

# ANNUAL REPORT 1989-90



WILDLIFE INSTITUTE OF INDIA

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OF  
INDIA**

**An Autonomous Institution of the Ministry of  
Environment & Forests**

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**New Forest, Dehra Dun  
October, 1990**

## AT A GLANCE

The year gone by has been marked by hectic academic and institutional development activities. There have been both qualitative and quantitative additions to the Institute's training and research programmes. Workshops and symposia held during the year covered diverse topics of current conservation and management relevance. Development of faculty proficiency in specialised subject areas and building up of infrastructure to support the Institute's various activities are the other aspects reviewed in this report which covers the period from April 1989 to March 1990. As the first phase of broad based institutional development draws nearer conclusion, we embark on a new phase of professional advancement in not only frontier technologies but also socio-economic aspects tied to field conservation.

Both our regular inservice wildlife management training courses viz the 9-month post-graduate diploma and the 3-month certificate courses were successfully completed during the year with 20 and 26 officer trainees respectively. The Institute's first 2-year M.Sc. course in wildlife biology was also successfully completed with each of the 7 students obtaining a degree in first class.

Short-term courses in wildlife management commenced in the previous year were continued but addressed specific groups. There were separate courses for PA manager level officers, for senior officers at a policy making level, and for IFS officers in general. A total of 54 officers were covered in these 3 courses. Workshops and symposia addressed topics such as wildlife and people, elephant management issues and wildlife health and disease monitoring, in addition to the annual research review seminar. These were attended by forest and wildlife professionals, researchers, and representatives from concerned institutions and agencies as well as non-governmental organisations. Faculty and researchers also participated in a number of professional conferences and workshops during the year, both in India and abroad and presented many scientific papers.

The Institute's research programme not only provides valuable information of management relevance spanning biological, management and socio-economic aspects, but also inputs directly into faculty development. This was expanded with 3 new projects being launched this year. The report reviews the progress of 18 ongoing research projects.

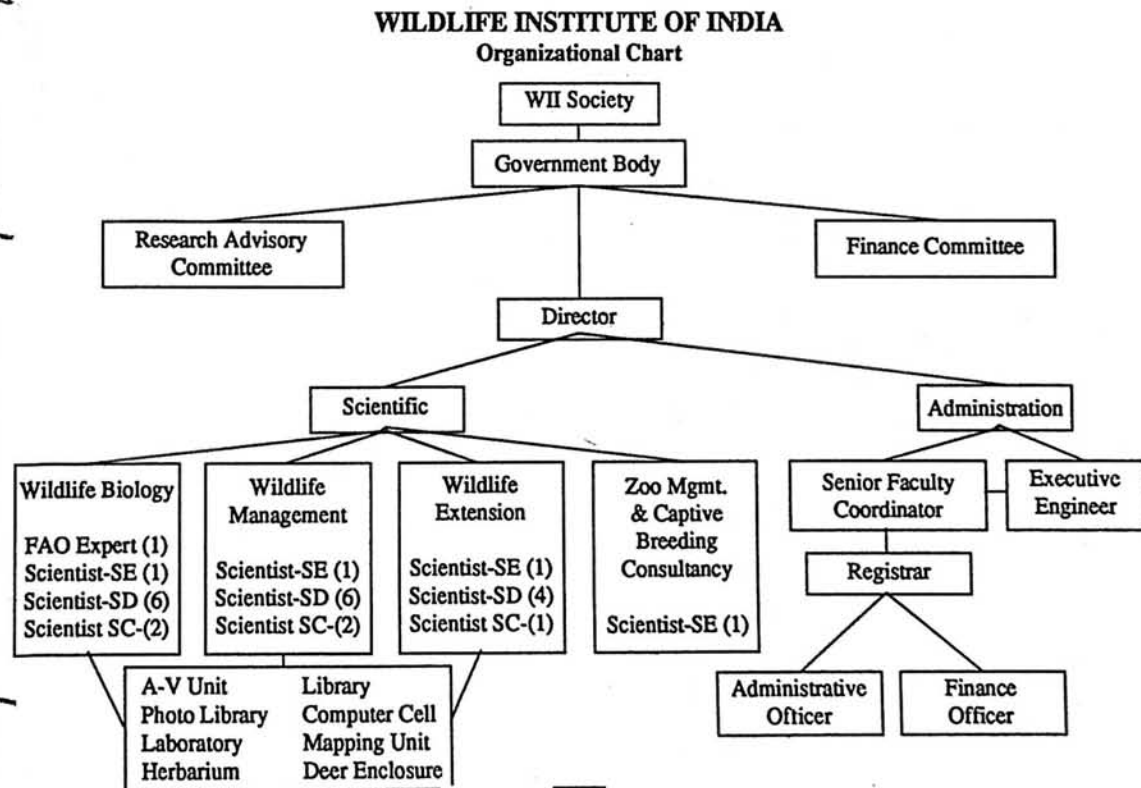
Consultancy services were provided to the Government of India for evaluating

the management of some national parks and sanctuaries for the IBWL award and to the state governments for interpretive planning, and animal damage control.

Faculty development received specialised inputs under the WII-FWS collaborative project which was launched during the year. Ten U.S. specialists in diverse fields visited the Institute during the year for on-the-job sharing of experience. Six faculty were also sent on overseas education/research fellowships with FAO-UNDP assistance under the special project for broad based institutional development now nearing completion. Publication of technical manuals and reports was in various stages of completion. One research project report was published during the year and the bi-monthly newsletter brought out regularly.

