

# ANNUAL REPORT

## 1993-94



भारतीय वन्यजीव संस्थान  
Wildlife Institute of India

# DIRECTOR'S NOTE

Institutions are seats of capacity building. WII has seen this mandate in the light of the complexity and severity of challenges confronting the conservation of wildlife and biodiversity in the country. Its response has come in the form of interdisciplinary research and training programmes that encompass:

- Biology of floral and faunal species and communities in pristine and secondary natural ecosystems.
- Management nuances of small and large protected areas calling for zoning and zonally relevant measures so as to take care of overall biodiversity and target species without jeopardising local people's concerns.
- Ecodevelopment around protected areas to support their management and at the same time give people a better deal by a search for reformulated equations that sustainably balance the need against productivity despite the now vitiated humans to land ratio, and in the process aim to rekindle people's traditional bonds with nature.
- Quest for ways and means of integrated forest management over large landscapes comprising protected areas, forests under community and commercial use, human habitations, development projects and other multiuse lands.
- Adoption of modern technology and scientific infrastructure in research and management.
- Promotion of conservation awareness among different target groups from park side people, park visitors to various government functionaries and students.


- Advice and field assistance in conflict management, as well as consultancy on EIA of development projects upon wildlife and biodiversity values.

Institute's pursuit of diverse activities is essentially sustained by the Central Government, providing the wherewithal, and by the State Governments enabling the conduct of activities. It has also received vital institution building help through meaningful collaborative international and bilateral programmes.

When we look around we find it difficult to see another institution in the wildlife sector which conducts such diverse and numerous activities from one campus. And, our campus itself has come up as an exquisite blend of perceptive architecture, competent infrastructure, modern technology and above all a vibrant commitment among the inmates, which is but matched by the reviving biodiversity of its verdant Chandrabani premises.

The autonomous status of the Institute has been greatly instrumental in achieving this progress. The eight year course of our autonomy has been one of responsibility, of an honest pursuit to develop the science of wildlife conservation in the true Indian context. We have not tried to restrain our young spirit of adventure and dynamism except by the reins of conscience shaped on the anvil of collective responsibility. We recall the indoctrinating advice of the first Chairman T.N.Seshan of our autonomous Governing Body, "Autonomy can be defended only by responsible conduct".

We have tried to live by this doctrine and the feedback we get is positive. We hope that with a better understanding of our role and performance and an assurance to strengthen our human resource base, our coming years will be of advancing contribution to the cause of conservation.

  
(H.S. Panwar)

## AT A GLANCE

From the very beginning itself, the Wildlife Institute of India (WII), while developing its infrastructure and conducting its programmes, has been alive to the realities of the field and to the need of a holistic and integrated approach to wildlife conservation taking into account the biological, the management and the human aspects. This concern is reflected in its various regular and short term training courses as well as in its educational and research programmes.

A major highlight of the new activities launched this year was the addition of two important training programmes viz. "Ecodevelopment Planning" and "Management Planning" for Protected Areas (PAs) under a UNDP assisted project. Ecodevelopment is visualized as a package strategy of joint management and sharing of resources as well as conservation compatible income generation activities that together go to strengthen the bonds of the local people with forests and other natural ecosystems around them. As a part of the project, the training is followed up in the field by the Institute advising and guiding the trained officers in the preparation of ecodevelopment and management plans for the selected PAs.

Short orientation courses for various target groups constitute an important activity pursued since 1986, addressing Army officers, senior administrators, IFS officers and voluntary agencies. A new course this year was in Biological Monitoring organized in collaboration with the British Council. The course provided training to foresters, university students, members of NGOs, officers

from Ministry of Environment and Forests and state forest departments, as well as participants from other institutions like the Zoological Survey of India and Salim Ali Centre for Ornithology and Natural History.

First of its kind in the country, an International Wildlife Conservation and Management training programme was conducted by WII in collaboration with the Smithsonian Institution of USA. It caters to the pressing need of training nationals of developing countries in the modern theory of biodiversity conservation. The course had in all 19 participants including 11 from India and two each from Brazil, Cambodia, Nepal and Srilanka. The feedback from this programme was highly positive in terms of its utility. Accordingly, a broad agreement has been reached with the Smithsonian Institution to conduct this programme for the next three years, subject to Government's approval.

WII's Workshops on special themes are targeted at in-service forest officers, wildlife managers, field biologists, scientists, university teachers and NGOs. This year a



Drop net demonstration during the workshop on Wildlife Damage problems and control

workshop on Wildlife Damage Problems and Control was jointly conducted by the WII faculty and USEWS scientists from February 2-7, 1994. The aim was to bring

together the wildlife damage control workers i.e. wildlife managers and scientists from different regions, to discuss and share knowledge/experience in wildlife damage problems and control strategies.

The Institute also conducted one workshop and was involved in the conduct of another for Senior Army Officers. This close collaborative work between WII and Army is seen as a means for training the trainers in the Army in order that the field formations and Army establishments are enabled to support the protection and conservation of wildlife and biodiversity.

In the research sector, 1993-94 was marked by completion of several major studies and the launch of some important ones. Of the fifteen research projects which were continued from the last year, six were completed while eleven new projects were initiated during the year. Four dissertations based on WII's research completed in the preceding year led to the award of Ph.D. degrees to respective research fellows. These dissertations dealt with the ecology of Asiatic lion, Snow leopard, Grizzled giant squirrel and Mugger crocodile. The research findings of the completed research projects were brought out as reports and research publications in reputed scientific journals, as well as popular articles.

Important research studies initiated in the preceding year viz 'Ecological study of montane grasslands in the Garhwal Himalaya and Western Ghats', 'Integrated forest management in Satpura Conservation Area' and 'Impacts of management practices on ungulate and lion habitats in Gir forests', progressed well during the year.

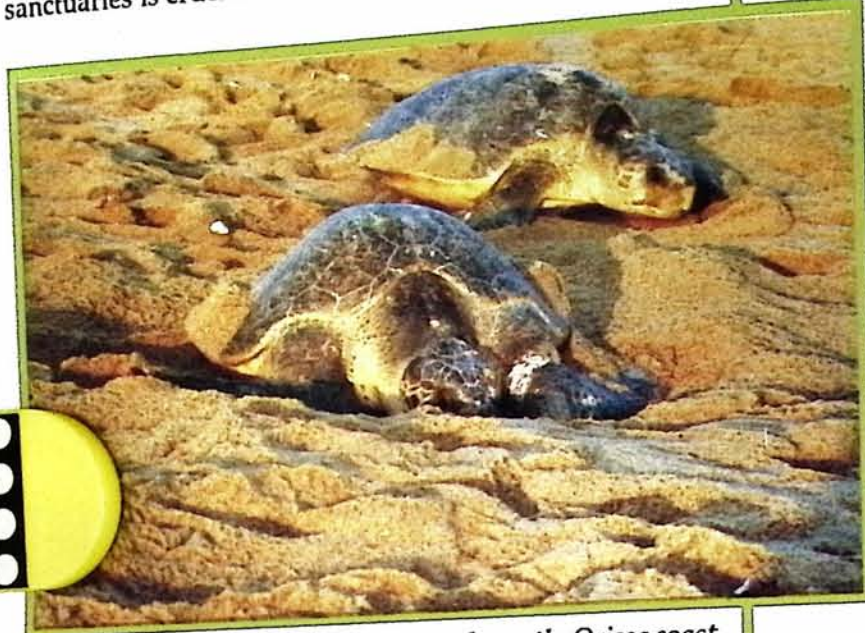
An important study initiated this year is on requirements for reviving potential wildlife corridors. The study will use remote sensing, ground truthing data and application of GIS in order to develop techniques for identification and management of such corridors with the aim of geographic networking of PAs on a regional basis.

Further, in view of mounting threats upon wildlife from illegal trade, a study on standardization of forensic techniques for species identification from mammalian tissues has been taken up. This marks the beginning of development of the science of wildlife forensics in the Institute. Several new studies which were slated to begin as a part of the second phase Indo-US collaborative projects under the auspices of Indo-US Sub-Commission on Science & Technology could not get started as they are awaiting Government clearance.

Environment impact assessment of development and industrial projects became a major activity in the reporting year. The study of EIA with respect to bio-habitats, biodiversity and wildlife was completed for Narmada Sagar and Omkareshwar projects in MP. This consultancy led to application of Digital Image Processing (DIP) and GIS for the first time in the planning of a new PA as a part of the mitigation measures for the impacts of these projects. An important feature of this study was the detailed information generated for management planning of the PA, dealing with zonation and zonally appropriate management including ecodevelopment measures to support not only the PA but the residual forests in the tract. The Institute also undertook several EIA consultancies for natural gas pipeline projects and these have led to facilitation of harnessing this eco-friendly fuel for industrial and domestic use. Besides, in its consultancy reports, WII has suggested important measures for conserving wildlife and biodiversity in the different affected areas as part of mitigation measures for the likely impacts from implementation of these projects. Here also, in one case, setting up of a new PA has been suggested as a sanctuary for Great Indian bustard in the Pohri area in Guna district of MP. From these consultancies the Institute has earned a significant sum of money which enable it to supplement the grant-in-aid funds for its varied scientific activities.

The areas of Asola and Bhatti Mines Sanctuary in the

National Capital Territory (NCT), Delhi have been under tremendous pressure of mining as well as other demands of land for urbanization. Proper management and amelioration of the degraded areas in these sanctuaries is crucial for strengthening Delhi's green



BIRASH PANDAY

Major nesting site for olive, ridley sea turtles on the Orissa coast

lungs. Apart from this, it is in itself an important means of conserving the biodiversity in the northern-most sector of the Aravali mountain chain. Accordingly, the Institute conducted a short term study and provided the frame work for an outline management plan and has made an offer to the Government of NCT to undertake preparation of a detailed management plan.

The year also saw the completion of the field phase of the National Survey of the status of Turtle and Tortoises, resulting in significant additions to the knowledge on the distribution and conservation of the different chelonians. An early by-product of this survey is a report brought out on the trade and trafficking in the turtles and tortoises, with suggestions for affording conservation measures. The report is backed by a poster giving photographs and geographic distribution of all species of land turtles and tortoises.

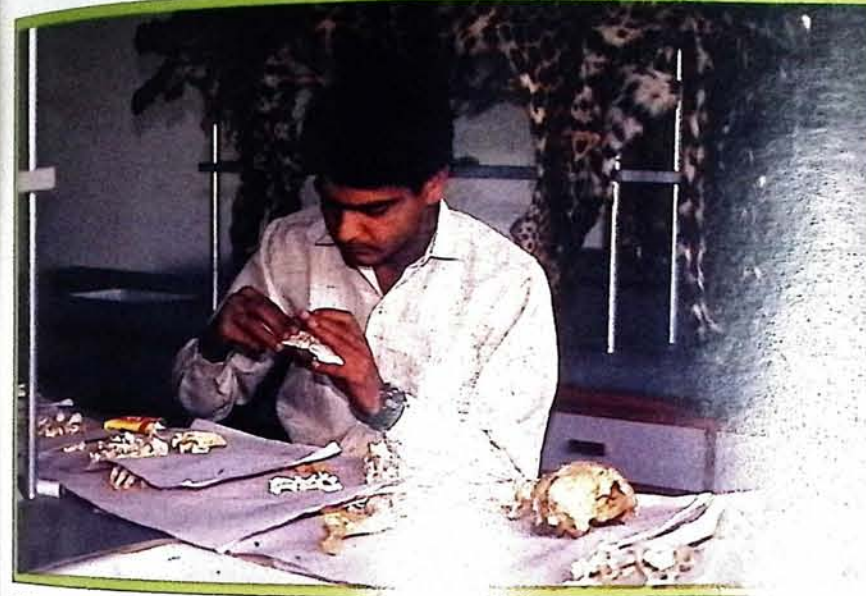


EIA survey for gas pipeline from Vishakhapatnam to Vijayawada meaningful feedback on the quality of programmes and suggestion for improvement. There was unanimous

The two publications together have great utility for state wildlife organization and other enforcement agencies. These publications were brought out in collaboration with WWF-India and Traffic-India. Yet another noteworthy event has been that a former WII M.Sc. student discovered an additional major nesting site for olive ridley sea turtles in the mouth of Rushikulya river on the Orissa coast. This finding from the short duration field research component of WII's research programme is of considerable significance as nearly two lakh turtles come to nest at this site every year which is nearly one third of the total population that comes to our east coast.

WII's Annual Research Seminar held in September 1993 this year had an impressive attendance of PCCFs and CWLWs besides noted scientists. Presentations of WII's studies brought forth appreciation as well as suggestions for new fields and topics for research. The occasion was also used to organise a Training Seminar to review WII's training and research programmes yielding

appreciation of the utility of various training programme and WII's efforts at integration of wildlife conservation with overall forestry management. Suggestions included adding a 'management dissertation' to the PG Diploma Course involving field work in the parent state by further extending its 9-month duration and also extending the 3-month Certificate course to four months and regularly conducting a short capsule course for top senior officers (PCCFs & CCFs). Several suggestions were made on taking up research work in states.



WII provides support to the wildlife law implementing and enforcement agencies in identifying hair, wildlife parts and other samples

On the extension side the Institute has interacted with a number of other institutions and NGOs as well as state wildlife organizations on the issues relating to parks and people. Besides this, WII participated in the India International Trade Fair-93 at Pragati Maidan, New Delhi from November 14-23, 1993. The stall of WII was located in the "Environment and Development" theme pavilion organised by the Ministry of Environment & Forests. The theme of the widely appreciated exhibition set up by WII was "India's Biodiversity (in relation to biogeography) and Ecodevelopment".

Roorkee University Students Association (RUSA) celebrated its annual festival during the first week of

March 1994. For the first time RUSA organized an exhibition on environment "EXPO-EKOTEK-94". WII was invited to set up a display, the theme of which was "India's Biodiversity and its Conservation". The WII pavilion was a major attraction of this exhibition.

On the institutional development side significant additions have taken place in the hardware and software of the computer facility from the combined resources of WII and UNDP Project. Training inputs from a visiting

US expert under the auspices of WII's collaboration with the US Fish & Wildlife Service led to fully operationalising the sophisticated GIS hardware and software received through the same source in the preceding year. Institute's Library maintained its progress in terms of additions to books and scientific papers and upgrading of the services. Specialized bibliographic compendiums were developed for WII's different courses and the library's own reprographic unit was commissioned.

With the possession of the acquired land permission for Sports Complex has been received and this has paved the way for its early development. Institute actively participated in the All India Forest Sports Meet at Dehradun in December 1993 and also provided assistance in its organization. Contract has been awarded for the construction of a 40-room new hostel and 34 houses for faculty and staff.

Besides responding to our own core needs, the Institute is now being sought for help by countries of the region by way of regular training courses, special subject workshops/study tours and advisory consultancies. This national and regional appreciation assures us that we are on track the right vis-a-vis the visualized objectives for WII.

## BACKGROUND

The image as visualized for the Wildlife Institute of India is best summed up in the aims and objectives assigned to it by the Government when sanctioning its creation in 1982. These are:-

- To build up a body of scientific knowledge on the wildlife resources of the country.
- To train personnel at various levels for the conservation and management of wildlife resources as well as provide orientation to all those concerned therewith.
- To carry out research relevant to management, including the development of techniques appropriate to Indian conditions.
- To provide information and advice on specific wildlife management problems.
- To provide a basis for cooperation with international organizations concerned with wildlife management, research and training.
- To work towards an autonomous institution of university status, which provides graduates in natural resource conservation and management for both government and non-government institutions, including university faculty and wildlife and conservation organizations. It should ultimately become a regional centre of international importance in studies on Asian wildlife and natural resource management.

Obviously these spell an agenda for the development of the upcoming science of wildlife conservation in the country. A necessary further thrust was soon added to encompass the human aspects of field measures for conservation. The Institute has tried to live up to this mandate and come up as a centre of excellence

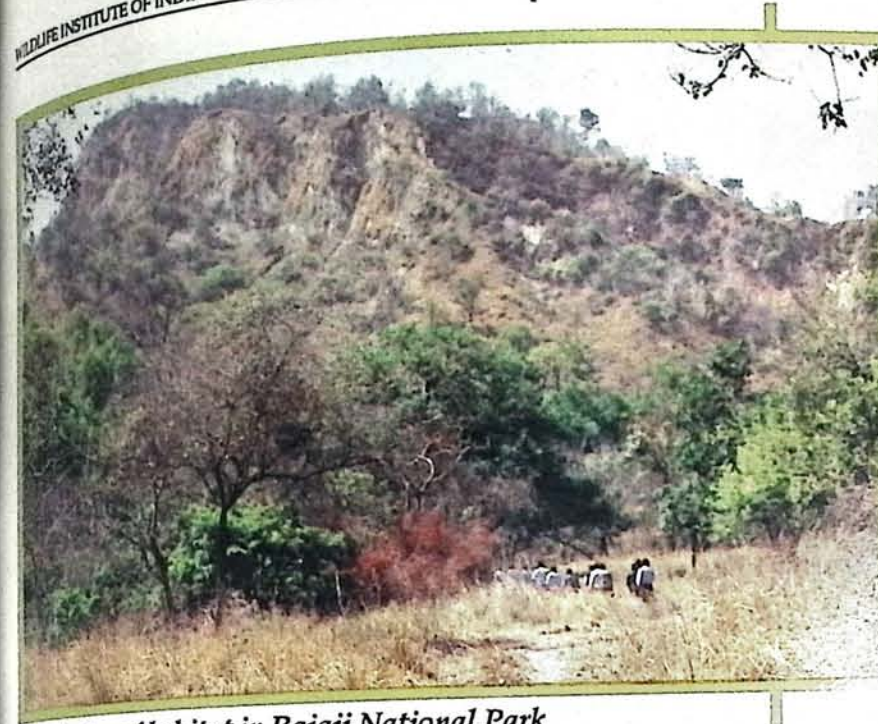
comprehensively addressing the multi-disciplinary and the inter-disciplinary aspects of field conservation of wildlife and biodiversity.

In our present day demographic and demand-supply scenario, the management of living natural resources is not the easiest task, especially because such management must simultaneously secure the life support systems, conserve biological diversity and ensure sustainable productivity. In the preceding half century our population has trebled and our livestock has grown to two and a half times. In the same period our natural areas have shrunk to half, if not in extent, certainly in productivity. Rural development has not been able to improve the lot of the people inhabiting wilderness regions of all kinds e.g. forest, arid savannas, deserts or coasts. Mega-development projects using natural resources e.g. minerals, water or wood have hardly respected the views of the local area or the local people, ending up in diversion of their land and export of their resources without any mitigatory measures against further vitiation of the equation between land and the people through viable alternative packages. Insidious operation of market forces has alienated people from the commons and forests, causing them to pillage their own sustaining resources, forests or fisheries.

While the management scenario has all these complexities, the stakes are high if the management fails. Life support systems have come under great stress. Denudation, drought, flash floods and impoverished water regime have become the signposts of degradation of our physical environment. We are rapidly losing our biological diversity.

India's biological diversity is unique not just because of species richness in some 'hotspots' but also, and as importantly, because of her range of biodiversity in diverse habitats from cold deserts to tropical rain forests. With the new found economic importance of biodiversity,

WILDLIFE INSTITUTE OF INDIA



Degradation of habitat in Rajaji National Park

much of India's economic strength in the 21st century will depend upon our ability to conserve biodiversity and make use of it for economic gains through technology development.

It is in this setting that WII has strived to translate its mandate into programmes and activities. The main thrust has been upon creating a body of scientific knowledge through research, and undertaking a multi-lateral human resource development effort so as to be able to address bio-ecological, managerial and related human concerns of field conservation.

Accordingly, our wide range of activities covering training and research are geared to achieve integration of biological, managerial, socio-economic and human aspects on scales of large regional landscapes. WII offers short as well as regular courses from a week long capsule to the full fledged two year M.Sc. programme. Courses cover wildlife biology, management, education-interpretation, zoo management, management planning for protected areas (PAs) and ecodevelopment

planning around them. Our research activities also range through this subject diversity, and field sites are spread out far and wide in the country. Institute's research is not only a primary source of scientific information for helping conservation, but is also seen as a means of keeping our faculty abreast of field situation and technology, so that their teaching always remains updated and directly relevant to field requirements.

