting period several visitors saw the herbarium. Among these were the frontline staff of Dudhwa NP, M.Sc. Forestry students from Kumaun University, Nainital, and B.Sc. students from the G.B. Pant University of Agriculture and Technology, Ranichauri, Tehri Garhwal.

AUDIO VISUAL UNIT

The audio-visual unit caters for the various requirements of the Institute's academic activities, training programmes, workshops and seminars by providing the vital support of audio-visual coverage. The unit has 16mm films and video films, synchronised programmes and various other audio-visual equipment. During 2000 and 2001, a Telex LCD Video Projector was procured. The unit screened six shows of the 'Nine Projector Synchronised Programme' of the Institute "We are nature, nature is our world". AV support and coverage was provided during the visits of more than sixty groups from different schools, colleges, institutions and VIPs. Film shows were also arranged for these groups.

The slides and prints collection was reclassified for quick retrieval and fifty print albums were made in-house. About five hundred transparencies were



Exhibition in All India Forest Ministers Conference at Coimbatore

S. Wilson



OTHER ACTIVITIES

World Environment Day

World Environment Day on June 5, 2000, was celebrated in the Institute campus by organizing programmes such as bird watching around the campus for beginners, wildlife film show, popular talk and quiz competition on the environment. Over sixty children participated in these programmes and prizes were awarded to the winners. Dr. B.K. Mishra co-ordinated these activities.

Wildlife Week Celebration

A large number of activities were organized during Wildlife Week, both within WII campus and outside. In the campus the celebrations began with a talk by Shri Nirmal Ghosh which was attended by researchers, students, faculty, staff and guests from outside.

added to the slide library of the Institute. About 20,000 slides and 6,000 prints with their negatives are maintained in the unit.

Photography of all the seized material, packets, cartons received from time to time by the Wildlife Forensic Cell was carried out. Macro photography of bones, skins, nails of different animals, turtle shells, ivory, shahtoosh shawls, tusk, musk, antlers, and horns was provided by the unit.

The Institute participated in the following exhibitions, and the AV Unit was given the responsibility of organising them at the following places.

- Exhibition on World Forestry Day at F.R.I. Deemed University, Dehradun, March 21, 2000.
- Exhibition at Himalayan Heritage Centre, Old Rangers College, Dehradun September 16-24, 2000.
- Exhibition at Lions Club Mela in Old Rangers College Ground, Dehradun, October 22, 2000.
- Exhibition in Rawai Sharad Utsav at Purola, Uttarkashi, December 15-17, 2000.
- Exhibition in All-India Forest Ministers Conference at Coimbatore, January 29-30, 2001.
- Exhibition on Annual Science Day at the Indian Institute of Remote sensing (IIRS) Dehradun, February 28, 2001.

NEWSLETTERS

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

- * WII Newsletter Volume 7: No.2 Summer 2000
- * WII Newsletter Volume 7: No.3 & 4 Autumn and Winter 2000



Making and handling of puppets

Vinod Verma

Seventy children from twelve schools of Doon Valley participated in an "On the Spot Drawing and Painting Competition". A wildlife quiz competition was organized in which teams from 21 schools participated. A rolling trophy was instituted jointly by WII and Friends of Doon, an NGO working in Dehradun for the winning team.

"Kath Katha", a puppet group from New Delhi, was invited during Wildlife Week to conduct a one-day puppet workshop for children. Forty children participated and learned techniques for making and handling puppets.



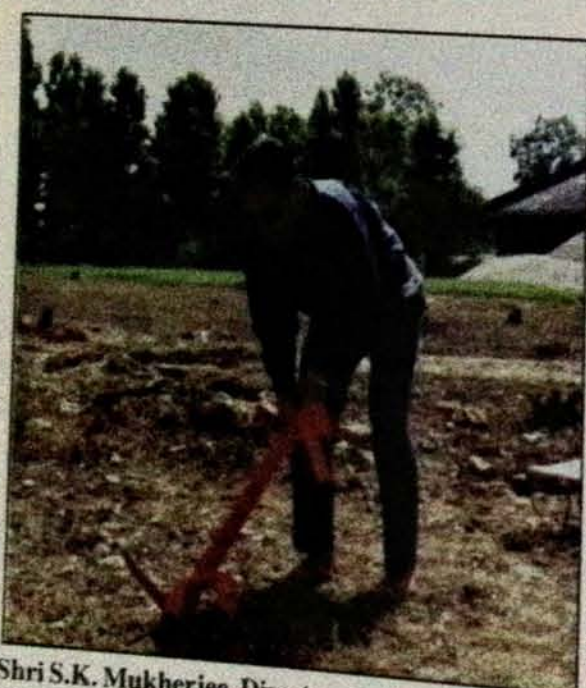
WII faculty members and researchers went to various schools and delivered popular talks on different aspects of wildlife conservation.