Infrastructural development included strengthening of library, documentation, computer and herbarium facilities. Development of the Institute's new campus at Chandrabani, Dehra Dun has also progressed, albeit somewhat behind the schedule required to keep pace with the growing academic activities.

The aforementioned and other activities are reviewed in the report which follows.



## INTRODUCTION

**W**hither conservation in India? A question one may well ask. After the resolute field successes of the seventies not only are there indications of slowing down of the movement, but there are sure signs of retrogression. Manas in Assam continues to be under siege. Indravati in Bastar is well nigh ravaged putting the only significant population of genetically pure wild buffalo under severe threat. Even Kanha, snuggled in the vast sylvan Satpuras and potentially and really one of our most secure nature reserves, now suffers from insurgency.

Where does an institution like the Wildlife Institute of India come in such a scenario? The field conservation problems are not merely biological in nature though indeed strategies for biological resurrection must account for the ground realities. A wildlife manager is required to grapple with the problems and pres-



ures of extraneous origin. Extraneous because the rural ecosystems in the wilderness regions have continued to degrade and the growing population of people must extract even more from the wilderness for subsistence. Major development projects — irrigation, power, mining — somehow have a sure knack of not adjusting to the local area development needs, though they may claim to contribute to the national economy. They invariably end up diverting areas from local use and queer the pitch for conservation as well as for the people in the residual area of land in general and that under wilderness in particular.

We not only need wildlife scientists and managers who understand these vitiated field equations, but also require to develop management measures which can combat and mitigate these problems. There is need to influence rural development in the wilderness regions in order that degradation of rural ecosystems is prevented and the economy sustained. Thus buffer zones have to be made resident to human activities.

WII is accordingly gearing up its programmes in order that field organisations develop capabilities to face these challenges. Its research and training activities are being diversified and enlarged. This year three short term courses for forest officers were undertaken, which focused on these issues bringing out relevant management strategies and the policy adjustments needed. Research on human aspects related to conservation has been stepped up. Preparatory action for launching new courses and to develop consultancy capability to help field organisations tackle the difficult situation, has begun.

In the following, we recapitulate in brief our activities and progress during 1989-90.

## OBJECTIVES

The major objectives of the Institute are:

1. Training managers and biologists for protected area management and wildlife research;
2. Training education and extension specialists for protected areas to gain public support for wildlife conservation;
3. Providing orientation courses for those involved in land-use management;
4. Conducting and coordinating applied wildlife research and evolving relevant techniques suited to Indian conditions;
5. Creating a database for building up a wildlife information system employing modern analytical techniques and computer equipment; and
6. Providing advisory and consultancy services to Central and State governments, universities, research institutions, and other official and non-official agencies.

## INSTITUTIONAL STRUCTURE

**W**II is organized into three scientific faculty divisions, viz. **Wildlife Biology, Wildlife Management, and Wildlife Extension**. An organizational chart showing how the various divisions and wings of the Institute relate to one another is given on page 3. Each of the faculties is headed by a Scientist-SE, and the administration division by a senior faculty coordinator who has a post of Registrar to assist him. Out of a sanctioned strength of 28 faculty posts in the scientists category 20 are currently in position, including the Director. There are in addition 23 Research Fellows. Of the 20 technical posts, 14 have been filled up. In the administrative category 31 out of 39 positions have been filled and against 44 maintenance level posts, 40 incumbents have been recruited.

Rapidly developing library, laboratory and computer facilities provide the needed support to Institute's scientific activities.

## THE ACTIVITIES

**T**he Institute has fully geared itself to strengthen the pool of trained managers, biologists and socio-economists in wildlife science spanning all scientific and applied aspects as relevant to the prevailing difficult field situations in the country. Its attempt is to provide training and research inputs for better management of wildlife and wild habitats in a manner that our efforts at the conservation of our natural heritage are compatible with the present-day field realities.

It is hoped that the personnel and researchers trained by the Institute will fulfil the requirements of the state forest departments, academic and research institutions including universities, and various other agencies; a few of them may also be absorbed by the Institute itself. Towards these objectives, WII has developed a well coordinated package of training, teaching, research and consultancy. Its programmes are organised and conducted accordingly.

The following sections present a round up of the Institute's activities during 1988-89 under three broad groups:

1. Academic
2. Organizational
3. Developmental

## ACADEMIC

### i) Training & Education Programmes:

One of the primary responsibilities of the Institute is to train in-service personnel of the state forest departments and wildlife wings, in the field of wildlife management. For this purpose the Institute conducts a number of short-term and long-term courses. There are two regular longer term training programmes in wildlife management, a Post-graduate Diploma Course in Wildlife Management for the officers at the level of director/officer in-charge of a protected area, and a Certificate Course in Wildlife Management for the officers at the level of Range Forest Officer.

The **Post-graduate Diploma Course in Wildlife Management**, of 9- months duration, imparts training in management planning strategies and techniques that are most appropriate to today's conservation situations and needs. The trainee officers are put through a programme involving both the theoretical and the practical aspects of management of wildlife and protected areas. The programme includes visits to representative wildlife areas in different parts of the country to get a first-hand experience of management problems and remedial measures. Special emphasis is laid on preparing them to handle the buffer zones of our protected areas, where wildlife-people and habitat-people interface conflicts today pose the greatest challenge to conservation. The legal aspects of protected area management, including the enforcement of wildlife and forest laws, consti-

tute another important area of instruction. A major part of the course is devoted to training these officers in the preparation of management plans for protected areas. This includes a 6-week field exercise in management planning, in an appropriate national park or sanctuary. At the end of this exercise each trainee has to independently devise and write up a management plan for the area.