It was after a mere three years, following the setting up of the Institute that the Government recognized the importance of giving it an autonomous status in accordance with its stated

objectives, so that it could gear up its academic activities with expedition while adhering to academic and professional excellence. Award of autonomy in April, 1986 paved the way for the recruitment of scientific and other staff and it was only then that the Institute could really take off. In response to the felt needs emerging from feedback from the field, the Institute went on adding fresh activities. The last eight years have all been

PRACHI MEHTA

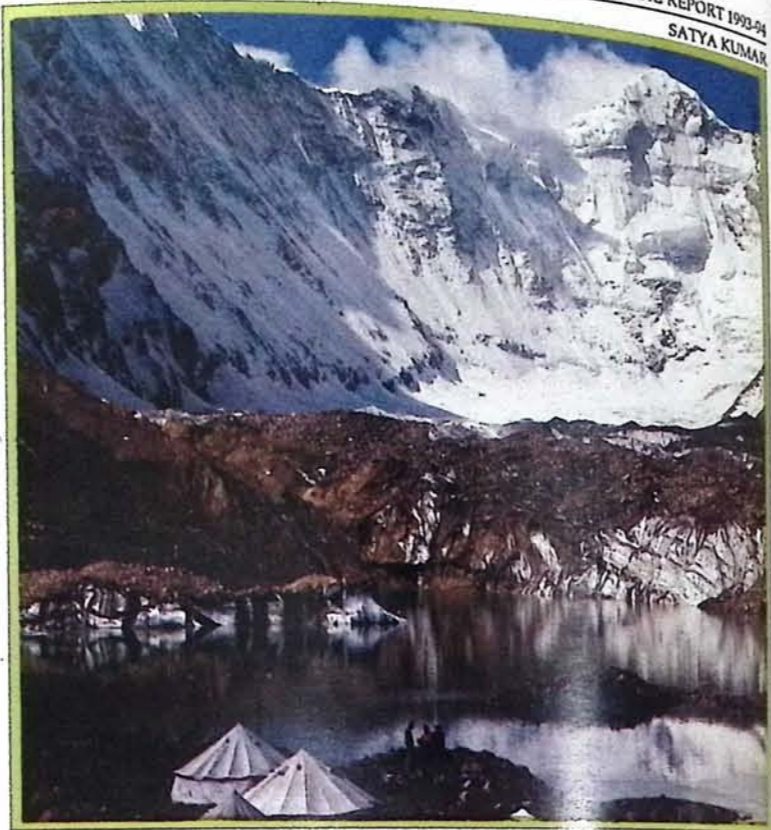


Bori WLS is one of site for developing area specific management guidelines for conservation of biodiversity in Satpura Conservation area

eventful during which Institute's activities have grown manifold. Some of the important activities which have been added are:

- *Masters Programme in Wildlife Biology (M.Sc.).*
- *Training Course in Management Planning for Protected Areas.*
- *Training Course in Ecodevelopment Planning for Protected Areas.*
- *Training Course in Zoo Management and Captive Breeding.*
- *Training Course in Conservation Education and Interpretation.*
- *Short term courses for inservice Forest Officers, IAS and the Army.*
- *Integrated forest management (research, training and advisory aspects).*
- *Enlargement in the scope and quantum of wildlife research.*
- *International scientific collaborative programmes.*
- *EIA studies for developmental and industrial projects.*
- *Planning of a biogeographically representative national network of protected areas for biodiversity conservation and its updating with fresh flows of information.*
- *Establishment of a Computerized National Wildlife Database.*
- *Application of advanced computer based Digital Image Processing (DIP) and Geographic Information System (GIS) technologies in wildlife research and management.*
- *Wildlife health programmes (research, training and advisory aspects).*

The Institute works in close collaboration with state wildlife organizations, scientific institutions and universities. It has also had the benefit of international and bilateral collaboration in its programme of faculty development and infusion of modern technology and scientific infrastructure. The progress of the Institute has not been lost upon the other countries in the region or the world and several countries have shown increasing interest in the training programmes of the Institute. The



*A panoramic view of Nanda Devi: site for scientific and ecological expedition*

Institute has already received trainees from Afghanistan, Bangladesh, China, Laos P.D.R., Mauritius, Zambia, Iran, Maldives, Myanmar, Pakistan, Bhutan, Mongolia, Sri Lanka and Nepal. It is hoped that in the coming years such participation will pick up substantially. Not only this, Institute's scientists on requests from international agencies have undertaken consultancies in several countries of the region on scientific and management problems. These are a reflection of the recognition of Institute's expertise. Yet another sign of recognition of WII's merit is the "Tree of Learning" award conferred upon the Director by the World Conservation Union (IUCN) in 1992.

This march towards excellence requires the coming years to add new activities as well as strengthen some of the present ones. Needless to say that the Institute will need strengthening of its staff and infrastructure to be able to shoulder these added responsibilities. In the following pages an account is furnished of the manner in which Institute planned and conducted its programmes and activities during the year gone by viz. 1993-94.

## OBJECTIVES

This march towards finding workable solutions to the various field problems that WII has set itself the following objectives:

- Training managers and biologists for protected area management and wildlife research;
- Training education and extension specialists for protected area to get public support for wildlife conservation;

- Providing orientation courses for those involved in landuse 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; and
- Providing advisory and consultancy services to central and state governments, universities, research institutions and other official and non-official agencies.



*Vally of flowers*

# INSTITUTIONAL STRUCTURE

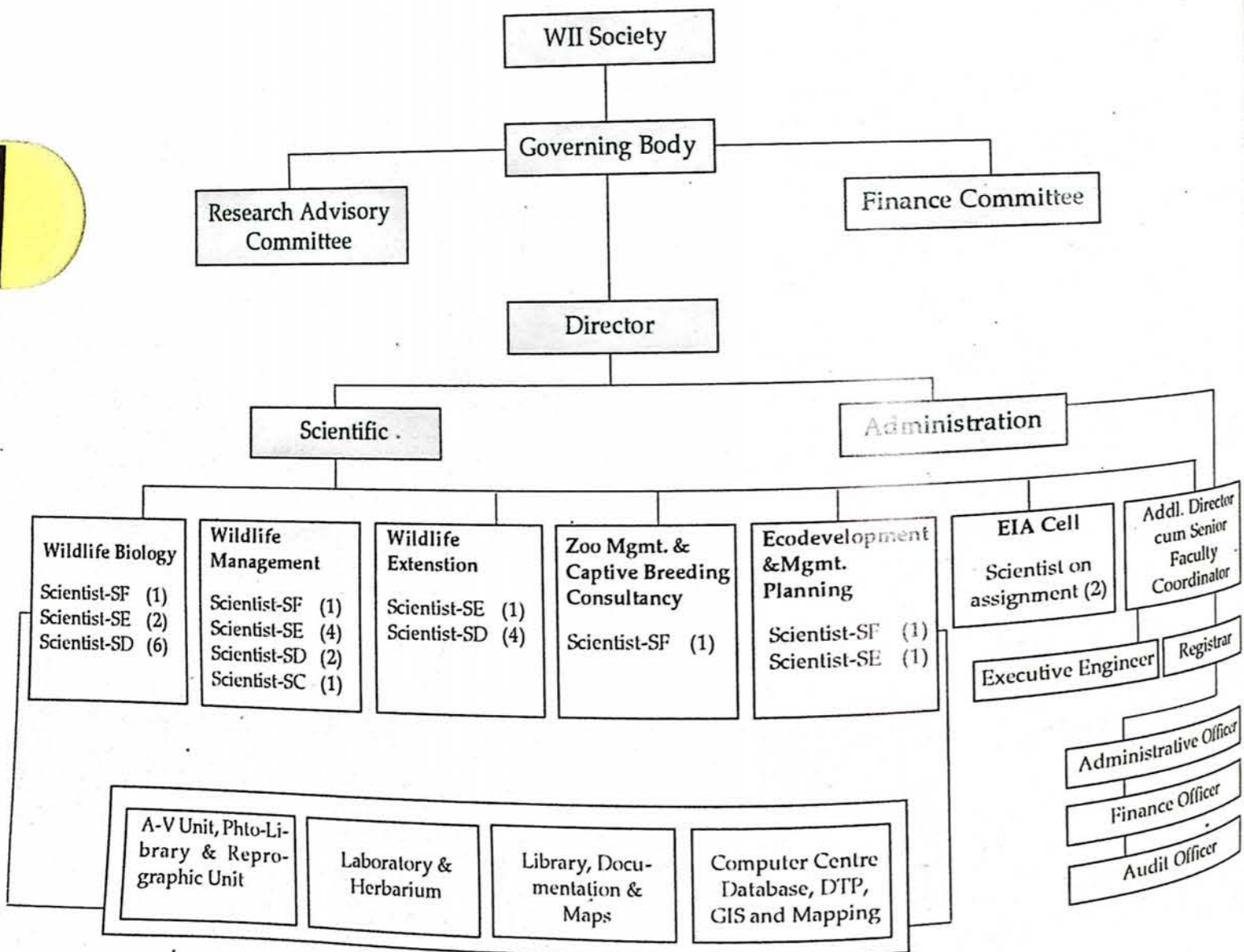
The Institute has three faculty divisions- Wildlife Biology, Wildlife Management and Wildlife Extension. Besides, there is a division handling training programmes in Ecodevelopment and Management Planning as well as internationally aided projects. The administrative division is headed by the Additional Director cum-Senior Faculty Coordinator

with a Registrar assisting him. The categories employed are scientist, technical and administrative. The Institute's library, laboratory and computer sections support its various scientific and academic functions. (see charts below).

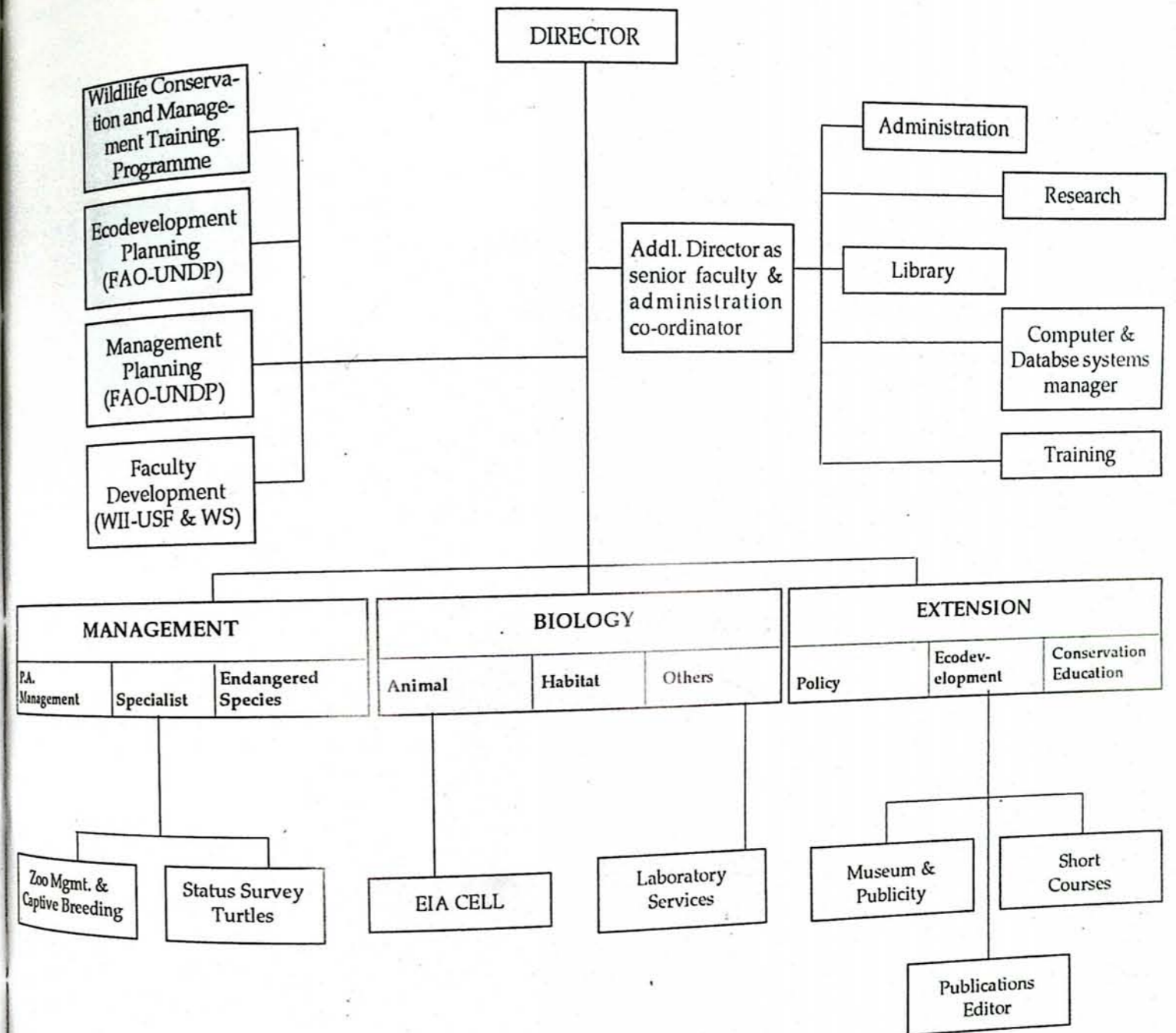
WII activities are divided into four broad categories;

- Academics
- Organisation
- Development
- Extension

## ORGANIZATIONAL STRUCTURE - ADMINISTRATIVE



## ORGANIZATIONAL STRUCTURE - SCIENTIFIC



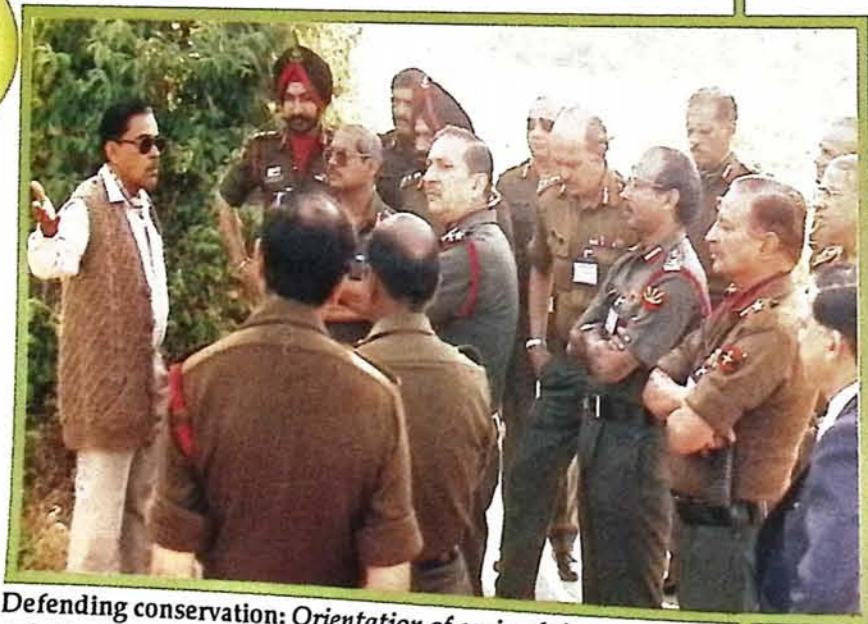
# ACADEMICS

## TRAINING PROGRAMMES

### Post-Graduate Diploma in Wildlife Management

WII has been active all through its existence in pursuing training programmes and courses for PA managers. Together with being the major wildlife training centre in the country, it has always teamed up with park managers to develop advanced and improved techniques for PA management.

The XIV Diploma course reported in the Seventh Annual Report 1992-93 concluded on May 31, 1993. All 20 officer trainees from 12 States and one Union Territory, successfully completed the course. The only lady officer trainee from Rajasthan cadre received the top trainee gold medal while trainees from Uttar Pradesh, Rajasthan,



Defending conservation: Orientation of senior defence personnel effective conservation awareness

Maharashtra and Madhya Pradesh also received awards of merit.

The XV Diploma course commenced on September 1,

1993 with 15 officer trainees, representing 8 States and 1 Union territory. At the time of reporting the course has completed all theory lectures and four field tours.

One week Orientation tour for the officer trainees was conducted in Sariska tiger reserve, Rajasthan. The purpose of the tour was to familiarize the trainees with wildlife-habitat-interactions, interpreting animal track and signs, aging and sexing of animals and data recording procedures etc. This was followed by the techniques tour conducted in Rajaji NP, where various field techniques demonstration enabled the trainees to evaluate habitat parameters, estimating animal populations, assessment of biotic pressures and handling data for computation and analysis. Before the first term examination, a specially designed 2-week course in computer application for word processing, data analysis and graphics was arranged.

The first management tour stretched nearly four weeks, covering several protected areas, deer park and zoos viz. Melghat Tiger Reserve, Guindy Deer Park, Anna Aringar Zoo, Madras Crocodile Bank, Point Callimere Sanctuary, Muttupet Mangrove Sanctuary, Gulf of Mannar Marine NP, Periyar Tiger Reserve, Eravikulam NP, Annamalai and Prambikulam WL sanctuary. Various management practices related to habitat management, endangered species management, wildlife protection, control of human activities, wildlife interface conflicts and tourism were the issues for interaction and learning.

The second management tour was conducted in Corbett tiger reserve where individual trainee officers were allotted topic related to the current management problems of the Reserve. These were then developed as a small project assignment for seminar presentation by individual trainee officers. Trainee officers are now preparing for second and final

term examination and subsequent tour for management planning in Gir.

Sub-optimal utilisation of seats for this and other training



Interpretation class in progress at the natural trail in the adjoining block II of WII Campus in Chandrabani

courses by states continues to be a matter of concern.

### Certificate Course in Wildlife Management

The X certificate course in wildlife management commenced on November 1, 1993 and concluded on January 31, 1994. Twelve officer trainees participated in the course including two trainees from Mauritius.

During the three months, the certificate course trainees were exposed to a wide range of subjects relevant to the scientific management of wildlife and protected areas. To make them aware of fundamentals in wildlife biology and management, a considerable amount of time was spent on theory lectures, practicals and seminars. Out of the total 13 weeks of the course, 56 days were spent at the WII campus for this purpose. During this, 120 lecture hours were devoted to theory classes on biology of Indian mammals, wildlife techniques, wildlife conservation and management, wildlife health and utilization, management plans, tourism, education and interpretation, wildlife law

and human dimensions.

Integral to the course were two field tours. The first tour to Chilla in Rajaji national park was to introduce the trainees to the practical aspect of wildlife science and management. This included landuse, forestry practices and habitat management initially. Later the trainees were exposed to the elephant conservation problems, especially the importance of corridors for maintaining large mammalian populations. In the later part of the tour, the trainees were taught several techniques used in wildlife population monitoring (Census), habitat evaluation and mapping, quantification of weeds and human impact on wildlife habitats. During the tour, the socio-economic aspects in conservation of protected areas were also discussed at length with reference to Gujjars of

Rajaji national park.

In the second tour the trainees were taken to different protected areas covering a variety of habitats ranging from the bhabar-terai region of the Himalayan foothills in Corbett national park, man made wetland system of Keoladeo national park of Bharatpur, Sariska Tiger Reserve in the semi-arid environment to a river system of National Chambal Sanctuary. At the end of the tour, trainees visited the National Zoological Park and Natural History Museum at Delhi. Emphasis in this tour was on management problems faced by the wildlife managers i.e. wildlife protection measures; administration and zonation; human disturbances and mitigation; tourism management; wildlife damage and habitat management, ex-situ management of endangered species and how these issues were handled by various management agencies.

The top trainee silver medal and the other awards of the Institute were bagged by trainees from Maharashtra.

### Ecodevelopment Planning Course

This was one of the two courses introduced this year under the GOI-UNDP project titled "Strengthening wildlife management and ecodevelopment planning capabilities". The course in ecodevelopment planning was conducted twice during the year, one from 18 April to 21 July 1993 and the other from 1 February to 11 May 1994. Perhaps this is the only course of its kind anywhere in the world in which natural resource managers and environmental organisations are trained in principles and practices of appropriate natural resource management with people's participation and reordering rural development to not only improve the socio-economic status of people but also to do so sustainably vis-a-vis resource productivity and optimal utilisation. The aim of the course is to prepare trainees to draw up plans with people participation which will promote traditional bond of people with their land and resources while compatibly supportive protection and management of PAs continue. The course is unique in the sense that the training goes beyond the campus and a selected band of 10 trainees will prepare model ecodevelopment plans in 10 biogeographically selected sites across the country. As during their stay at the Institute, the course participants have access to extensive advisably support from institutes faculty as well as national and international consultants during the planning stage. A highlight of the first & second courses is that the 10 officers selected for plan preparation at the project sites are being sent for a study tour to Nepal, Malaysia, Indonesia and Australia to expose them to the variety of similar initiatives going on in other parts of the world so that they can incorporate new ideas and practices into their plans.

