भारतीय वन्यजीव संस्थान
Wildlife Institute of India

Annual Report
1991-92

Wildlife Institute of India

An Autonomous Institution of the Ministry of
Environment & Forests

Annual Report
1991-92

New Forest, Dehra Dun

DIRECTOR'S NOTE

The hypocritic gap between expression and action of *Homo sapiens* is an age old tragedy. But perhaps never was this tragedy as intense and foreboding as it is today when greed and expediency have simply taken over the affairs from local to international levels, in a world that technology has shrunk into a small village.

Is 1992 going to be yet another year of onslaught on nature and environment behind the thin veneer of rhetorics? But can we really keep quiet on the sheer incapacity of the global village community in taking mature and responsible decisions? The unwillingness of the North to slowing down the consuming consumerism, and the reluctance of the South to recognizing that runaway population growth is as serious an impediment in the course of environmental restoration, are sadly topped by a basic inability every where in eliciting real participation of people at the grassroots in the decision making processes. Perhaps it is this last phenomenon that is at the root of Nature's ravage. Caracas World Parks Congress was but a resolute bid by the world gathering of conservationists to send a sobering signal to Rio.

As these lines are written, Rio has happened. But, no healing touch for Nature's wounds is in sight on a scale that could make a difference. This realisation hurts us at the Institute where we are involved with committed, competent young people, who have arduously learnt the science and practice of conservation and who are yearning to prove themselves in the field. Yet, our commitment keeps our sublime hope alive that the coming year will be different.

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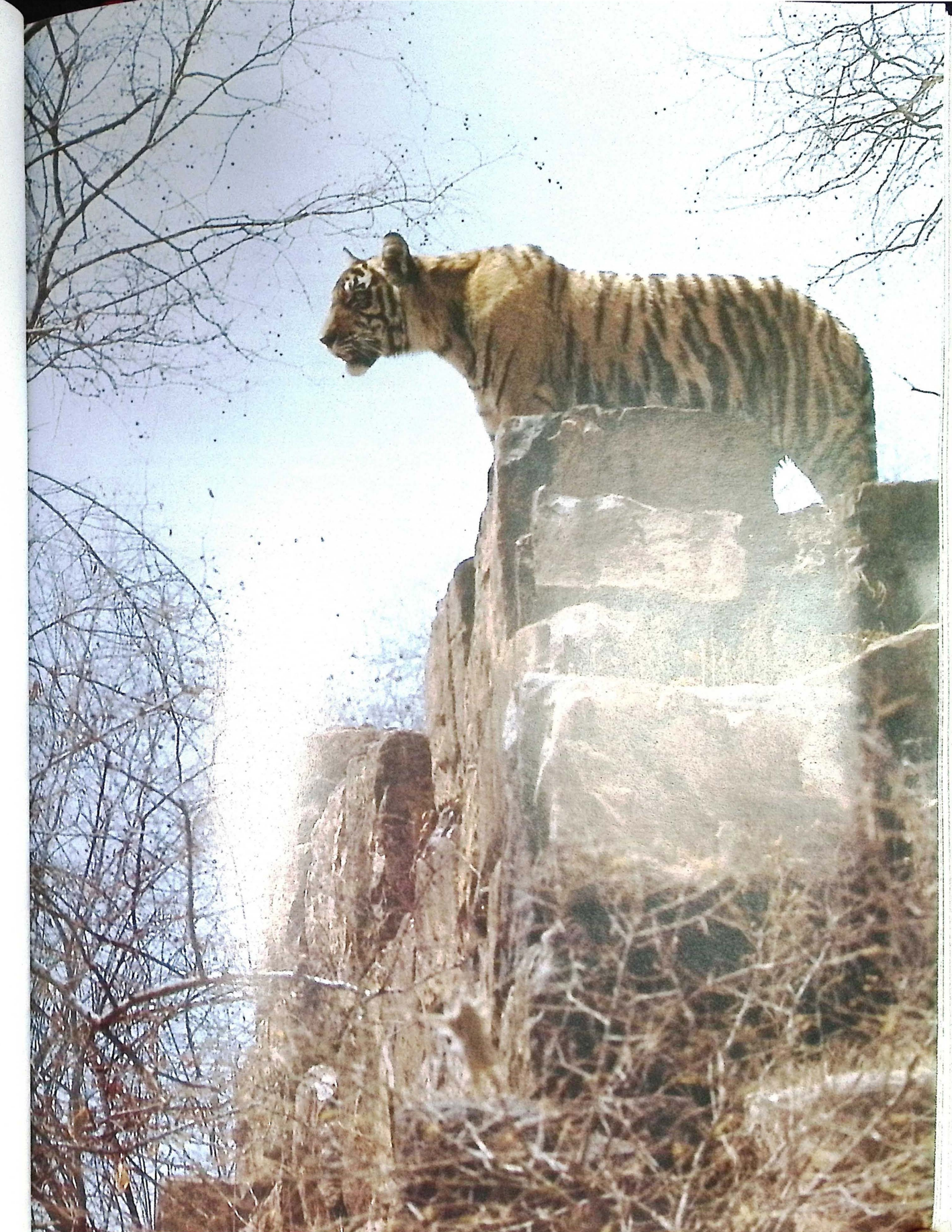

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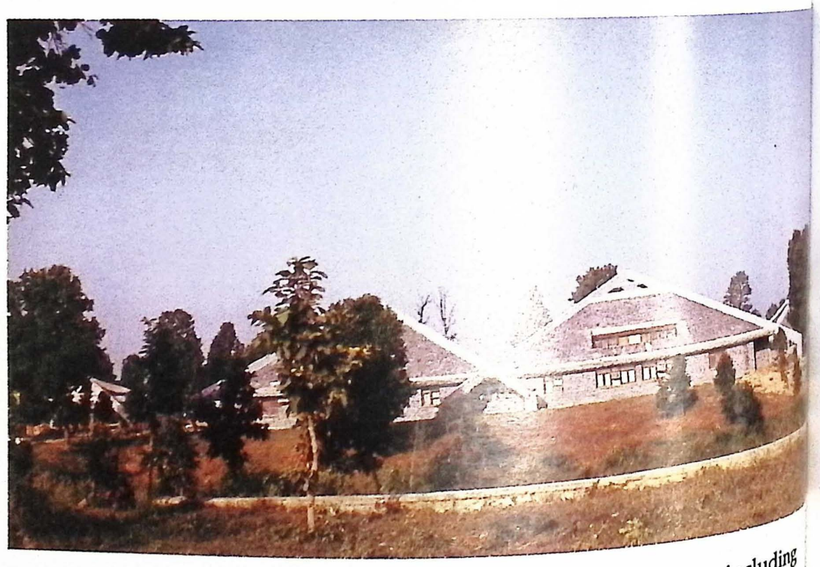
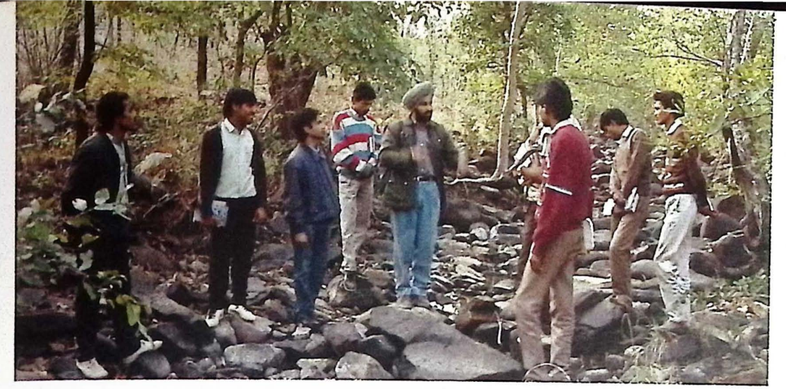
AT A GLANCE

The Wildlife Institute of India (WII) completes its sixth year of scientific pursuit as an autonomous institution. During these years, concerted efforts at development of faculty, infrastructure and programmes have now given WII the capability and functional momentum that the current field conservation scene demands.

For the Institute, the year 1991-92 marked, after a long wait, a phased moving to its own new campus at Chandrabani. As the constructions of the first phase near completion, the protection accorded to the area over the last few years has led to the revival of it's wilderness into a picturesque parkland setting - the pyramidal slate-topped buildings snuggling in the midst of verdant *sal* trees, and the open greens blending perfectly with the sylvan Siwalik hills.



During the year, a majority of programmes including most of the academic activities started taking place at the new campus. The researchers, trainees and students moved in to occupy the hostels, and to facilitate their studies, the library and some of the computers were also shifted. The rest of the computer equipment, along with all the new acquisitions will take a little more time to shift or become operational at Chandrabani, as it awaits adequate and stable power supply and completion of the air-conditioning work.



Among the faculty divisions, Wildlife Extension has taken occupancy at the new location, and so have the academic cell and some sections of administration. The move to Chandrabani allows not only proper space but also an ambience true to WII's own objectives and pursuits. An enthusing work environment and a sense of belonging seem to define our new campus. It also allows the Institute to take up work on long awaited programmes.

The year 1991-92 saw the continuation of intensive institutional development and organisational activities, alongside the growing training, research and consultancy programmes.

The Diploma and Certificate courses in wildlife management for in-service personnel are among the core programmes of WII and these occupied the entire year. These courses drew some trainees from the neighbouring countries as well, which points to WII's acceptance as a centre for wildlife training in the region.

During the year, the second batch of the M.Sc. course passed out, with all the seven students attaining first division. Some of these students were then involved in short term survey and research work. In the third batch that started soon afterwards, there are again seven students and all of them are holding scholarships for their studies here.

As a follow-up to last year's course in zoo management for senior officials and veterinarians, a similar four-week course was conducted for mid-level supervisors and technicians. This is now a regular programme. With this, the number of regular courses offered by WII has risen to four. This is welcome. However, WII's capacity in terms of turning out the number of trainees from the two main in-service courses still remains underutilized, while the paucity of trained officers continues to undermine the management of the protected areas in the country. This situation is a matter for concern. It is important that the wildlife sector gets adequate allocations in the Central and State plan budgets, and that the grants are tied to preparation of systematic management plans and their proper implementation.

Other than zoo management, there were two one-week courses on wildlife management for IFS officers, and another on related issues for the IAS officers. Welcome additions to programme topics were Interpretation and Conservation Education, and Chemical Immobilization of Wild Animals, on which workshops were held as part of joint WII-USFWS project.

The research at WII has been branching out to cover uncharted but priority subjects and areas in the country. The Institute has entered a phase when its earliest research endeavours are beginning to concretise. The final reports on these are either published or in the pipeline.

The emergence of trained biologists from such research is, however, cause for only cautious cheer. The States, as yet, do not have enough opportunities to make use of such biologists, nor do they appear to be thus preparing for, in the near future. It is widely recognised that the planning of proper management of our protected areas suffers from establishing and regularly monitoring the status of fauna and their habitat as well as the socio-economic and traditional resource use parameters. WII's teaching and research programmes are indeed providing personnel to take up such work. It is hoped that during the VIII Plan there will be measures which offer the needed support to field conservation as well as scope for professional fulfillment to the young, keen and competent products of WII.

Several new projects were launched this year - studies on the Himalayan ibex, biodiversity in Satpura, the montane grassland and the Indian giant squirrel. An UNDP assisted project on protected area management and eco-development planning was to start this year but could not. While awaiting the clearance for its launching, preparations have been mounted to undertake this all important project in the coming year.

What follows is a detailed review of WII's programmes and activities during the year 1991-92.

INTRODUCTION

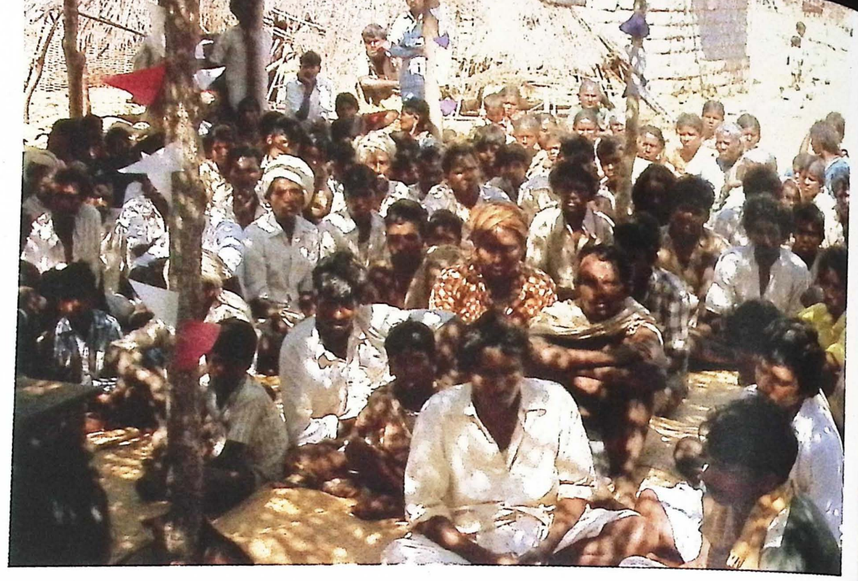
Neglect of rational landuse and the population pressures have been the main causes for the decline of the country's rich, living natural heritage. While the deteriorating situation came to be recognised in the sixties and, increasingly so, in the seventies, the efforts at amelioration tended to remain traditional i.e. largely employing statutory and enforcement measures. The unsustainability of the enforcement approach by itself, both in terms of the scientific as well as the human aspects, started becoming clear in the late seventies.

Ever since, there has been a concern to organise conservation based on sound scientific and perceptive human considerations. For conservation to be effective, the concern had to become a science - properly studied, understood and applied. This called for a new applied field conservation discipline - the wildlife science based on researched scientific and socio-economic information and trained management personnel to plan and execute the measures.

It was this imperative for developing the wildlife science in the Indian context, of teaching it and ensuring its proper field practice that necessitated the setting up of the Wildlife Institute of India (WII) in 1982, under the Ministry of Environment and Forests, Government of India. It was awarded autonomy in 1986.

Now, in the last year of its first decade, and the sixth year of its autonomy, WII is all set to emerge from its fledgling phase. Its feet are established and wings strong. There is a definite directional momentum in its plans and programmes, as ordained by the country's conservation requirements. At the same time, it continues to grow with a keenness to learn from and realign itself along the harsh realities in the field. This is but appropriate for an institution seeking to support environmental care at a time when the needs of the needy and the greeds of the greedy are together pitted against the crucial national and global concern for sustainable conservation of biodiversity and preservation of the life support systems.

India's problem, so representative of a developing world, is to find that common path between conservation and development. A rapidly growing population and an increasing gulf between the haves and the have-nots, have had a deleterious effect on the natural resources, in a



vicious cycle of cause and effect. This has become most apparent in the wilderness areas and the habitations around these areas. Ways and means shall have to be located in order to maintain the richness of the natural habitats on the one hand yet provide for sustainable development of people living in the surrounding region on the other. WII is striving to do its bit by offering training support for eco-development planning.

In fact, this has been the great lesson learnt: that the protected areas cannot remain islands of plenty engulfed by seas of want and deprivation. It isn't enough to merely provide protection to some splendid animal and bird communities; conservation cannot be achieved in isolation nor at the cost of the people living in and around the protected areas.

WII's understanding and senstivity to the root issues is reflected in its activities. And it is toward finding practical

solutions to the various field problems that the Institute has set itself the following objectives:

* Training managers and biologists for protected area management and wildlife research;

* Training education and extension specialists for protected areas to get public support for wildlife conservation;

* Providing orientation courses for those involved in land-use management;

* Conducting and coordinating applied wildlife research and evolving relevant techniques suited to Indian conditions;

* Creating a database for building up a wildlife information system employing modern analytical techniques and computer equipment;

* Providing advisory and consultancy services to Central and State governments, universities, research institutions, and other official and non-official agencies.

INSTITUTIONAL STRUCTURE

The Institute has three faculty divisions - Wildlife Biology, Wildlife Management and Wildlife Extension. The administrative division is headed by the Additional Director-cum-Senior Faculty Coordinator with a Registrar assisting him. The categories employed are scientist, technical, administrative and maintenance. The Institiute's library, laboratory and computer sections support its various scientific and academic functions.

(See chart below).