The **3-month Certificate Course in Wildlife Management** trains personnel at the field executive level, i.e. Range Forest Officer. The course structure is quite similar to that of the Diploma Course but the emphasis here is more on the practical aspects of wildlife management than on theory. The course thus aims at preparing the Range Officers so that they may be able to properly implement management plans as well as perform for the practical tasks that they encounter in their everyday duties in the field. This course, too, has a sizable component of field tours and exercises.

In addition to these two regular training courses, a number of short-term courses and training workshops are conducted to meet specific training needs of the target groups involved. Most of these are of two to three weeks duration. Among these, a **Capsule Course** in wildlife management is organised at Dehra Dun and in some protected areas for a regional coverage. This course was started out of the realization that the number of protected areas in India is quite large, and the Diploma and the Certificate courses put together cannot turn out trained officers at the desired rate. The Capsule Course thus provides a short-duration, high-turnover option. Open to officers of state forest departments and wildlife wings this course aims at enabling them, in a short time, to introduce a minimum component of scientific management in the administration of protected areas, and providing for wildlife habitat concerns in the course of forestry operations in forests outside the umbrella of the protected-area network of India.

The Institute started its post-graduate degree programme in 1987- 88 with the introduction of an **M.Sc. Course in Wildlife Science**. This programme aims at producing qualified field biologists and ecologists who could pursue a career either in research with the state wildlife wings/forest departments or other research organisations, or in teaching at the universities which are setting up new courses in wildlife science and ecology. The M.Sc. programme has thus not only met the long-standing demand for a good post-graduate degree course in Wildlife Science but has also extended WII's academic activities beyond the training of in-service officers.

This course is of two years (four semester) duration. It admits direct entrants from Indian and foreign universities who have graduated in one of the specified

Life Sciences/Forestry/ Veterinary courses. But it has also provision for taking in-service forestry and wildlife candidates.

Applications for enrolment are screened, choosing those with good 1st class and some evidence of conservation interest. All those chosen then appear in a national entrance test and the top twenty or so are called to an interview in which the first 6 or 7 candidates are chosen. The Institute provides scholarships for six candidates. In the first course the Bombay Natural History Society provided one, as Salim Ali Memorial Scholarship. IUCN has also offered scholarships for this programme.

Saurashtra University in Rajkot, Gujarat awards the Master of Science, Wildlife degree and for this purpose the WII is recognised as a Centre for Post Graduate Teaching and Research.

The syllabus gives great emphasis to field work, there being some ten weeks of formal field courses besides several weekends and day long trips prior to eight month dissertation. The syllabus is broad based, with considerable attention being given to an understanding of the environment of India. As most candidates come from strong zoological backgrounds, there is large botanical component as well. The strongest emphasis however is on vertebrate ecology and behaviour and the inter-relationships between animals and their habitats. Considerable time is spent on research methodology including quantitative analysis and computing, chemical capture, census techniques, laboratory nutritional and dietary analyses and remote sensing technologies.

The programme recognises that the graduate will largely be working in the field of conservation and so there are courses on conservation, human ecology and wildlife and forest management which introduce the student to the reality of the wildlife situation in India and elsewhere. The syllabus introduces the student to independent study through formal term papers, major essays on wildlife science topics which necessitate much library research and data compilation. The degree is examined both by semester examinations and by course work: essays and practical reports. There are field based practical examinations each semester to ensure the students are competent in basic field craft. Finally, the dissertation account for one quarter of all marks for the degree.

**REGULAR COURSES IN 1989-90:****M.Sc. Wildlife Science :**

The first 2-year M.Sc. course started in January 1988 was successfully completed in December 1989. All the 7 students have obtained an aggregate of over 60% and were awarded a degree in First class by the Saurashtra University. Two of them have been awarded fellowships for doctoral programmes by universities in USA for working on Indian wildlife in collaboration with the Institute. Four other are preparing for wildlife research in the country, while the remaining one person has joined back the Bihar forest department.

For the second 2-year M.Sc. course, WII received over 1200 applications. A written test was conducted at two centres: Dehra Dun and Bangalore in which a total of 44 students appeared. Of these, 27 students were called for interview which was held at Wildlife Institute of India, Dehra Dun on 13 June, 1989. Based on the written test and viva voce, 7 students (5 men and two women) were selected for admission to the course which commenced in July 1989. The course is in its second semester and the academic performance of all the students so far, as adjudged in the examinations for the first semester through class room and field work, is considered good and all of them possess an aptitude for studies in wildlife science.

*Learning to Radio track*

Because of the limited infrastructural facilities available to the Institute in the FRI building in terms of lecture halls, laboratory, computer and library space, it has been decided with the approval of the Governing Body that the third M.Sc. course should not be commenced in July 1990 as originally planned. This would be taken up in July 1991.

**X Diploma Courses in Wildlife Management :**

The X Diploma Course which started on 1 August 1988 came to an end on 28 April 1989 after 39 weeks of hectic training activities. Twenty officer trainees

*Understanding peoples' problems*

from 12 different states namely, Arunachal Pradesh, Assam, Haryana, Himachal Pradesh, Jammu & Kashmir, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan, Tamil Nadu, Tripura and Uttar Pradesh successfully completed their training.