Sixteen persons participated in the first course, out of which 2 were nominees of reputed non-governmental

organisations, namely, MYRADA in Bangalore and Ranthambore Foundation, in addition to the 14 representatives of the state forest departments. The second course was attended by 11 participants out of which 3 were from NGOs, one from Indian Remote Sensing Institute and the remaining from various state forest departments.



Participants of Ecodevelopment Planning Course in a Joint Forest Management meeting at Jhabua

Although the course has been availed of below capacity, it is felt that as the information about the course spreads, the response from the states will grow.

### Wildlife Management Planning Course

The second new course under a GOI-UNDP joint project was in Wildlife Management Planning. The course has two basic objectives - one, to supplement the turnover of Institute's diploma trainees through this short term course in order to bridge the gap between the availability and requirement of trained wildlife managers and planners, and two, to strengthen the wildlife management planning capabilities. The project is preparing ten model wildlife management plans for PAs selected in various biogeographic zones across the country. The model plans will hopefully be used by the States in preparing plans for

other sites as well.

The 100 day course commenced on October 1, 1993 and ended on January 25, 1994. Eight participants from the states of Bihar, Meghalaya, Madhya Pradesh, Orissa, Tripura, West Bengal and Uttar Pradesh participated in the course. As a part of training the trainees participated in a 3-week test planning exercise in the eastern part of the Kanha National Park in Madhya Pradesh. Six of these trainees will prepare wildlife management plans for their respective sites. The trainees had access to extensive national and international consultancy support during their course. The six trainees earmarked for plan preparation will have consultancy support in the field as well. These six will also travel to field sites in Malaysia, Indonesia and Australia to study wildlife management practices there so that new and appropriate ideas can be incorporated to their plans.

### Short Courses

**Zoo Management Course** Since 1990, WII has regularly organised this course for zoo professionals (i.e. institutional heads, senior veterinarians and curators and middle level zoo personnel) in view of the rapidly



Demonstration of field techniques during the International Wildlife Conservation and Management Training Programme changing concepts of management of wildlife in captivity,

and the imperatives for close cooperation among the zoo fraternity in order to make significant contribution to complement the conservation effort in the field. The training, designed to emphasize the essential tasks and techniques involved in day to day management in zoo/captive wildlife sanctuary, was conducted from December 27, 1993-January 9, 1994. This year the course was conducted in collaboration with the Arignar Anna Zoological Park, Vandalur, Madras, Tamil Nadu. In all, 35 nominations were received, but only, 22 nominees from 15 States and UT's participated in the training programme.

The daily schedule of the training programme consisted of three to four lectures, field demonstrations and presentations by participants. The curriculum for the training programmes was scheduled to cover all important components of zoo management so as to enable the trainees to analyze and solve problems by applying suitable methods and techniques.

In the course of the training, study tours were organised to different types of captive facilities. During the study tour to Guindy Children Park, Madras Snake Park and Crocodile Bank, the participants studied the management of different types of captive wildlife facilities. The next study tour was organised to Tirupati Zoological Park which is quite unique in the country. During the training, the participants studied in detail the design, layout and working of lion safari and bear safari parks in detail. The Arignar Anna Zoological Park which is considered as one of the well designed and maintained park, provided a perfect venue for the training programme.

During the year the Short Course in Wildlife Management for IFS Officers of three weeks duration (February 7-23, 1994) was attended by 21 officers from 11 States. The course

commenced with a panel discussion covering the entire gamut of conservation scene in India, the place of biodiversity and wildlife conservation in national development, and the various approaches to wildlife conservation in the current Indian situation. Subsequent sessions focused on wildlife conservation and management, eco-development approaches in which the officer trainees participated with interest. Participants were also given first hand exposure as to how to interpret wildlife signs and evidences in the field. Other aspects covered in the field included physical and chemical restraint method, use of radio telemetry, problems of elephant conservation and revival of corridor links, Gujjar relocation and rehabilitation programme, wildlife damage and mitigation strategies and opportunities of eco-development in the buffer and multiple use zone.

**Capsule Course for IFS Officers** A one-week capsule course was organised for senior and middle level IFS officers from October 4-8, 1993, at Rishikesh. This was the first of the two courses this year offered by the Ministry of Environment and Forests, GOI under the Compulsory Training Programme.

Eighteen forest officers of the level of Conservator and Deputy Conservator of Forests, representing nine states attended this course. The course was designed to provide an overview of the living resource conservation problems in the country and the ongoing efforts to mitigate these problems; to orient the participants towards critical issues in wildlife management and to appreciate the need for addressing socio-economic problems of reserve-side communities and enhancing productivity of buffer and multiple use land as a strategy for effective wildlife and forest conservation. Specific emphasis was laid on providing insight into strategies to accommodate concerns for "Conservation of biodiversity in forests -outside protected areas" without adversely affecting the main forestry objectives.

The course curriculum included panel discussions, lectures, field visits to nearby Rajaji national park, group discussion and presentations by participants. The concepts and strategies discussed during talks and panel discussions were reinforced by presenting audio-visual programmes on relevant issues. A number of relevant literature and techniques manuals on wildlife management were provided to the participants.

**One-week course in Environment and Nature Conservation for Army officers.** WII organised an one-week course on "Environment and Nature Conservation" for Senior Army Officers (Brigadiers and Colonels) from 1-5 November 93 at Dehra Dun. This course was a joint effort of WII and Army Adventure Cell of the Military Training Directorate of Indian Army, New Delhi.

A total of 33 officers from all over the country attended this course. While the local Army unit arranged accommodation, food and transportation. WII designed and conducted the course. The resource persons were drawn from WII faculty, scientist from FRI and Indian Army. There were panel discussions, audio-visuals, case study presentations and field visit to Rajaji National Park.

The objectives of this course were to orient the decision makers towards achieving effective conservation awareness in the defence services, to provide an insight into environmental problems including rapid depletion of biodiversity and strategies to mitigate these problems, identification of direct and peripheral involvement of defence services in conservation efforts.

A number of participants presented case studies highlighting the Indian Army's efforts towards amelioration of environment, wildlife protection, and wildlife research.

The course has been a fruitful experience for both the participants as well as WII faculty.

**Interpretation and Conservation Education Course.** The Interpretation and Conservation Education Course was organised by WII at Dehra Dun from August 16-25, 1993. The course was designed to meet the needs of staff from national parks, sanctuaries, deer parks, environment and development projects, defence services, wildlife tourism agencies and NGOs requiring assistance in the development of education and awareness programmes. The course was attended by twenty participants of which eleven were from NGOs, seven were forest officials, while one each was from Army and WII. An exhibition on Interpretive and awareness material was also organised during the course.

The participants were provided with sufficient reading material such as important wildlife books, manuals, research reports and articles.

The first Indo-British **Biological Monitoring Course** was a joint programme of the University College of London (through the British Council Division, New Delhi) and WII. It was held at Chandrabani campus from February 7-18, 1994. The course included four days of field work in Rajaji national park and eight days of classroom and computer lessons. There were fifteen participants; four from the Ministry of Environment and Forests and from State Forest Departments, seven from NGOs including ENVIS and WWF-I, one each from ZSI and an University and two from WII. The course was structured to enable a great deal of interaction between the participants themselves. Focus of the course was on the need for biological monitoring with special reference to the fauna and flora of forested habitats in India. Apart from dealing with the selection of taxa for monitoring, sampling design, collection of field data and data analysis, the course included case studies presented by instructors as well as by the participants. A manual based on the presentations made at the course is currently being edited for publication.

The **International Wildlife Conservation and Management Training Programme** was held at Chandrabani Campus in collaboration with the Smithsonian Institution, Washington D.C. to train nationals of other tropical countries alongside Indians from March 7-April 16, 1994. There were eleven participants from India, two each from Cambodia, Brazil, Nepal and Srilanka. Trainees included researchers, NGO representatives, forest officials, park wardens and University lecturers.

The course was imparted through classroom lectures as well as field and computer exercises. The syllabus included diverse topics covering habitat evaluation, demography, ecology, nutrition and physiology, behaviour and bio-statistics. Participants were acquainted with the use of field equipment and computers.

Trainees collected data during field exercises analyzed the data using techniques they had learnt during the course and communicated their findings through a poster presentation. The feedback from the course was highly positive.

**Research Fellows Orientation Course** As per the decision taken in the Research Advisory Committee meeting, an Orientation Programme was conducted for the new Junior Research Fellows who joined WII in early 1994. Ten new researchers participated in this Orientation Programme which was conducted from 15 March to 15 May 1994. A ten day special course on "Satellite Image Interpretation" was also a part of this course which was conducted at the Forest Survey of India, Dehra Dun.

### Training Inputs to Other Institutions

The WII faculty provided teaching inputs related to wildlife management for different regular and refresher forestry training courses conducted by the IGNFA and SFS College, Dehra Dun.

Two members of the Wildlife Management Faculty and the Additional Director addressed various aspects of wildlife management as invited resource persons in three separate newly initiated refresher courses by the Directorate of Forestry Education, FRI for state forest service officers. The courses were conducted by the State Forest Service (SFS) College at WII and at the SFS College, Dehra Dun. Special emphasis was placed on the new perspective in wildlife management planning, and integrated forest management inclusive of wildlife in managed forests. A field trip to the Rajaji National Park was integral to the courses.

Two members from the Faculty of Wildlife Management delivered 30 lectures at the Indira Gandhi National Forest Academy, Dehra Dun (IGNFA) to complete the elective course in wildlife management for the senior batch of IFS probationers. Likewise, a set of 40 lectures were delivered at the SFS College, Dehra Dun to complete the syllabus on wildlife management at the regular SFS officers' course.

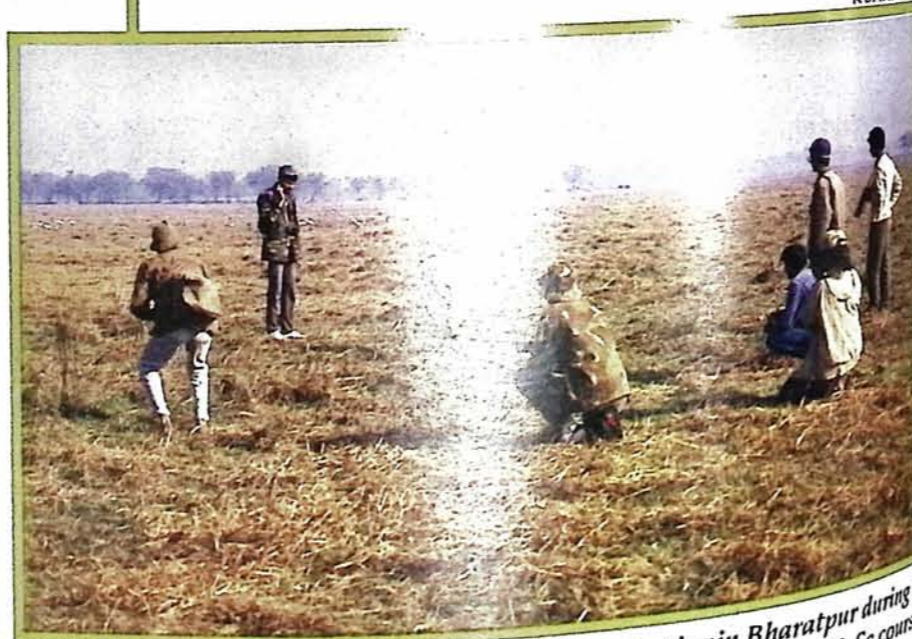
The Institute is now being sought for help by other countries of region by way of study tour based training programme. Two officers from Malaysian Forest and Wildlife Conservation Department and an officer from People's Republic of China were trained by WII during 1994, adopting the study tour approach where interaction of managers and first-hand experience of problems, broadens the scope of learning.

WII helped Corbett National Park in designing its one month guide training programme and also provided faculty support during the course.

### EDUCATION PROGRAMME

The Post Graduate (M.Sc.) course in Wildlife Science at WII has been developed to provide competent research biologists to further the cause of wildlife conservation in India and elsewhere. Wildlife and animal ecology in general, are relatively new subjects within the university system in India. Only two other institutions offer a full post graduate degree in Wildlife Science. This programme at WII therefore is vital for meeting the need for trained wildlife scientists in the country.

The III M.Sc course, which commenced in July 1991 concluded in June 1993 with all seven candidates securing higher 1st class Degree from Saurashtra University. The IV M.Sc course started from July 21, 1993. Based on a All India written test and viva-voce, seven candidates were selected and awarded a fellowship of rupees 1200/- each (including one WWF-I funded fellowship).



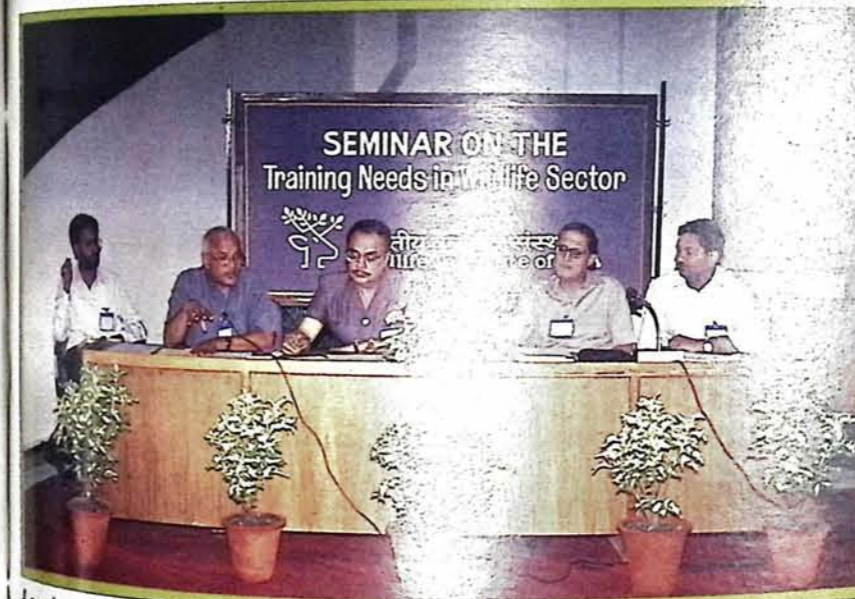
Noose trap demonstration in Bharatpur during a techniques tour of the IV M. Sc course

The first semester which ended in January 1994 involved teaching of theory, physical environments, vegetation,

biology and quantitative methods used in wildlife studies.

Two techniques tours were conducted during the semester in order to teach the students various field research methods. Areas visited for the purpose were Sariska tiger reserve, Rajasthan and Kedarnath wildlife sanctuary, Uttar Pradesh.

During the ongoing second semester which commenced from February 1994, a techniques tour Wetlands was conducted in Keoladeo National Park, National Chambal Sanctuary and Gharial Rearing Centre, Morena and Karera Wildlife Sanctuary and Madhav National Park, Shivpuri.



A seminar on training needs in wildlife sector was conducted during the seventh Annual Research Seminar

### WORKSHOPS, SEMINARS AND MEETINGS

Organised

The Fish and Wildlife Services sponsored a unique Grantsmanship Workshop at WII in August 1993 to train Indian and American scientists in preparing proposals for generating private/corporate funds for scientific research. This workshop was delivered by an NRI and was attended by the WII faculty and selected

researchers in addition to 10 American scientists.

A workshop on Wildlife Damage Problems and Control, the first of its kind in the country, was organized at Madhav National Park, Shivpuri and Great Indian Bustard Sanctuary, Karera, Madhya Pradesh from February 2-7, 1994. It was a joint endeavour of WII, US Fish and Wildlife Services and the Madhya Pradesh Forest Department.

The workshop aimed at bringing together wildlife damage control workers, wildlife managers, scientists and resource persons from within India and abroad to discuss and share knowledge/experience of wildlife damage problems and control strategies and to help inventorying of field managers and scientists actively engaged in wildlife damage control work in the country.

There were 95 participants, of which three were from the Kingdom of Saudi Arabia, Riyadh. The technical sessions and field demonstrations generated a lot of interest among participants, allowing active interaction and free thought provoking discussion on problem solving approaches.

During the year the Seventh Annual Research Seminar (ARS) was organised from 27 - 29 September, 1993 at WII campus. The important feature of this ARS was presentations made on completed projects detailing the significant findings of 3-4 years of field work by the respective researchers highlighting the management implications of such findings. The ARS was chaired by the Chairman Research Advisory Committee, (RAC) and attended by over 50 external guests including members of the RAC, four members of the Governing Body including two members common to both the Committees. Four PCCFs, six Chief Wildlife Wardens (CWLW), three representatives of

CWLWs and six Park Directors, representing ten States also attended the Seminar. Representatives of NGOs viz. BNHS, WWF, Zoo Outreach Organisation and Coimbatore Zoo were also present. Senior scientists from sister institutions viz. ICFRE, ICAR, FRI, SFS, FSI, IIRS, ZSI, BSI, SACON and a few eminent wildlife scientists from selected Universities were also present who actively interacted in the ARS.

In all, twentytwo presentations representing Institute's nine ongoing and twelve completed short/long term research studies were made and these led to a very meaningful discussion.

As in previous years there were awards for the best five presentations (three for ongoing and two for completed projects). A special award in recognition of the participation and contribution made by one of the WII researcher in the Ecological Expedition to Nanda Devi jointly organised by MEF and the Indian Army was also declared. The award included a merit certificate besides books worth Rs. 750/- to each of the winner.

A photo-exhibition on WII's research activities including scientific poster papers by the students of IIIrd M.Sc. Wildlife Science, based on their short term dissertation work was organised at the time of ARS. This new initiative of exhibiting scientific poster papers and allowing young students to interact with the august gathering of eminent scientists and wildlife managers was highly appreciated by the participants of the ARS.

● A half-day Seminar on the Training Needs in Wildlife Sector was conducted on September 29, 1993 to coincide with the Institute's ARS. The Training Seminar was chaired by the IG (Forests). Seven presentations were made by the faculty highlighting past activities of the Institute's diverse training programmes. Compilation of

reports on WII training programmes and research was also brought out and circulated to all the participants. Altogether 200 internal and external participants were present during the Seminar. Several valuable suggestions were made by the Chairman, PCCFs and CWLWs for improving the regular training programmes and on the future needs. These suggestions are being incorporated by the Institute in its plan for the year 1994-95.



A landscape of Nanda Devi

### Participated

● A Gender Workshop on Rural Women was organised by the Lal Bahadur Shastri National Academy of Administration, Mussoorie, on April 24, 1993. The objective of the workshop was to appreciate and focus on gender issues through participation. The workshop was conducted over five sessions on Gender issues, Gender perception, Rural women's knowledge, Rural women and project planning and Evaluation. The workshop was attended by a Scientist SD of WII.

● A faculty member participated in the International Conference on Conservation, Restoration and Management of Tortoises and Turtles on 11-16 July 1993 at the State University of New York, USA and

presented a paper based on the work carried out by the WII- USFWS collaborative Turtle and Tortoise Conservation Project.

● Coastal Zone 93 - the eighth International symposium on Coastal and Ocean Management held at New Orleans, Louisiana, USA during 19-23 July 1993 was attended by a faculty member of the WII keeping in view the institutes' planned involvement in coastal and off-shore Protected Area Management. The participation provided an opportunity for WII to forge links with scientists and managers of international repute in this field besides gathering first hand informations on this new subject area from presentations made in the symposium.

● A researcher from WII participated in the Sixth International Otter Symposium and IUCN/SSC Otter Specialist Group Meeting on September 6-10, 1993 at Pietermaritzberg, South Africa. The subject of discussion was "the problems and prospects of otter conservation". There were around 60 participants from 22 countries. The WII researcher presented a paper which generated much discussion and was complimented for providing the high quality and quantity of researched information on the smooth coated otter.

● International Wildlife Management Congress, organised by the Wildlife Society USA, was attended by the Head of Biology Faculty and another scientist from the same faculty. Held in Costa Rica on September 18-25, 1993, the objective of this congress was to explore the possibility of integrating people and wildlife for a sustainable future. The congress was attended by 521 participants from 66 countries and provided a veritable forum to discuss international strategies for implementing sustainable developmental plans to benefit world wildlife resources.