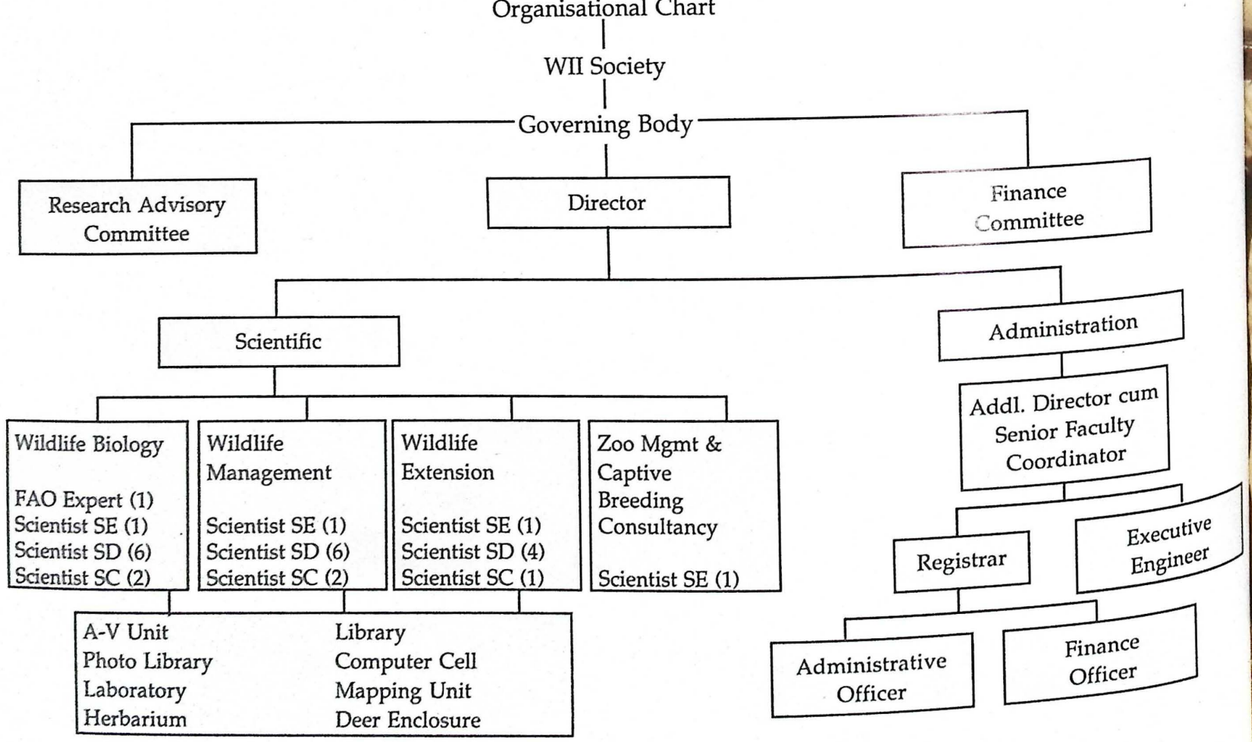
WII activities are divided under three broad categories:

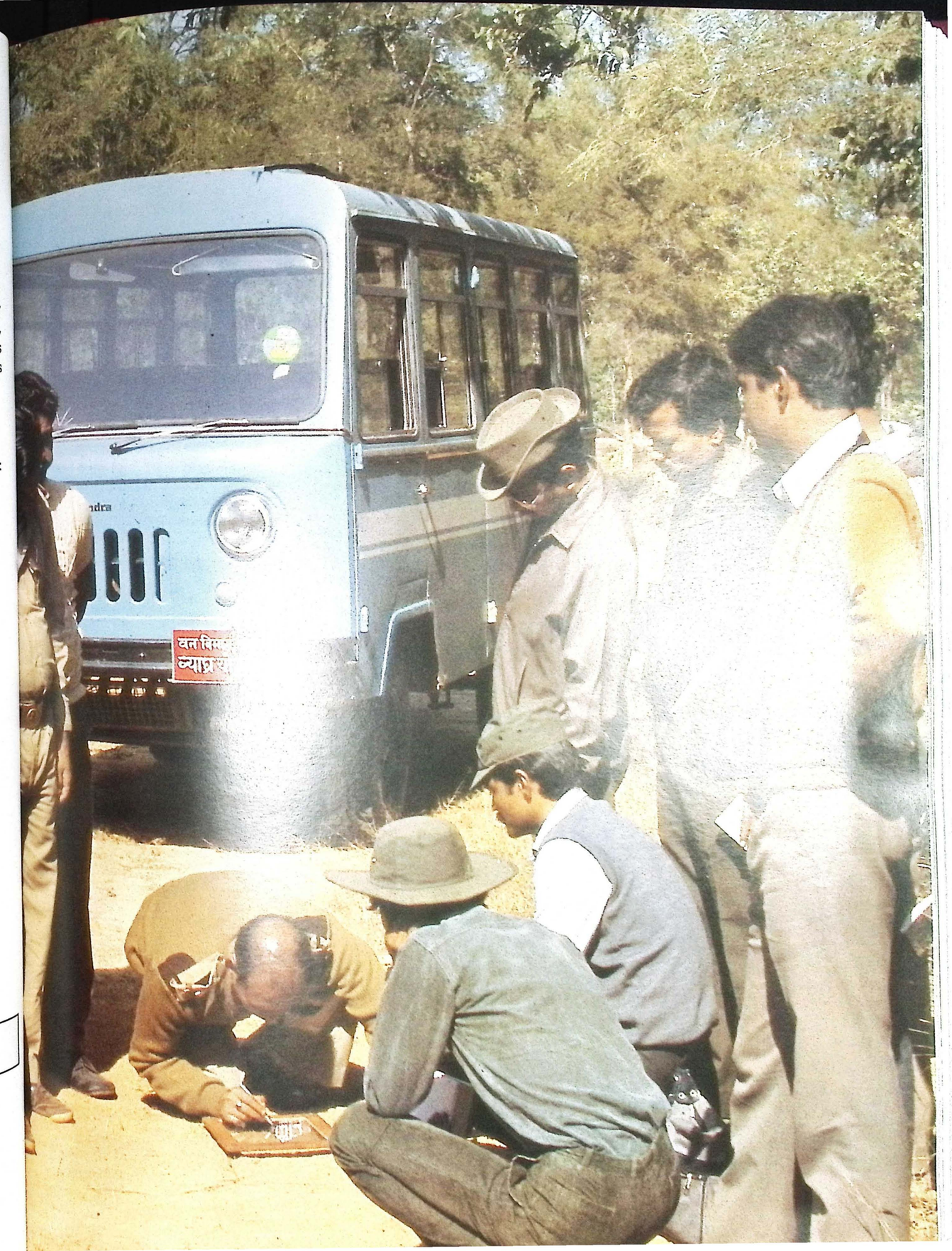
* Academics

* Organisation

* Development

WILDLIFE INSTITUTE OF INDIA
Organisational Chart





Proper scientific management of wildlife and its habitat largely depends upon the availability of trained personnel. However, there is a severe paucity of such trained staff with the State wildlife organisations. Accordingly, the development of a cadre of trained managers and researchers remains the main work priority for the Institute. This is achieved through a number of long and short term courses for in-service forest management personnel and biologists.

TRAINING PROGRAMMES

Diploma Course: The nine-month post-graduate **Diploma Course in Wildlife Management** is open to in-service officials at the park manager level. It imparts training in management strategies, and techniques for management planning and implementation that are suited to the present-day conservation needs and situations. This means that special emphasis is laid on preparing them to handle the buffer zones of the protected areas

(PAs) where wildlife-people interface conflicts pose a major challenge to the managers. Training includes the legal aspects of PA management, including the enforcement of wildlife and forest laws. Practical lessons take the trainees to representative wildlife areas in different parts of the country, and give them a hands-on of wildlife, habitat and human pressure evaluation techniques. A test in the preparation of management plan of a protected area takes place in a special six-week exercise including a three-week field tour of an appropriate national park or sanctuary.

During the year under review, the XII Diploma Course concluded on 30 April 1991. There were 19 officer trainees representing 12 states and union territories, including one foreign trainee from Laos (PDR) who attended the course. The course has been reported in detail in the Fifth Annual Report (1990-91). At the end of the course, two trainees qualified for the award of the Honours Diploma. The top position was attained by a trainee from Maharashtra.

The XIII Diploma Course commenced on 1 August 1991. Representing 10 states and two union territories, there are 19 officer trainees besides a foreign trainee from Nepal, for the course. However, the trainee from Punjab had to be returned midway due to administrative reasons.

The trainees attended 250 hours of theoretical classes, and did about 15 weeks of training in the field. Beginning with a week of orientation at the Rajaji National Park, the trainees then attended a month long techniques tour in the Kedarnath Musk Deer Sanctuary, Garhwal, UP, and Sariska Tiger Reserve, Rajasthan. The two locations provided them with varied locations, habitats and animals and thus the methodologies for habitat evaluation and analysis. A brief visit to the wetland habitat Keoladeo National Park, Bharatpur was also a part of this tour.

For the course, two management tours were organised, totalling about 6 weeks, which exposed the trainees to a variety of management situations and practices in Corbett, Buxa, and Sunderbans Tiger Reserves, Asola, Mahananda, Jaldapara and Gorumara wildlife sanctuaries, the Nawabganj Bird Sanctuary, and the zoological parks at Lucknow, Kanpur, Darjeeling and Delhi. Besides looking at the management issues, problems and mitigation strategies at each place, the trainees studied the interpretive role and potential of different protected areas and zoological parks as an aspect of conservation education.

The course is nearing its end, and the trainees are on a 3-week management plan tour to Melghat Tiger Reserve. This tour is the high point of the course wherein the learning by the trainees during the entire course is put to test. The trainees, during this exercise, are required to prepare a management plan for Melghat Tiger Reserve. For this, they will collect first-hand information on park resources, problems and existing management practices. The information would be collated and after group discussions on the park's significance, objectives, values and planning, each trainee will prepare an analytical and incisive management plan.

Certificate Course: The curriculum for the **Certificate Course in Wildlife Management** is quite similar to that of the Diploma course except that it is of a three-months duration, has more emphasis on the practical aspects of

wildlife management and is open to in-service personnel at the field executive or range forest officer level. The aim is to prepare these officials so that they are able to translate the management plans in books to the field situations. During 1991-92, the VIII Certificate Course started on 1 May 1991. In all, 20 officer trainees from 13 states and union territories, besides two from Sri Lanka and one from Zambia attended the course. Out of the total duration of the course, eight weeks were spent in theory sessions covering wildlife biology, management and extension aspects, including interpretation, tourism, law and human dimensions. The remaining four weeks were spent in the various field tours.

The orientation-cum-techniques tour was held at Rajaji National Park to expose the trainees to wildlife management field techniques, landuse practices, census methods, tourism and eco-development, the use of remote sensing and aerial photography. The Institute's project in the park in which radio-telemetry is being used for determining elephant movement and habitat utilisation was discussed in detail.

The management tour took the trainees to Dudhwa, Ranthambhore, Sariska and Keoladeo National Parks, Kishanpur Wildlife Sanctuary and the National Zoological Park, Delhi. Here, the emphasis was laid on the human dimensions in wildlife management and the need for integrated forestry practices. At the zoo, the trainees were exposed to modern zoo management, nature interpretation and conservation education techniques.

During the course tenure, a number of guest lectures, including overseas guests, were organised. The trainees participated in a number of in-house seminars and lectures too. The course concluded on 30 July 1991, and an officer trainee from West Bengal bagged all the top honours.

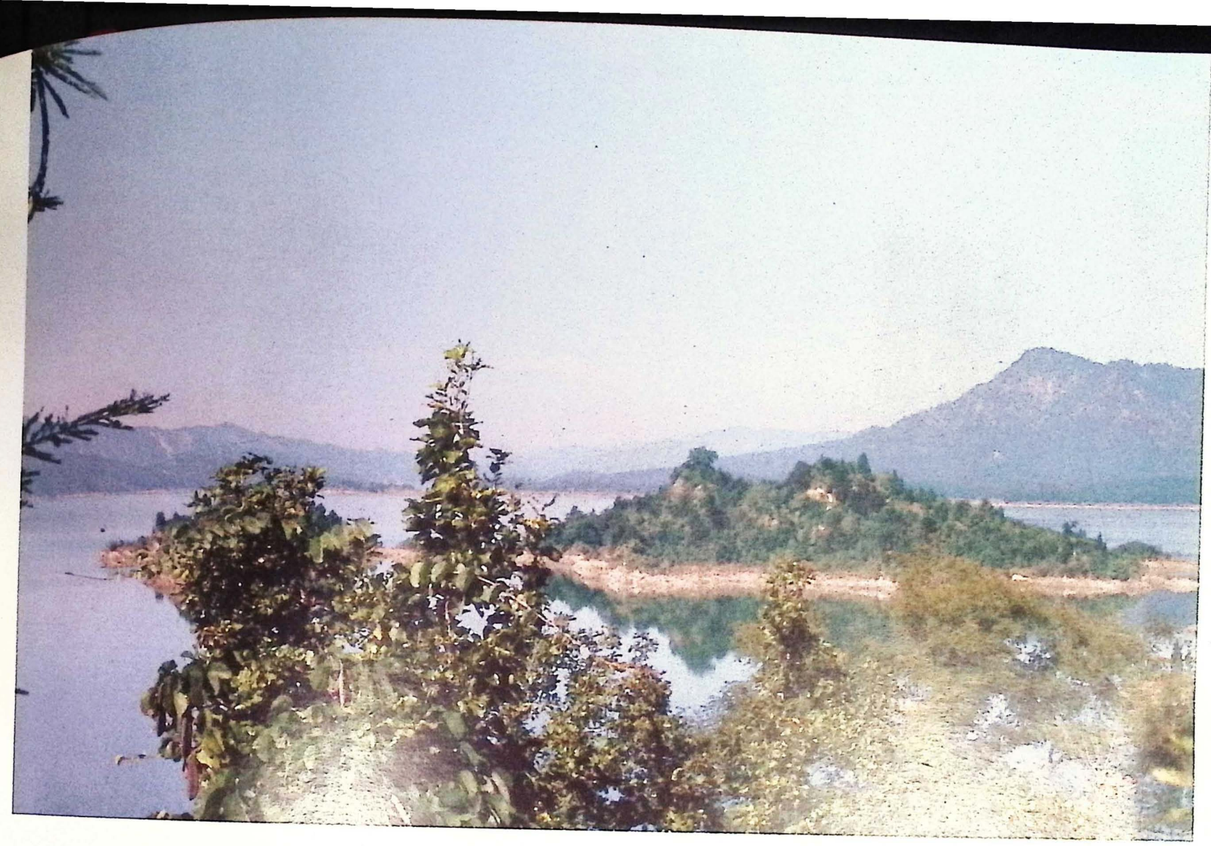
Short Term Courses: The number of protected areas in the country is quite large, and the Diploma and Certificate courses are not enough to turn out trained personnel at the desired pace. As such, WII also organises one-week capsule courses and subject specific workshops to meet the special training needs of different target groups. Of these, the most prominent is the one-week **Compulsory Course in Wildlife Management** for Indian Forest Service officers.

During the year, two such courses were organised. In the first, 21-25 October 1991, 27 forest officers of DCF and CF level from seven states attended; while in the second, held at Rishikesh, 3-7 February 1992, 28 officers from seven states took the course.

The aim of the first course was (i) to orient the participants toward critical issues in PA management and discuss strategies to deal with these issues, and (ii) to enable them to appreciate the need for addressing socio-economic problems of communities adjoining the protected areas, and enhancing the productivity of buffer zones with multiple landuse as a strategy for effective wildlife and forest conservation.

The second course held at Rishikesh, while focussing at PA management, strongly dealt with the promotion of wildlife conservation in forests other than protected areas without adversely affecting the main forestry objectives. The adverse impact of the neglect of landuse in areas surrounding protected areas were discussed and suggestions sought on plausible measures to enhance sustainable development of these areas as a means of effective biodiversity conservation.

The courses were conducted through interactive discussions with in-house guest faculty, and case presentations with audio-visual media used to good effect. The participants were provided with extensive carry-away reading material for use during the course and later in the discharge of their functions.