#### XI Diploma Course in Wildlife Management :

The XI Diploma Course which started on 1 August 1989 will end on 30 April 1990. Eighteen Officer trainees from 13 states are attending this course. Of the total training period of 39 weeks, the class utilized 14 weeks in field tours, visiting various protected areas of the country. Class room teaching, laboratory work, guest lectures, group discussions, class test and library work constituted the remaining period.

One week orientation tour to Chilla Range in the Rajaji National Park was the first field tour where the trainees were exposed to basic introduction related to wildlife observation, interpreting the wildlife signs and evidences and collecting materials for study.

The Wildlife Field Techniques Tour was conducted at Kedarnath Musk Deer Sanctuary, the Sariska Tiger Reserve and the Keoladeo National Park at Bharatpur. Habitat evaluation and animal census techniques suitable to high altitude area were demonstrated and discussed with the trainees. The musk deer breeding centre at Kedarnath was evaluated for the need of conservation through captive breeding. On the way to Sariska Tiger Reserve officer trainees visited National Zoological Park and National Museum of Natural History, both in New Delhi. Personnel from these institutions and the accompanying WII faculty highlighted the various aspects of zoo management and the role of museums in mobilization of public support for conservation through building awareness. Trainees also visited Indian Institute of Public Administration where fruitful interaction took place with Prof. Shekhar Singh who with his team of researchers has conducted elaborate evaluation of protected area management in several states. At Sariska, exercises on wildlife population parameters and census methods for various species were conducted. Other field techniques covered habitat analysis and evaluation, animal behaviour, visitor management, facility and interpretive resource inventory and park zoning for recreation. In the last leg of the techniques tour the trainees visited Keoladeo National Park to familiarize themselves with a wetland ecosystem, its related conservation problems and their management. The work of the BNHS field station in the Park gave an excellent opportunity to understand the important role of systematic scientific research and monitoring in managing protected areas.

To learn various aspects of management problems and mitigation strategies adopted in various protected areas Management Tours were conducted in selected wildlife reserves such as National Chambal Sanctuary, Karera Wildlife Sanctuary, Kanha National Park, Tadoba National Park, Guindy National Park, Indira Gandhi Wildlife Sanctuary, Parambikulam Wildlife Sanctuary and Periyar Tiger Reserve. These tours covered a wide variety of management issues related to species, habitats, tourism, protection and conflicts arising from people's resource dependence. In order to enable the trainees to get a hands on experience at field management, the second management tour this year was organised in just one park viz. Dudhwa Tiger Reserve. From a large list of management issues covering all the three aspects viz. biological, managerial and human related, each trainee was allocated one specific issue. During their stay in the park for a week, each trainee officer collected data, discussed with park authorities and faculty and prepared a report on the assigned topic. Later each presented a seminar at the Institute, which was evaluated for credits. To put the management learning into practice, a management planning exercise of 4 weeks was conducted at Melghat Tiger Reserve, following which each trainee independently prepared a management plan of the study area. These plans are to be evaluated for course credits.

Guest lectures form another important part of this training. Guest speakers this year included persons with experience in wildlife management, forestry, conservation and environmental issues both from within and outside the country. Besides this, the trainees also participate in a number of in-house seminars and group discussions on varied wildlife conservation and management topics.

#### VI Certificate Course in Wildlife Management :

The VI Certificate Course in Wildlife management commenced on 1st May, 1989 with 26 officer trainees from 16 states and Union Territories. One participant left the course due to personal reasons.

The curriculum of the course covered 13 weeks of training, class room lectures of 8 weeks and field tours of 5 weeks. The class room lectures emphasized the theoretical aspects of wildlife science, major components being wildlife biology, wildlife management and wildlife extension, education, socio-economics and law. All teaching inputs as far as possible were supported by practical demonstrations, open discussions, film shows, video clips and slide programmes.

Inbuilt into the course were two field tours-providing direct demonstration of use of field techniques in the practice of wildlife management. The "Orientation-

cum-techniques tour" conducted in Chilla part of Rajaji National Park from 26 May to 6 June 1989 was the first. The objective of this tour was to provide field orientation to the trainees in interpreting animal evidences and behaviour and train them on how to collect data and keep records. Various field methods like animal capture, animal estimation, census, habitat evaluation and impact assessments were also demonstrated to the trainees.

Apart from these, the trainees were also exposed to different methods for estimation of crop density, vegetation and habitat mapping, estimation of weed, abundance and identification and quantification of wild animal feeding signs on vegetation. The use of remote sensing and aerial photography in wildlife management was also briefly covered. They were exposed to various conflict areas and use and erection of modern wildlife barriers like electric fencing. The Institute's ongoing research project using radio-telemetry for determining elephant movement and habitat utilization to develop improved management strategies proved to be a good demonstration of wildlife research in action.

Their second Management Tour from 26 June to 15 July 1989 included visits to Dudhwa National Park, Katerniaghat Sanctuary, Kishanpur Sanctuary, National Zoological Park, National Museum of Natural History, Ranthambhore National Park, Sariska National Park and Keoladeo National Park. The objective of this tour was to familiarize the Range Officers with various problems in different National Parks and Sanctuaries and provide them with a comparative overview of the approaches adopted for their solution. Management of the swamp deer and reintroduced rhino and importance of key habitats were also explained in the field to the trainees. They interviewed villagers and staff of the protected areas to get a first-hand feeling of the problems related to peripheral areas of the parks. Man-eating, cattle lifting, crop damage and rehabilitation problems came up for discussion too.