At the congress two papers were presented from WII

which were well appreciated. A forum meeting was also convened by the participants of the Cat Group to discuss the serious threats facing the long term conservation of tiger.

● Regional Seminar on Conservation and Management of Biological Resources in Himalaya, September 21-30, 1993. This seminar was sponsored by UNESCO - New Delhi under the World Heritage Fund and organized by G.B. Pant Institute of Himalayan Environment & Development, Almora at its regional unit in Srinagar (Garhwal). The seminar discussed the concept of Biosphere Reserves and their implications for the development of human beings in the Himalayas in a long term perspective, involving scientists and resource managers. Two Scientists from WII participated in the programme and two papers were presented.

● A workshop organised by the Administration of Nandadevi Biosphere Reserve, Forest Deptt., U.P. on 16 - 17 October 1993. The workshop was organised in the remote hill village of Reni, Chamoli (Garhwal) and the objective was to explore the channels of communication between the park officials and villagers. An attempt was made by the park officials to interact with scientists, villagers and NGOs by highlighting the values of the Biosphere Reserves and PA, people's participation in conservation efforts and ecodevelopment packages that could be made available to people. One research scholar participated in the programme and presented the case study on the Valley of Flowers N.P.

● A National Workshop on declining access to and control over Natural Resources in National Parks and Sanctuaries Organised by Society for Participatory Research in Asia, and the Rural Litigation and Entitlement Kendra, Dehradun, at FRI, Dehradun on October 28-30, 1993, the workshop was attended by the Director, WII, along with Faculty Members and

officer trainees of XVth Diploma Course. There were wide ranging queries, indicating the extent of ambiguity national parks and sanctuaries were alleged to be shrouded in and the urgent need on the part of Government to explain and explicit the laws, plans, policies and practices. Since there was no other person to clarify the position on part of the Government, the Director, WII gave information on how statutory and programme support from Government was trying to accommodate the concerns of people in the management



*Anemone rivularis* from a research site of WII in the Valley of Flowers

of PAs. Director also informed how WII's research and training programmes were targeted at amelioration of the problem.

- An International Wolf Seminar in Spain organised by the IUCN Wolf Specialist Group was attended by a Scientist SE of WII in October 1993. A paper was presented by him at the seminar.
- In October the southern Regional Meeting of the Central Zoo Authority and the Population Habitat Viability Analysis for the Lion Tailed Macaque was held at Anna Zoological Garden, Vandalur, Madras. The Western regional meeting of the CZA and the PHVA for the Asiatic lion followed these meetings in Madras and were held at the Baroda Municipal Corporation's

Zoological Garden. These meetings and workshops were attended by a Scientist SE from WII.

The regional meetings of CZA focused on networking and a cooperative approach to captive breeding. The integral part of PHVA workshops was computer based modelling using VORTEX program.

- Centre for Micro-Planning and Regional Studies, Lal Bahadur Shastri National Academy of Administration, Mussoorie organised the Workshop on issues in resource use and institutional structure in and around national parks and sanctuaries on January 6-8, 1994. It was attended by the Director, WII, a Scientist from the Extension faculty and a research fellow. A paper was presented at the workshop by the Director, WII.

- A National Workshop on Grassland Management in India, New Opportunities and Challenges. This workshop was organised by Indian Institute of Forest Management, Bhopal February 2-3, 1994. The objective was to have a discussion among scientists, managers and students on the grassland situations in India, their values, the ways to improve pasture and range lands & grassland management. One Scientist SE and one Research Scholar attended the seminar and presented a paper.

- A workshop on India's Forest Management and Ecological Revival was organised by TERI-UF (Tata Energy Research Institute and University of Florida) in February 1994. Director, WII participated in this workshop and presented a paper titled "Protected Areas for Biodiversity Conservation in India: Problems and Prospects".

- The first Galliformes Symposium, "Galliformes in India" was held at Shimla on March 2-4, 1994. This

symposium was organised jointly by World Pheasant Association - India and the Department of Forest Farming and Conservation, Himachal Pradesh at HIPA complex, Fair Lawns. The symposium aimed at bringing together wildlife biologists and managers in order to share their knowledge and expertise to strengthen *in situ* and *ex situ* conservation of Galliformes in India. On behalf of WII, one Scientist attended the symposium and presented a paper. Another paper authored by a WII scientist was read by a Himachal Pradesh wildlife official.

- On the recommendation of the International Symposium on the Tiger, convened by the Government of India at New Delhi from February 22-24, 1993, a Global Tiger Forum was set up at the two day ministerial level conference of the tiger range countries held at New Delhi on March 3-4, 1994. The conference jointly sponsored by Government of India and United Nations Environment Programme (UNEP) was attended by delegates from Bangladesh, Bhutan, Cambodia, Indonesia, Malaysia, Myanmar, Nepal, Vietnam and Russia. China's absence, a very important range country, was felt. Director, WII was one of the delegates from India. Additional Director and Head, Biology faculty attended this conference as observers.

The Global Tiger Forum will seek to mobilise all available expertise to preserve the tiger and its habitat, involving Government and Non Government sectors and individuals. It will comprise members from the willing countries who have tiger population so that through regular exchange of information and experience the status of the tiger can be closely monitored and appropriate action taken to safeguard the survival of tiger.

- The Zoology Deptt. of H.N.B. Garhwal University organised a one-day seminar on March 30, 1994 on the Environmental Awareness on Conservation of Depleting Animals and Plants in Himalayas. This programme was intended to make the villagers,

government officials and students of the university aware of the significance and fragility of Himalayan environment and the role of the youth in its conservation. A theme presentation on the Valley of Flowers and its conservation was made by a WII researcher.

- A Meeting of wildlife officials from Govt. of India, State and NGOs was organised by the Ministry of Environment and Forests, GOI on June 3, 1993 at New Delhi. The Director and the research coordinator represented WII at this meeting. A document highlighting WII's contributions in the field of wildlife research was brought out on this occasion. The main issues discussed at the meeting were review of wildlife research projects supported by various funding agencies, identification of wildlife research priority areas and evolving a system for monitoring of research projects in order to avoid overlapping.

As a follow up to this meeting, the MEF recognized four regional nodal agencies in the country for monitoring wildlife research on zonal basis. As one of the regional nodal agencies, WII has been assigned the task of coordinating and monitoring research in states of Uttar Pradesh, Bihar, Madhya Pradesh, West Bengal, Orissa and all the seven north eastern states. WII has also been recognized as a national institution which will help the Ministry to coordinate this effect at national level.

#### STUDY TOURS

Under the WII-USFWS collaborative project on specialized faculty training and development, four faculty members visited USA.

- A Scientist SE visited USA during July-August 1993 to study wetland habitat management and research. The exposure through seminars, discussions and field visits would help him develop and strengthen research and teaching inputs at WII.

● Another Scientist SE was deputed on a study tour in the field of wetland ecology and management (freshwater) to UK and USA from July-September, 1993.

● Two Scientists SD were detailed to USA for study tours on GIS from January-May, 1994, and in wildlife health sciences from February-April, 1994 respectively.

● The Director participated in the 11th General Assembly of IUCN at Buenos Aires in Argentina and undertook a study tour to field sites in Argentina and Columbia. He also held discussions with a number of American agencies, FAO in Rome, World Bank in New York and WWF-International in Switzerland from January-February 1994.

## RESEARCH

In addition to the primary responsibility of imparting training and education, WII is also looked upon to conduct and coordinate wildlife research in the country and evolve relevant techniques suited to Indian conditions, strengthen conservation efforts through generation of scientific information and create a trained manpower base of biologists, wildlife ecologists, socio-economists and managers. The ongoing research programmes are also important means of developing the professional capabilities of the Institute's faculty as well as of keeping them abreast of current field situations, management needs and research trends at all times. This ensures that the faculty's own inputs and teaching methodologies are constantly updated.

WII has undertaken extensive research programmes in ecological, biological, management and socio-economic aspects of wildlife conservation. A Research Advisory Committee (RAC) comprising eminent conservationists, academicians and representatives of scientific organisations as well as State wildlife organisations examines, approves and oversees the Institute's research

programmes. It also ensures that WII's research activities conform to the national conservation priorities.

The RAC met twice during the year, once to coincide with the VII Annual Research Seminar (ARS). It considered eleven new research projects proposed by the Institute's faculty, of which nine got approved.

The RAC has also approved ten research projects for proposed collaboration with three US agencies viz. US Fish & Wildlife Service (USFS), US National Park Service (USNPS) and US Forest Service (USFS) under the Indo-US Sub Commission on Science and Technology, Environment and Ecology Sub - Group. Also approved was the organisation and conduct of **Orientation, Training and Course Work** for new researchers. For this a curriculum and day to day programme on theory, practical, field sessions and seminar presentations were developed during the year.

### National Test for Selection of Researchers

A National Test was conducted for the selection of JRFs for new research projects in December, 1993 at WII. 279 candidates from the original over 700 applicants were called for a Written Test and a Personality cum Interview. Twenty new JRFs and three RAs were selected and WII's fellowships were assigned to them. The selected JRFs joined the Institute in March, 1994 and participated in the Course Work-cum-Orientation Programme. On successful completion of the Course Work each JRF will be allotted an approved research project.

### Research Projects

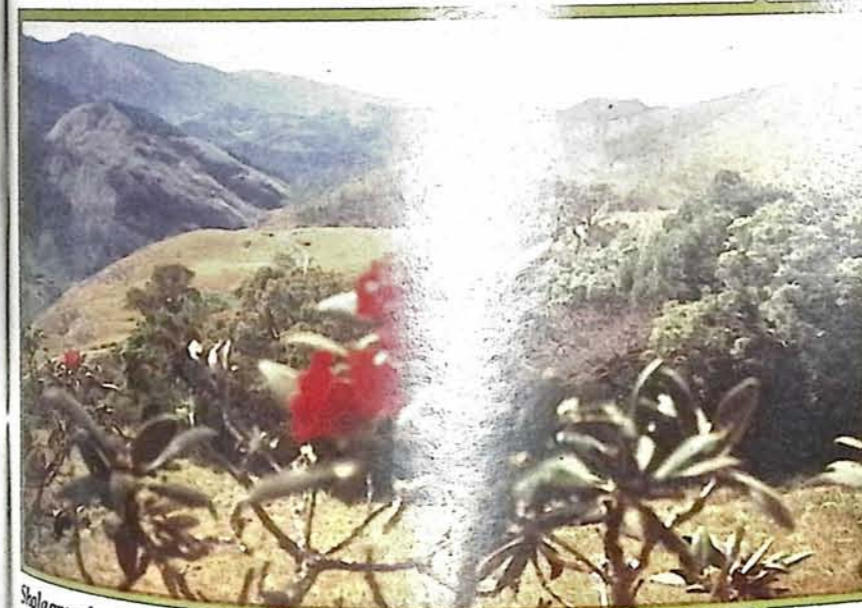
At the beginning of the reporting year fifteen research projects were ongoing, of which six got completed. Eleven new projects were initiated during the year. Four dissertations based on research projects completed in the previous year led to the award of Ph.D. degrees to

respective research fellows. These dissertations dealt with the ecology of Asiatic lion, Snow leopard, Grizzled giant squirrel and Mugger crocodiles. The findings of the completed research projects have also been brought out in the form of research reports and research publications in reputed scientific journals and as popular articles.

The following are the summaries of the research projects for the year 1993-94:

### Completed Projects

There were fifteen research projects in the report writing stage at the time of reporting of the last annual report. Of these, the following nine have been completed and sent to the concerned wildlife officials for comments before being published by WII as monographs;



Stolon grassland and Rhododendron nilgiricus in Eravikulam N. Park

- 1) Ecology of the Indian Wild Ass in the Little Rann of Kutch, Gujarat.
- 2) Ecology of aquatic mammals in National Chambal Sanctuary.
- 3) Ecology of Asiatic Lion, Gir, Gujarat.
- 4) The ecology and biology of Phayre's leaf monkey in Tripura.

- Turtles and Tortoise Conservation Project.
- Ecological studies of Snow Leopard and its associate prey species in Hemis National Park, Ladakh.
- Ecology of Endangered Grizzled Giant Squirrel in Tamil Nadu, South India.
- Ecology of Indian Flying Fox, Dehradun.
- Monitoring of Restocked Mugger Crocodile in Manjira, Ethipothalla and Siwaram Wildlife Sanctuaries in Andhra Pradesh.

The reports for the following six projects are being finalised :

- Abundance of and habitat use by the Himalayan ungulates in Kedarnath wildlife sanctuary, Uttar Pradesh.
- Study of montane grasslands in the Valley of Flowers (Himalayas) and Eravikulam National Park (Western Ghats).
- Movement and habitat utilization by elephants in north-western Uttar Pradesh.
- Ecological studies to evaluate crop damage by nilgai and blackbuck in Haryana and to formulate mitigation strategies.
- 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 community and the sanctuary, Tamil Nadu.
- The management and ecology of the swamp deer in Dudwa National park, Uttar Pradesh.

## Ongoing Projects

- **Strengthening of national wildlife database: phase II, and establishment of Protected Area Network Cell at WII (PANC).** The objectives of the National Wildlife Database are

- to provide information on the conservation status of animal species, habitats and the network of protected areas in the country;
- to establish linkages with other similar computer based data centres; and
- to provide extensive bibliographic support to wildlife researchers, park managers and other interested users.

During the year verification, cross-checking and data analysis was carried out. Visual representation of data on Autocad was done to represent biounit wise distribution of mammalian species.

A user-friendly manual for the National Wildlife Database Management System (NWDMS) was developed and circulated to users. A new slide-show was created for the database demonstration, converting data into information in visual form.

The significant findings of the National Wildlife Database project were presented at the Annual Research Seminar of the Institute in September, 1993, and the utility of a computerised wildlife database demonstrated.

While software modification and data updating is a continuous process in any ongoing computer based project such as this, a lot of effort has been put to improve the quality of data as well as to create awareness amongst students, researchers, trainees of various courses and participants of workshops and seminars, by

giving them lectures, presentations and demonstrations on the database, and obtaining from them information that is useful and essential for the database.

Setting up of PANC is in the planning stage and is expected to begin functioning from May 1994.

- **Ecology and population genetics of the Asian Wild Buffalo (*Bubalus bubalis*) in Kaziranga National Park, Assam** Project activities had been temporarily suspended in order to allow the researcher to attend the Ph.D. Semester Course Work at the University of Wisconsin, USA. As such, during the first nine months of the current year no field activities of the ongoing project were carried out. In USA, the researcher learnt various advanced laboratory techniques viz. DNA extraction and purification from skin biopsy samples and PCR (Polymer chain reaction).

Field activities re-commenced in January, 1994 after the return of the researcher from USA and much of the remaining year was spent in re-establishing the field research base, and obtaining necessary permissions for using a new field technique which allows the collection of skin biopsy samples from free ranging animals.

The first field trial using skin biopsy dart was conducted on a captive sambar. Based on this successful trial, the research team made a similar attempt to standardise the new technique on domestic and wild buffaloes in Kaziranga National Park and then a few skin biopsy samples were collected. The collected samples were stored in liquid nitrogen. Further, extraction of DNA, purification and DNA fingerprinting are being planned using these samples. Collection of a large number of samples using skin biopsy technique has also been planned during the remaining tenure of the project.

- **Developing area specific management guidelines for conservation of biodiversity in Satpura Conservation Area, taking into account the forestry objectives and local people's needs** One researcher investigated the relationship of bird species composition and guild structure of bird community with stands in post working interval of 5, 20 & 60 years under four different silvicultural treatments. It was apparent that changes in vegetation and bird communities occur over the shorter run, while over the longer cutting cycles the original bird communities are restored.



Gawli cattle from Churna village move into the Satpura National Park for grazing

- Another researcher, looking at the relationships between large ungulate densities and successional stages, discovered that Sambar (23.1/sq km) and Chital (45.1/sq km) attained their highest densities in the plantations of 13-18 year age class. Ungulate richness was observed to be the highest in the selection-cum-improvement system. A senior research fellow with a background in socio-economics joined the project during June 1993. After a brief orientation, she spent several weeks on the project site in MP and prepared and tested field methodology for socio-economic surveys.

- **Integrated landuse approach for conservation of biological diversity of terai grassland in U.P.** The total

eastern wet alluvial grassland of the Valmiki tiger reserve covers 26 sq km. of which a substantial area is planted with sissoo, khair, teak and bamboo. While the plantations are successful, these have compromised the diversity of the grassland itself. A substantial area has further been lost to a railway line between Bagha and Gorakhpur.

The grassland system and swamps are extensively used by the local people and their cattle. In one of the blocks, old droppings of rhino were found. Evidently rhinos come into this area from the adjoining Royal Chitwan national park in Nepal. Survey work will continue in the grassland and is also proposed to be extended to the rest of the reserve which might have small scattered grassland patches. The river Gandak appears to be a suitable habitat for the Gangetic dolphin, though no actual sightings were made. Evidence of otter was found. The Nepal wildlife department is conducting a project on the rehabilitation of gharial in the Gandak river and this aspect will not be lost sight of on the Indian side stretch of Gandak within the Valmiki tiger reserve.

- **Ecological survey of the wolf (*canis lupus pallipes*) in peninsular india** Extensive surveys were conducted in parts of Maharashtra, Gujarat and Rajasthan. Wolf was found to be widely but sparsely distributed. Most populations were small and therefore highly vulnerable. Where there is paucity of natural prey, the wolves have taken to livestock depredation, leading to a direct conflict. Nowhere the population appeared to be secure, except in a few protected areas. Potential breeding sites were identified in and around the existing PAs. Management of such habitat pockets is likely to help the wolf population to breed successfully and disperse to suitable areas.

- An ecological study of the montane grassland in the Valley of Flowers (Garhwal Himalayas) and Eravikulam (Western Ghats) national parks with a view to develop baseline information of grasslands for conservation planning.

Valley of Flowers N.P. - The work began with the appointment of a researcher and establishment of the base camp at Ghangaria during May 1993. After the field reconnaissance, work on community identification began. The researcher has so far collected 492 plant species as well as ecological information on their habitats. Simultaneously, a few grazed alpine pastures in the vicinity of the National Park were studied and data on species occurrence were collected to understand species diversity in grazed and ungrazed situations. This work has laid the foundation for the study on community structure and function which would be carried out in the summer of 1994 onwards.

Eravikulam National Park - After the preliminary surveys and species listing, the researcher has stratified the park into seven vegetation units and identified communities in different units. The findings were discussed in the Annual Research Seminar 1993. Quantification of vegetal components and animal use of these lands have begun. The researcher has set up enclosures to study the structure and function of the grassland communities and it is expected that by the year end the dynamics of this unique ecosystem would have been worked out.

- A study of the ungulate-lion habitat in Gir Forest, Gujarat This project aims to investigate the impact of relocation of 'maldharis' (local pastoral community) and their livestock, fire, grass harvesting and provision of water on vegetation, ungulates and lion.

In 1993-94 the number of vegetation plots were increased from 140 to 270. Soil samples from 112, randomly

selected plots were collected and analyzed for chemical and physical properties. All the plots (270) and, old and new wells all over the Gir, were mapped on 1:50,000 scale. Preparation of a new vegetation map from spot data, data analyses and writing up have begun. This is in addition to the seasonal data collection on vegetation structure and function and, ungulate density.

- **Standardisation of forensic techniques for species identification from mammalian tissue**

This project was initiated in February, 1994 with a view to strengthen the capability of WII in relation to identification of mammals through study of mammalian tissue. The project is of 3<sup>1/2</sup> years duration and envisages to produce an extensive identification manual which will be immensely useful for the wildlife staff of the state forest departments dealing with wildlife offences.

The reference material will be collected from various zoos all over the country and reference slides will be made. Help will also be taken from Institutes such as IVRI, IIMS, Dairy Research Institute and JNU for identification of samples for which facilities do not exist within WII. In the reporting year i.e. during February and March work was started on identification of mammalian hair.

Techniques for identifying mammals based on cross sectional appearance of guard hair was standardized. During the reporting year keys have been prepared for fifty wild species: eighteen ungulates, three primates, nine carnivores, one hare, six rodents, three civets and a few domestic ungulate species. Work is in progress to include other species.