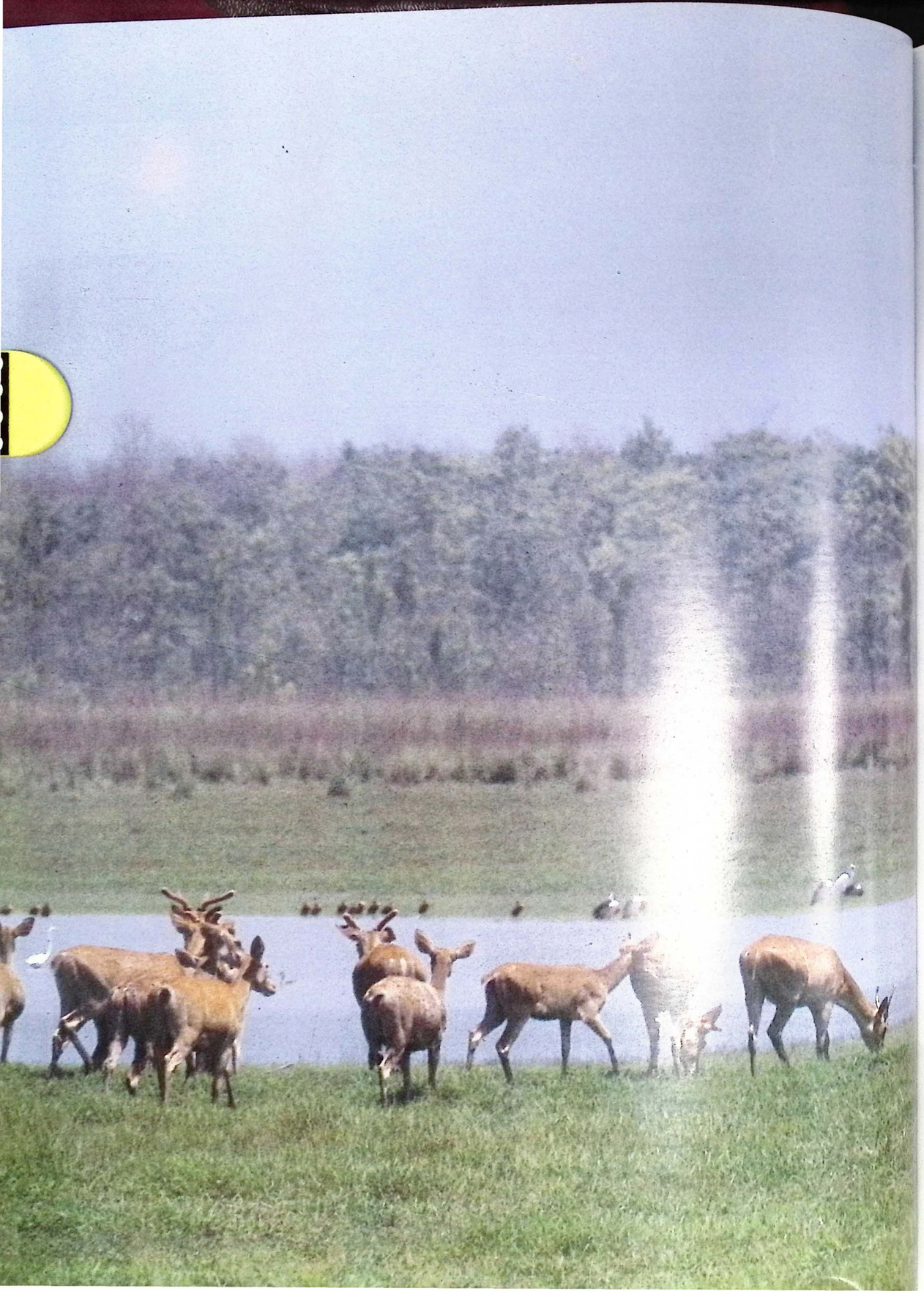


A similar course in **Wildlife Conservation and Landuse**, sponsored by the Department of Personnel, Government of India, was conducted for IAS officers at the Corbett National Park, UP on 25-29 November 1991. Though nominations from various Central services were also received, none from these other services turned up. Only 20 IAS officers attended the course.

This was one of the few courses organised for personnel other than in the forest services. As most of the target resources are affected by factors beyond the control of PA managers, the conservation of wildlife and biodiversity must equally become the concern of officials in the general administration and other development departments as well. Conducted with a certain degree of informality, the course covered the entire gamut of wildlife conservation and sustainable development issues and problems through panel discussions, lectures, audio-visual programmes, field visits and elephant rides into the park. The course evaluation by the participants was rated very high.

The first **Short Term Course in Zoo Management** organised for senior zoo officials and veterinarians last year was a success. Encouraged by this, a similar four-week course was conducted at the WII campus (11 November - 6 December 1991) with a view to impart specialized training to zoo technicians and mid-level supervisors in modern techniques in the management of wildlife in captivity. Due to paucity of accommodation at the Chandrabani campus where the course was located, only 20 nominations were accepted, of which ultimately only 16 participants from ten states and union territories attended.

The training methodology included lectures on all aspects of zoo management, field exercises, visitor interviews, guide map and signage preparation, etc., including demonstration and presentation by the participants on their respective zoos. Video programmes included topics such as artificial insemination, safety measures, feeds and feeding, research aspects as well as films on some of the best zoos in the world. The highlight of the course was the demonstration on the use of micro-computers for records and stud-books maintenance. Field trips comprised visits to Kanpur Zoological Park and the Prince of Wales Zoological Garden, Lucknow, the endangered species breeding project at Kukrail, near Lucknow, and Malsi Deer Park-cum-Mini Zoo, Dehra Dun.



EDUCATION PROGRAMME

Besides its training programmes, WII conducts a two-year course **M.Sc. in Wildlife Science** with recognition from the Saurashtra University, Rajkot which conducts the examinations and awards the degrees. The aim of this course is to produce qualified field biologists and ecologists who could contribute the much needed information to support conservation by taking up a career in wildlife research. They could also go into teaching, especially now, as various universities are offering courses in wildlife biology and ecology. The course has a strong field bias with almost half the total time devoted to field tours, including a six-month project in field research leading to a dissertation evaluated for credits.

The first M.Sc. course was started in 1987-88, and the year under review saw the completion of the second batch and the beginning of the third.

The second batch which had begun in June 1989 successfully passed out in June 1991. The students wrote dissertations on their specific topics after carrying out their field study in three different protected areas. All the seven students passed out in first division.

The third batch commenced on 15 July 1991. Ten students were selected after a written test at three centres viz. Calcutta, Bangalore, and Dehra Dun followed by a personality test. Eventually, only seven students (5 boys and 2 girls) joined the course. All students have been granted fellowship of Rs. 1000 per month (four of these funded by IUCN) plus free hostel accommodation, and have been duly registered with the Saurashtra University for the M.Sc. degree.

In the Ist semester, the students began with an orientation tour to Rajaji National Park before beginning their classes comprising both theory and practicals (field and lab) including guest lectures. The techniques tour was conducted in Sariska Tiger Reserve and Dudhwa National Park covering the various techniques of habitat and animal studies. At the end of the Ist semester, exams were conducted in Dec. 91 - Jan. 92 for Ecology Theory, Habitat Studies and Biology.

The IInd semester began on 15 January 1992 and is now in progress. A two-week wetland study techniques tour has already been conducted to Keoladeo Ghana National Park, Bharatpur, National Chambal Sanctuary, Morena and Shivpuri National Parks. The papers for this semester are - Wildlife Ecology; Environment, Conservation and Statistics; and Conservation, Management and Behaviour.

WORKSHOPS, MEETINGS, SEMINARS

Other than the above mentioned training programmes, and in order to further reach out to target/subject specific groups, workshops and seminars are organised. During 1991-92, besides a meeting with Chief Wildlife Wardens on the biogeography based representative protected area network, two workshops and seminars plus the annual research seminar were conducted.

*In 1984, WII was commissioned a "Biogeography Project" by the Government of India to review the adequacy of the existing network of wildlife protected areas, and draw up a plan for a network which would cover the range of biogeographic diversity in the country. Accordingly, the draft project report entitled "Planning a Wildlife Protected Area Network in India" in two volumes (608 pgs.) was published in 1988. This draft report was circulated to the Chief Wildlife Wardens, scientific institutions and conservationists around the country for comments and updating of information on the implementation of the recommendations.

Last year, three regional seminars (in Karnataka, Bihar and Assam) were organised, and this year, at the recommendation of the Research Advisory Committee (RAC) and coinciding with the **Annual Research Seminar,** a **Biogeography Meeting** was held in Dehra Dun on 29 August 1991. Chief Wildlife Wardens and their representatives from 13 states and union territories attended the meeting, and made presentations, providing concrete and specific information and comments on the implementation of the recommendations made in the report, problems and difficulties regarding implementation, and made suggestions for changes or additions including suggestions for new protected areas. Several members of the Governing Body and the RAC were also present at the

meeting. Action has now been initiated to effect the necessary revisions in the report and bring it up to date.

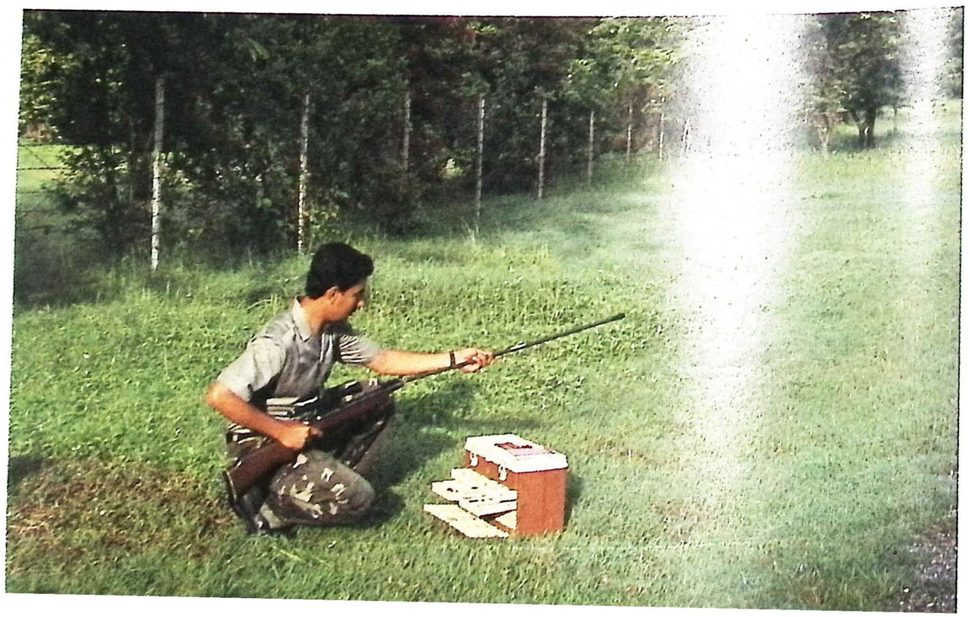
* In our country, PA management is already severely constrained by shrinking and degradation of natural areas from population pressures as well as inadequate and inappropriate rural development inputs in these upcountry tracts. In this situation, the traditional approach to PA management has relied heavily on legal procedures and policing which has, in the long run, alienated the local people, giving rise to conflicts at the interface between habitations and protected areas. Besides, there has been little effort toward exposing the visitor to the parks, to their values and the need for conservation. However, today interpretation and conservation education are considered important for generating conservation awareness among people and eliciting their support and participation in the conservation efforts. In view of this, an **Interpretation and Conservation Education** workshop was organised in Dehra Dun (16-24 September 1991) in collaboration with the US Fish and Wildlife Service (USFWS) as part of the five-year collaborative project.

Twentyseven participants from various disciplines and backgrounds like wildlife management, zoo management, tourist departments, army and representatives from non-governmental organizations (NGOs) attended the workshop.

The immediate aim of the workshop was to get people from various fields to offer critical analyses of the present efforts, point out the shortcomings and offer solutions regarding the use of media in generating conservation awareness among the masses. The methodology adopted was lectures with audio-visual support, question time, group exercises, case studies, field visits and on-site discussions, exhibition of interpretive materials and presentations by the participants themselves. Topics included basic interpretive media, interpretive planning, eliciting people's participation in forest management in India, role of NGOs in conservation awareness, role of the Defence Services in environmental conservation, and case studies on interpretive programmes at Kanha National Park, Melghat Tiger Reserve and the National Zoological Park, New Delhi.

* At Kanha National Park a workshop was organised (2-6 December 1991), on **Chemical Immobilization** and **Translocation of Wild Animals**. This was also a part of the WII-USFWS collaborative project and in response to a long standing demand from State wildlife wings and other field personnel for being introduced to the modern tools and techniques in chemical restraint of wild animals. In all, there were 30 participants of RFO and CF level from 17 states and union territories including two wildlife scientists from Aligarh Muslim University.

The subjects discussed and demonstrated at the workshop were basic biology, anatomy, physiology, pharmacology of the immobilizing drugs, projector system, capture operation plan, monitoring of the darted animal, record keeping, writing a report, and translocation and transportation of the immobilized animal. Audio-visual aids were used, and the participants were provided with reading material and other equipment.



The following is an account of the workshops, seminars attended and overseas study tours undertaken by the faculty and researchers, during 1991-92.

* ***Training Seminar on Wildlife Economics and Management Policy and Practices*** was held at Eliot College, Kent, UK and the International Training Centre, Jersey Wildlife Preservation Trust, Jersey on 2-21 April, 1991. The Additional Director-cum-Chief Faculty Coordinator attended the seminar under the collaborative Faculty Development Project of WII-USFWS and interacted with other delegates on how wildlife management and economics could be integrated with wildlife interpretation and education. The member also visited World Conservation Monitoring Centre, Cambridge, a Ramsar site and an endangered species captive breeding centre at Slimbridge.

* A Research Associate in the Management faculty attended the ***International Conference on Rhinoceros Biology and Conservation*** held at San Diego, California, USA on 9-11 May 1991. In joint authorship with another faculty member, the participating member presented a paper entitled "Management of the Reintroduced Great One-horned Rhinoceros in Dudhwa National Park, UP, India". The paper was also read at the Department of Biology, University of California, San Diego, which was visited as part of the post conference tour (12-19 May 1991). Another highlight of the tour was the visit to the Wild Animals Park, San Diego which is among the best managed animal parks in the USA. It has great Indian one-horned rhinoceros as well. The Research Associate was made a member of the IUCN's Reintroduction Specialist Group (RSG) and Species Survival Group (SSG). Financial assistance for the member's visit came from USFWS and the San Diego Zoological Society.

* Scientist-SE in the Extension faculty went to the USA for an ***Orientation in Wildlife Interpretation and Conservation Education*** (29 May - 11 July 1991). This fellowship tour was sponsored under the WII-USFWS collaborative project on faculty development. The aim of the tour was to familiarise the member with modern methods and techniques employed in the subject field in USA, and also provide him with an exposure to the functioning of the USFWS, National Parks Service and other related organisations. The orientation involved intensive interaction and observation on a wide ranging aspects in interpretation and conservation education. The member also participated in the local training programmes and delivered a talk on "National Parks Management in India and Comparison with US National Parks."

* The Senior Computer Technician went on a study tour to USA (14 September-5 October 1991) for training in ***GIS and System Administration***, in view of the Institute setting up this facility. The study tour was under the WII-USFWS collaborative project. Training was received in the use of GRASS (Geographical Resource Analysis Support System) software technique, the Sun Workstation (Sun Os and Open Windows), and on system administration of the Sun systems.

* Joint Director, incharge of the Zoo project, attended a ***Captive Breeding Specialists Group Meeting*** in Singapore on 27-29 September 1991 followed by the annual meeting of the International Union of Directors of Zoological Gardens. A status report on "Captive Breeding, Rehabili-

tation and Reintroduction of Endangered Species in India" was submitted at the meeting.