During this tour, the trainees visited the National Zoological Park at Delhi where they got acquainted with modern approaches to zoo management. Wildlife interpretation and tourism management for parks and zoos were covered in Sariska and Delhi Zoo. The techniques of nature interpretation and conservation education were demonstrated to the trainees at the National Museum of Natural History. In Bharatpur and Sariska the topics of wetland management, water and fire management, anti-poaching operations, wireless network and interface conflicts management were emphasized in a field setting.

After each tour trainees wrote their tour journals under guidance of faculty members. These were evaluated for course credits. Apart from regular lectures, a number of guest lectures on different topics by visiting experts were organised.

Wildlife film shows organized were educative and helped in breaking the monotony of routine classes.

At the end of the teaching inputs specified for the course, performance of the trainees was assessed by written theory examination containing three papers and practicals i.e. two tour journals.

All the 25 officer trainees have passed in the examination. Awards and medals were given to the outstanding trainees based on credits earned. The course concluded on July 28, 1989.

#### Short-term Courses in 1989-90 :

During the reporting period, 3 capsule courses in wildlife management for forest officers were conducted as per the schedule given below:

- i) 13-17 November 1989 at the Ranthambhore National Park, Rajasthan for senior level forest officers of the rank of Conservators of Forests and above.
- ii) 8-19 January 1990 at WII, Dehra Dun for ACF and DCF level officers.
- iii) 19-23 February 1990 at WII, Dehra Dun (As part of the compulsory training programme for IFS Officers)

In all a total of 54 officers from the rank of ACF to CCF attended these three courses during 1989-90. The senior level officers course was attended by 10 participants representing 8 states. In addition, the field Directors of the Ranthambhore and Sariska Tiger Reserve participated in the course. To accord with the job responsibilities of senior forest officers policy, planning and administrative aspects of wildlife conservation were emphasised in this capsule course. Various management strategies and approaches to deal with the current field problems were also discussed. Much of the course delivery was through interactive discussions in which the participants as well as the faculty and invited resource persons participated fully. Additional discussion sessions were scheduled in the evenings when issues such as the 1988 Forest Policy, the National Mission on Wastelands Development, and the Development of State Wildlife Organisations were discussed. Daily field trips into the national park and its surrounds formed important components of the course.

Topics dealt with in the capsule course included: Overview of the conservation scene in India; Management strategies and approaches; Development planning for wildlife sector; People's participation; People and Wildlife issues; Ecocodevelopment; Management planning for PAs; Biogeography project of WII; Research

and Monitoring; and Wildlife Law. One of the sessions was exclusively devoted to participant led discussions and the topics covered in this session were: Nilgai and Blackbuck overabundance in Haryana; Tribals, shifting cultivation and elephants in NE India; Lion management issues; and Gujar rehabilitation in Rajaji National Park.

An evaluation of the course conducted to elicit participants' feedback on the last day revealed that the course had been very successful in meeting its objective of providing a better understanding of and solutions to some of the current issues in wildlife conservation. The participants rated the utility of the course as very high and recommended that it be offered on a regular basis. Some even suggested increasing the duration of the course to two weeks. However, WII already offers a two week capsule courses for ACF and DCF level officers which is open to other senior officers as well.

The 12-day capsule course organised in January 1990 had 25 officers representing 9 states. Two full days were spent in the nearby Rajaji National Park to provide an introduction to wildlife management issues, techniques of estimating animal numbers and evaluating habitat conditions, and in discussing the human dimension of protected area management with special reference to the Gujar community living within the park. Another 2 day field trip to the Corbett National Park provided the opportunity to look at protected area management strategies such as habitat management, tourism management, protection enforcement, management of endangered species and administration of project tiger. In addition to the Institute's faculty, guest speakers from outside were invited to deliver specific portions of the course curriculum.

The first 5-day compulsory course in wildlife management for IFS officers was held in February 1990. Although 35 officers were nominated by the Ministry of Environment and Forests, Govt. of India, only 19 officers from 8 states participated in the course. The course was designed in such a manner that much of the course delivery was through panel discussions and interactive sessions. One full day was spent at the Rajaji National Park discussing biological, socio-economic and managerial aspects of wildlife and protected area conservation. There was a high level of interaction by the participants in all the sessions. In their evaluation of the course a majority of the participants rated the course as being very relevant and recommended that it should be offered on a regular basis to all IFS officers, and that the duration and coverage should also be increased to include more field visits, some case studies and some management techniques as well. However, as mentioned earlier, there are other short-term courses offered by the Institute which focus more on these issues.

### Workshops, Conferences, Symposia:

**A Discussion Forum on Wildlife and People** was organised by WII at Dehra Dun on 27-28 April 1989. The discussion forum was attended by a large number of persons from WII and other Institutions such as Indian Institute of Public Administration, New Delhi, Centre for Parliamentarians on Population and Development, New Delhi, Forest Survey of India, Dehra Dun, Centre for Tribal Conscientization, Pune, People's Science Institute, Dehra Dun, Research Foundation for Science and Technology, Dehra Dun and so on. The forum was organised in the following three sessions:

- i) The first session dealt with conservation problems i.e. need for more protected areas, problems of people in protected areas, people's requirements of biomass resources.
  - ii) The second session provided the background through a series of position papers on issues crucial to the debate i.e. population growth, resource dependency, forest laws in India, and
  - iii) The last session consisted of presentations on possible or potential solutions to the problems.
- iii) The last session consisted of presentations on possible or potential solutions to the problems.