## New Research Projects Initiated

- **Behavioural Ecology of Caracal in Sariska Tiger Reserve, Rajasthan** The caracal is among the most threatened lesser felids in India and as such the objective of the project is to provide information for its better conservation. Information will be collected on food, habitat use and ranging patterns by the caracal and any overlap in resource use by other co-predators such as jungle cat and jackal will be quantified. This will be done by monitoring radio collared animals.

A month long reconnaissance study was conducted in January 1994 in Sariska tiger reserve during which the different methods for estimating prey abundance and area used by predators were tested.



Illegal felling and girdling in Singhbhum forest

- **Evaluation of elephant habitat in Singhbhum forests in relation to fragmentation, degradation, mining and disturbance factors** Of the total 3300 km<sup>2</sup> elephant habitat and around 340 elephants found in Bihar, Singhbhum forests in south Bihar alone encompass 60% habitat and hold a sizeable elephant population (around 58%). Three forest divisions in this tract viz. Saranda, Kolhan and Porahat with their moist tropical deciduous sal forests form the major natural habitat for

elephants in the Chotanagpur plateau biotic province. But absence of any protected area, habitat fragmentation and degradation, improper landuse including mining and pollution, past forestry practices and illegal felling are the major management threats to the habitat manifested in the long distance disoriented movement of elephants and their increasing conflicts with man in this region.

The research fellow for the project joined in June 1993. However, actual field work started in September 1993 after the establishment of field station at Gua, in Saranda Forest Division. Another research fellow joined the project in February 1994. An orientation course work was attended by both the research fellows in March- May 1994.

So far a comprehensive base map of the area showing compartment and administrative boundaries, vegetation, cover and landuse have been prepared by using topo maps and forest resource map developed by FSI. Compartment history records were tracked for better appreciation of vegetational changes and past forest management practices. For delineating the recent changes in forest fragmentation IRS geocoded data products of December 1993 / January 1994 have been ordered and are under process of acquisition. Upon receiving this visual interpretation, ground truthing will be done to categorize the fragmentation for recording data on several variables.

- **Establishing computerised wildlife database for conservation monitoring and evaluation in Tadoba National Park** In order to ensure effective management of the growing number of PAs in a country the need is being felt for developing a simple, rapid, field friendly and computer compatible method for data collection and analyses. The proposed project seeks to establish computerised database on spatial as well as non-spatial

attributes for ecological monitoring and evaluation in Tadoba National Park, Maharashtra. Data collection for the study started in January 1994.

- **Application of GIS for evaluation of wildlife corridor between Bandhavgarh National Park and Kanha Tiger reserve** Kanha and Bandhavgarh tiger reserves, located in central India and separated from each other by over 250 kms of fragmented landscape, are part of the large contiguous forest tract which forms the tiger heartland in India. Habitat fragmentation, primarily due to anthropogenic factors, has resulted in a reduction of the total habitat area available and also in the isolation of the wildlife populations of these reserves, often in patches which are effectively 'islands' with little or no connectivity to other patches.

The aims of the present study are to assess the potential and efficacy of the forest patches that lie between the two tiger reserves as corridors and to visualise and develop methods for their effective revival. The basis for the study is the hypothesis that the establishment of a long corridor of 'mini-reserves' that contain critical resources such as food and shelter may increase the likelihood that a species can successfully move between isolated reserves. Satellite imageries have been used to identify four alternative corridor possibilities, and the same technology is being used to study the fragmentation in the area.

- **Sero-epidemiological studies on some infectious and parasitic diseases in wild ungulates and their relationship with livestock** Since receiving permission from CCF Wildlife, Rajasthan to conduct this study in Sariska national park and immobilize animals for blood and other samples collection, a reconnaissance of the area has been completed. Four sites have been identified for animal capture and immobilization. A base lab is being set up for work on haematology, parasitic survey and bacterial isolation. Serum separated from

blood samples and stored in liquid nitrogen will be taken to other veterinary institutions for immunological tests against important infectious diseases. The first sample collection is planned for August 1994.

- **Ecological significance of mugger crocodile burrows : An investigation in the semi-arid regions** Tropical vertebrates of aquatic habitats resort to eco-physiological adaptations to survive drought as well as extremes of environmental temperatures. In the semi-arid regions of India, large aquatic vertebrates such as crocodilian are subjected to environmental stress in regular frequency. Constructing and retreating into burrows is one of the means adopted by mugger crocodiles to manage such a stress. While these burrows have an ecological significance and survival value for crocodilian during pinch periods in the semi-arid region, very little scientific information exists on the burrows' micro-climate, physical structure and their role in other seasons, and how important these are for management of crocodilian species in the light of massive reintroduction of crocodiles in man-made reservoirs subjected to man-induced as well as natural water-level fluctuations.

This short duration (one year) faculty research project initiated in July 1993 at a captive breeding unit in Hyderabad Zoo and a wild habitat at Kamaleswar Lake in Gir Wildlife Sanctuary is examining the ecological significance and importance of such burrows for the long-term survival of mugger crocodiles. Besides recording micro-climate data of burrows by using temperature and humidity probes, the genesis of burrow construction and location, diurnal and seasonal use pattern of burrows and annual burrow increment and losses are also being monitored. The project is to continue upto July 1994 to cover the three seasons of an annual cycle before concluding the findings.

- **Survey of sea-turtle nesting beaches along Orissa coast** Concerned at the fragmentation of the nesting sites on the Gahirmatha coast in Orissa along the Bay of Bengal beach, and the destruction of large number of nests by successive nesting females, a short duration (six months) project is assessing the actual Olive ridley turtle nesting densities in other nesting beaches in the Orissa coast. The rationale behind this survey project is to identify other nesting beaches in need of conservation support, to identify the geo-morphological and ecological characteristics of olive ridley nesting beaches, to identify biotic and abiotic factors that operate on the coastal sand dunes that alter the nesting habitat quality and shift nesting sites, and based on these findings, to assess the importance of the entire Orissa coast in terms of sea-turtle conservation and the need for additional coastal protected areas.

The project initiated in December 1993 has discovered, in March 1994, a new sea-turtle nesting site at the mouth of Rushikulya river in Ganjam district of Orissa, where an estimated 200,000 females laid their eggs. Keeping in view the fragmentation and threat to Gahirmatha nesting beach, this is an important discovery and the location needs to be given Protected Area status.

At the completion of the project in May 1994, the report is proposed to be sent to State Govt. as well as the Environment ministry before the commencement of the next sea-turtle nesting season in December 1994 so that a more realistic sea-turtle protection and conservation action plan for Orissa coast could be developed.

- **Effect of shifting cultivation on the ecology and conservation of mammals with special reference to *Trachypithecus phayrei* in Northeast India** The field work for this study has been undertaken by a serving forest officer. The project work was started in September 1993 in Tripura. Initially the study area selected was in Gumti Wildlife Sanctuary in south Tripura district but due to severe insurgency problems especially in that part

of the state an alternate site had to be selected in Sepahijala wildlife sanctuary. A research camp was established near the training division headquarters. The vegetation map of the study site has been completed with phenological studies for the winter months. The study in the adjoining areas where tribal practice shifting cultivation is also being undertaken.

- **Survey of the potential Sites for Reintroduction of Asiatic Lions** Field work for this project began in November 1993. Three sites were shortlisted for the survey. On an average all these field surveys lasted for 15 days, and concentrated on ascertaining the extent of forest area in and adjoining the three sites, in establishing the contiguity of these forest tracts. Vegetation was sampled to describe the major vegetation type in each site. An attempt is being made to establish the relative abundance of wild ungulate prey in the three sites, based on direct sightings as well as on indirect evidences. The impact of people and their livestock on habitat quality is also being assessed. A survey of all the three sites during the summer would complete the field work which would be followed by data analysis and report writing.

#### Wildlife Institute of India & US Fish & Wildlife Collaborative Research Project

- **Conservation and Management of Freshwater Turtle and Land Tortoises in India** A detailed analyses was done on the status of the freshwater turtles and tortoises at national, biogeographic and state levels and statewise action plans have been developed. Based on this, a new status listing is proposed for turtles and tortoises to incorporate in the Wildlife (Protection) Act (1972). Both active and passive species and community level management of turtles have been recommended.

- **Ecology of Indian Giant Squirrel** After a survey of forested areas in Karnataka between January and March 1993, a field station was established at Mookambika Wildlife Sanctuary, South Kanara,

Karnataka where the project was based from April to September 1993. A lowland site and a crest-line site were selected for intensive studies. Unforeseen circumstances including high level of pre-monsoon poaching of Giant Squirrels by tribals, as well as disturbances in the intensive study area, forced the project team to shift the project base. In October 1993 a new field station was established at Bhimashanker Wildlife

Sanctuary, Pune, Maharashtra. Intensive data collection commenced from January 1994. Intensive study areas have been gridded and all trees > 15 cm DBH have been tagged and mapped. The phenology of these marked trees is being recorded on a monthly basis. Regular observation is being made in one intensive study area within the Bhimashanker sacred grove. In other forest patches, population densities and patch-specific diets are being recorded along with patch specific tree species compositions and species densities. Samples of consumed as well as non-utilised food items are being collected regularly for laboratory analysis.

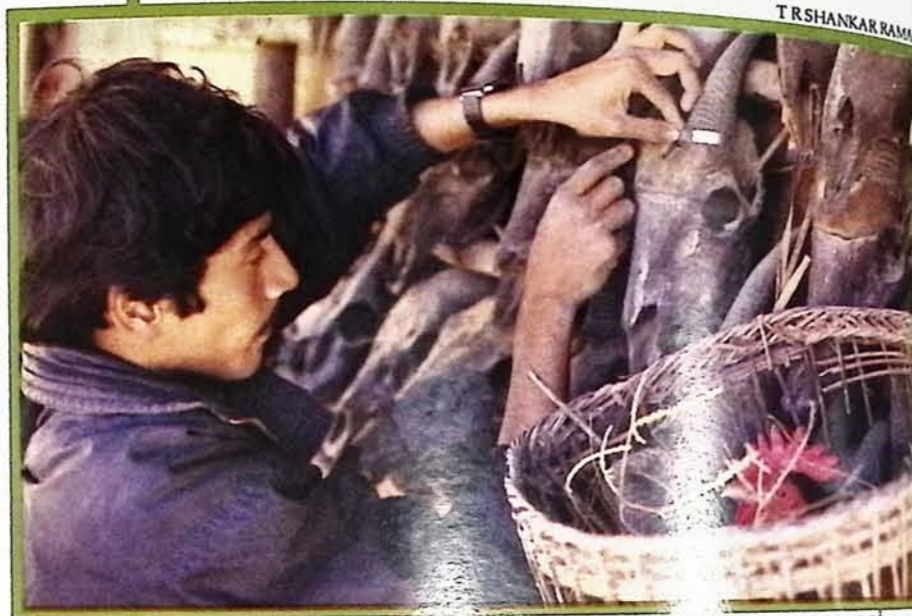
- **Ecology and Genetics of *Capra ibex sibirica* in India** During the reporting period field work was intensified in the study area by establishing two sub-camps and allocating two different but complementary topics to the researchers. Collected samples of faeces have been analyzed to determine diet preference and availability.

Both the researchers have been able to make some observations on the birds, snow leopard and red fox besides their routine jobs.

#### Status Surveys

While fully recognising the fact that no justified species specific scientific research and management could be initiated without an updated status survey of rare and

endangered species, the Institute has been seeking support and approval for such research projects. The turtle and tortoise survey, wolf survey and Malabar civet survey are some of the projects which have been approved by the RAC and are either completed or in progress. The Institute faculty have also carried out the following small scale rapid survey projects of endangered



Poaching is one of the main threats to wildlife in PAs in Mizoram

species during the year in collaboration with international, national and state conservation agencies.

- **Survey of Clouded Leopard in Mizoram and Sikkim** was carried out with support from the International Society for Endangered Cats, Canada and Masserli Foundation, Switzerland. Based on interviews and survey of Protected Areas using camera traps, the survey has made significant findings on the occurrence of this elusive cat in Sikkim and Mizoram which calls for more intensive and long term field studies.

- With support from the Mizoram State Forest Department, a survey was carried out in three Protected Areas (Dampa and Phawngpui wildlife sanctuaries, and Murlen national park) for Primates, goral, serow in Mizoram. Five species of primates were seen, seven probably occur. Dampa and Murlen were found to have extensive primary forest habitat for hoolock gibbon

and capped langur (*Presbytis pileatus*). *Haplobates hoolock* and Phayre's leaf monkey (*P. phayrei*), a species of great conservation importance, occurs only in Dampa. Murlen and Phawngpui were found to have potential as conservation sites for serow, goral, and macaques. Habitat loss and degradation due to shifting cultivation (jhum), and poaching were found to be the main threats to wildlife. based on the information collected, species and area specific management recommendations were made to the Forest Department of Mizoram.

- A status survey of Nilgiri Tahr (*Hemitragus leucurus* Ogilby, 1938) and its habitat in Anamalai Hills, South India was carried out with the support from the Regional Himalayan Tahr Studbook Keepers- the Minnesota Zoo. 227 km of tahr grasslands were traversed on foot. 338 tahr were seen in the entire area. Two hitherto unreported populations were found. One



Nilgiri tahr and its habitat in Anamalai hills in South India

of these (50-70 tahr) is sizeable and important for the longterm conservation of Nilgiri tahr. The total tahr population of Anamalai and Parambikulam Sanctuaries is estimated between 560-680. Poaching was found to be the major threat. Two populations which were reported in 1978 have been wiped out due to poaching.

- The Institute faculty members continued the survey of status of Goral and its habitat in Rajaji national park as also the status survey of Indian Gazelle and its habitats outside the protected areas in Rajasthan deserts. These individual and collective surveys carried out with meagre funds and faculty members' own time, provided significant information for developing species management strategies.

#### Technical Support to State Wildlife Management

- **Release of deer from captivity to semi-wilderness condition in Malsi deer Park, Dehradun** Malsi deer park is a recreational wilderness area. The Divisional Forest Officer, Dehradun requested WII to examine the possibility of releasing the captive population of four species of deer into the larger semi-wilderness condition in the Malsi deer park. The objective was to minimize the maintenance cost incurred on artificial feed for the deer.

CHARU DUTT MISHRA

The WII team carried out detailed investigation and evaluated the proposed release enclosure for the suitability of terrain, availability of water and natural forage for the deer. An area of one hectare was suggested for the first phase of release of twelve chital and eight hog deer on an experimental basis.

- At the request of the Government of National Capital Territory of Delhi a group of Faculty members surveyed the Asola-Bhatti wildlife sanctuary on the outskirts of Delhi during September 1993 with the ultimate objective of developing its management plan. A report covering the history of landuse, relating it to issues in management planning and planning approach was forwarded to the Government of NCT Delhi. Subsequently, a self contained proposal for preparation of a management plan was also conveyed.

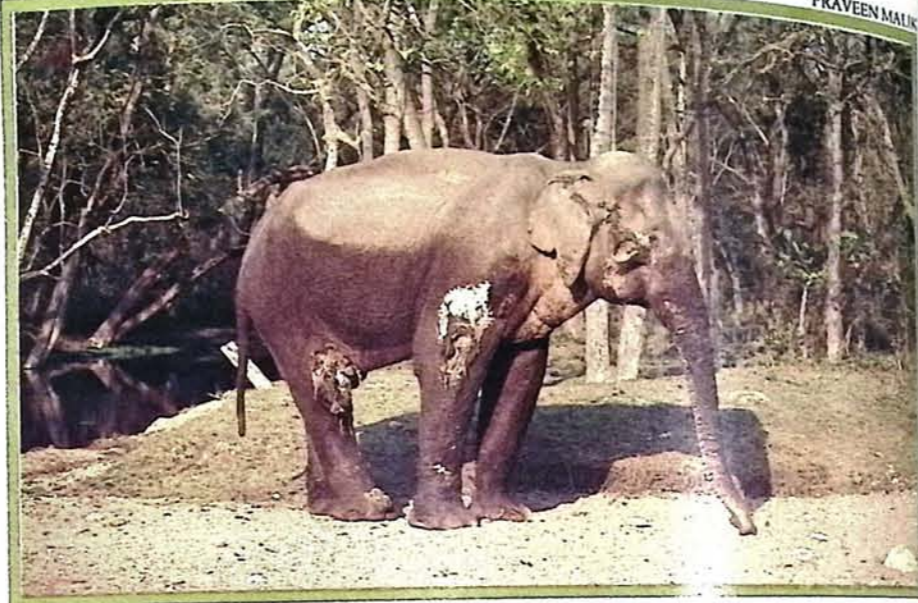
● The Keoladeo Ghana National Park, Bharatpur has been an important winter migration site for Siberian Cranes. However, over the years the number of these birds coming here has been dwindling sharply and in 1992-93 only five birds arrived. As part of an international effort for the recovery of these species, two birds each raised in USA and Russia, were released in Bharatpur.

WII was the coordinator between Ministry of Agriculture, GOI and the International Crane Foundation, USA that facilitated the quarantine procedures and the requirement of health certificate to enable the release of young birds here. The aim was to bolster numbers of the flock and track the birds during their return journey to Siberia so that conservation measures and hunter education programmes could be planned and started along the route.

Although the wild Siberian cranes did not arrive at Keoladeo National Park again last year the scientists are hopeful that they may reappear on the breeding grounds in the Kunovat Basin of western Siberia. The WII will continue to assist the project in its effort to augment the dwindling flock, in future release programmes on both the breeding and the wintering grounds.

● At the request of UP State Government, the Head of the Management Faculty at WII, conducted a workshop on Tiger Census methods at Chila Wildlife Sanctuary in May 1993. The workshop was attended by Wildlife Warden and DCF level forest officials of western UP and also junior staff of Shivalik circle.

● Health problem in elephant in Rajaji National Park For the last few years there have been occasional individual cases of sick wild elephants in Rajaji National Park. WII assisted in diagnosis of these cases wherever possible and also assisted park managers in planning prevention and control of such cases in future.



PRAVEEN MALIK

● Supply of Chemical Immobilization drug to States WII has often helped State Wildlife Agencies (Karnataka, Andhra Pradesh, Tamil Nadu, Goa, Uttar Pradesh, Haryana and Madhya Pradesh) by providing

*Treatment of sick animals on the request from various wildlife agencies is carried out periodically by WII*

immobilization drugs such as Immobilon, Revivon and Narcan. These drugs were provided to states in emergencies like animal damage control and translocation of endangered animals. WII also helped many states in providing wildlife immobilization equipment and accessories whenever requested during emergency operations.

● WII provided technical support to Wildwatch, USA an International NGO in its programme for developing educational material on Indian wildlife for school children in USA.

#### Laboratory

Techniques standardized at Wildlife Biology laboratory for studying food habits and habitat quality for herbivores were used by researchers and two M.Sc students, who studied habitat use by goral in Simbalbara wildlife sanctuary and Majathal wildlife sanctuary, for their respective dissertation. Data analysed in the

laboratory was useful to understand how the availability of different forage plant can influence the diet of a species in two different habitats. Leopard scats collected from the latter sanctuary were analyzed to determine the prey base.

Water samples collected from different waterholes used frequently by Indian Wild Ass in Little Rann of Kutch were also analyzed.

To support wildlife law implementing agencies and wildlife offence cases, the laboratory has provided services to various field managers and police departments by identifying wild animal skins based on hair characteristics, bones and hair samples, etc. Work has also been undertaken to prepare a key for identifying tiger and leopard bones.

#### Herbarium

During 1993-94 angiosperms, gymnosperms and ferns were collected from the Valley of Flowers National Park (about 300 specimen) and Eravikulam NP (200 specimen). Some occasional plant specimen collections were made from the following areas: Rajaji NP, Corbett NP, Pin Valley NP and Dudwa NP. The list of plants of Valley of Flowers NP and Rajaji NP is under preparation. A preliminary checklist of flora of WII campus, Chandrabani has been prepared. In total, 400 species representing 85 families have been collected, processed, mounted and preserved in the WII herbarium. A booklet

depicting arrangements of families in the herbarium has also been prepared for ready reference.