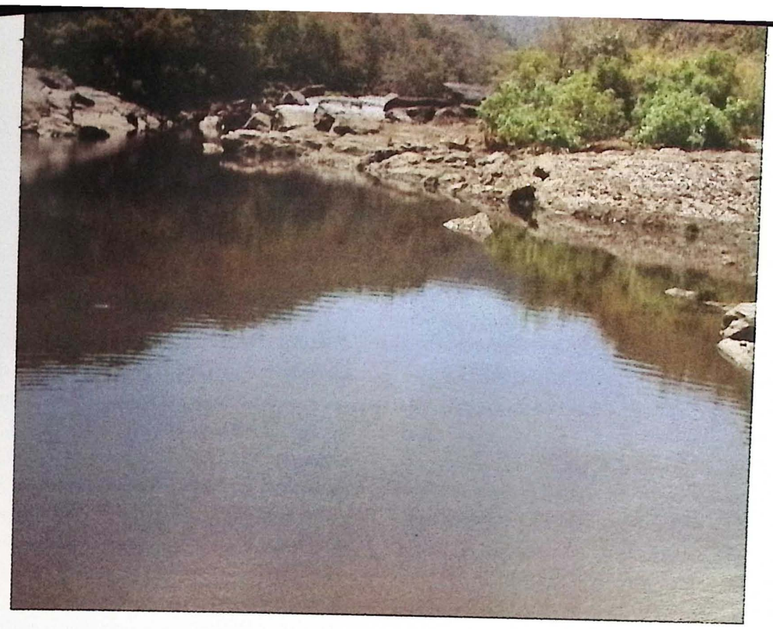
*The ***First National Symposium on Unconventional Pests: Control Vs Conservation,*** organised by the University of Agriculture Sciences, Bangalore and Bangalore University on 14-16 October 1991 was attended by the faculty handling the subject of animal damage control and three researcher scholars. Four papers were presented: (i) "Assessment of Damage to Winter Crops by Nilgai in Nahar and Kairu areas of Haryana", (ii) "Economic Aspects of Agricultural Crop Depradation by Nilgai and Blackbuck in Haryana", (iii) "Crop Depredation by Wild Ass, Nilgai, Feral Pigs and Demoiselle Cranes around Little Rann of Kutch", and (iv) "Ranging Pattern of Nilgai in Agricultural Dominated System and Some Management Implications".

* A one-day workshop on ***Sustainable Development with Special Emphasis on Environment of Doon Valley*** was organised in Dehra Dun on 28 October 1991 by the local unit of the Confederation of Engineering Industry, and Friends of the Doon. Two members of the faculty attended the workshop, one of who discussed the role of wildlife conservation in sustainable development.

* A Scientist-SC in the Extension faculty attended the ***Third Global Congress of Heritage Interpretation International*** at Honolulu, Hawaii (USA) on 3-8 November 1991, which was jointly organised by East-West Center, Eastern Michigan University and the University of Hawaii. The theme of the congress was "Joining Hands for Quality Tourism: Interpretation, Preservation and the Travel Industry". The faculty member presented a paper entitled "Interpretive Networking : A New Perspective". The financial assistance for the member's participation was provided by the congress organisers.

* The faculty incharge of animal health along with two research fellows attended the ***International Seminar on Wildlife Medicine,*** at Bangalore on 8-10 November 1991. It was jointly organised by Indian Veterinary Association (IVA), Karnataka Veterinary Association (KVA), Federation of Asian Veterinary Associations and the Commonwealth Veterinary Association.

Being the first seminar of its kind to be held in India, it provided an excellent opportunity to wildlife and zoo veterinarians in the country to share their research findings, field experiences and case reports. However, as much as 70 percent of the papers presented were on captive animals which suggested that studies on free ranging wildlife were still at a preliminary stage in India. Moreover, there was no session on epidemiology which was discouraging, since wildlife epidemiological studies form an important component of wildlife management programmes.



On behalf of WII, five papers by various authors were presented - (i) "Immobilising Drugs and Delivery Systems for Chemical Immobilisation of Wild Animals"; (ii) " On the Use of *Xylazine* and *Ketamine* Mixture for Immobilization of Buffaloes in Kaziranga National Park, Assam, India"; (iii) "Chemical Immobilization of Wild Asian Elephants: Pharmacological, Biological and Ecological Considerations"; (iv) "Surgical Implantation of Radio-transmitters in Smooth Coated Indian Otter"; and (v) "Wildlife Health - A Programme of Wildlife Institute of India".

*A Senior Research Scholar attended a symposium ***Mammals as Predators*** organised by The Zoological Society of London and The Mammal Society at London on 22-23 November 1991. In joint authorship, he presented a paper entitled "Management of Asiatic Lions in the Gir Forest, India".

* With the establishment of ***Trade Record Analysis of Flora and Fauna in Commerce (TRAFFIC) - India*** chapter, a joint WWF-IUCN initiative, India has joined the worldwide network for monitoring of trade in wildlife. Its inauguration and a workshop was held at Delhi on 25-27 November 1991 and was attended by persons from varied backgrounds such as forests, customs, para-military, legal, media, etc. WII was represented by the Joint Director-cum-Chief Faculty Coordinator and a Scientist-SD from the Management faculty. The Joint Director presented a paper "Modus Operandi of Traders and Indian Trade Routes", giving information on the species and derivatives of trade significance with case studies.

*Two senior research fellows participated in the ***International Symposium on Environmental and Hormonal Approaches to Ornithology*** (27 November - 1 December 1991) at Srinagar (Garhwal), UP. Organised by the Department of Wildlife, HNB Garhwal University, the symposium highlighted the role of hormonal studies in captive breeding of endangered avifauna and research to evolve effective methods of control of crop damage by birds. WII's participating members presented three papers - (i) "Prescribed Burning and Bird Communities in Dudhwa National Park, UP (India)"; (ii) "Distribution of the Common and Demoiselle Cranes with Reference to Crop Depredation around Little Rann of Kutch, Gujarat", and (iii) "The Status of Houbara Bustard in Little Rann of Kutch, Gujarat".

* One Scientist-SD from the Management faculty participated in the 36th working session of IUCN's ***Commission on National Parks and Protected Areas (NPPA)*** for South and South-East Asia. This was held in Bangkok, Thailand on 1-5 December 1991 and was organised by the Asian Institute of Technology, Bangkok. The member presented a paper in joint authorship titled "Protected Area Network in India : A Review".

* The University of Delhi organised the ***Second Congress of the Asia and Oceania Society for Comparative Endocrinology,*** in Delhi on 3-6 December 1991. A Scientist-SC from the Management faculty attended the congress and presented a paper under joint authorship, entitled "Prospects of Fertility Control Techniques in Managing Captive and Wild Animal Populations".

* An international conference on ***Environment and Development*** was held in New Delhi on 11-12 December 1991. It was jointly organised by Business Council for Sustainable Development, UNDP and Confederation of Engineering Industry. The objectives of the conference were to arrive at a consensus on the issues of concern for

developing countries, and discuss the use of environmentally sustainable technologies. One of the faculty members attended the conference and submitted a background paper on "Biomonitoring of Industrial Pollution Using Plants : A Useful Tool in Environmental Analysis".

* A Scientist-SD attended the ***International Conference on Wetland and Waterfowl Conservation in South and West Asia,*** at Karachi, Pakistan on 14-20 December 1991. It was organised by the International Waterfowl and Wetland Research Bureau (IWRB), Asian Wetland Bureau (AWB) and National Council for the Conservation of Wildlife (NCCW) at the invitation of the Pakistan Government, and in cooperation with the Sindh Wildlife Management Board, IUCN-Pakistan, WWF-Pakistan, Pakistan Zoological Survey Department, the Secretariat of the Convention on the Conservation of Migratory Species of Wild Animals (Bonn, 1979), and the Bureau of the Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar, 1971).

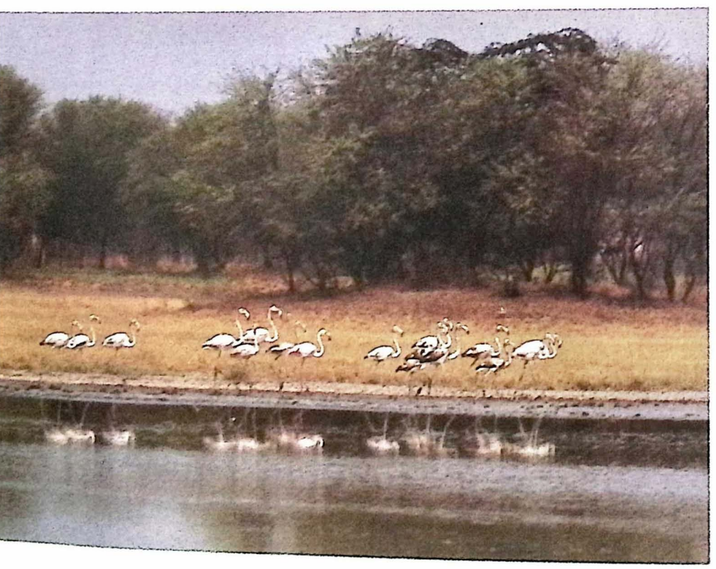
Highlighting the destruction and degradation of wetland ecosystems in the South-West Asian region, the conference called for international and regional cooperation in the conservation and wise use of trans-border wetlands, international river systems and migratory waterfowl throughout their range. The conference was preceded by a three-day ***Training Requirement Workshop***, wherein WII was identified as a key agency for training in wetland conservation.

* The Director, along with Head, Wildlife Biology faculty and a Scientist-SD in the Management faculty participated in the ***IVth World Congress on National Parks and Protected Areas,*** at Caracas, Venezuela on 10-21 February 1992. Such a congress is organised every ten years by the IUCN. The theme of the IVth Congress was "Parks for Life : Enhancing the Role of Conservation in Sustaining Society", focussing attention on the role of protected areas in the conservation of biodiversity and the society as a whole.

Over 15 papers/abstracts from various faculty members and researchers at WII were accepted for the Congress. Active contributions were made in the various sessions and workshops, namely -"People and Protected Areas", "Training Protected Area Managers", "Role of Species Research", "Research in Protected Areas" and "Data Management in Protected Areas".

A proud moment for WII at the Congress was when the Director was presented the IUCN "Tree of Learning" award for his contribution to conservation through education.

* Joint Director, incharge of the Zoo project, and a Scientist- SD in the Management faculty attended a seminar on ***Controlled Breeding for Survival*** and the ***Sixth National Conference of Indian Zoo Directors*** held at Nehru Zoological Park, Hyderabad on 15-16 February 1992. They presented an update report on the "Zoo Consultancy Project" of WII, the role of WII in scientific training of zoo managers and importance of zoological parks in conservation of endangered species.



* ***The First International Conference of the IUCN/SSC - Indian Subcontinent Reptile and Amphibian Specialist Group*** was held at Bhubaneswar, Orissa on 23-25 February 1992. The aim was to bring forth action plans for amphibians and reptiles of the subcontinent. The conference highlighted the precautions to be taken in captive breeding programmes.

The Institute was represented by a Scientist-SD from the Management faculty, a research biologist, two senior research fellows and one M.Sc. student. The following papers were presented - (i) "The Status of Freshwater Turtles in Rajasthan with Special Reference to Keoladeo National Park, Bharatpur"; (ii) "Studies on Some Ecological Aspects of *Python (Molurus molurus)* : A Case Study in Keoladeo NP, Bharatpur"; (iii) "Herpetofauna Diversity in Little Rann of Kutch and Conservation Needs"; (iv) "Status and Conservation Problems of Herpetofauna of Terai"; and (v) "Action Plan for Future Gharial Rehabilitation in National Chambal Sanctuary".

* Joint Director, incharge Zoo project, attended three meetings of the Central Authority for Zoos of the Ministry of Environment and Forests, and contributed towards drafting and finalising standards for Indian zoos as a co-opted member of the sub-committee constituted for the purpose.

RESEARCH

The Institute is being looked upon as an important centre contributing to the development of wildlife science in the country and the region. In any developing science, research is an important ingredient, more so in wildlife science which is essentially field based, multi-disciplinary and applied in nature, with a strong human dimension. WII's research projects help generate vital scientific knowledge and information to support field conservation, and also help the faculty keep abreast of the technological advances and contemporary field situations.

The research activities at WII are guided by its Research Advisory Committee (RAC) comprising eminent conservationists, academicians and representatives of scientific organisations. The RAC ensures that the research conforms to the national priorities, and coordinates the procedures of screening and evaluating the research projects.

The research projects underway at WII cover the different ecological and geographic regions of the country, and address endangered species, aquatic animals, crucial habitats including animal and gene corridors, wildlife health, problems of pastoral communities and impact of development projects.

During the year 1991-92, the RAC met twice and approved six new research projects. These are -- two studies of the montane grasslands in the high altitude areas of Himalayas and the Western Ghats; integrated forest management in the Satpura region; two studies on wildlife health addressing ungulates and small carnivores; and the survey and ecology of the Indian wolf.

Besides, three other projects, supported by external funding, were also approved - on the Himalayan ibex, the Indian giant squirrel, and the frugivorous birds. The RAC, along with the Governing Body and Chief Wildlife Wardens who had primarily come for the biogeography meeting attended the fifth *Annual Research Seminar* at Dehra Dun on 30-31 August 1991. These annual seminars provide an excellent opportunity for an effective appraisal of the ongoing studies. Twenty-three presentations, spread over six sessions, were made covering all the ongoing research projects. Certificates and prizes worth Rs.500/- each in the form of books on wildlife and related subjects were awarded to six researchers for their excellent work and presentations.

The following are the summaries of the research projects for the year under review.

(i) **National wildlife database project**

A computer-based National Wildlife Database project was initiated in January 1990. The objective was to provide up-to-date assessment of the conservation status of biogeographical regions, vegetation types, individual animal species and the network of PAs in the country. The first phase of the project ended in March 1992. The major findings of the project so far have been mentioned in the report "Strengthening of National Wildlife Database - Phase I".

During the year under review, several modifications were made in the software so as to improve the output quality from the database. The software programme is now ported to an advance RDMS-FoxPro. Based on Champion and Seth (1968) and French Institute's categories, a new vegetation map for the country was prepared.

More than 10,000 references on various aspects of conservation were added to the bibliographic database on protected areas. The database now has records of all existing as well as proposed protected areas in the country. The development of the protected area network

has been mapped graphically. This covers their distribution in various area categories, gazettement in different years and the representation of these protected areas in the ten biogeographic zones of the country.

One of the principal investigators of the project standardised the methodology for obtaining ecological data for the database on habitat variables using rapid ecological methods, and was awarded a D. Phil. degree by the University of Oxford.

(ii) **Creation of a laboratory facility at Wildlife Institute of India to standardise methods to determine carnivore diet**

The project, started in January 1991, was aimed at developing appropriate, accurate and efficient techniques for scat analysis, and training laboratory technicians.

The methods for analysis of leopard scats have now been standardised. The minimum sample size of scats needed to obtain reliable estimates of leopard diet was estimated by using the "observation area curves". From the 100 leopard scats randomly collected at Gir, 20 hair were picked from each scat after washing and drying, and these were then used to identify the prey species on the basis of their medullary characteristics. The significant finding was that a minimum of 80 scats must be analysed for a reliable estimate of a leopard diet in Gir. In case of lion, the minimum requirement was 30 scats. From the scat sample collected at Gir, 15 prey species were found in leopard scats and 8 in lion scats.

As a test of accuracy of the researcher and the reliability of medullary method for prey species identification, ten simulated diets were prepared. Each of these was made up of 20 hair of five different species (chital, sambar, chowsinga, nilgai and cow) in varying proportions. In four cases, all 20 hair were identified accurately. In five cases, the accuracy was 95 per cent whereas in one case, it was 89 per cent. However, the confusion in identification in all cases was between nilgai and cow which have similar medullary patterns and measurements.

(iii) **Ecological studies on snow leopard and its associated prey species in Hemis National Park, Ladakh, J&K**

This project has been completed. Begun in November 1987, its field work was completed by March 1990. The data have since been analysed, and the final report was submitted to the Institute for publication in 1991-92. The major habitat features of the snow leopard were analysed using the GIS package. Part of the report has also been submitted by the research scholar to the University of Rajasthan, Jaipur for appraisal and award of Ph.D degree.