Outreach programme for school students, May 11-12, 2000.

'Snow Leopard Adventures', a New Delhi based outdoor recreation company started a "Save and Value the Environment" initiative for school students. A group comprising 25 students, three members of Snow Leopard Adventures and one teacher from Sri Ram School, New Delhi, visited the WII, and environmental education activities were organised for them.

Campus Development

The construction of an additional Modular Institutional Block with Basement, Ground Floor and Mezzanine floor for housing the computer centre, Forensic laboratory, faculty, research associates and support staff besides lecture rooms and health laboratory, has been completed at a cost of Rs. 1,91,74,574.00.



Vinod Verma

Shri S.K. Mukherjee, Director, on the occasion of Bhumi Pujan of seminar hall-cum-interpretation centre

An external electrical supply for the additional modular institutional block was provided at a cost of Rs. 4,88,252.00.

Work on the construction of Seminar Hall-cum-interpretation Centre at the WII initiated in

September 2000, and is expected to be completed in twenty months time.

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 as per laid down procedures. During the reporting period, there were no cases pending, contemplated or decided.

Technocrats' Excellency Award, 2000

The Technocrats' Welfare Society of India (TWSI) selected Dr. V.B. Mathur, Head, Computer and GIS Centre for the Technocrats' Excellency Award - 2000, for the outstanding contribution in the field of information technology applications. The award was presented by the Hon. Minister of Energy, Shri B.S. Koshyari, Uttaranchal State on the fifth Annual Day of the TWSI on 29th December, 2000, at the KDMIPE auditorium, Dehradun.

Distinguished Visitors

During the year the Institute had the opportunity to welcome some very important dignitaries. Dr. Jayalaxshmi Mistry, Lecturer in Environmental Management in Developing Countries, Department of Geography, Royal Holloway University of London; Dr. Tom McCarthy, Conservation Director, International Snow Leopard Trust (ISLT); Dr. Marguerite Pappaioanou, DVM, Associate Director for Science and Policy, Office of Global Health, Centres for Disease Control and Prevention in Atlanta, Georgia (USA), Dr. Joel Heinen, Faculty of Wildlife Ecology, Florida International University Miami (USA), Dr. David J. Chivers, Reader in Primate Biology and Conservation in the Department of Anatomy, University of Cambridge, England, Shri A.K. Kundra, Special Secretary to the Ministry of Environment & Forests, GOI, Shri Ajai Vikram Singh, Chief Secretary to the Uttaranchal State, Shri Nityanand Swamy, Chief Minister of Uttaranchal, and Shri P.V. Jayakrishnan, IAS, Secretary to GOI, Ministry of Environment & Forests, GOI, visited the Institute.

Perspective 2001-2002



The Institute's activities will get new impetus after full implementation of the faculty re-structuring based on the recommendations of the WII-Evaluation Committee. Hopefully, our proposal for Deemed University status will soon be evaluated and approved by UGC.

Our affiliation to Saurashtra University for the M.Sc. course in Wildlife Science will continue, and the Post Graduate Diploma Course in Wildlife Management and the Certificate Course in Wildlife Management will be organized as scheduled. The Institute is also planning to have additional three months dissertation work for PG Diploma Trainee Officers. This will lead to successful trainee officers being awarded the M.Phil. degree in Wildlife Management. We have also planned a series of thematic training workshops for the field managers and frontline staff.

A national workshop on Regional Planning for Conservation and Development under the India-Ecodevelopment Project is being planned for August 2001 in New Delhi. Similarly, a national workshop for sea turtle conservation has also been planned at Bhubaneswar, Orissa under GOI - UNDP Sea Turtle Project; at the same time we

plan to fix satellite transmitters on some Olive Ridley turtles to ascertain their foraging grounds. Under this project we have also planned a study tour to Australia and Malaysia for better understanding of sea turtle conservation undertaken outside India.