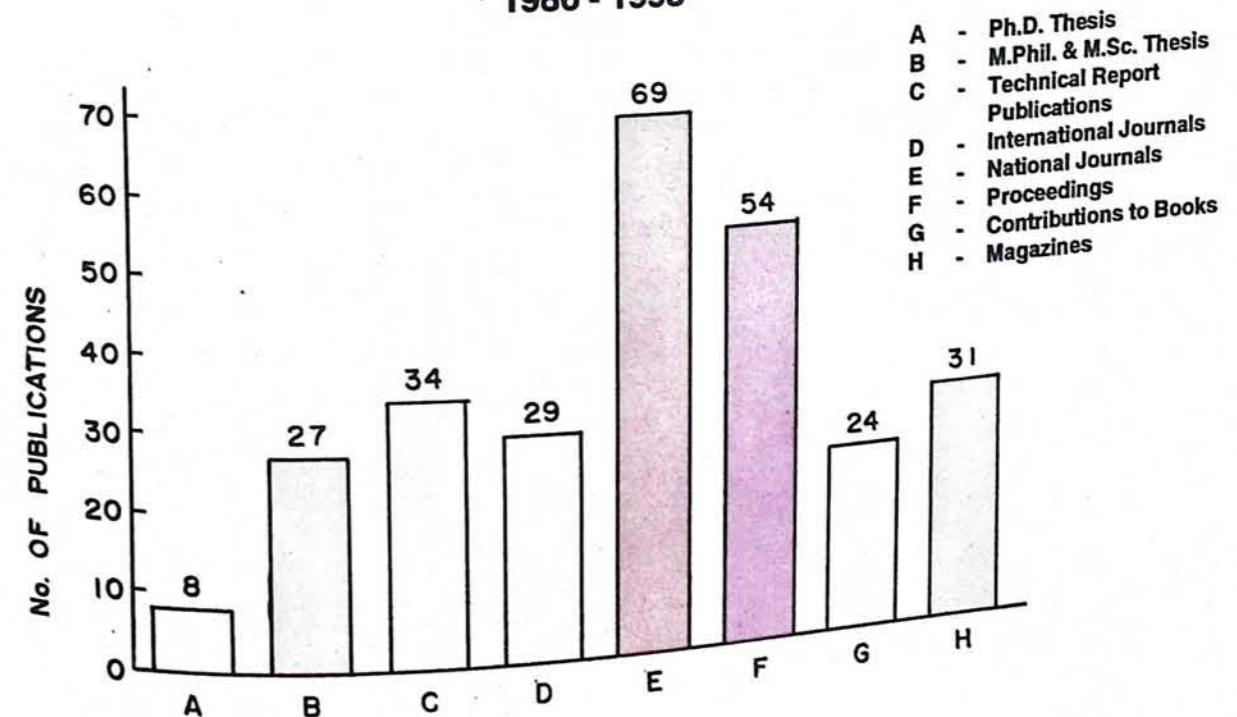
#### PUBLICATIONS

In order to disseminate scientific information to field managers, wildlife biologists, teachers and voluntary organisations, WII brings out technical reports, proceedings of workshops and field manuals from time to time.

During the reporting year WII published the following books and posters:

- A primer on biodiversity for school children.
- Turtle Trade in India: Study of Tortoise and Fresh water Turtles published in collaboration with WWF-India and Traffic India.
- An interpretive poster on "Tortoise and Turtles in India" was published in collaboration with WWF-I and Traffic India.
- WII publishes a quarterly newsletter containing information on various activities of the Institute as well as current development in the field of resource conservation. This publication also acts as a medium for interaction among the participants of all the regular and short term courses, workshops and seminars organised by WII. It also allows field managers to present their views as well as to report on the latest development in the field. During the reporting period one composite issue (Jan. 93 to Dec. 93) and another regular issue (Jan. 94 to March 94) were published inhouse by the Institute.

#### WII PUBLICATIONS 1986 - 1993



## ORGANISATION

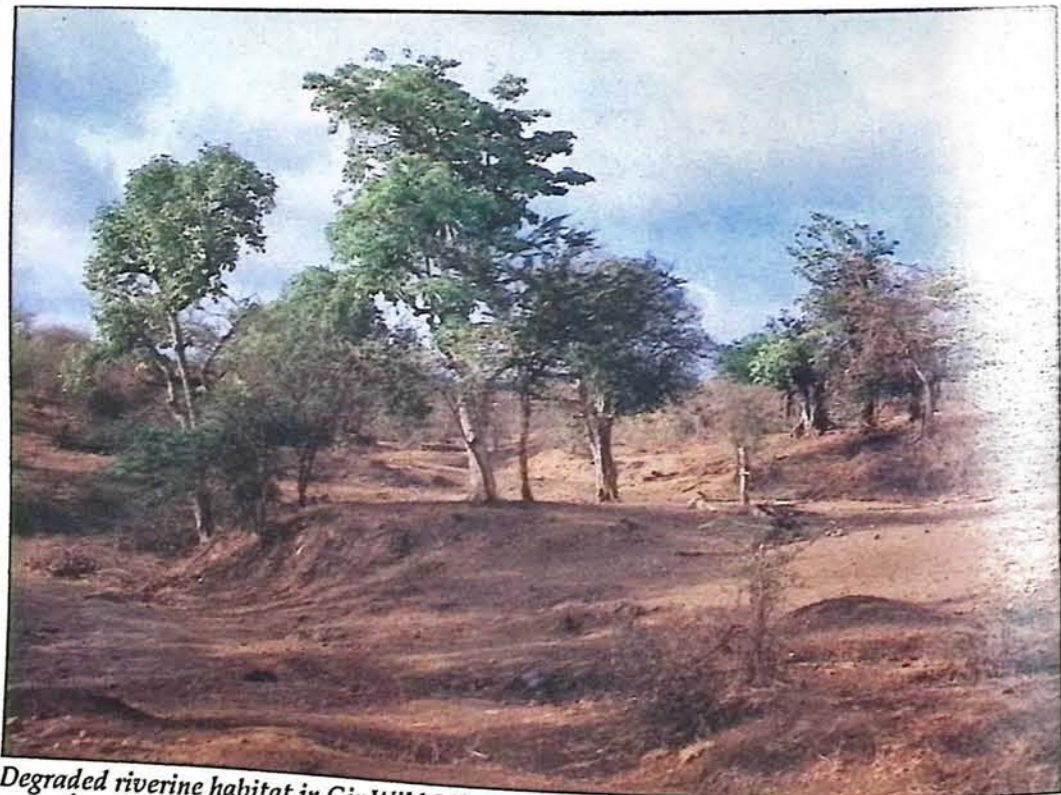
The WII Society has 35 members, presided over by the Union Minister for Environment and Forests. The society comprise Forest Ministers of some of the states, nominated Members of Parliament and UP Legislative Assembly, officials from several ministries/departments of GOI and non-officials including NGO representatives concerned with wildlife conservation. The Annual General Meeting of the WII Society was held on October 30, 1993 at WII Campus for the first time. The poster on freshwater turtles and tortoises was released on the occasion.

The Institute's functioning is orchestrated by a 15-member Governing Body chaired by the Secretary,

Minister of Environment and Forests. The XXII and XXIII meetings of the Governing Body were held on April 10, 1993 and October 30, 1993 respectively. The Research Advisory Committee met twice during the year.

### Faculty and other recruitment

Four Scientists SD joined the Institute, two in the Biology and two in the Extension faculties. At the computer centre one system manager and two computer programmers were recruited. A laboratory technician joined the Wildlife Biology lab. In administration, one driver and one lower division clerk joined during 1993-94. One superintendent and one accountant were also recruited by transfer on deputation.



DIVAKARSHARMA

Degraded riverine habitat in Gir Wild Life Sanctuary

## DEVELOPMENT

### UNDP collaboration

After a preparation period of nearly five years, the Institute was able to commence this three year project (1993-1996) wherein two new training courses were started - one in Ecodevelopment Planning and the other in Wildlife Management Planning. In addition, the Institute will have prepared 10 model wildlife management plans and 10 model ecodevelopment plans in biogeographically selected sites through the trainees of these courses, during the project period.

### Specialized faculty development project through US-FWS

This 5-year project on WII Faculty development entered its last year. This project was to be completed in December 1993 but has obtained a no-cost extension for six months upto June '94. The project's aim has been to improve the skills and expertise of WII faculty in nearly a dozen selected disciplines related to modern wildlife management. This is done by interacting with American scientists and through visits to each other's institutions and field research sites. During the year 1993-94, eight American scientists visited the Institute while four members of WII faculty undertook study tours to the US. In addition, the project supplied high-tech field, laboratory and computer equipment and software, both indigenous and imported, of considerable value to WII.

As the first phase of the WII's scientific collaboration with the Fish and Wildlife Service comes to an end, the two agencies are in an advanced stage of finalising a set of new research projects to be jointly undertaken by Indian and American scientists for another 5-year term. Proposals for collaborative research between WII and US

National Park Service, USDA Forest Service are also under consideration of the two Governments.

The Smithsonian Institution, USA conducts training programme in several regions of the world by involving an international faculty. One such programme was being conducted in Malaysia from 22 July to 10 September 1993. One Scientist SD from the Wildlife Biology Faculty, sponsored by the Smithsonian Institution, participated in this training programme.

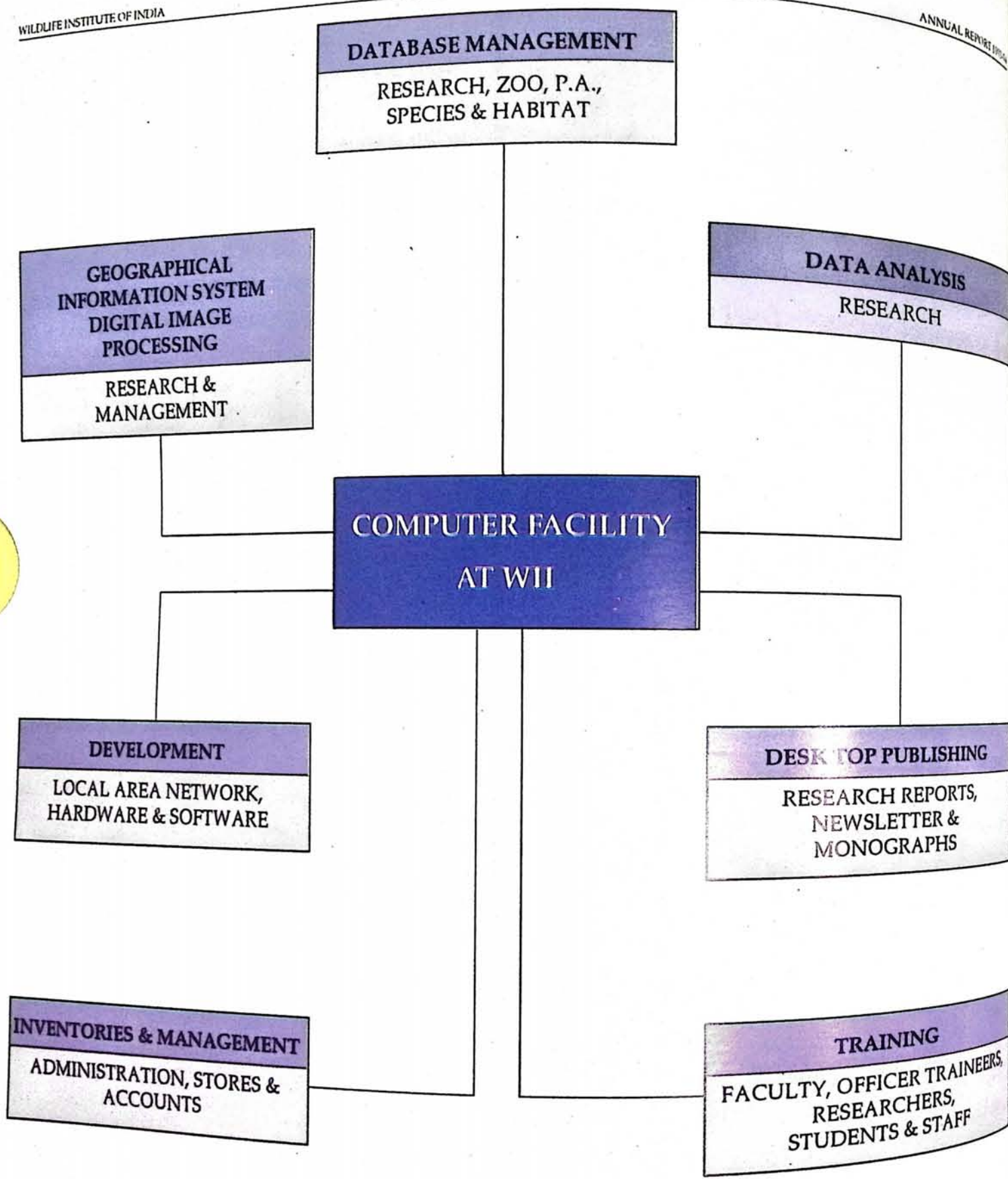
International Centre for Conservation Education (ICCE), UK, conducts courses on Conservation Education for developing countries. One Scientist SD of the Extension Faculty was sponsored by The British Council Division to attend a course in conservation education from March-May 1994.

### Computer Facility

The computer facility at the Institute has come a long way since it started with only two Apple IIe computers some nine years ago. At present, the computer facility is reasonably well equipped to serve the training, research, database, cartographic including geographic information system (GIS), digital image processing of remotely sensed data and desktop publishing requirements of the Institute. The Institute's Computer Committee provides the necessary guidance and supervision for managing the computer facility.

WII has also started a 2-week formal training course on the use of computers and software packages to officer trainees of the various training courses namely Diploma, Certificate, Eco-development planning and Management planning as part of their curriculum.

During the reporting year, the computer facility has been strengthened with the addition of two IBM/PS1 486DX, 16 Nos. IBM PS/1 486SX, 23 Nos. dot matrix printers, a



HP Laserjet 4 printer, a HP Deskjet 500C colour printer, a Calcomp Digitizer (9500 series) and a HP plotter (7475A). These systems were procured under the UNDP project.

A Central Point Anti Virus software for Netware to protect our precious data and software from virus on LAN was procured. MS Word for Windows was acquired under the UNDP project.

The long awaited posts of System Manager and that of computer based mapping technician has been filled up. Now there are a total of six computer professionals employed at the Institute.

In the reporting year, under the WII-FWS collaborative project Dr. Ralph Root, National Park Service-GIS, USA conducted a training course in GIS and Digital Image Processing from November 1993 to January 1994. This was attended by the Institute GIS team comprising of faculty members and computer personnel.

WII acquired a PC ARC/INFO Ver 3.4D GIS package from Environmental Systems Research Institute (ESRI), Redlands, USA.

**Library and Documentation Centre**

For any pragmatic institutional development, it is not only necessary to promote scientific and technological research but also to disseminate information to the users at a faster pace. The library and documentation centre of WII plays such a vital role in disseminating information to the target scientists of research organisations.

During 1993-94, 1400 new titles were added to the library, bringing the total collection including back volumes of journals / titles to 60,000. In addition, there are 6,000 reprints and over 7,500 maps. The library subscribes to 206 national and international journals. Abstracting services covering Indian wildlife literature has been

started, and for strengthening retrospective service, CAB-CD from 1991 was procured. Specialized bibliography was also prepared for different courses.

For easy retrieval of information the title of books and reprints are available on computer readable form, by using CDS/ISIS (version 3.0).

During the year a separate reprographic unit was set up in the library to meet the urgent requirement of users. An independent archival cell was also established to preserve WII publications.

**Campus Development**

In order to meet the requirements for the completion of some Phase-II works, such as landscaping, development of sports complex etc. the construction programme in Phase-II during 1993-94 was scaled down. Accordingly, the cost of New Hostel Block, faculty and staff houses was brought down to be between Rs.42 and Rs.45 Lakhs. The room space as well as common facilities have also been scaled down. With these modifications, the campus development programme was approved by the Governing Body in its meeting held on 10.4.93. Some additional works in Phase-I programme viz. extension of servant quarters for Type V houses, construction of explosive stores, construction of tennis court have been undertaken during 1993-94. Construction of car shed for Type IV houses and construction of boundary wall in Block I have also been completed.

Carpeting of roads in the campus has since been completed. Survey and mapping of the additional land acquired between Blocks I and II has been done and this area is being developed for providing the sports activities in the campus. A cricket pitch for practice purposes and site for a lawn tennis court near hostel block is being made. Besides this, two children parks, one in Block-I and one in Block-III, have been constructed.

A store room for keeping horticulture equipments near the greenhouse has been constructed and the greenhouse, glasshouse have also been electrified. For development of campus landscaping work near children parks, playgrounds in Block-I and Block-II was done. The work for utilization of water overflow from overhead tank in Block-I has been completed.

Tenders worth Rs. 1 crore (approx) based on 1989 CPWD schedule of rates for construction of New Hostel block, faculty and staff houses in Phase-II construction were invited during October/ November 1993. Finalisation of tender formalities is in progress. Anticipated financial achievements for campus development during the year 1993-94 is Rs.90 lakhs.

#### Teaching Aids

The audio-visual unit at the institute maintains equipment like cameras and accessories, slide projectors, 16 mm film projectors, VCR, TV, overhead projectors which are extensively used as teaching aids in classroom lectures as well as in field. During the reporting year this unit acquired fourteen video films, one 16mm film, about 1000 slides and thirty display panels.

#### VISITORS

- A number of **International consultants** from fields such as wildlife management planning, buffer zone management, ecodevelopment planning, monitoring and database management and coastal and marine area management, visited the institute and helped improve its training programmes.
- A number of graduate and post-graduate forestry trainees from the IGNEA, SFS College, Rangers College, IIFM, a few Agriculture and general Universities visited WII and were exposed to WII's important facilities viz.

Library, Laboratory, Computer, GIS, etc. Teaching inputs on important general wildlife conservation topics by the Institute's faculty were also arranged.

- The important **Indian visitors** were Forest Ministers of Assam and Meghalaya, parliamentarians, Directors of sister institutions, CEE, SACON, GBPIHE, BNHS, Lal Bahadur Shastri National Academy of Administration and Institute of Economic Growth.
- Important **International visitors** to the Institute were British High-Commissioner, New Delhi, Director General WWF-International, Forestry and Wildlife delegations from Indonesia, Malawi, Finland, Myanmar, Science Councillor of US Embassy, New Delhi, Official from World Bank and from the Smithsonian Institute, Washington D.C.
- A **High Power delegation from Bangladesh**, visited WII campus on March 29, 1994. The members of the delegation were Secretary, Environment and Forest, Director General in the office of the Prime Minister of Bangladesh, Director General, Planning Commission & Chief, Environment & Forests, Director General, Forest Industries and Sh. M. Hussain, CCF. The delegation was accompanied by Sh. P.K. Onial, IFS, Dy. D.G., ICFRE. The delegation was on a study tour in India mainly looking at social forestry projects and the initiatives in Joint Forest Management.

The members appeared to be greatly impressed with the campus and what they are able to see and understand about the role and functions of WII. The Secretary, E&F was extremely keen in establishing formal linkages with WII in the training, research, conservation education and application of modern technology and tools in forestry and conservation planning. He did think that the Institute was unique and doing significant work.

#### CONSULTANCIES

**Environment Impact Assessment**  
Responding to the mandatory need for reliable environmental impact assessment of development projects, and encouraged by its experience in carrying out such studies for Bodhghat hydel project, Narmada Sagar and Onkeshwar projects and HBJ Pipeline project, WII has now established an Environment Impact Assessment (EIA) cell under the directives of its Governing Body. The EIA cell has since then completed three major consultancy projects. The report on the EIA of the HBJ gas pipeline upgradation project that was taken up on behalf of M/s Engineers India Limited in March 1993 has been submitted. Another study on the impact of the Vishakapatnam-Vijayawada pipeline was taken up in September 1993 to identify impacts of the construction and operation of pipeline on forest and wildlife habitats. The report on this study has also been submitted to EIL. The impact assessment of **Haldia-Barauni Pipeline Project** on wildlife values was conducted in March 1994 and the report submitted to EIL. Apart from assessing the status of wildlife habitats enroute the above mentioned proposed pipeline projects, identification of impacts on these habitats were made and suitable mitigation measures were suggested for eliminating and minimising the impacts.

**Impact assessment study of Narmada Sagar and Omkareshwar Projects on flora and fauna with attendant human aspects** This study, initiated in 1990, is in its completion phase. To predict the impacts of Narmada Sagar and Omkareshwar projects on flora and fauna of the central Indian dry deciduous forests, the thrust areas were identified for detailed study. During the year, a full length technical report on the impact of Omkareshwar project on the different thrust areas was

submitted to Narmada Valley Development Authority. To have an ecological assessment of the proposed protected area, for the first time a joint study team of WII and Indian Institute of Remote Sensing (IIRS), Dehra Dun, visited the area during October-November, 1993, and prepared different thematic maps of the area on geomorphology, vegetation, drainage and landuse patterns. Currently, use of these information in Geographical Information Systems (GIS) is in progress to analyze the suitability of the area to an array of wild animals at forest compartment level and also to suggest

S A HUSSAIN



*A study of integrated landuse approach for conservation of biological diversity of terai grassland in Valmiki Tiger Reserve*

some prescription for better management of this area.