(iv) **Habitat ecology of ungulates in Kedarnath Wildlife Sanctuary, UP**

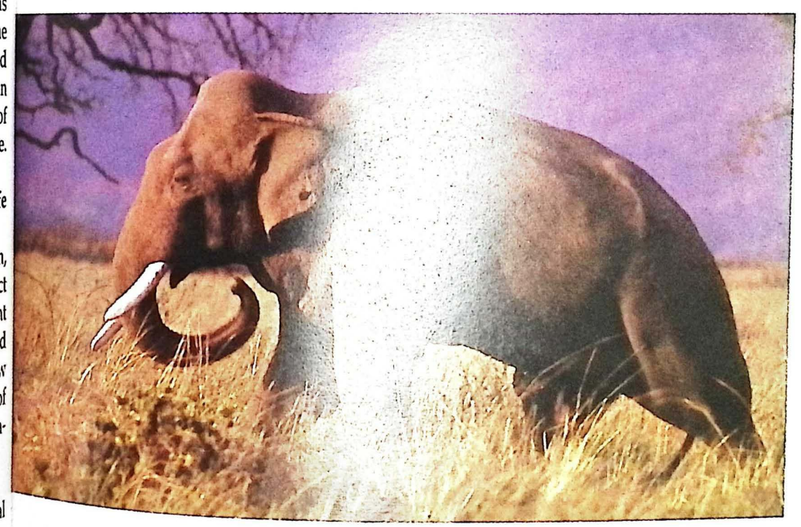
An intensive study on the different habitats, vegetation, ungulate abundance, their habitat use and human impact was carried out. On the basis of this, a rapid assessment survey was conducted in other parts of the sanctuary and the adjoining areas. As a result, information on new records for the area, confirming existence or absence of some species, ungulate abundance, distribution, and status of the habitat has been obtained.

On the basis of this survey and the study, the crucial factors affecting ungulates, their habitats, areas which need protection and management have been identified. Potential areas outside the sanctuary have also been identified and recommended for inclusion in the sanctuary area. Also during the year, a comparative ecological survey of the abundance and distribution of ungulates was carried out in the Govind Pashu Vihar Sanctuary.

The study has generated valuable baseline data for conducting training in high altitude habitat ecology.

(v) **Study of inter-relationships between the village ecosystem and elephant corridor habitat, in the forest linking Rajaji and Corbett national parks, with a view to devising compatible management strategies, UP**

In the preceding year, four villages had been selected and data collected to study their dependence on the forest, as well as the impact of human pressure upon the corridor. The preliminary information collected on the socio-economic set-up of these villages was assembled and analysed. A study of the amount and monthly pattern of fuel and fodder consumption was carried out in 32 households, and completed. Headloads of fuel and fodder were monitored at all the entry points of these villages and the data recorded in computer compatible formats which would now be analysed. The entry and exit points of these villages were also periodically monitored for cattle grazing pattern.



The field work has thus been completed. Data is now being collated and analysed.

(vi) **Movement and habitat utilization by elephants in north-western Uttar Pradesh**

The field study began in 1989. During 1990-1991, some elephants were radio-collared. The radio locations and data on various aspects of the habitat are being collected since July 1991 for the bull elephant, and July-September 1991, and March 1992 onwards for the cow elephant. Winter data of the female group could not be collected as more time was spent tracking the bull elephant. Data collection on group size and composition, and radio tracking is continuing.

(vii) **Ecology of Indian wild ass in the Little Rann of Kutch, Gujarat**

The project is aimed at collecting information on the ecology and biology of the wild ass, as also on the socio-economy of the people in and around the sanctuary. The field work has been completed and data analysis is being carried out. Quantification of vegetation was done on five islands which were considered potential habitats for the species within the sanctuary. This data is also under analysis. It was found that the southern fringes of the sanctuary have a better population spread than the other areas. Also, there are more females than males, though among foals, the sex ratio is more or less even.

On the socio-economic aspects, it was found that land ownership status determined the amount and kind of fodder the people used. The agriculture class used more cotton stalks for fuel as compared to the labour class. Enclosures were also set within the sanctuary and their grass productivity obtained to determine the impact of livestock grazing on wild ass habitat.

(viii) **Ecology of large ungulates in Sariska Tiger Reserve, Rajasthan**

The field work for this project was conducted between June 1988 and December 1990. During the year under review the data was being analysed. Monthly group composition data of chital, sambar and nilgai, and the antler phenology data for chital and sambar were also analysed. Thirty-nine chital food plants, 39 sambar, 50 nilgai and 63 domestic livestock food plants were identified. Plant and fecal samples collected, were being chemically analysed.

(ix) **Ecology of aquatic mammals in National Chambal Sanctuary**

The overall objective of the project is to integrate its findings with those of the earlier project on the ecology of crocodilians and turtles, and develop a compatible management strategy to benefit all aquatic species in the Chambal river.

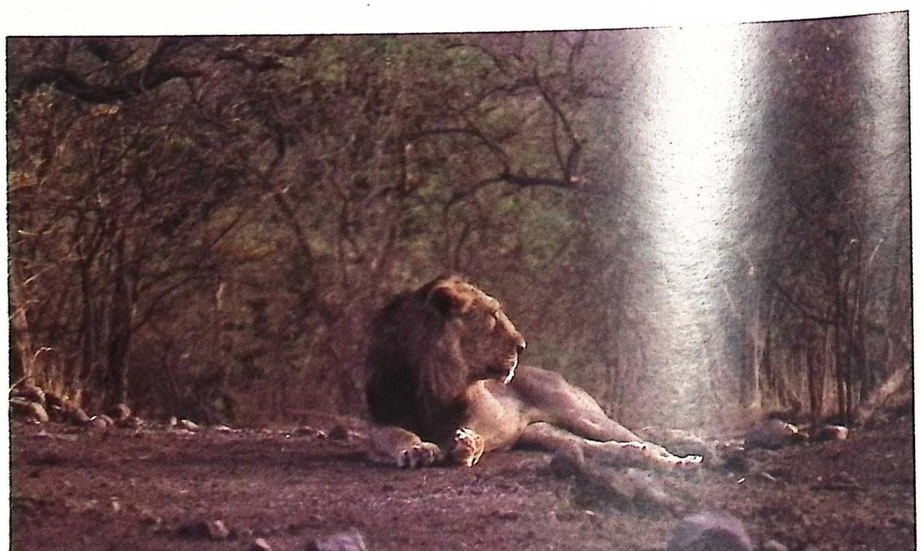
During the study period, status, distribution and habitat preferences of otters and dolphins were established. Tracking four radio-implanted otters has provided valuable infor-mation on their social grouping, home range and dispersal patterns, breeding season and movement with respect to season, food base and other biotic and abiotic factors. The final report of the project is under preparation.

(x) **A study of ungulate - lion habitat in Gir forest, Gujarat**
A reconnaissance, literature survey and consultations with the park authorities and Gir Lion Committee experts were carried out in the first three months beginning February 1991. Consequently, the project was modified to include concerns expressed in the consultations, like inclusion of differential use of habitat by the lions in dense and sparse vegetation classes, and that it was absolutely necessary to intensively monitor habitat usage by the lions.

Tracking of a Chodavadi female lion, which was radio-collared earlier, continued, and it was felt that 3-4 animals in different vegetation density classes would need to be radio-collared and monitored. For the study of vegetation structure and density, 45 plots were selected in different parts of the national park and sanctuary, which also reflected the occupancy and usage by the local community of Maldharis. It is also proposed to have some enclosures for observing differences in herb layer biomass and productivity. Detailed work on habitat use by ungulates by foot transects and also using the vehicle will be carried out.

(xi) **Ecological factors pertinent to the improved management of the Asiatic lion in India, Gir, Gujarat**
Last year, while detailed analyses of the field data were being carried out, an interim project report had been submitted. During the present year, data analyses were being completed. The final project report, as also the Ph.D dissertation of the researcher are nearing completion.

(xii) **Ecological studies to evaluate crop-damage by nilgai and blackbuck in Haryana and to formulate mitigation strategies**
The field study for this project is being done in the Nahar and Kairu areas of Rohtak and Bhiwani districts in Haryana. This year, the field work of collecting data on the relative abundance, social organisation and habitat use, activity pattern, food and feeding habits, and the reproductive aspects of the nilgai was completed. However, quantitative assessment of damage to *rabi (wheat, mustard* and *gram)* and *kharif (bajra* and *jowar)* crops in the fenced and unfenced plots in the cultivation areas at Nahar was continued to evaluate the effectiveness of the fence. Last year, an eight strand electric fence running a length of 1.8 km had been erected around *bajra* and *jowar* crop fields.



(xiii) **Study of impact of the Narmada Sagar Project (NSP) on flora and fauna with attendant human aspects, Madhya Pradesh**
Information available on the six major thrust areas - vegetation communities, wildlife habitats, terrestrial wild mammals, riparian and avian species, ornithological species, and people — is now more detailed. 286 plants of 213 genera and 72 families have been recorded from the study area. A quantitative approach to vegetation classification has yielded information on vegetation association in terms of trees and shrub species from which it has become possible to obtain a comparable database for vegetation studies in the 'impact zone' (impact of lopping, cutting and grazing). A study of the riparian vegetation along the Narmada riverbank has also been completed. An inventory of habitat categories has been prepared for (1) forest areas to be submerged, (2) peripheral areas outside the submergence zone which would provide refuge to people and wildlife, and (3) contiguous forest areas outside submergence. This has been done in order to identify and quantify the various habitat types to be lost. Using line transects, the status of large mammals in the proposed submergence area has been estimated. With the help of habitat suitability index models developed for chital, the nature and extent of the impact of NSP on the ungulates has been ascertained.

A stretch of 65 km of Narmada river, downstream of the Narmada Sagar dam site, has been surveyed to assess the status of aquatic vertebrate fauna as well as the use of river shoreline by terrestrial mammalian fauna.
In the submergence area, a total of 191 bird species representing 50 families have been recorded. These have been classified in ten different feeding guilds. Preliminary data on their diversity and density have been analysed. A reconnaissance has been done of the project area in and around Omkareshwar in order to plan studies here in future. Data on sample households is also being collected through regular village surveys.

(xiv) **Study of the ecosystem of Masinagudi village in the Mudumalai Wildlife Sanctuary, with a view to evolving a model ecodevelopment plan to ensure compatibility between the village and the sanctuary, Tamil Nadu**
During the year, field study continued. The demographic set-up of villages around Masinagudi was studied. Survey was also conducted here to gather information on landuse, cropping pattern and biomass needs. Certain households were selected to study their production and consumption of biomass resources. All such data has been recorded in computer compatible formats.

Headload counts (both fuel and fodder) and cattle grazing pattern were carefully recorded by monitoring all exit/entry points in three villages at regular intervals. Dung transport from the villages was also surveyed. Records of milk and other products sold by the villagers through the milk cooperative and hill tribes cooperative were obtained. From the veterinary hospital, information regarding cattle vaccination and artificial insemination was gathered.

Data collection on biomass pattern will continue, and a study on the assessment of human pressure upon sanctuary and reserve forests will be undertaken in the next phase.

(xv) **Ecology of endangered Nilgiri langur, Mundanthurai, Tamil Nadu**
The project has been completed. The study on the folivorous Nilgiri langur *(Presbytis johni)* was conducted on Mundanthurai plateau in Tamil Nadu from 1985 to

1988. The plateau which is at an altitude of 200m MSL has the only large population of about 300 animals living at such a low altitude where biotic pressures are very high. The study focussed on population count for the plateau, ecological and behavioural studies for two groups and impact of biotic pressures on the habitat and the langurs. The research fellow is in the process of completing his Ph. D. dissertation.

(xvi) **Monitoring of rhinoceros reintroduced in Dudhwa National Park, Uttar Pradesh**

The project tenure was extended by three months up to June 1991 during which time additional data on grassland burning and habitat response was collected. A herbivore census was also carried out within the Rhino Reintroduction Area and also in other areas of the park.

In September 1991, one of the adult cow-rhinos translocated from the Royal Chitwan National Park, Nepal died after an abortion and internal infection. This was a setback to the project. The current population of rhino in the park is one bull, four adult cows and five calves. What influences the random natural events have, is more likely to decide the future of this population, rather than its possible inbreeding depression. A detailed report on the project is in preparation.

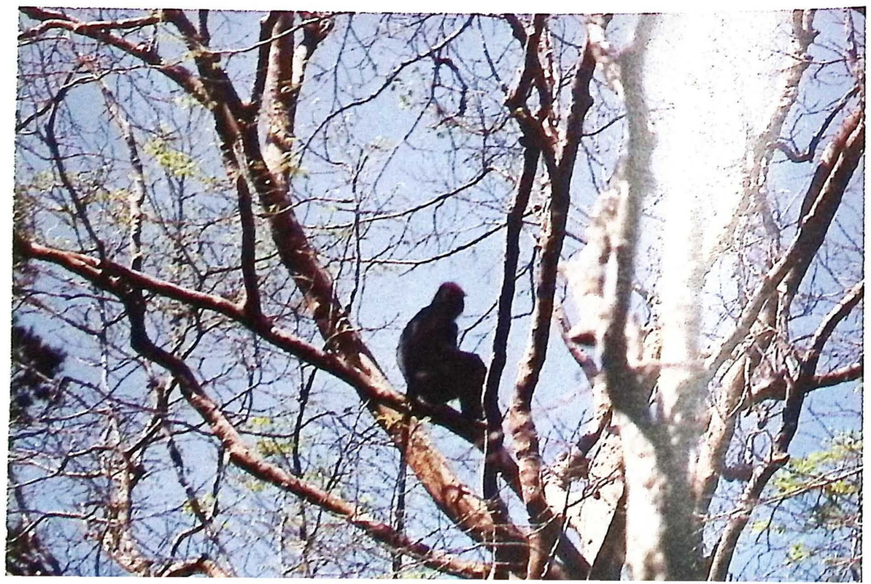
(xvii) **Management and ecology of swamp deer in Dudhwa National Park, Uttar Pradesh**

During the year under review an extensive survey of the swamp deer, in the line of 1988 survey, was carried out covering all protected and other categories of areas in UP and Bihar terai. There are 9839 sq km of terai which is under forest department's control, in India and Nepal. Of these, 90 per cent of the area in India and 14 per cent of the area in Nepal were covered. The swamp deer population is estimated at 4050 - 4650 for the entire terai, but is confined to 12 locations in India and only two in Nepal. Data on the status of other endangered species was also collected, and the localities surveyed were compared on the basis of 11 parameters ranging from vegetation type to human disturbance. Planned burning as well as strict control, regulating cattle grazing, and stopping all plantation activities in grasslands were some of the management measures recommended.

Habitat and population studies, with stress on habitat use differential pertaining to male and female animals, have continued. Analyses of data and field samples in the lab are in progress. The preparation of the final report on the status of the swamp deer is underway.

(xviii) **Ecology and population genetics of the Asiatic wild buffalo in Kaziranga National Park, Assam**

As in the previous year, collection of data on population structure, habitat use, etc. was continued this year. The major activity this year was to carry out two field operations for chemical immobilization of these animals in December 1991 - January 1992, and March 1992. The first



operation was unsuccessful, as blood samples could not be collected due to inadequate anesthesia. However, the latter operation carried out was quite successful. One adult bull visiting the cattle camps and a wild female buffalo were successfully tranquilised using *Immobilon*. Sufficient quantity of blood samples was collected for electrophoretic, cytogenetic and DNA fingerprints study. The animals were revived with *Revivon* and monitored for 24-48 hrs.

During the year, the project investigator and the research fellow visited the Centre of Cellular and Molecular Biology (CCMB), Hyderabad for a month for learning the DNA fingerprinting technique.

(xix) **The ecology and biology of Phayre's leaf monkey in Tripura**

The object of this project is to assess the impact of shifting cultivation on the survival of the Phayre's leaf monkey in Tripura. The field study, conducted at Gumti Wildlife Sanctuary by an IFS officer located there, and covering surveys,vegetation studies and intensive ecological and behavioral data collection from one group of monkeys, was completed in June 1991.