The Institute will also organize training workshops at Keoladeo Ghana National Park and Royal Chitwan National Park, Nepal, the two pilot sites under the UNESCO-IUCN Project "Enhancing Our Heritage Monitoring, and Managing for Success in World Natural Heritage Sites".

The Training Research and Academic Council (TRAC) of the Institute will be reconstituted as the term of the present TRAC members is ending shortly, and we hope that the new TRAC of the Institute will provide us with a fresh focus on training, research and academic activities.

We have also planned to bring out some publications, including Best Practice Guides, Training Manuals and Directories.

The civil and electrical work of the new seminar hall-cum-interpretation centre is likely to be completed during this period.

Publications



S. Wilson

Dendrobium aphyllum

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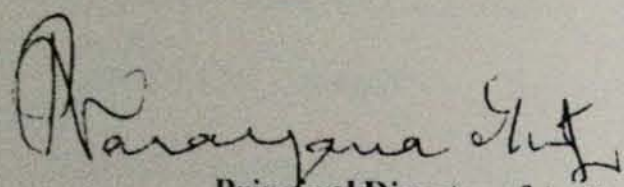
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Accounts



AUDIT CERTIFICATE

I have examined the Receipts and Payments Account, Income and Expenditure Account for the year ended 31st March, 2001 and the Balance Sheet as on 31st March, 2001 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 fair view of the state of affairs of Wildlife Institute of India, Dehradun according to the best of information and explanation given to me and as shown by the books of the organization.


Principal Director of Audit
Scientific Departments

Date: 18th December, 2001

Place: New Delhi

Wildlife Institute of India
Balance Sheet as on 31-3-2001 (All amounts in Rupees)

FUNDS & LIABILITIES	As on 31.3.2000	Additions during 2000-01	As on 31-3-2001	ASSETS	As on 31-3-2001	Additions during 2000-01	As on 31.3.2000	Additions during 2000-01	As on 31-3-2001
Excess of income over expenditure	24246885.59	11561818.20	35808703.79	Land			6607214.65	0.00	6607214.65
Pension Fund	6095818.25	2448363.00	8544181.25	Trees			2432709.00	0.00	2432709.00
GP Fund	11945760.03	974676.46	12920436.49	Avenue Plantations			3177938.15	41374.00	3219312.15
Amount Capitalised	237114699.07	18223052.00 (-) 619498.00	254718253.07	Campus Development			5586069.31	441739.00	6727487.31
WII PF Trust Fund	0.00	800722.00	800722.00	Lab Equipment			1432947.07	696277.00	2129224.07
Security Deposit	725702.95	330024.00	1055726.95	Furniture & Fixtures			8304215.44	1849413.00	10153628.44
				Vehicle			5718910.50	20900.00	5739810.50
				Library books			11044876.28	1621504.00	12666380.28
Payment received for research equipment for Siberian Crane Project	94202.00	-12000.00	82202.00	Office Equipment			4700110.90	993774.00	5693884.90
Project Cost (Shri Pratap Singh)	88590.30	-88590.30	0.00	Camp Equipment			558771.34	0.00	558771.34
To Advance receipt of printing of PANC Report	500000.00	(-) 108300	391700.00	Photographs & Equipment			2137473.20	52457.00	2189930.20
To advance for conducting zoo management course 99	172139.00	0.00	172139.00	Materials and Supplies			3863727.95	0.00	3863727.95
Study on acquisition of private land around National Park	25000.00	0.00	25000.00	Educational Films			1080432.35	0.00	1080432.35
CZA Management Course 2001	0.00	611500.00	611500.00	Journals & Periodicals			16630862.00	2010728.00	18641590.00
Workshop GHNP	76092.00	(-) 76092	0.00	Training Equipment			24034812.24	1819927.00	25235241.24
				Boundary Wall			1446200.59	0.00	1446200.59
				Boundary Fencing			817934.93	0.00	817934.93
				Building Complex			118805266.00	7172031.00	126040210.00
				Architectural & Supervision Fee			6853373.85	62913	7474451.85
Carried Forward			315130564.55	Carried Forward					242718141.75