**A Workshop on Elephant Management** was organised by the Institute on behalf of the Ministry of Environment and Forests, Govt. of India, at Dehra Dun on 6 May 1989. The workshop discussions focussed on an overview of elephant management issues, various problems of elephant management in the country and strategies to overcome such problems. The workshop was presided over by the Inspector General of Forests and attended by wildlife officials of Karnataka, Tamil Nadu, Kerala, Bihar, Arunachal Pradesh, West Bengal, Nagaland, Assam and Orissa. In addition, officials of Ministry of Environment and Forests, Govt. of India, members of Asian Elephant Specialist Group IUCN/SSC, researchers of Bombay Natural History Society and faculty members and researchers of Wildlife Institute of India also participated in the discussions.

The outcome of the discussion thoroughly examined the objectives of elephant conservation in terms of viable population in productive habitats which can ultimately reduce the increasing man-elephant conflicts. It was emphasized that the management goal of elephant conservation should be aimed at the population level and not at the individual animal. In this context the proposed Elephant

Project for VIII Five Year Plan was welcomed by the attending delegates. The workshop ended with a field trip to Rajaji National Park where delegates were apprised of the conflicts in elephant conservation induced by improperly planned development and by the growing incursions by humans into elephant habitat.

**A Workshop on Wildlife Health and Disease Monitoring** was held at WII, Dehra Dun from September 26-28, 1989. The workshop was attended by research and veterinary officers from state forest and wildlife departments, representatives from the Indian Veterinary Research Institute, Haryana Agriculture University and Wildlife Health specialists from the National Wildlife Health Research Centre of the United States Fish and Wildlife Service, Madison, USA. This workshop was organised under the aegis of the ongoing collaborative project on faculty development between WII and the US Fish and Wildlife Service. The workshop stressed the need for incorporation of disease investigation and wildlife health monitoring in all wildlife management programmes. Techniques of post mortem examination and collection of samples for further analysis were demonstrated through a necropsy performed on a domestic goat. The use of chemical immobilisation and sample collection techniques from a cheetal of the WII deer park were also demonstrated. Post capture complications and cautions were also discussed in this demonstration session. A field trip was organised to the Rajaji National Park to discuss an observational system of wildlife health condition assessment.

**Annual Research Review Seminar** was conducted from 5-6 October 1989 at WII, Dehra Dun. Such annual research seminars are being organised by the Institute since 1987. During this period a meeting of the Institute's Research Advisory Committee (RAC) was also held and members of the RAC attended the seminar in which the researchers presented the work of their respective research projects. In all progress of 17 ongoing research projects was reviewed during this seminar. The RAC appreciated the significant improvement in the quality of research work and the presentations. The RAC also decided to institute awards for the best 5 presentations to encourage the young researchers. Besides a credit certificate the award includes a prize for each winner of Rs.500/- to be given in the form of wildlife and related books of choice.

A faculty member attended the **V International Theriological Congress (ITC)** which was held at Rome from 22-29 August 1989 and also the **Mountain Ungulate Conference (MUC)** held at Camerino, Italy from 4-6 September 1989. The ITC provided an opportunity for over 500 leading mammalogists from all over the world to exchange recent advances in the study of mammals and was organised by the International Union of Biological Science. A paper on Ele-

**phant Conservation in India—Problems and Prospects** was presented by the WII participant at this Congress. He also attended the meeting of the IUCN's Asian Elephant Specialist Group and the Cat Specialist Group during this period at Rome. The MUC was organised by the University of Camerino and attended by about 50 scientists from around the world. The WII faculty participant to this Conference presented a paper on **Conservation Status of Goral in India with special reference to Rajaji National Park** and this paper won the award instituted by Oasis Wildlife Magazine, Italy for the best presentation in the conservation and management session.

The Director participated as a resource person in a **Regional Workshop on Role of Training in Management of Critical Ecosystems in Asia and Pacific Region**. The workshop was supported by the UN Economic and Social Commission for Asia and Pacific (ESCAP), the World Bank and the UNDP in collaboration with WWF-USA. The workshop was aimed at ascertaining the types and levels of training required and identifying countries in the region where efforts through a small project could be addressed on priority, so as to meaningfully contribute to the management of critical ecosystems. The workshop was held at Bangkok and Khao Yai National Park, Thailand from 27 November to 2 December, 1989. From the meagre resources assigned at this stage for the proposed project, it was apparent that it could address only basic conservation management and conservation education aspects in a couple or three countries of the region. It was a good strategy, therefore, to use the forum to assess the overall training requirements and to emphasize that for sustaining the quality of training at an affordable price, good centres should come up within the region itself. Further, such centres, besides catering to the basic training requirements should devote an all out effort to faculty development right from the beginning. The experience of the Wildlife Institute of India was emphasized as a promising example, where nearly 15 years of initial training and concerted indigenous faculty development in the latter years have brought it to an advanced stage in meeting training needs at all levels. The forum did provide a means of informing countries and international agencies operating in the region of the training programmes of Wildlife Institute of India and their relevance and availability to such countries. It was some measure of satisfaction to perceive appreciation by the participants of the developmental course taken by the Wildlife Institute of India and the progress achieved. It should help in motivating the countries to send their students to WII and the international agencies to support such training, including from the proposed project.