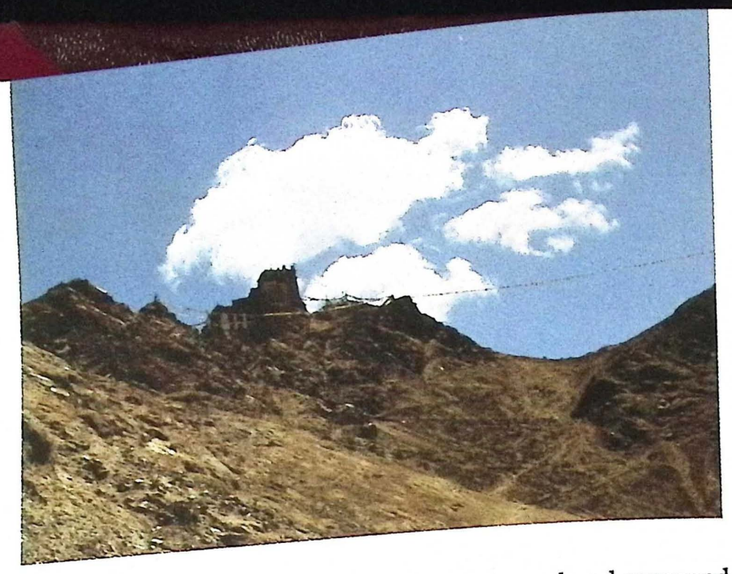
The preliminary analysis of data indicate that Phayre's leaf monkey mostly feeds on tender leaves from a relatively few tree species, all of which are colonisers in secondary forests. If the shifting cultivation cycle, which at some places is as low as two years, could be made longer than 10 years, and the mosaic of uneven aged secondary forests be maintained, the Phayre's leaf monkey could attain higher densities in these forests. At the same time, it is important that the remaining patches of primary forests be also preserved. It may be mentioned that under such a management regime, however, some other primate species could be adversely affected. The final report for the project is under preparation.

(xx) **A pilot study on the conservation of the Malabar civet, Kerala**

This study was taken up as a follow-up to a preliminary survey conducted last year to locate the remnant populations of the Malabar civet, one of the highly endangered species. For the last few decades, there have been no definite sightings of this species by the scientific community and it was, infact, considered 'extinct' until 1987 when two dead specimens were recovered from north Kerala. During the preliminary survey too no live animals were spotted but skins of two more animals killed were collected. It was also learned that most of the remaining populations were confined to the heavily populated areas where habitat conversion and hunting were alarming. The present study on the ecology of the species was conducted in one of the areas recommended from the preliminary survey. This is to be followed up with a survey to locate other populations and suitable habitats along the Western Ghats.

During the year, a research assistant was employed to conduct ecological studies in Nilambur forests and adjoining areas. These forests remain the only known habitat of Malabar civet as there are no signs of its

presence in the higher elevations, even though these are better protected. However, inspite of using spotlights, baits, lures and camera traps, no animal could be seen. But its presence in the area - even if in very low densities - was confirmed through indirect evidences. With severe habitat loss and hunting pressure in the degraded lowland forests and scrub forests near human habitations continuing,the survival of the Malabar civet is in grave doubt.



New Projects

The following are summaries of the project begun during the year 1991-92.

*** Ecology and genetics of Himalayan ibex in India, HP**
This project, located in the Pin Valley National Park, Himachal Pradesh is a collaborative venture between WII and the Smithsonian Institution, USA. The objectives of the project are to determine the status of ibex in the Pin Valley National Park; study its ecology, behaviour and genetics; and develop a habitat index model for it in order to facilitate management strategies and activities in the national park.

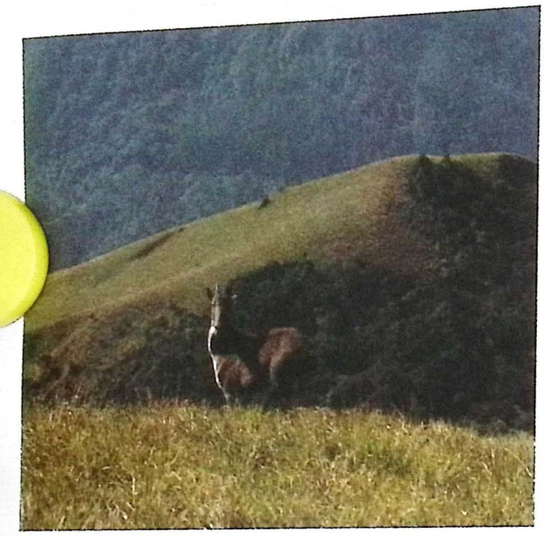
Two junior research fellows have been recruited for the project and they have already spent two months (November - December 1991) in the high altitude study area. The base camp was established at Thango, 15 km from the nearest roadhead and preliminary information on age/sex composition of ibex and habitat utilization, and the use of the area by the people has been collected. This data has been analysed and a report prepared. Also, topo maps of the study area have been digitized for a preliminary analysis of terrain and habitat features using GIS software - IDRISI.

*** Study of montane grasslands in high altitude area of Himalayas and of Western Ghats**
A preliminary survey was conducted for selecting a site for the study area in the Western Ghats. For this purpose, some proposed sites were seen and several organisations concerned with the ecology of the Western Ghats visited. The Berijam Sheep Breeding Farm, Kodaikanal, Tamil Nadu seemed a good site. There was a part of land (ca 200 acres) here which the farm was finding difficult to manage and which it was willing to return to the state forest department. With a stream flowing through the area, wattle and eucalyptus plantations on one side and extensively grazed and managed pastures on the other, this seemed quite an ideal site for the study.

A reconnaissance was done of Eravikulam National Park (ENP) Munnar, Kerala. Rajamalai, which is open to tourists and has a good population of nilgiri tahr that is approachable to unbelievably close range, seemed a promising site. The low elevation areas adjacent to the Tata tea estate and the adjoining areas outside the ENP could be good sampling sites for comparative studies. A study of community dynamics could be done on over 50 plots cleared by the forest department in the 1980s for replanting 'high yielding' grasses. The experiment had not succeeded and now the area was getting naturally revegetated. Also, old fire-lines around shola patches, the swampy areas, plateaus, ridge tops and valley bottoms in Turner's valley were identified as intensive study sites.

About 150 plant species, including over 20 species of grasses were collected, and their identification is in progress.

*** Developing area specific management guidelines for conservation of biodiversity in the Satpura conservation area, taking into account the forestry objectives and local people's needs, Madhya Pradesh**
In view of the emphasis now, on the conservation of biodiversity, the forest management strategies need to be re-oriented. This was also recommended in the National Wildlife Action Plan 1983 and the National Forest Policy 1988. There is need for an integrated management approach which would seek cooperation and coordination between the forest department and the people living around the forests. Such an approach would help conserve the protected areas and also meet the resource requirement of the local communities in a manner that is sustainable.



It is toward meeting this need that this project has been initiated in the Satpura Conservation Area. The work objective is to evaluate the status of the floral and faunal diversity in relation to abiotic environmental factors, forestry practices and human pressure for developing suitable management practices to maintain biodiversity.

Two junior research fellows have joined the project and briefly visited Melghat Tiger Reserve which is one of the study sites, on an orientation tour.

*** Studies on sero-prevalence of infectious diseases and their epidemiological significance in canids, viverrids and mustelids**

The study will collect baseline information on diseases of wild animals so as to find if these diseases (distemper, rabies, leptospirosis, canine hepatitis and canine parvovirus) affect the wild animals' distribution and abundance.

A research assistant was appointed for January-March 1992, during which time relevant literature was scanned for deciding the study area. Certain specifications were laid out. With dhole being a key species in this study, Bori-Satpura-Pachmarhi, Mudumalai-Bandipur, Bandhavgarh, Palamau, Nagarjunsagar, Panna and Nagarhole were considered for the purpose.

After much deliberation, it was decided to locate the study in Bandhavgarh National Park and its adjoining forests in Umaria, Shahdol and Jabalpur forest divisions. The forest area here is extensive and contiguous, has a good network of roads, and communication and electricity facilities, and there is Jabalpur Veterinary College nearby. Permission of forest department for conducting the study in the area is awaited.

CONSULTANCY SERVICES

In its capacity as a premier institution engaged in wildlife research and training, WII is often consulted by Central and State governments and other organisations on matters of wildlife conservation of current relevance.

* A major consultancy study for the Central government is underway on the **Management of Wildlife in Captivity, including Captive Breeding and Rehabilitation of Threatened and Endangered Species, and the Design and Management of Zoos.** During the year under review, information/data on additional 30 zoos (i.e. now 60 zoos in all) has been entered in the database. Of these, inventory/stock position of 40 zoos has been computerised, while information on the stock position of the rest of the zoos is being collected. An internal committee was especially constituted which, at its meetings on 24 and 29 July 1991 discussed and finalised drafts of standard/guidelines for zoo management, format for assessment of zoos and also the curriculum for the four-week training programme in zoo management which was held on 11 November - 6 December 1991. During the year, visits were paid to Kanpur Zoological Park, Prince of Wales Zoological Garden, Lucknow; Sanjay Gandhi Biological Park, Patna; and two zoos under construction — Jamshedpur Zoological Park, and Biological Park, Ranchi.

*** A Scientist-SC in the Management faculty was directed to offer technical advice on the Feral cattle problem at the air-force base, Agra.** As observed in a survey, there were about 60 heads of feral cattle in and around the forested patches of the air-force base and these were posing a serious hazard to safe taking-off and landing of aircrafts, especially at night. The member visited the site in May 1991 and suggested an erection of 4-strand electric fence, totalling 7 km, around the forest patch in the midst of the loop roads. It was also recommended that a cattle trap across the entry point and at least one corral within the fenced area be constructed. A report to this effect was sent to the concerned authorities in September 1991.

* The Gir National Park and Sanctuary has been facing drought conditions since 1986, and these have been aggravated by the irrigation authorities releasing water from its reservoirs for other purposes. During the year under report, WII's consultancy was sought on the **management of drought affected wild mugger crocodiles** in the water-bodies of the park and sanctuary. One Scientist-SD in the Management faculty, assisted by the research fellow already working in the park, carried out a census of mugger crocodiles in one of the reservoirs in July 1991. They also surveyed for the availability of aestivating burrows in the sanctuary, which the mugger use to tide over drought conditions.

It was recommended that a minimum water spread of 100 ha with a depth of 2 mts in the reservoirs must be maintained during the dry months (February - July). This would help not only the mugger to survive but also the fish and avifauna on which it depended. A man made drought situation would eliminate the fish population and severely affect their future breeding. It would also force the carnivores including lions, dependent on these water-bodies, to move out of the park boundary in search of water, thus creating chances for man/livestock - wildlife confrontations.

As a result of the consultancy, the faculty member is planning a short-term research project on the ecological significance of mugger aestivating burrows and their role as a drought refuge.

* At the request of the Deputy Director of the reserve (a former Diploma trainee at WII), the Head of the Wildlife Biology faculty visited the Kalakadu - Mundanthurai Tiger Reserve, where the field study of the Institute's project on the Nilgiri langur was located, to monitor the progress of its management programmes.

It was recommended that the habitat for chital be improved; the eucalyptus plantations on the plateau be properly managed; a survey of the Nilgiri tahr be conducted in the entire reserve and that the Neteri reservoir be stocked with two local fish varieties - *Burbus carnaticus* and *B. malabaricus* — in order to enhance the habitat values for the otter species and fish eating birds.

* At the request of the Head of the Social Forestry Division, FRI, a Scientist-SC in Management faculty visited their field sites for agroforestry research near Kurukshetra in February 1992 to offer **technical advice on the construction of a nilgai-proof fence.** They already have a 3-strand electric fence to check the movement of nilgai in the research area. The functioning and maintenance of this fence were evaluated. It was then advised that the existing fence be replaced with an 8-strand electric fence. Suggestions regarding maintenance were also made to the concerned scientists.

* Scientist-SC in the Management faculty visited Keoladeo National Park, Bharatpur to offer **technical advice on**

construction of cattle - proof electric fence around its python areas. After a survey, he advised the authorities to erect a 3-strand electric fence to prevent cattle from straying into these areas. The erection site was also selected, and requirements of fence equipment and accessories discussed.

* The Research Associate in the Management faculty and a senior research fellow were deputed to conduct a survey of the **Asola Wildlife Sanctuary** which is being managed by the Delhi Development Authority. The aim was to ascertain its biological values and make suggestions on the principal issues of management. The Head of the Wildlife Management faculty provided the framework for preparing a management plan.

* A one-week **training programme for park guides in Panna National Park, MP** (22-26 February 1992) was sponsored by a non-government individual in the region. WII developed the course content and provided basic inputs through its faculty, while the Director, Panna National Park selected the candidates from among promising youngsters from adjoining villages, and took care of the logistics. The decision for having this training programme came from the realisation that inspite of the tremendous richness of interpretive material in the park, very few tourists (only five per cent of those going to Khajuraho) visited it.

The aim of the programme was to promote wildlife tourism there, through training some of the local youth to become guides who could accompany the tourists not merely as road guides but as nature interpreters. Ten youngsters, with minimum qualification -- matriculate, from Hinouta and Madla villages situated on the park periphery took the training. Emphasis was on orienting them to the park values and need for conserving such areas, qualities of an effective guide, visitor safety, conduct with visitors, etc.

* The Institute faculty continued to provide **teaching inputs** to Indira Gandhi National Forest Academy, and State Forest Service College, Dehra Dun, in subjects related to wildlife management and conservation.

* A senior faculty member visited the UP Staff College, Nainital as **guest faculty** for the one-week compulsory course for senior IAS officers.

PUBLICATIONS

The Institute has developed in-house designing and publishing capability, and from time to time brings out publications addressing topical conservation and management issues as well as ecological/biological topics. The quarterly **WII Newsletter** entered its sixth year of publication. Its circulation now covers all Chief Wildlife Wardens, managers of national parks, sanctuaries and zoos, WII alumni, apart from a good many NGOs and individuals in India and abroad.

Special and thematic reading material for workshops — e.g. *An Introduction : Workshop on Interpretation and Conservation Education* — were also published during the year.

Many of WII faculty members and researchers have had their scientific papers, notes and popular articles published in various journals during 1991-92. A list of these publications, along with reports and papers presented at the various conferences and seminars is appended.

ORGANISATION

The WII Society has 35 members and is presided over by the Minister for Environment & Forests. The members comprise forest ministers of some states, members of parliament, members of the UP legislative assembly, officials from concerned ministries, and non-officials including NGO representatives concerned with wildlife conservation. No meeting of the society, however, could be held in 1991-92.

The Institute's functioning is orchestrated by a 15 - member Governing Body chaired by the Secretary, Ministry of Environment and Forests. The Governing Body meets about every three-four months. However, some of its functions regarding research and building construction matters have been delegated to sub-committees, e.g. the Research Advisory Committee (RAC). The membership list of the Governing Body and RAC is also appended.

Faculty and other recruitments

In the scientist category, 25 posts, including that of the Director, have been filled up against the sanctioned strength of 28; and there are 22 researchers. Of the 25 technical posts, 19 have been occupied. In the administrative category, 41 out of 50 posts have been filled up, and in the maintenance category out of the sanctioned strength of 42 posts, 27 have incumbents serving.

During the year 1991-92, two officers from the Indian Forest Service - one each in the category Scientist-SF and Scientist-SE joined WII on deputation.

No regular recruitment could be made to the post of Registrar, though a retired army official has been appointed to the post on a one-year contract basis.

Other recruitments made during the year were - three drivers, four attendants, one tradesman-A, and one peon.

DEVELOPMENT

COLLABORATIONS

Specialised Faculty Development Project

The five-year project on specialised faculty development between WII-USFWS entered its third year in May 1991. The project seeks to enhance professional competence of WII faculty in diverse fields of frontier technology. This is done through an exchange of scientific personnel and acquisition of hi-tech equipment so as to upgrade the quality of various training and resource activities at the Institute.

During 1991-92, the Head, Wildlife Extension faculty visited institutions and national parks in USA, while the Addl. Director/ Chief Faculty Coordinator attended a course in the UK under the wildlife education and interpretation component of the project. The Senior Computer Technician visited USA under the GIS component of the project.

During the year, two workshops — on Interpretation and Conservation Education; and Chemical Immobilization — were held under the project.

On the other hand, three interpretive specialists, two in GIS, two in wildlife health and the project co-ordinator from USA visited the Institute during the period. Besides, three persons from USA arrived for mid-term evaluation of the project in October 1991, whose comments were encouraging.

The Institute acquired the state of the art GIS equipment including SUN Sparcstation - 2 and GRASS software.

Turtle and Tortoise Conservation Project

This three-year WII-USFWS collaborative project on freshwater turtle and land tortoise was launched in May 1991. The objectives of the project are to (1) determine the current status of tortoises and freshwater turtles; (2) identify viable turtle populations and habitats to establish protected areas for protection and conservation; (3) set up captive breeding units for endangered turtles and tortoises for reintroduction; and (4) provide scientific information and training to field officers and conservationists for better understanding and management.