**Study on the management in captivity, including captive breeding and rehabilitation of threatened and endangered species, and the design and management of zoos** During the year under report, the Nehru Zoological Park, Hyderabad; Indira Gandhi Biological Park, Visakhapatnam; Arignar Anna Zoological Park, Vandalur, Madras, Sakkarbaug Zoo, Junagadh, Smt. Kamla Nehru Zoological Garden, Ahmedabad, Veermata Jijabai Bhosle Udyan, Bombay were visited. The zoo database now contains general information/data on 72 zoos of which inventory/stock position of 50 zoos has been computerized.

Contributions were made towards formulating the policy about the Captive Breeding Programmes for zoos. The species for planned captive breeding by zoos were identified. Assessment of zoos at Ahmedabad, Junagadh, Rajkot, Bombay, Hyderabad and Visakhapatnam were carried out by the zoo consultancy project scientist as a member of the team constituted by the Central Authority for Zoos for the purpose.

#### Individual International Consultancies

Bhutan, with approximately 57 % of the country under natural vegetation and over 20 % area under the protected area system, has played a significant role in conserving the biological diversity of the eastern Himalaya, considered one of the global "hotspots" for biodiversity. The cultural and religious traditions of the Bhutanese people and policies of the Royal Government of Bhutan (RGoB) have advocated conservation of nature and natural resources.

The Nature Conservation Section (NCS), Forestry Services Division (FSD), RGoB and WWF - Bhutan Programme have jointly launched a scheme for protected area management planning, biodiversity survey, and establishment of a computerised database at Thimphu, its capital. A Scientist SE from the biology faculty of WII was offered a short term consultancy work with the WWF - Bhutan programme and NCS.

During January - February, 1994 the concerned scientist surveyed Royal Manas NP alongwith the Biological Inventory Team which comprised two counterparts from the Nature Conservancy Division, RGoB and two Foresters from Royal Manas national parks. This short survey resulted in the collection and identification of about 600 species of higher plants (Pteridophytes, Gymnosperms, and Angiosperms) within the present boundary of RMNP. The collected specimens with field numbers and field notebook have been handed over to the counterparts in NCS-FSD, RGoB for future reference

and establishment of Herbarium. One database file with the plant records have also been given to the counterparts for updating the data from the field note books. After updating all the information, this file will be incorporated in the main MASS database at Thimphu. Nearly 300 species of day to day use by the locals were recorded and some of them were recommended for propagation in the village wastelands. A few species of high conservation value were identified for close monitoring, and management recommendations were also made.

During March 19 - April 5, 1993, WWF-Bhutan and NCS jointly organized a Training course on Protected Area Survey Techniques for the field staff at Royal Manas National Parks. WII faculty member doing the above consultancy was one of the resource persons in this workshop to teach various techniques and to help in establishing permanent vegetation monitoring plots in this park.

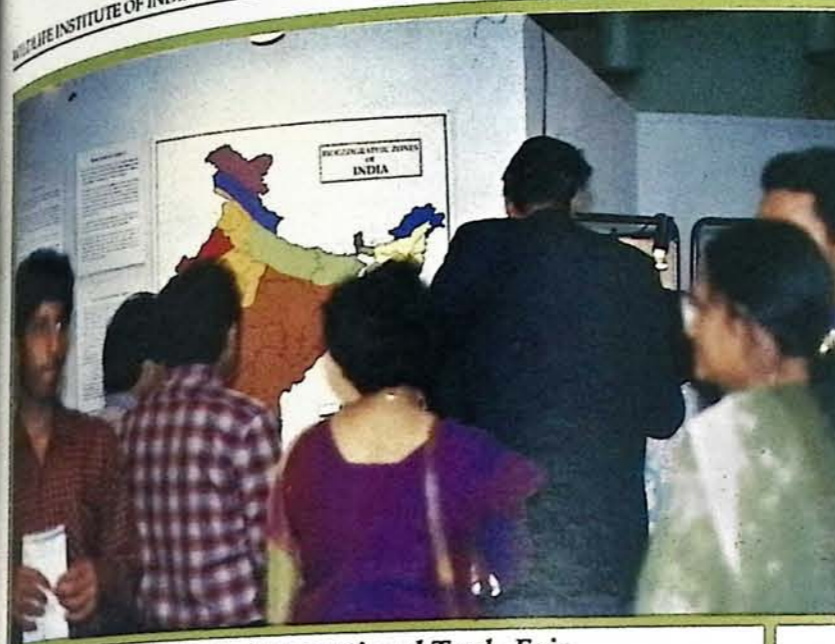
#### EXTENSION ACTIVITIES

##### Outreach activities

WII helps local schools in their environmental education programmes by organising popular talks and film shows on wildlife and nature conservation.

During the reporting period, WII organised nature awareness programmes for five groups of school children from three local schools and two Delhi based schools. Children were taken on nature interpretation excursions around the campus forest, Malsi deer park and Rajaji national park. They were also involved in nature games and exploratory activities.

WII has also helped the local Army establishment in designing course programmes for middle level army officers and has provided input through talks on relevant topics.



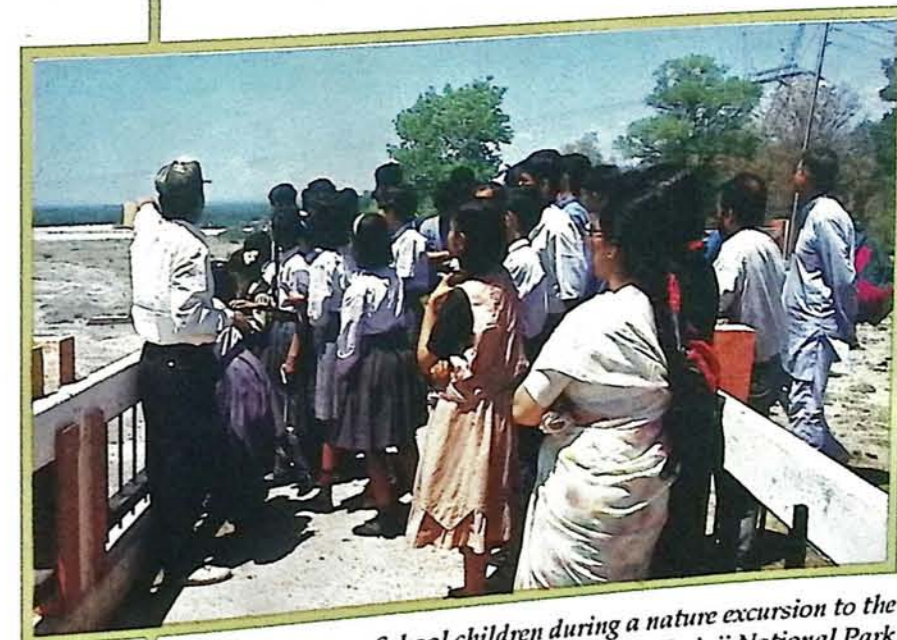
WII pavilion at the India International Trade Fair

##### Audio-visual Programme

During the reporting period a new task was initiated to transfer the nine projector synchronised audio-visual programme of WII on to video format. This will enable a large number of people belonging to various target groups to view this excellent AV programme which highlights global and national conservation scenario and the role being played by WII in training, research and education in the field of wildlife conservation and sustainable development.

##### Exhibitions

The Institute participated in the "Conservation and Development" exhibition organised by the Ministry of Environment and Forests, GOI during the India International Trade Fair from 14 Nov. to 26 Nov. 1993 in Delhi. Another exhibition on the same theme was organised at Roorkee University during the Youth festival organised by Roorkee University Student Association where WII setup an interpretive exhibition on this theme.



School children during a nature excursion to the Rajaji National Park

#### An initiative in trust building and ecodevelopment

The ecodevelopment initiative taken by WII in the nearby Chandrabani village has taken deeper roots during the reporting period. The villagers participated in problem identification meetings and discussed ameliorative planning for the village and its surrounds. A programme for afforestation of fibre yielding trees, shrubs and bamboo has been developed which when implemented will help to gradually mitigate the people's dependency on the natural forest around the village. In the long run, the fibre yielding trees

and shrubs will allow them to begin some cottage industries. A defunct water source was identified by the villagers for revival. Suitable measures will be taken jointly to revive this water source in order to enhance water availability in the village.

##### World Environment Day

On the occasion of the World Environment Day on 5 June 1993, children of Chandrabani village were taken on an nature excursion to the Rajaji national park. In the town,

pamphlets containing conservation messages were distributed through local news agencies.

#### Wildlife Week

During the wildlife week, (1-7 Oct. 1993) besides screening wildlife films for the villagers staying around the WII Campus, the women folk of these villages were taken to the Rambans plantation sites near Biharigarh where demonstrations were given on the plantation and decortication techniques. They also visited the cottage industries run by the Women's Development Organization at Dehra Dun. A drawing competition was also organised specially for the children of the Chandrabani village.

#### EXTRA CURRICULAR ACTIVITIES

WII participated in the Central Government Employees Welfare Cricket Competition held at Dehradun and was the runner's up.

WII actively participated in the IInd All India National Forest Sports Meet held at Dehradun in 1993. WII

secured 1st prize in the Wildlife Quiz competition and a prize for "Mimicry" was bagged by an officer trainee of the Xth Certificate Course.

A one time sanction was granted to the corps of Engineers of the Indian Army to lead the "Scientific and Ecological expedition to Nanda Devi". This multi disciplinary expedition was probably the first of its kind, an organised effort was made by the Army and the scientific institutions to conduct status surveys for wildlife and clean up the mountains. The objectives of this expedition were to prepare a comprehensive listing of flora and fauna, to assess the status of the flora, fauna and wildlife habitats, to assess status of forests in the buffer zone and the natural resource utilisation pattern of the villagers, to gather base line information on water quality of the Rishi Ganga river system, to clean up the National park and approach route of the garbage left by previous expeditions and to scale Nanda Devi and clean higher camps. A senior research fellow participated in the expedition to study the status of mammals in Nanda Devi National Park. The duration of the expedition was from 2nd May 1993 to 22nd June 1993, a total of 52 days in the sanctuary.

#### WILDLIFE INSTITUTE OF INDIA MAIN WORK PROGRAMME FOR 1993-94

Activity	Started in	
	1993	1994
<b>Regular Courses</b>		
1. XIVth Diploma Course in Wildlife Management	Ongoing	
2. XVth Diploma Course in Wildlife Management	Sept	
3. Xth Certificate Course in Wildlife Management	Nov	
4. IIIrd MSc in Wildlife Biology - IVth Semester	Ongoing	
5. IVth MSc in Wildlife Biology		
- Ist Semester	July	
- IInd Semester		Jan
6. Short Course in Zoo Management	Nov	
7. Ist Protected Area Ecodevelopment Planning Course for PA Managers	April	
8. IInd Protected Area Ecodevelopment Planning Course for PA Managers		Jan
9. Protected Area Management Planning Course for PA Managers	Sept	
<b>Other activities</b>		
10. WII-UNESCO Mobile Training Seminar for Wildlife Professionals	Ongoing	
11. Capsule Course in Wildlife Management for IFS Officers		
- Ist	Oct	
- IInd	Feb	
12. Capsule Course in Interpretation and Conservation Education	August	
13. Annual Research Seminar	Sept	
14. Capsule Course in Wildlife Management for IAS and Central Services Officers	Dec	
15. Workshop on Nature and Environment for Indian Army Officers	Ongoing	
16. Workshop on GIS for Wildlife Managers and Field Researchers		Jan
17. Workshop on Animal Damage Problems and Control for Wildlife Managers and ADC Workers in Universities, Research Organisations and Institutions		Feb
18. Campus Development		
a) Barbed-wire Fencing in Block III	Aug	
b) Chain-link Fencing for Block IV	Sept	
c) Car-shed for Type IV Houses	Sept	
d) Extension of Servants' Quarters for Type V Houses	Sept	
e) Explosive Store	Oct	
f) Cricket Pitch	Oct	
g) Boundary Wall between Blocks I & II	Nov	
h) Phase II Construction - Hostel Block (addl.), Faculty & Staff Houses (addl.)	Nov	
<b>Publications</b>		
19. A primer on biodiversity for school children		
20. Turtle Trade in India : Study of Tortoise and Fresh Water Turtles		
21. Turtle Poster in collaboration with WWF-I and Traffic India		

## PERSPECTIVE: 1994-95

The tempo of the institutional activity has constantly been growing in the preceding years. This growth has proved to be useful and result oriented and has been in direct response to the requirements of the field. It is in this setting that one foresees the programmes for the year 1994-95. Notwithstanding the fact that Institute's faculty and staff are overstressed in the extreme, there is little scope for relenting and the year 1994-95 promises to be as programme packed as the year gone by, if not more. New courses which started in 1993-94 (Ecodevelopment Planning, Management Planning, WII-Smithsonian course in wildlife conservation and management and WII-UCL course in Biological Monitoring) will be continued. Some additional short term courses addressing new target groups viz. university teachers, NGOs and Parliamentarians are likely to be initiated.

Most of the officers earlier trained in ecodevelopment planning and management planning who were earmarked to different PAs have now eventually taken up position and they will require intensive inputs from WII to help them draw up their ecodevelopment and management plans. Training inputs in the use of computers in wildlife management will be strengthened this year for the officer trainees of the Post Graduate Diploma and the Management Planning courses. This year's special workshops will cover **Wildlife tourism** and the use of the GIS technology in wildlife research and management. Another important workshop will be on **Integrated forestry programmes to support biodiversity conservation with PCCFs and CCFs** as the target group.

We hope that the research activities will take a quantum jump with the anticipated clearance of 10 projects under the auspices of the Indo-US Sub-Commission on Science & Technology. A maiden initiative for WII will also be to strengthen its professional skills in the planning and management of coastal and marine PAs.

The **National Wildlife Database** at WII will be strengthened by collecting, collating and computerizing primary information on PAs from the states as well as incorporating updated information on the planning proposals for WII's earlier work on biogeographically representative network of PAs.

It is notable that the only surviving world population of Asiatic lion is confined to the Gir Conservation Unit and this is a potentially hazardous situation of "all eggs being in one basket". This adage has threatening portents this year, now that there is a recent information of extensive mortality among African lions from "canine distemper" as different to "feline distemper" which has been reported among large cats. WII will accordingly take up a rapid survey of some of the suggested sites to make recommendations on a couple of parks/sanctuaries which could become a second home for the Asiatic lion.

The work of standardization of forensic techniques will be strengthened further and yet another major initiative (as a part of the Indo-US joint programme) will be the development of **wildlife health programmes** in collaboration with regional veterinary institutions within the country.

The high quality of Institute's EIA consultancy reports indicate that this activity will grow in scope and quantum and at the same time generate more income for Institute's other scientific activities. Institute has also been approached by the Governments of West Bengal, Andhra Pradesh and Maharashtra to undertake research and advisory activities in order to support the bio-diversity

conservation component in the World Bank aided state forestry projects. Some more states may also approach WII as similar forestry projects get underway. This activity will also help Institute raise some income.

On the campus development side the work on sports complex in the newly acquired land is expected to be completed. Likewise, addition of 40 room hostel and a total of 34 new houses for staff will also be completed in the year. The Institute hopes to add another institutional block to meet its requirement of space for the tremendously increased training programmes and other activities.

Training inputs for WII faculty from the UNDP project has got into full swing and the coming year will witness a well structured overseas training programme for some faculty in specialized technologies and ecosystems/species. Scientific equipment will be further built up from the amalgamated resources of grant-in-aid, other incomes and inputs from Indo-US and UNDP projects.

The habitat and biodiversity improvement in the WII campus forges ahead and the campus promises to become a demonstration site of ecological amelioration in harmony with the requirements of neighbouring people through our initiative, "Ecodevelopment Closer Home".



(H.S. Panwar)

## PUBLICATIONS

Bhupathy, S, CS Silori and SFW Sunderraj (In Press) - Additional locality records for two Indian tortoise species. *J. Bombay nat. Hist. Soc.*

Choudhury, BC and SA Hussain (1993) - Species identification sheets of Indian Otters on trade. In Identification manual of species on trade. Pub. Traffic-India-WWF.

Choudhury, BC and S Bhupathy (1993) - Turtle Trade in India: A study of Tortoises and freshwater Turtles. Pub: WWF India (Prepared by TRAFFIC - INDIA) New Delhi.

Gupta, AK and SK Mukherjee (1994) - Status of wildlife in Tripura. Problems in its management. *Environ.* Vol 11 No. 1.

Jhala, YV (1993) - Damage to Sorghum crop by Blackbuck. *Tropical Pest Management.* 39(1):23-27.

Jhala, YV (1993) - An Update on the status distribution and Ecology of the Indian Wolf (*Canis lupus pallipes*). In C. Vila and J. Castroviejo, (eds.) International Wolf Symposium, Leon, Spain.

Jhala, YV (1993) - Predation on Blackbuck by the Velavadar wolf pack. *Conservation Biology* 7(4):874-881.

Johnsingh, AJT and J Joshua (1993) - Man, Elephant and Tiger. *Hornbill.* (1):32-35.

Johnsingh, AJT and J Joshua (In Press) - Birds species in three vegetation types on the Mundanthurai Plateau, Tamil Nadu. *J. Tropical Ecology.*

Johnsingh, AJT and J Joshua (1994) - Conserving Rajaji-Corbett National Parks: the elephant as a flagship species. *Oryx.* 28 (2).

Johnsingh, AJT, J Joshua, Ravi Chellam, NVK Ashraf, Krishnamurthy and DVS Khati (1993) - Etrophine and

Acepromozine combination for immobilizing Wild Elephants (*Elephas maximus*). *J. Bombay nat. Hist. Soc.* 90:45-49.

Joshua, J and Johnsingh AJT (1994) - Impact of biotic disturbances on habitat and population of the endangered Grizzled Giant Squirrel, (*Ratufa macroura*) in the Alagarkoil Valley in the Western Ghats, South India. *Biol. Conserv.* 68:29-34.

Kumar, Ajith, CR and K Sankar (1994) - Ichthyofauna of Sariska Wildlife Sanctuary. *Journal Bombay Nat. Hist. Soc.* Vol. 90(4):299-300.

Kumar, S (In Press) - Wildlife Tourism in India: Need to tread with care. In *Indian Wildlife: Threats and Preservation*, published by mountain ecoconservation and wildlife society of India.

Mukherjee, S, SP Goyal and Ravi Chellam (1994) - Refined techniques for the analysis of Asiatic lion (*Panthera leo persica*) scats. *Acta Theriologica* (Accepted).

Pandey, S, Justus Joshua, ND Rai, D Mohan, GS Rawat, K Sankar, MV Katti, DVS Khati and AJT Johnsingh - Birds of Rajaji National Park, India. In press. FORKTAIL.

Prasad, SN, SP Goyal, PS Roy and S Singh (1994) - Changes in wild ass (*Equus hemionus khur*) habitat conditions in Little Rann of Kutch, Gujarat from a remote sensing perspective. *International Journal of Remote Sensing*, U.K. (In Press).

Rana, Madan S and Sunita Agarwal (1994) - Authorship trends in Indian wildlife and Fisheries literature - a bibliometric study. *Annuals of Library Science and Documentation* (INSDOC) Vol. 41 (1):13-18.

Rao, RJ and BC Choudhury (1993) - Sympatric distribution of Gharial (*Garias gangeticus*) and Mugger (*Crocodylus polustris*) in India. *J. Bombay Nat. Hist. Soc.* 89(3):312-315

Rawat, GS (1993) - A preliminary Habitat Suitability Index Model for Himalayan Musk Deer. pp. 209-219 in *High Altitudes of the Himalaya*. Ibid.

Rawat, GS and VK Uniyal (1993) - Pastoralism and Plant Conservation: The valley of Flowers Dilemma. *Environmental Conservation* Vol. 20(2):164-167. 1993.

Rawat, GS (1993) - Protected areas and conservation of Rare endemic Plants in the Himalaya. PP. 89-101 in *High Altitudes of the Himalaya: Biogeography, Ecology and Conservation* (eds) Pangtey, Y.P.S. & Rawat, R.S. Gyanodaya Prakashan, Nainital.