Brought Forward Income Tax Salary	1457.00	315130564.55	Brought Forward DG Set	1970326.00	242718141.75
Loan (A/c No. 8)	3500000.00	0.00	EPABX	0.00	1970326.00
			AC Plant	119258.00	1026000.00
			Advance for Expenses (Fig.)	510000.00	2716710.00
CM Relief Fund Telemetry Workshop	500000.00	0.00		436546	436546
				0.00	0.00
CZA Value of exhibit design	100000.00	117191.00	IUCN expt. Receivable	527551.00	2187205.00
			Advance for expd. to staff	2857254.00	2440779.20
CZA Stud book project	103500.00	200000.00	Loan & advance to staff	3114493.20	3175520.00
			Staff quarters	3175520.00	1724111.00
			Road & culvert	1724111.00	530852.32
			Tennis court	530852.32	856592.00
			Auditorium	856592.00	
Tropical Rainforest Workshop	315000.00	315000.00	Closing stock of steel & cement	972764.90	
			Closing balance (Training)	5142243.40	1008973.90
			Closing bank balance	5508214.29	5805689.40
			Closing cash balance	92174.20	10859213.54
			F.D.R.	10350000.00	33640.20
			WH PF Trust Fund	800722.00	10350000.00
			GPF		800722.00
			Bank balance	2645760.03	6921436.49
			MPSEB Bond	0.00	1800000.00
			Kotak Mahindra Fund	0.00	1500000.00
			Tata Gift Fund	9300000.00	1499000.00
			F.D.R.		1200000.00
			PENSION FUND:		
			Bank balance	295818.25	844181.25
			F.D.R.	5800000.00	7700000.00
			Training cost accrued but not received	378700.00	437375.00
			CONSULTANCY PROJECT(B)		
			Closing balance		
			GRAND TOTAL	995363.85	5426740.50
					315969755.55

GRAND TOTAL

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. Oberoi
(S.S. OBEROI)
Finance Officer

Dr. A.K. Gupta
(Dr. A.K. GUPTA)
Registrar

S.K. Mukherjee
(S.K. MUKHERJEE)
Director

Wildlife Institute of India Receipt and Payment Accounts for the year 2000-2001

RECEIPTS

To Opening Balance	
Cash in hand	92174.20
Cash in bank	5508214.29
Balance in bank (trainee a/c)	
To Grant in aid Ministry of Env. & Forests	(Plan) 49500000.00 (Non-Plan) 14500000.00
To Training cost received during the year	
Outstanding Training cost received during year	
To adv. For expenses (staff)	
Other Receipts (training) Short Courses Outstanding advance for expenses received(training)	
Interest-Bank Account (training)	
To interest credited by bank	
To G.P.F.:	
Opening balance	
Encashment of FDR	
Encashment of UTI Bond	
Receipts during the year	
Other receipt payable	
TO PENSION FUND:	
Opening balance	
FDR Encashment	
Carried Forward	

Current Year PAYMENTS

By Salaries	11038514.00
By Bonus	0.00
By Honorarium	0.00
By Fellowship	1158473.00
By Wages	1636212.00
By Travel Expenses	3176940.00
By Newspaper & Magazine	0.00
By Publicity & Advt	0.00
By Medical	1517780.00
By Operational Expenses	6930346.00
By Stationary	635693.00
By Overtime Allowances	0.00
By Postage and Telegram	0.00
By Sports Goods	0.00
By Telephone and Trunk Calls	0.00
By Electricity & Water	0.00
By Printing & Binding	0.00
By LTC	0.00
By Conveyance Charges	0.00
By Entertainment Charges	0.00
PLAN	635693.00
NON-PLAN	363310.00
TOTAL	143452.00
	39270.00
	1031889.00
	1987847.10
	73945.00
	161652.00
	1340.00
	15527.00

2645760.03	26093958.00	13009783.10	39103741.10
8100000.00			
6000000.00			
4125787.46			
146625.00			
295818.25			
1300000.00			
104546338.63			
Carried Forward			

Wildlife Institute of India
Income and Expenditure Account for the year 2000-2001