A faculty member attended the **India-Pakistan Conference on Environment (IPCE)** held at Lahore, Pakistan from December 13-15, 1989. The Conference

was jointly organised by IUCN, Pakistan and Centre for Science and Environment, India. The conference was the outcome of concern expressed by scientists, officials and non-government organisations on the deteriorating state of the environment in the region and was aimed at establishing channels of interaction between India and Pakistan which could lead to mutually agreed solutions to the environmental crises. A paper entitled **Management of Protected Areas in India with special reference to Project Tiger** by Director, WII was read out at the Conference. The conference provided an opportunity for delegates from India and Pakistan to sit together to find out workable solutions to the environmental problems hindering the attainment of the goals of sustainable development in the two countries.

Two faculty members attended the **International Symposium on Natural Resources Management for Sustainable Agriculture** held at New Delhi from 6-10 February 1990. The symposium was primarily aimed at reviewing the research work done so far on characterisation, conservation and management of natural resources and formulating guidelines for further development of research and education in resources management for sustainable agriculture. Nearly 500 delegates from all over the world attended this symposium. The symposium was jointly organised by the Indian Society of Agronomy and the Indian Society of Dryland Agriculture Research.

Two faculty members along with their two research fellows participated in the **Seminar on Wetland Ecology and Management** conducted by the Bombay Natural History Society at the Keoladeo National Park, Bharatpur from 23-25 February 1990. The WII participants presented two papers on: **An approach to simulation modelling of the habitat of the Siberian Cranes in Keoladeo National Park, Bharatpur and Ecological significance of River Chambal as a major waterfowl refuge: its prospects.** There were over 200 participants in the 9 technical sessions of this seminar.

A faculty member participated in the seminar jointly organised by the Ministry of Environment and Forests, Govt. of India, Tamil Nadu Forest Department and the US National Parks Service at Madurai Kamaraj University from 8-13 January 1990 on **Marine Parks**. The seminar provided an opportunity for managers, researchers and administrators to share a common platform to devise appropriate strategies for marine parks management in India. The participants included protected area planners and managers from maritime states in India, university professors and researchers as well as marine parks management experts from US and Australia. A day long field visit to the Gulf of Mannar Marine Park enabled the participants to visualise an area for the actual model planning workshop that

formed part of the seminar.

Some of the other seminars and workshops attended by WII faculty during this period are as follows:

- i) **International Crane Congress** organised by the Saurashtra University, Rajkot from 22-29 December, 1989.
- ii) **A seminar on the role of Birds in the environment and their conservation** organised by the Bird Watchers' Society of Andhra Pradesh and the A.P. Forest Department from 7-9 February 1990.
- iii) **Seminar on Synthetic Aperture Radar applications in forestry** organised by the Forest Survey of India, Dehra Dun from 28 February-1 March, 1990 at Dehra Dun in collaboration with M/s INTERA KENTING, Canada.
- iv) **XVII All India Conference on Manpower Planning of Library and Information Centres in India** organised by the Indian Association of Special Libraries and Information Centre, Calcutta, at Jaipur, from 27-30 December 1989.
- v) **Seminar on Information Economics** organised by Documentation Research and Training Centre, Indian Statistical Institute, Bangalore from 12-14 March 1990.
- vi) **Vertebrate Pest Control Conference**, Sacramento, California, USA from March 6-8, 1990.
- vii) **Conference on Predator Management in North-coastal California, USA**, Hopland Field Station, California, USA, March 10-11, 1990.
- viii) **55th North American Wildlife and Natural Resource Conference**, Denver, Colorado, USA, March 19-21, 1990.

## RESEARCH

One of the primary objectives of the Institute is to conduct research in selected priority areas pertaining to conservation of India's living natural resources. The Institute is also being increasingly looked upon as an important centre contributing to the development of wildlife science in India and the region. WII attempts to meet this objective through its several research projects,

Map Showing Locations of ongoing Research Projects



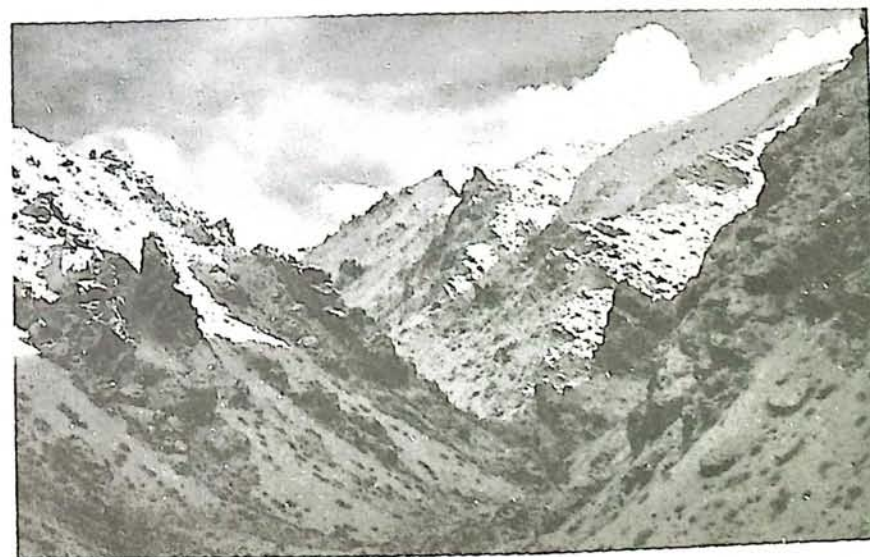
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|---|---|
| 1. Hemis High Altitude NP               | 10. Nilgal & Black buck crop damage study |
| 2. Kedarnath Musk Deer Sanctuary        | 11. Rajaji NP                             |
| 3. Sariska Tiger Reserve                | 12. National Chambal Sanctuary            |
| 4. Wild Ass Sanctuary                   | 13. Manjira, Ethipothalla & Siwaram WLS   |
| 5. Dudhwa NP - Rhino & Swamp Deer study | 14. WI, Dehradun                          |
| 6. Kaziranga NP                         | 15. Gumti WLS                             |
| 7. Pabitora WLS                         | 16. Masinagudi village, Mudumalai WLS     |
| 8. Rajaji NP & Corbett Corridor Link    | 17. Gir NP & WLS                          |
| 9. Narmada Sagar EIA study              |   |