Sankar, K (1994) - Painted spurfowl in Sariska Tiger Reserve, Rajasthan. *Journal Bombay Nat. Hist. Soc.* Vol. 90(4):289.

Sathyakumar, S, SN Prasad, GS Rawat and AJT Johnsingh (1994) - Conservation status of Himalayan Musk deer and livestock impacts in Kedarnath Wildlife Sanctuary, Western Himalaya. (IN) Pangtey, YPS & RS Rawal (Eds.) *High Altitudes of the Himalaya*, Gnanodhaya Publications, Nainital, India. pp:240-245.

Sathyakumar, S, SN Prasad and S Walker (1993) - Status of captive Himalayan Forest Musk deer (*Moschus chrysogaster*) in India. *Int. Zoo Yb. Zoological Society of London.* 32: 32-38.

## PAPERS PRESENTED AND ACCEPTED

Chellam, Ravi and AJT Johnsingh (1993) - Management of Asiatic lions in the Gir forest, India. *Symp. Zool. Soc. Lond. No.* 65: 409-424.

Choudhury BC and S Bhupathy (In press) - An Action Plan for Conservation and Management of Freshwater Turtles and Land Tortoises in India. Paper presented at the International conference "Conservation, Restoration and Management of Tortoises and Turtles, July 1993. State University of New York, Purchase. New York, USA.

Goyal, SP, K Sankar and AJT Johnsingh (1993) - Monitoring isolated ungulate populations - a case study from Sariska Tiger Reserve. *International Wildlife Management Congress, Costa Rica*, 19-25 September.

Goyal, SP (1994) - Techniques for monitoring wildlife habitat. Paper presented at Indo-British course on biological monitoring of forests, 7-18 February, Wildlife Institute of India, Dehra dun.

Jessup, DA, NPS Chauhan and J Kirkpatrick (1993) - Contraception as a management tool for surplus blackbuck and nilgai. In: 'Symposium on Contraception in Wildlife Management', Denver Tech Centre, Denver, Colorado, U.S.

Uniyal, VK, Jiang Fu Quan, (1993) - Analysis of High Altitude Forests in and around Valley of Flowers N.P.

Joshua, J and AJT Johnsingh (In Press) - Ranging patterns of elephants in Rajaji National Park: Implications for Reserve design. In the proceedings of the International Seminar on the Conservation of Asian elephants, held at Mudumalai. June 13-18, 1993.

Kala, CP, VK Uniyal and GS Rawat (1994) - 'Valley of Flowers, an Ecological Perspective' in National Environmental Awareness Programme, DOE, Garhwal University, Srinagar, Garhwal, March 30, 1994.

Karunakaran, PV, GS Rawat and VK Uniyal (1994) - 'Grassland Communities of Eravikulam N.P. and their Utilization' by Nilgai Tahr in National Workshop on Grassland in India, New Opportunities and Challenges - IIFM, Bhopal, February 2-3, 1994.

Khan, IA, SN Prasad and PK Mathur (1993) - Manipur brow-antlered deer (*Cervus eldi eldi*): Its future conservation through rehabilitation. *Int. Zoo Yb., The Zoological Society of London*, 32:39-44

Panwar, H S (1994) - Protected Area for Biodiversity Conservation in India :

Problems and Prospects. TERI-UF Workshop; India's Forest Management and Ecological Revival, February, 1994 (pp 48)

Rana, Madan S and SK Mukherjee (1994) - Need for National Information Programme for India's National Parks and Sanctuaries. In Vashishtha (CP) Ed. *Library movement and Library development in India*. Thirty-Ninth All India Library Conference of ILA Seminar Papers. 1994. ILA, Delhi P. 345-56.

Rawat, GS, RS Chundawat and S Sathyakumar (In Press) - Conservation planning and management of Protected Areas in the Himalaya (1993). Proceedings of the Training Seminar on conservation of biological resources in the Himalaya. UNESCO-GBPIED, Srinagar (Garhwal) 21-30 September 1993.

Rawat, GS, RS Chundawat and S Sathyakumar (1993) - Conservation planning and Management of Protected Areas in the Himalaya. Paper presented in the Training Seminar on Conservation and Management of Biological Resources in the Himalaya. UNESCO-GBPIED, Srinagar Garhwal Sept. 21-31, 1993.

Sathyakumar, S (1994) - Save them from the brink. *The Hindu. Sunday Supplement* II (13.2.94) Vol.:117 (7).

Sathyakumar, S (1994) - Status of Galliformes in Govind Pashu Vihar Western Himalaya. Proceedings of the First World Pheasant Association-India Symposium, Simla. March, 1994.

Singh, R and NPS Chauhan (1994) - Agricultural crop damage by blackbuck in Haryana - a case study. In: Workshop on Wildlife Damage Problems and Control., Wildlife Institute of India, Dehradun.

Sinha, B and SP Goyal (1993) - Survival struggles : Indian wild ass in the Little Rann of Kutch. *Popular Article. Frontline.* May 1993.

Sunderraj, SFW, BK Mishra and AJT Johnsingh (In Press) - Elephant use of Rajaji-Corbett Forest Corridor North-

west India. (in press). In proceedings of the International Symposium on Asian elephant. June 1993. Mudumalai Wildlife Sanctuary, Tamil Nadu.

Thapliyal, P, NPS Chauhan and VK Uniyal (1994) - Crop raiding, human mauling and cattle lifting by Himalayan black bear in Chamba district of Himachal Pradesh. In: Workshop on Wildlife Damage Problems and Control., Wildlife Institute of India, Dehradun.

Uniyal, VK, S Pandey and VB Sawarkar (1993) - 'Buffer zones; key to the success of Protected Areas' in UNESCO-GBPIED, Regional Seminar on Conservation and Management of Biological Resources in Himalaya, Srinagar (Garhwal), September 21-30, 1993.

## REPORTS

Mathur, PK, PK Malik and PD Muley (1993) - Ecology and population genetics of the Asian Wild Buffalo (*Bubalus bubalis*). WII's Project Progress Report (1988-1992), pp:39

Sathyakumar, S (1993) - Status of mammals in Nanda Devi National Park. (IN) Scientific and Ecological Expedition to Nanda Devi. A report. pp:5-15.

Uniyal, VK, Ruchi Badola, Suhas Kumar, VB Sawarkar and HS Panwar, (1994) - A Preliminary Report on the Perspective Planning of Asola and Bhatti Wildlife Sanctuaries, Delhi Administration.

Wildlife Institute of India (1993) - Environmental impact assessment of the proposed Vishakapatnam - Vijayawada (VV) petroleum pipeline on wildlife and their habitats. A report to Engineers India Limited, New Delhi.

Wildlife Institute of India (1994) - Impact Assessment of Haldia - Barauni Pipeline project on Wildlife values. A report to Engineers India Limited, New Delhi.

## GOVERNING BODY

- |  |               |  |                  |
|--|---------------|--|------------------|
| <p>1. Shri R. Rajamani, IAS<br/>Chairman, Governing Body &amp;<br/>Secretary to the Govt. of India,<br/>Ministry of Environment &amp; Forests,<br/>Paryavaran Bhavan, 'B' Block,<br/>CGO Complex, Lodi Road,<br/>New Delhi - 110 003</p> | Chairman      | <p>7. Shri Shivbhadra Sinhji<br/>Bhavvilas, Near Gaurishankar Lake<br/>Bhavnagar - 364 003<br/>Gujarat.</p>  | Member           |
| <p>2. Shri A.K. Mukerji,<br/>Inspector General of Forests<br/>Ministry of Environment &amp; Forests,<br/>Paryavaran Bhavan, 'B' Block,<br/>CGO Complex, Lodi Road,<br/>New Delhi - 110 003</p>   | Vice Chairman | <p>8. Shri Ashish Chandola<br/>A-1, Chirag Enclave<br/>New Delhi</p>   | Member           |
| <p>3. Shri S.C. Dey,<br/>Addl. Inspector General of<br/>Forests (WL),<br/>Ministry of Environment &amp; Forests,<br/>Paryavaran Bhavan, 'B' Block,<br/>CGO Complex, Lodi Road,<br/>New Delhi - 110 003</p>                               | Member        | <p>9. Shri M.C. Ghildial,<br/>Chief Wildlife Warden,<br/>Govt. of Uttar Pradesh,<br/>17, Rana Pratap Marg,<br/>Lucknow, UP.</p>                          | Member           |
| <p>4. Shri G.S. Rajamani,<br/>Joint Secretary (Finance),<br/>Ministry of Environment &amp; Forests,<br/>Paryavaran Bhavan, 'B' Block,<br/>CGO Complex, Lodi Road,<br/>New Delhi - 110 003</p>  | Member        | <p>10. Dr. D.N. Tewari,<br/>Director General,<br/>Indian Council of Forestry Research &amp;<br/>Education, P.O. New Forests,<br/>Dehra Dun - 248 006</p> | Member           |
| <p>5. Dr. Ishwar Dass<br/>E-1/154, ARERA - Colony<br/>Bhopal - 462 016<br/>M.P.</p>  | Member        | <p>11. Shri P. Thakur,<br/>Joint Secretary (Education),<br/>Ministry of Human<br/>Resource Development,<br/>Shastri Bhavan,<br/>New Delhi.</p>           | Member           |
| <p>6. Shri S. Deb Roy,<br/>B-4/V-24, Lodi Road Complex<br/>New Delhi - 110 003</p>   | Member        | <p>12. Shri B.C. Choudhary,<br/>Scientist-SE,<br/>Wildlife Institute of India,<br/>Dehra Dun.</p>  | Member           |
|  |               | <p>13. Shri H.S. Panwar,<br/>Director,<br/>Wildlife Institute of India,<br/>Dehra Dun.</p>   | Member-Secretary |

## RESEARCH ADVISORY COMMITTEE

## Ex-Officio Members

- |    |   |   |                  |
|----|---|---|------------------|
| 1. | Director, Wildlife Preservation<br>Government of India  | - | Chairman         |
| 2. | Director, Botanical Survey of India   | - | Member           |
| 3. | Director, Zoological Survey of India  | - | Member           |
| 4. | Five Chief Wildlife Wardens, each to represent five<br>regions coterminous with the jurisdiction of Regional<br>Offices of the MEF, on one year rotational tenure | - | Members          |
| 5. | Director, Wildlife Institute of India   | - | Member-Secretary |

## Nominated Members of Eminence

- |    |   |   |        |
|----|---|---|--------|
| 6. | Shri J.C. Daniel (Wildlife Scientist with the<br>background of research organisation) | - | Member |
| 7. | Prof. J.S. Singh, BHU, Varanasi<br>(Ecologist with University background)             | - | Member |
| 8. | Dr. A.H. Musavi, AMU Aligarh<br>(Wildlife Scientist with University background)       | - | Member |
| 9. | Shri S. Deb Roy (Experienced Wildlife Manager)  | - | Member |

## WII Faculty

- |     |  |   |        |
|-----|--|---|--------|
| 10. | Shri S.K. Mukherjee, Additional Director, WII  | - | Member |
| 11. | Dr. AJT Johnsingh, Joint Director, WII<br>(Faculty members nominated by the Director, WII) | - | Member |
| 12. | Dr. P.K. Mathur,<br>Research Co-ordinator, WII   | - | Member |



B/F 4,91,71,836.70  
 ANNUAL REPORT 1993-94  
 B/F 65,66,660.00 71,22,763.36 1,36,89,423.36

## RECEIPTS

## PAYMENTS

## NON PLAN

## PLAN

## TOTAL

To Loan & Advances (Staff)	25,639.00	By Seminar & Workshop	-	-	-
To Cost of Material (Wood, Cement & Steel)	24,00,948.00	By Insurance of Research Fellows & Faculty Members	-	6,982.00	6,982.00
To Advance for Expenses	2,66,016.00	By Stipend to M.Sc students	47,000.00	22,834.00	69,834.00
		By Legal Expenses	-	20,008.00	20,008.00
		By Fan Advance	-	680.00	680.00
		By Training Cost	-	-	10,35,203.00
To Miscellaneous Receipts		By Govt. Contribution to C.P.F.	2,00,000.00	2,84,488.00	4,84,488.00
i) Sale of Tender document	6,450.00 }	By repair and maintenance of vehicle	2,00,000.00	2,18,653.00	4,18,653.00
ii) Guest House Charges	}	By POL for Vehicle	2,50,000.00	2,41,101.65	4,91,101.65
iii) Lab. Testing	2,525.00 }	By DG Set	-	52,735.00	52,735.00
iv) H.L.Fee	1,05,021.40 }	By Purchase of Vehicle	5,50,000.00	1,51,026.00	7,01,026.00
v) Confiscated EMD	6,638.00 }	By Journals & Periodicals	-	11,54,066.00	11,54,066.00
To Seminar & Workshops	1,26,128.00	By Scientific Publication	-	-	-
To Security Deposit (Hostel)	2,500.00	By Audiovisual, Computers & Training Equipment	-	5,39,245.00	5,39,245.00
To Research Projects	2,47,800.00	By Laboratory Equipment	-	12,294.00	12,294.00
To Cooperative	50.00	By Laboratory chemicals	25,000.00	1,99,026.00	2,24,026.00
		By Office Equipment	-	-	-
		By Photographs & Photographic materials	-	1,58,706.00	1,58,706.00
		By Educational Films	-	75,038.00	75,038.00
		By Furniture & Fixtures	-	13,78,977.00	13,78,977.00
		By Library Books	-	12,25,995.00	12,25,995.00
C/O	5,23,61,552.10	C/O	78,38,660.00	1,28,64,618.01	2,17,38,481.01

B/F 5,23,61,552.10  
 ANNUAL REPORT 1993-94  
 B/F 78,38,660.00 1,28,64,618.01 2,17,38,481.01

## RECEIPTS

## PAYMENTS

## NON PLAN

## PLAN

## TOTAL

		By Avenue Plantation	-	-	3,93,562.00
		By Advance for Expenses	-	-	-
		By Advance for Expenses (Training)	-	-	1,90,000.00
		By Tennis Court	-	1,35,118.00	1,35,118.00
		By Loans and Advances	-	-	-
		By Festival Advance	-	-	5,545.00
		By Remittance of Income Tax (Contractors)	-	-	38,871.00
		By Remittance of Sales Tax (Contractors)	-	-	43,701.00
		By Procurement of Cement, Steel & Wood	-	-	-
		By Construction of Building	-	62,41,640.00	62,41,640.00
		By Air Conditioner	-	-	-
		By Campus Development	-	7,98,334.00	7,98,334.00
		By Construction & Architectural Management Fee	-	1,16,520.00	1,16,520.00
		By E.P.A.B.X.	-	24,062.00	24,062.00
		By Camp Equipment	-	7,482.00	7,482.00
		By Exhibition	5,50,000.00	2,04,180.00	7,54,180.00
		By Road & Culverts	-	4,83,572.00	4,83,572.00
		By Estate Maintenance	-	5,86,081.00	5,86,081.00
		By Security Deposit released	-	43,898.00	43,898.00
		By Construction of Staff Quarters	-	3,52,157.00	3,52,157.00
		By Material and Supplies	-	3,77,339.00	3,77,339.00
		By Office Equipment	-	3,13,878.00	3,13,878.00
		Closing Balance	-	-	1,40,153.80
		By Cash-in-hand	-	-	1,95,01,448.88
		By Bank Balance with UBI	-	-	-
		By Cash with UBI (Trainees Account)	-	-	75,528.41
Total	5,23,61,552.10		83,88,660.00	2,25,48,879.01	5,23,61,552.10

Sd /-  
 (S.S. Oberoi)  
 Finance Officer

Sd /-  
 (J.H. Desai)  
 Registrar

Sd /-  
 (H.S. Panwar)  
 Director

WILDLIFE INSTITUTE OF INDIA, DEHRA DUN  
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDING 31ST MARCH, 1994.

ANNUAL REPORT 1993-94

EXPENDITURE		INCOME	
To salaries and allowances	64,42,132.00	By Grant-in-aid Deptt. of Env., Forests & WL., New Delhi.	4,10,00,000.00
To Leave Salary & Pension Contribution	2,00,002.00	Less transfer to Capital expenditure	1,45,41,746.00
To Bonus	1,07,531.00		2,64,58,254.00
To Honorarium	42,426.00		
To Fellowship	4,52,428.00	By Training Cost	4,95,379.00 }
To Wages	2,45,641.00	Other receipts	1,35,450.00 }
To Travel Expenses	11,86,002.00		6,30,829.00
To Newspapers & Magazines	24,592.00		
To Publicity & Advertisement	4,35,864.00	By Interest on Training Account	13,096.00
To Operational Expenses	16,39,569.75		
To Stationery	3,16,427.00	By Interest on Bank Deposits	6,94,916.00
To Rent for Hired Buildings	86,777.00	By Miscellaneous Receipt	1,20,634.40
To Postage & Telegram	2,04,270.50	By Research Projects	2,47,800.00
To Sports Goods	1,10,112.00	By Seminar & Workshops	1,26,128.00
To Uniforms	34,489.00		
To Telephone & Trunk calls	3,88,143.00		
To Conveyance	47,639.00		
To Electricity & Water charges	8,99,489.11		
To Entertainment	1,04,310.00		
To Printing & Binding	3,44,252.00		
To Repair & Maintenance of Office equipment	3,15,139.00		
To Govt. contribution to C.P.F.	4,84,488.00		

C/O 1,41,11,723.36

B/F 1,41,11,723.36

B/F 2,82,91,657.40

EXPENDITURE		INCOME	
To Seminar & Workshops			6,982.00
To Insurance (Research Fellow and Faculty Members)			69,834.00
To Stipend			62,188.00
To Over Time Allowances			20,008.00
To Legal Expenses			10,35,203.00
To Training Cost			4,18,653.00
To Repair & Maintenance of vehicles			4,91,101.65
To POL for vehicles			2,24,026.00
To Lab chemicals			7,54,180.00
To Exhibition			
To Audit fee			
To Estate Maintenance			5,86,081.00
To Scientific Publications			
To Excess of Income over Expenditure			1,05,11,677.39
Total	2,82,91,657.40	Total	2,82,91,657.40

Finance Officer

Registrar

Director

C/O 2,82,91,657.40



S.No.	Particulars	Opening stock	Addition during the year	Total
1.	Land	80,32,795.00	-	80,32,795.00
2.	Trees	24,32,709.00	-	24,32,709.00
3.	Avenue Plantation	10,74,806.65	3,93,562.00	14,68,368.65
4.	Furniture & Fixture	42,37,962.89	13,78,977.00	56,16,939.89
5.	Lab Equipment	11,95,858.07	12,294.00	12,08,152.07
6.	Office Equipment	9,57,982.90	3,13,878.00	12,71,860.90
7.	Training Equipment	83,46,419.24	5,39,245.00	88,85,664.24
8.	Camp Equipment	3,50,997.34	7,482.00	3,58,479.34
9.	Photographs & photographic material	5,22,758.20	1,58,706.00	6,81,464.20
10.	Educational films	9,82,069.35	75,038.00	10,57,107.35
11.	Library Books	28,40,393.28	12,25,995.00	40,66,388.28
12.	Journals & periodicals	26,88,333.50	11,54,066.00	38,42,399.50
13.	Materials & supply	34,86,388.95	3,77,339.00	38,63,727.95
14.	Vehicles	34,88,156.47	7,01,026.00	41,89,182.47
15.	Campus development	14,73,875.31	7,98,334.00	22,72,209.31
16.	Boundary Wall Block I	14,46,200.59	-	14,46,200.59
17.	Boundary fencing 1&3	8,17,934.93	-	8,17,934.93
18.	Construction of Bldg	4,23,45,749.18	62,41,640.00	4,85,87,389.18
19.	Architectural fee, Supervision & Completion	34,91,310.85	1,16,520.00	36,07,830.85
20.	D.G. Set	6,62,391.00	52,735.00	7,15,126.00
21.	E.P.A.B.X.	9,91,742.00	24,062.00	10,15,804.00
22.	Air Conditioner	25,97,452.00	-	25,97,452.00
23.	Staff Quarters	28,23,363.00	3,52,157.00	31,75,520.00
24.	Road & Culverts	-	4,83,572.00	4,83,572.00
25.	Tennis Court	-	1,35,118.00	1,35,118.00
<b>Total</b>		<b>9,72,87,649.70</b>	<b>1,45,41,746.00</b>	<b>11,18,29,395.70</b>