EXPENDITURE	Current Year	INCOME	Current Year
To Salaries & Allowances	19718209.00	By Grant - in - aid from MoEF	64000000.00
To Bonus	225731.00	Less: transfer to capital exp	-18223052.00
To Honorarium	23750.00		45776948.00
To Fellowship		By Training Cost	2437364.00
To Wages	1158473.00	By Other Receipt(training)	1156700.00
To Travel exps	1737310.00	By Int. on Trainee a/c	143972.00
To Newspaper & Magazine	3176940.00	By Int. on Bank Deposit	2152931.00
To Publicity & Adv.	35344.00		
To Medical	125933.00	By Income Tax Refund	19419.00
To Operational Expenditure	1517780.00	By Misc. receipts	787717.00
	6930346.00		
		By Training cost accrued but not received	177375.00
To Stationary	635693.00	By WII Receipts(instt charges)	3371568.35
		By M.Sc Course Fee	601670.00
To Postage & Telegram	143452.00	By Consultancy Project Receipt during the year	15516399.00
To Sports goods	39270.00		
To Telephone & TC	1031889.00	By EMD forfeited	16000.00
To Electricity & Water charges	1987847.10		
To Printing & Binding	73945.00		
To Govt. contr. to pension fund	263574.00		
Leave Salary and Pension contr	43455.00		
To LTC	161652.00		
To WII PF Trust	800722.00		
Carried Forward	39831315.10	Carried Forward	72158063.35

Brought Forward	39831315.10	Brought Forward	72158063.35
To Sri Lanka Training Cost Refund	190250.00	By Balance of Project Cost (Shri Pratap Singh) lapsed to Govt. Account	88590.30
To Ecotourism Course	25573.00		
To Conveyance Charges	1340.00	By Balance of GHNP Project lapsed to Govt Account	76092.00
To WINISIS Workshop	12000.00		
To Entertainment charges	15527.00		
To SAARC Contribution	281400.00		

To IUCN Contribution	36146.00
To Stipend	185800.00

To OTA	363310.00
To Legal Expr	125250.00
To Training cost	3266744.00
To Repair & Maintenance of Vehicles	781345.00
To POL for vehicle	1491665.00

To Lab Chemicals	114481.00
To Estate Security	1882530.00
To Landscaping	768486.00
To Publication	302743.00

To Consultancy Project Exp.	11085022.35
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To excess of income over expenditure	11561818.20
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TOTAL:

72322745.65

TOTAL:

72322745.65

S.S. OBEROI
(S.S. OBEROI)
Finance Officer

S.K. GUPTA
(Dr. A. K. GUPTA)
Registrar

S.K. MUKHERJEE
(S.K. MUKHERJEE)
Director

PERMANENT ASSETS AS ON 31-3-2001

Particulars	Opening Balance	Additions during the year	Total as on 31-3-2001
Land	6607214.65	0.00	6607214.65
Trees	2432709.00	0.00	2432709.00
Avenue Plantations	3177938.15	41374.00	3219312.15
Campus Development	5586069.31	441739.00	6727487.31
Lab Equipment	1432947.07	699679.00	2129224.07
Furniture & Fixtures	8304215.44	696277.00	10153628.44
Vehicle	5718910.50	1849413.00	7568323.50
Library Books	11044876.28	20900.00	11065776.28
Office Equipment	4700110.90	1621504.00	6321614.90
Camp Equipment	558771.34	993774.00	1552545.34
Photographs & Photographic Equipment	2137473.20	0.00	2137473.20
Materials and Supplies	3863727.95	52457.00	3916184.95
Educational Films	1080432.35	0.00	1080432.35
Journals & Periodicals	16630862.00	0.00	16630862.00
Training Equipment	24034812.24	2010728.00	26045540.24
Boundary Wall	1446200.59	1819927.00	3266123.59
Boundary Fencing	817934.93	-619498.00	198436.93
Building Complex	118805266.00	0.00	118805266.00
Architectural & Supervision Fee	6853373.85	7172031.00	14025404.85
DG Set	1970326.00	62913.00	2033239.00
EPABX	1026000.00	621078.00	1647078.00
AC Plant	2597452.00	0.00	2597452.00
Staff Quarters	3175520.00	119258.00	3294778.00
Roads & Culverts	1724111.00	0.00	1724111.00
Tennis Court	530852.32	0.00	530852.32
Auditorium	856592.00	0.00	856592.00
Total:	237114699.07	17603554.00	254718253.07