The National Museum of natural history, Zoological Survey of India, Calcutta and the museum of the Bombay Natural History Society, Bombay were visited, and distribution maps prepared for rare turtles. A countrywide food and pet markets survey was conducted in the major turtle marketing centre, Calcutta and 25 markets from other parts of the country to find out the exploitation pressure on turtles. The survey revealed that the turtle exploitation is much under control.

Based on a questionnaire survey of 120 Indian zoos, an inventory on turtles in captivity was prepared. Feedback was received from 23 zoos, 18 of which exhibit turtles and 11 of them breed them in captivity. Feedback of another questionnaire survey of turtle distribution yielded some interesting records.

Three major field surveys (Western Ghats, Bihar and the North - East) and two short surveys (Sunderbans and Narmada river) were conducted to assess the present status of turtles and tortoises in these areas. The Western Ghats survey revealed a much wider distribution of the Cochin forest turtle *(Geoemyda sylvatica)* in Kerala, Tamil Nadu and Karnataka. Earlier, this species was thought to be restricted to a small forest range near Chalakudi, Kerala. Also, many strongholds of the rare Travancore tortoise *(Indotestudo forstenii)* were located in the Western Ghats.

The survey in Bihar indicated a continued but perhaps depleted survival of rare and endangered Sal forest tortoise in the Saranda Reserve Forest, Chaibassa. A total of 15 turtle and tortoise species was recorded in north-eastern India of which the record of Indian soft-shell turtle, *(Aspideretes gangeticus)* is an addition for this region. Besides, many significant range extensions were obtained for Asian leaf turtle *(Cyclemys dentata)*, Malayan box turtle *(Cuora ambionensis)*, Spotted pond turtle *(Geoclemys hamiltonii)*, Tricarinate hill turtle *(Melanochelys tricarinata)* and Indian peacock soft-shell turtle *(Aspideretes hurum)*.

Indian Giant Squirrel Project

Another WII-USFWS collaborative project (five-year) was begun in June 1991. The project study is collecting information on the Indian giant squirrel regarding its habitat size, population structure and density, key resources utilised by it, relationships and behaviour, breeding success and spatio-temporal dynamics of habitat patches and dispersal of offsprings, etc. The principal investigator of the project is based in Bombay.
During the year, researchers and project staff were appointed.

COMPUTER FACILITY

WII's computer section has been considerably strengthened with inputs from the Institute's own resources and those from the WII- USFWS collaborative project. When fully installed, the WII's computer facility would be the best to serve wildlife conservation in the country.
During the year under report, the major activity has been procurement of hardware, software and furniture for the establishment of computer network at the new campus. Last year, after a thorough evaluation of the Institute's requirements, the following configuration had been decided upon:

1. Novell Netware LAN with about 100 nodes for word-processing, statistical analysis, graphics and database management

2. Sun Sparcstation-2 for GIS with GRASS

3. Xenix based digital analysis of satellite data

4. UNIX based library system

Items 2, 3 & 4 above would also be networked to LAN allowing remote logging in and data transfer.

The computer facility supports a wide variety of commercial application software like WordPerfect, FoxPro, SPSSPC, GRASS, IDRISI, ISROVISION, and APPLAUSE II. Besides, a number of non commercial and highly specialised software like DECORANA, TRANSECT, BLOSSUM, SEAS, and CHAP are also supported.

LABORATORY

Wildlife biology laboratory at WII has been established to support field research with analyses of materials collected in the field, and use the specimens during various training courses. The laboratory facility is also extended to wildlife managers for identification of species while dealing with wildlife offence cases.

Existing facilities permit estimation of forage quality, diet determination of carnivores (from scats) and herbivores (from fecal matter) and to undertake water quality estimation. It is also possible to estimate habitat quality of an area by determining crude protein, fibre components, energy value, silica and macro nutrients in plants and fecal matter.

Necessary chemicals were imported under WII-USFWS collaborative project for quantification of plant inhibitors.

LIBRARY AND DOCUMENTATION CENTRE

Libraries are now performing an increasingly vital role in the functioning of any educational and research institution. The Library and Documentation Centre at WII is no different and has been growing steadily. It has over 11,500 books and 1500 bound volumes of journals in its collection, besides 7000 maps and 4600 reprints and numerous theses, dissertations, conference and seminar reports. It receives 145 journals and periodicals.

The library provides a host of services to which now have been added the accession list service, and reprographic service. The centre is being computerised. It is currently operating with CD-ISIS on two DOS machines but is to be replaced with a UNIX multi-user machine providing online search and retrieval facilities.

Though meant primarily for the use of faculty, researchers, M.Sc. students, Diploma and Certificate course trainees, and other trainees on short term courses, the service is being made available to users from other institutions as well.

TEACHING AIDS

The audio-visual unit at the Institute provides equipment support and maintenance alongwith technical back-up of teaching aids that are now being used more and more in classroom lectures as well as in field studies. The unit has a 16 mm film and video library and a collection of slides under 44 title heads. During the year under review, five SLR cameras, three films (16mm), four video films and about 300 slides were added to the collection.

HERBARIUM

The WII herbarium houses over 12,500 vascular plant specimens (ferns, gymnosperms and angiosperms) collected by students, researchers, trainees and faculty members during their various field trips to different protected areas all over the country. These specimens have been mounted on herbarium sheets which are arranged in alphabetical order of their respective family and generic names.

During 1991-92, about 750 specimens have been added to the collection. These are from Pin Valley National Park, HP (100 specimens), Satpura National Park & Pachmarhi Wildlife Sanctuary, MP (60), Narmada Sagar submergence area (over 200), Eravikulam National Park, Kerala (120), Anamalai Wildlife Sanctuary, Tamil Nadu (100)

DEVELOPMENT

and Mehao Wildlife Sanctuary, Arunachal Pradesh (150 specimens). In addition to these, random collections from frequently visited areas—viz. Rajaji National Park, Sariska Tiger Reserve, etc., were also made.

About 500 specimens were processed, identified and mounted during the year. On the basis of the collection, checklists of plants were prepared for Pin Valley National Park and Mehao Wildlife Sanctuary.

CAMPUS DEVELOPMENT

Most of the academic activities of the Institute have shifted to the Chandrabani campus where the first phase of construction work is nearing completion. During the year, the administrative block, hostel block "A" and the dining block were completed and are already being used.

The work on the overhead tank and walkways is also through. Work on bank and co-operative store building, A.C. plant room and garage have begun. The Governing Body has sanctioned Rs 157.8 lakhs this year towards an additional administrative block, a 30-room hostel, five faculty houses and 24 staff houses. The detailed estimates for these are being worked out.

MAIN WORK PROGRAMME FOR 1991-92

Sl. No.	Activity	Month of commencement 1991	1992
	Regular Courses:		
1.	9-month Diploma Course in Wildlife Management	AUG	
2.	3-month Certificate course in Wildlife Management	MAY	
3.	III Batch of 2-year M.Sc. Wildlife Biology	JUL	
	Other Activities:		
4.	SAARC Seminar on Wildlife Management	APR	
5.	Annual Research Review Seminar	AUG	
6.	Conservation Education Workshop	SEP	
7.	Short Course in Zoo Management	NOV	
8.	Capsule Course in Wildlife Management for IFS Officers	OCT	
9.	Capsule Course in Wildlife Management for IAS and Central Services	NOV	
10.	Workshop in Chemical Restraint Techniques	DEC	
11.	International Seminar on Integrated Forestry Planning and Management	JAN	
12.	Capsule Course in Wildlife Management for IFS Officers	FEB	
13.	WII-UNESCO Mobile Training Seminar in PA Management	MAR	
14.	Ten New Field Research Projects	AUG/ OCT NOV DEC	JAN
15.	UNDP Project on Eco-development Planning & Management Planning for PAs	OCT	
	Campus Development:		
16.	Phase I Constructions		
	Guest House	JUL	
	Phase II Constructions		
	Academic Block	JAN	
	Hostel Block	JAN	
17.	Faculty & Staff Houses	JAN	
	Interiors & furnishings in Phase I Buildings	OCT	
18.	Air-conditioning of Library & Computer rooms	JUL	
	Publications		
	i) Revised & Updated Biogeography Report		MAR
	ii) Manual of Chemical Restraint Techniques		JAN
	iii) Guidelines for Management Planning		MAR
	iv) Research Reports		FEB
			MAR

PERSPECTIVE FOR 1992-1993

The world is awaiting UNCED (United Nations Conference on Environment and Development) to be held at Rio de Janeiro, Brazil in the first fortnight of June 1992. Much is expected, in terms of the earth's future and survival, from this, which is proposed to be the single largest gathering of the heads of states. The conference will have brought the subject of environment to the political centre stage. It is obvious that environment and its state is now to be treated as crucial to a country's overall planning. Among the major issues to be discussed at the conference is the conservation of biodiversity.

At the national level, considering India has among the richest biodiversity in the world, we had already realised the need for tackling the immense problems that it faces, and the urgency of conserving the biodiversity quite some years ago and accorded it a priority in our environmental planning.

In accordance with the national environmental agenda, WII already has projects undergoing to study the biodiversity aspects and formulate management plans for their efficient and scientific preservation. The Biogeography Project and the two-volume report on a representative protected area network could well be considered the harbinger and original work of import in this field.

The general outlook for WII for the year 1992-1993 is a continuing phase of both intensive and extensive development. For the coming year, a good many research project proposals are on the anvil, and a few are likely to be cleared soon. That would mean reaching out to newer territories. Projects which were cleared this year but were unable to get started for various reasons, namely, the study of montane grasslands in the Himalayas (the Valley of Flowers, Garhwal), and the survey and ecology of Indian wolf, would begin soon.

About half a dozen project studies should be completed in the coming year, and about an equal number nearing their last stages. The reports on some of the completed projects are likely to be published. The remaining ongoing projects are expected to continue at their planned pace.

PERSPECTIVE FOR 1992-1993

Besides the regular academic courses, including the short-term courses for IFS and IAS officers and on zoo management, the Institute would be organising a capsule course in wildlife management for officers in the protected areas who have otherwise had no formal training in PA management. This would be held in February 1993.

A vital new course slated for the year is on PA ecodevelopment planning (duration - three to four months, beginning February 1993) for wildlife managers in selected protected areas. The course will impart training in the planning and implementation of model ecodevelopment programmes around the protected areas.

The research seminar is an annual feature and the next one is to be held in September 1992. With the presentations by the researchers improving over the years, the seminar this year should again bring forth important observations and findings that would go toward generating ideas and discussions, and formulating plans and strategies in the overall environmental as well as institutional research context.

An international seminar on integrated forest planning and management will be organised in January 1993. The turtle and tortoise conservation project is due to complete its field survey by end 1992. The findings of the survey will be presented in a workshop-cum-seminar in February 1993 wherein a Statewise turtle and tortoise conservation action plan is proposed to be developed.

With the support of UNESCO, a four-week mobile training seminar for PA professionals from the Central and South-East Asia region was to be organised in March 1992, but could not be. It is now planned for March 1993.

With the work commencing on the second phase of construction, the entire WII should be operating from the new campus during 1992-93. This, along with the computer centre with all new acquisition becoming fully functional, will further streamline the Institute's activities and pave way for strengthening and enhancing the faculty and staff as well as the programmes. In fact, as the use of the computer in data analyses, cartography and application of GIS in WII's research and management studies become essential, the commisssioning of the new powerful computer network with over fifty nodes by the next year is being eagerly looked forward to.

With environment now being accorded due recognition, there is much work to do. WII can look forward to having its share of responsibilities and role in devising solutions to the grave problems that beset nature conservation and which are now engaging serious minds, the world over.

MAIN WORK PROGRAMME FOR 1992-93

Activity	Month of commencement 1992	1993
Regular Courses:		
1. XIII P.G. Diploma Course in Wildlife Management	Ongoing	
2. XIV P.G.Diploma Course in Wildlife Management	Sept.	
3. 9th Certificate Course in Wildlife Management	Oct.	
4. IIIrd M.Sc. Wildlife Biology	Jan.	
IInd Semester	July	
IIIrd Semester		Jan.
VI Semester		
5. IIIrd Short course in zoo management	Nov.	
Other Activities:		
6. Capsule Course in Wildlife Management for IFS Officers	May	
7. Annual Research Seminar	Sept.	
8. Capsule Course in Interpretation and Conservation Education	Sept.	
9. Protected Area Ecodevelopment Planning Course for PA managers	Sept.	
10. Capsule Course in Wildlife Management for AIS and Central Services		Jan.
11. International Seminar on Integrated Forestry Planning and Management for PA & Forest Managers		March
12. WII-UNESCO Mobile Training Seminar for Wildlife Professionals		March
13. Protected Area Management Planning Course for PA managers.		Feb.
14. Workshop on Field Research Methods for PA managers.		Feb.
15. Campus Development:		
a) Bank & Cooperative Store Building	Ongoing	
b) A.C. Plant Room	Ongoing	
c) Garage	Ongoing	
d) Heritage in WII Building	March	
e) Sentry Hut	Sept.	
f) Renovation of New campus Roads	August	
g) Waterproofing of WII buildings	Sept.	
h) Open Air Theatre	Sept.	
i) Administrative block (Addl.) (30 room-hostel (Addl.), 5 Faculty Houses (Addl.), 24 staff houses.	To begin	
16. **Publications**		
i) A Guide to Chemical Restraint of Wild Animals.		
ii) High Altitude Workshop Proceedings.		
iii) Procedures for Monitoring Wildlife Health and Investigating Diseases : A Field Guide		
iv) Aviculture of Indian Pheasants (In Press).		
v) The Development of International Principles and Practices of Wildlife Research and Management (In Press).		

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PAPERS PRESENTED AND ACCEPTED

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Shah, Nita V. and Goyal, SP (1991) - Crop Depredation by Wild Ass, Nilgai, Feral Pigs and Demoiselle Cranes around Little Rann of Kutch. First National Symposium on Unconventional Pests : Control vs. Conservation; University of Agricultural Sciences, Bangalore (Karnataka); 14-16 October 1991.

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Sinha, SP and Sawarkar, VB (1991) - Habitat and Dietary Selection by the Population of Reintroduced Great One Horned Rhinoceros *(Rhinoceros unicoinis)* in Dudhwa National Park, Uttar Pradesh, India. International Rhino Conference, Rhinoceros Biology and Conservation, San Diego, California, USA; 9-11 May 1991.

Sinha, SP and Sawarkar, VB (1992) - Management of the Reintroduced Indian Great One Horned Rhinoceros in Dudhwa National Park, UP, India. IV World Congress on National Parks and Protected Areas, Caracas, Venezuela; 10-21 February 1992.

GOVERNING BODY

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New Delhi-110 003. — Chairman

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Wildlife Preservation,
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CGO Complex, Lodi Road,
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Bombay Natural History Society,
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Bombay-400 023. — Member

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12. Chief Wildlife Warden,
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13. Director General,
Indian Council for Forestry Research
& Education,
P.O. New Forest,
Dehra Dun-248 006. — Member

14. Shri S.K.Mukherjee,
Addl. Director,
Wildlife Institute of India,
Post Box 18, Chandrabani,
Dehra Dun-248 001. — Member

15. Director,
Wildlife Institute of India,
Post Box 18, Chandrabani,
Dehra Dun-248 001. — Member-Secretary

RESEARCH ADVISORY COMMITTEE

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   Lodi Road, New Delhi-110 003. — Chairman

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   Ministry of Environment & Forests,
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   Calcutta (West Bengal). — Member

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   Botanical Survey of India,
   P-8 Brabourne Road,
   Calcutta (West Bengal). — Member

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   Professor of Eminence,
   Central Arid Zone Research Institute,
   Jodhpur (Rajasthan). — Member

10. One representative of WII faculty. — Member

11. Director,
    Wildlife Institute of India,
    Post Box 18, Chandrabani,
    Dehra Dun-248 001. — Member-Secretary

AUDIT CERTIFICATE

I have examined the accounts and the Balance Sheet of Wildlife Institute of India, Dehradun for the year ending 31st March 1992. I have obtained all the information and explanations that I have required and subject to the observations in the appended Inspection 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 the Institute according to the best of my information and explanation given to me and as shown by the books of the organisation.

Dated: 25.9.1992
Place: Dehra Dun

Sd/-
For Principal Director
of Audit (SD), A.G.C.R. Building,
New Delhi

RECEIPTS AND PAYMENTS ACCOUNT FOR THE YEAR ENDING 31ST MARCH,1992.

RECEIPTS		PAYMENTS		NON PLAN	PLAN	TOTAL
To Opening Balance:			By salaries	45,50,390.80	5,11,316.00	50,61,706.80
Cash in Hand	22,242.16					
Cash in Bank	1,67,26,261.34	1,67,48,503.50	By Leave Salary & Pension Contribution	1,89,227.00	-	1,89,227.00
Balance in Training Account		84,799.35	By Bonus	88,914.00	5,654.00	94,568.00
			By Honorarium	25,150.00	-	25,150.00
			By Fellowship	3,42,017.00	-	3,42,017.00
To Grant-in-aid Department of Environment, Forests, New Delhi		By Wages 3,41,00,000.00	3,23,550.00	2,50,294.10	5,73,844.10	
			By Travel Expenses	4,46,470.50	2,13,257.00	6,59,727.50
			By Newspaper & Magazines	17,458.50	-	17,458.50
To Training Cost			By Publicity & Advertisement	52,416.00	-	52,416.00
9-months Diploma Course		6,91,000.00	By Operational Expenses	6,69,622.98	-	6,69,622.98
3-months Certificate Course		1,43,400.00	By Stationery	3,08,140.00	1,50,000.00	4,58,140.00
Other receipts		61,482.00	By Maintenance of Deer Park	47,685.00	-	47,685.00
Training cost acrued last year but received this year		1,75,150.00	By Rent for hired Building	2,34,049.00	10,800.00	2,44,849.00
To Interest credited by Bank		3,62,491.12	By Postage & Telegram	57,005.20	50,000.00	1,07,005.20
To Interest on Mobilisation Advance		39,658.00	By Sports Goods	9,267.00	-	9,267.00
To Recovery of Mobilisation Advance		3,77,889.00	By Uniforms	27,204.00	-	27,204.00
To Recovery of Income Tax from Contractor		2,44,214.80	By Telephone & Trunk calls	1,53,415.00	72,179.00	2,25,594.00
To Recovery of Sales Tax from Contractor		3,51,497.95	By Conveyance Charges	9,097.50	992.00	10,089.50
To Recovery of Security Deposits from Contractor	(-)3,95,101.00		By Electricity & Water Charges	21,841.80	40,536.80	62,378.60
To Earnest money converted into security deposit	(+) 23,561.90	(-) 3,71,539.10	By Entertainment	27,135.75	-	27,135.75
To Recoveries from Pay Bills to be remitted to Govt. Deptts./other bodies.		8,63,153.00	By Printing & Binding	2,00,686.00	90,087.00	2,90,773.00
			By Repair of Office Equipment	-	71,301.00	71,301.00
	C/O	5,38,71,699.62	C/O	78,00,743.03	14,66,416.90	92,67,159.93

B/F	5,38,71,699.62	B/F	78,00,743.03	14,66,416.90	92,67,159.93
		By Seminar & Workshop	1,32,691.00	-	1,32,691.00
		By Insurance of Research Fellows & Faculty Members	15,510.00	-	15,510.00
To Encashment of fixed deposit	1,52,217.28	By Stipend	77,087.00	-	77,087.00
To Refund of Advance for expenses (Training Account)	1,20,000.00	By Legal Expenses	21,199.00	11,338.00	32,537.00
To Received from IUCN Scholarship	2,40,158.00	By CPF Contribution by WII	1,31,544.00	-	1,31,544.00
To Miscellaneous Receipts		By Training Cost	-	-	8,34,063.14
i) Sale of Tender document	22,270.00				
ii) Guest House Charges	1,232.00	By repair and maintenance of vehicle	1,55,539.00	80,000.00	2,35,539.00
iii) M.S.C. Application form charges	9,254.00	By Vehicle Insurance	14,256.00	-	14,256.00
iv) Greeting cards	784.00	By POL for Vehicle	1,90,293.90	1,50,000.00	3,40,293.90
v) Miscellaneous	1,266.00 34,806.00				
To Recovery of Advances		By Purchase of Vehicle	-	7,75,222.56	7,75,222.56
i) Motor Car Advance	24,000.00	By Journals & Periodicals	-	5,35,895.40	5,35,895.40
ii) Scooter Advance	9,947.00	By Scientific Publication	-	1,57,894.00	1,57,894.00
iii) Computers Advance	20,662.00	By Audiovisual,Computers & Training Equipment	-	47,08,910.00	47,08,910.00
iv) Cycle Advance	3,681.00 58,290.00	By Laboratory Equipment	-	6,600.00	6,600.00
To Recovery of Secured Advance	6,87,114.00	By Laboratory chemicals	-	83,071.00	83,071.00
		By Office Equipment	-	2,89,855.00	2,89,855.00
	C/o 5,51,64,284.90	C/O	85,38,862.93	82,65,202.86	1,76,38128.93

B/F 5,51,64,284.90				
	B/F	85,38,862.93	82,65,202.86	1,76,38,128.93
	By Photographs & Photographic materials	-	81,248.00	81,248.00
	By Educational Films	-	42,550.00	42,550.00
	By Furniture & Fixtures	-	14,09,107.00	14,09,107.00
	By Library Books	-	2,52,976.00	2,52,976.00
	By Avenue Plantation	-	3,82,019.00	3,82,019.00
	By Advance for Expenses	35,960.29	-	35,960.29
	By Advance for Expenses (Training)	-	-	95,000.00
	By Awards	2,995.00	-	2,995.00
	By interest on GPF	529.00	-	529.00
	By interest on CPF	53,159.00	-	53,159.00
	By Housebuilding Advance	3,03,850.00	-	3,03,850.00
	By Festival Advance	11,400.00	-	11,400.00
	By Sales Tax	-	1,07,593.80	1,07,593.80
	By Remittance or Income Tax deduction from Contractor Bills	-	-	2,47,009.80
	By Remittance of Sales Tax deduction from Contractor Bills	-	-	3,56.490.15
	By Procurement of Cement, Steel & Wood	-	18,81,333.68	18,81,333.68
	By Construction of Building	-	1,21,87,277.42	1,21,87,277.42
	By Air Conditioner	-	17,90,537.00	17,90,537.00
	By Campus Development	-	6,16,219.00	6,16,219.00
	By Construction & Architectural Management Fee	-	7,40,561.00	7,40,561.00
	By Secured Advance	-	9,06,563.00	9,06,563.00
	By D.G. Set	-	6,62,391.00	6,62,391.00
	By E.P.A.B.X.	-	3,07,737.00	3,07,737.00
C/O 5,51,64,284.90		C/o 89,46,756.22	2,96,33,315.76	4,01,12,635.07

B/F 5,51,64,284.90		B/F 89,46,756.22	2,96,33,315.76	4,01,12,635.07
	By Narmada Sagar Project A/C	2,21,690.00	-	2,21,690.00
	By camp Equipment	(-) 29,132.00	-	(-) 29,132.00
	By Remittance of recoveries from paybills	-	-	8,90,126.18
	Closing Balance			
	By Cash-in-hand	-	-	39,329.25
	By Bank Balance with UBI	-	-	1,35,82,868.19
	By Cash with UBI (Trainees Account)	-	-	3,46,768.21
	Total 5,51,64,284.90	Total 91,39,314.22	2,96,33,315.76	5,51,64,284.90

Finance Officer Registrar Director

WILDLIFE INSTITUTE OF INDIA,DEHRA DUN
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDING 31ST MARCH,1992.

EXPENDITURE		INCOME		
To salaries and allowances (including LTC)	50,61,706.80	By Grant-in-aid Deptt. of Env., Forests & WL., New Delhi.		3,41,00,000.00
To Leave Salary & Pension Contribution	1,89,227.00	Less transfer to Capital expenditure	2,66,87,355.45	74,12,644.55
To Bonus	94,568.00			
To Honorarium	25,150.00			
To Fellowship	3,42,017.00	By Training Cost 9-months Dip.Course	6,91,000.00	
To Wages	5,73,844.10	3-months Cert.Course	1,43,400.00	
To Travel Expenses	6,59,727.50	Other receipts	61,482.00	8,95,882.00
To Newspapers & Magazines	17,458.50			
To Publicity & Advertisement	52,416.00	By Training Cost accrued but not received		1,25,200.00
To Operational Expenses	6,69,622.98			
To Stationery	4,58,140.00	By Interest on Bank Deposits		3,62,491.12
To Maintenance of animals (Deer Park)	47,685.00			
To Rent for Hired Buildings	2,44,849.00	By interest on mobilisation advance		39,658.00
To Postage & Telegram	1,07,005.20			
To Sports Goods	9,267.00	By Miscellaneous Receipt		34,806.00
To Uniforms	27,204.00			
To Telephone & Trunk calls	2,25,594.00			
To Conveyance	10,089.50			
To Electricity & Water charges	62,378.60			
To Entertainment	27,135.75			
To Printing & Binding	2,90,773.00			
To Repair & Maintenance of Office equipment	71,301.00			2,40,158.00
To Seminar & Workshops	1,32,691.00	By International Union for for Conservation of		
To Insurance (Research Fellow and Faculty Members)	15,510.00	Nature and Natural Resources Scholarship		
	C/F 94,15,360.93			C/F 91,10,839.67

	B/F 94,15,360.93		B/F 91,10,839.67
To Stipend	77,087.00	By excess of expenditure over income	24,38,879.10
To Legal Expenses	32,537.00		
To CPF Contributions (WII shares)	1,31,544.00		
To Training Cost	8,34,063.14		
To Repair & Maintenance of vehicles	2,35,539.00		
To Vehicle Insurance	14,256.00		
To POL for vehicles	3,40,293.90		
To interest on CPF	53,159.00		
To interest on GPF	529.00		
To Sales Tax	1,07,593.80		
To Narmada Sagar Project	2,21,690.00		
To Awards	2,995.00		
To Lab chemicals	83,071.00		
Total	1,15,49,718.77	Total -	Rs. 1,15,49,718.77

Finance Officer Registrar Director

WILDLIFE INSTITUTE OF INDIA : DEHRA DUN

BALANCE SHEET AS ON 31ST MARCH 1992

FUNDS & LIABILITIES

	As on 31.3.91 Amount Rs. Ps.	Addition during 1991-92 Amount Rs. Ps.	As on 31.3.92 Amount Rs. Ps.
Excess of income over expenditure 1990-91	2,34,60,570.87		
(-) Excess of expenditure over Income during 91-92		(-)24,38,879.10	2,10,21,691.77
Amount capitalised as per Balance Sheet 1990-91	4,81,51,959.72		
Additions during the year		2,66,87,355.45	7,48,39,315.17
		C/O	9,58,61,006.94

ASSETS

	As on 31.3.91 Amount Rs. Ps.	Additionduring 1991-92 Amount Rs. Ps.	Ason 31.3.92 Amount Rs. Ps.
Land	80,32,795.00	—	80,32,795.00
Trees	24,32,709.00	—	24,32,709.00
Avenue Plantation	2,84,164.65	3,82,019.00	6,66,183.65
Campus Development	2,13,109.31	6,16,219.00	8,29,328.31
Lab Eqpt	11,15,708.07	6,600.00	11,22,308.07
Furniture & Fixture	8,79,821.89	14,09,107.00	22,88,928.89
Vehicle	19,99,454.91	7,75,222.56	27,74,677.47
Library books	20,60,985.78	2,52,976.00	23,13,961.78
Office Equpt	8,82,281.90	2,89,855.00	11,72,136.90
Camp Eqpt	2,78,430.34	(-) 29,132.00	2,49,298.34
Photographs and Photos Material	3,44,463.20	81,248.00	4,25,711.20
Educational films	8,68,291.35	42,550.00	9,10,841.35
			C/O 2,32,18,879.96

	B/F	9,58,61,006.94	
Security deposit	8,16,070.00(-)3,71,539.10	4,44,530.90	
Withheld amount (V.K. Garg)	25,000.00	—	25,000.00
		C/o	9,63,30,537.84

			B/F 2,32,18,879.96
Journals & Periodicals	12,17,382.10	6,93,789.40	19,11,171.50
Material & Supplies	16,57,651.95	—	16,57,651.95
Training Equpt	20,01,056.24	47,08,910.00	67,09,966.24
Boundry Wall Block I & Gate	14,46,200.59	—	14,46,200.59
Boundry Fencing	8,17,934.93	—	8,17,934.93
Chandrabani Campus building complex	1,97,81,310.66	1,39,56,765.49	3,37,38,076.15
Archi tectural competition	1,50,000.00	—	1,50,000.00
Architect fee & Supervision charges	16,88,207.85	7,40,561.00	24,28,768.85
D.G. Set	—	6,62,391.00	6,62,391.00
EPBX	—	3,07,737.00	3,07,737.00
Air Conditioner	—	17,90,537.00	17,90,537.00
Training cost Acrued but not received	2,38,050.00	(-)1,75,150.00 (+)1,25,200.00	1,88,100.00
Advancefor expenses for training	1,20,000.00	(-)1,20,000.00 (+) 95,000.00	95,000.00
			C/o 7,51,22,415.17

B/F	9,63,30,537.84		
			B/F 7,51,22,415.17
Advanceto staff (for expenses)	2,82,832.81	(+) 35,960.29	3,18,793.10
Loan & Advances to staff	9,47,908.20	(+)3,15,250.00 (-) 58,290.00	12,04,868.20
To Sundry Debtors	25,18,136.00	(+) 9,06,563.00 (-) 10,65,003.00 (+) 2,744.62 (+) 4,992.20 (+) 600.00	23,68,032.82
To closing stock of Steel, cement and wood	32,35,617.29	(-)17,69,488.07 (+)18,81,333,68	33,47,462.90
CASH AND BANK BALANCES			
With U.B.I Dehra Dun (Trainees A/C)			3,46,768.21
With U.B.I Dehra Dun.			1,34,76,738.19
With S.B.I. Dehra Dun			1,06,130.00
Cash in hand			39,329.25
Grand Total -	9,63,30,537.84	Grand Total -	9,63,30,537.84

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

Sd-	Sd-	Sd-
(S.S. Oberoi)	(Lt Col. S.I. Dutt)	(H.S. Panwar)
Finance Officer	Registrar	Director

PERMANENT ASSETS AS ON 31-3-1992

Sl. No.	Particulars	Opening stock	Addition during the year	Tota
1.	Land	80,32,795.00	—	80,32,795.0
2.	Trees	24,32,709.00	—	24,32,709.0
3.	Avenue Plantation	2,84,164.65	3,82,019.00	6,66,183.6
4.	Furniture & Fixture	8,79,821.89	14,09,107.00	22,88,928.8
5.	Lab Equipment & Chem	11,15,708.07	6,600.00	11,22,308.0
6.	Office Equipment	8,82,281.90	2,89,855.00	11,72,136.9
7.	Training Equipment	20,01,056.24	47,08,910.00	67,09,966.2
8.	Camp Equipment	2,78,430.34	(-)29,132.00	2,49,298.3
9.	Photograph and photographic material	3,44,463.20	81,248.00	4,25,711.2
10.	Educational films	8,68,291.35	42,550.00	9,10,841.3
11.	Library Books	20,60,985.78	2,52,976.00	23,13,961.7
12.	Journals and periodicals	12,17,382.10	6,93,789.40	19,11,171.5
13.	Materials & Supply	16,57,651.95	—	16,57,651.9
14.	Vehicles	19,99,454.91	7,75,222.56	27,74,677.4
15.	Campus development	2,13,109.31	6,16,219.00	8,29,328.31
16.	Boundary Wall Block I	14,46,200.59	—	14,46,200.5
17.	Boundary fencing II & III	8,17,934.93	—	8,17,934.9
18.	Construction of Building	1,97,81,310.66	1,39,56,765.49	3,37,38,076.15
19.	Architectural competition	1,50,000.00	—	1,50,000.0
20.	Architectural fee & Supervision	16,88,207.85	7,40,561.00	24,28,768.85
21.	D.G. Set	—	6,62,391.00	6,62,391.00
22.	E.P.A.B.X.	—	3,07,737.00	3,07,737.00
23.	Airconditioner	—	17,90,537.00	17,90,537.00
	Total -	4,81,51,959.72	2,66,87,355.45	7,48,39,315.17

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