and to some extent also by interacting with various universities and other research organizations, both in India and abroad. WII's research projects are seen as an important means of developing the professional capabilities of its faculty, by keeping the researchers abreast of current field situations, management needs, and research trends. This should help to ensure that the faculty's own inputs and teaching methodologies are constantly updated and upgraded.

To aid the Institute in setting its research priorities, and to coordinate the procedures of screening and evaluation, a **Research Advisory Committee (RAC)** has been established. It has eminent conservationists and academicians as its members. The thrust of the Institute's research effort is on the applied aspects and its prioritization takes into consideration the various ecological, biological and socio-economic problems encountered in the field. Research projects are conceived and devised in such a manner that their findings are of direct help to conservation.

A brief resume of progress under each of the study projects is as follows:

i) **The ecological studies of snow leopard and its associated prey species in Hemis High Altitude National Park, Jammu & Kashmir:** This study which was launched in December 1987 has gathered ecological information on blue sheep which is the major prey species of the snow leopard. In addition, data on movement pattern and habitat utilisation of snow leopard has been collected using direct and indirect evidences as well as through radio telemetry. The level of interaction between snow leopard and its co-predators in the study area has



also been assessed. Field work of this research project was completed in February 1990 and data analysis and report writing work has commenced. To fill in certain gaps in the vegetation data, an additional three weeks field work will be undertaken in July-August 1990.

ii) **An investigation of the habitat ecology of major ungulates in Kedarnath Musk Deer Sanctuary, U.P:** As part of this study, the densities of and habitat utilisation by major ungulates were estimated in different habitat types. The ungulates selected for this study are the goral, Himalayan tahr, barking deer and sambar. In addition, detailed vegetation study has been carried out to character-



ise the habitat and habitat types used by these ungulates. Spot observations were also conducted to collect data on ungulate distribution to determine their preferred and non-preferred habitats. Densities of these four ungulate species in different parts of the study area were estimated by using appropriate census techniques. Data was collected on the extent of human pressure within the study area and its impacts on the habitat and ungulate densities and distribution.

iii) **The ecology of the sympatric herbivores in Sariska Tiger Reserve:** The herbivores selected for this study are the sambar, nilgai and cheetal. Line transects have been carried out to estimate the densities of these species in the study area. In addition, habitat evaluation studies have also been done to assess seasonal variation in habitat pressures and the relative abundance of these ungulates. Information on food plants has been collected and dung and plant samples have been gathered to identify plants eaten by these ungulates through



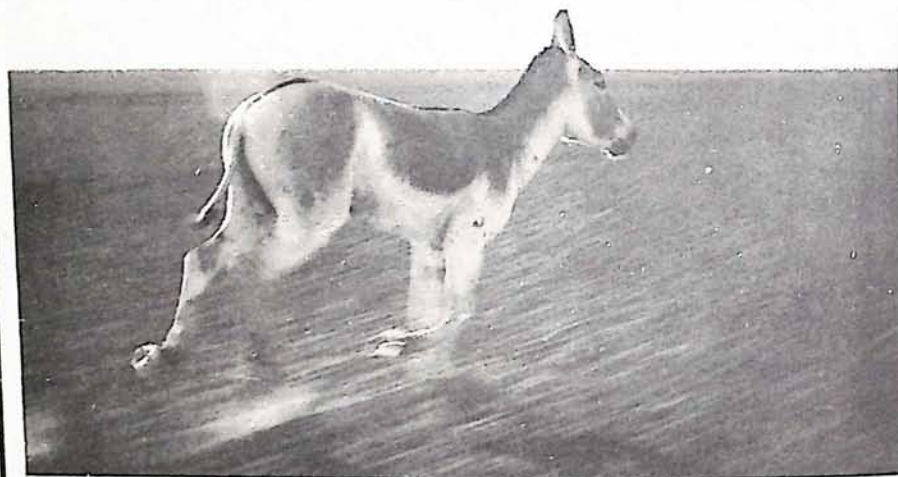
Morphometric measurements before Radio Collaring



ectodermal fragment studies. Scats and kills of predators have also been collected to get an idea of the rate of predation.

iv) **Ecology of Indian wild ass (*Equus leionus khur*) in Rann of Kachch, Gujarat:** Besides general ecological studies on the Indian wild ass, specific information on population distribution with respect to habitat type, overall habitat use, changes in population structure of a few selected groups, feeding ecology, breeding ability, and impact of human activities is being gathered. It

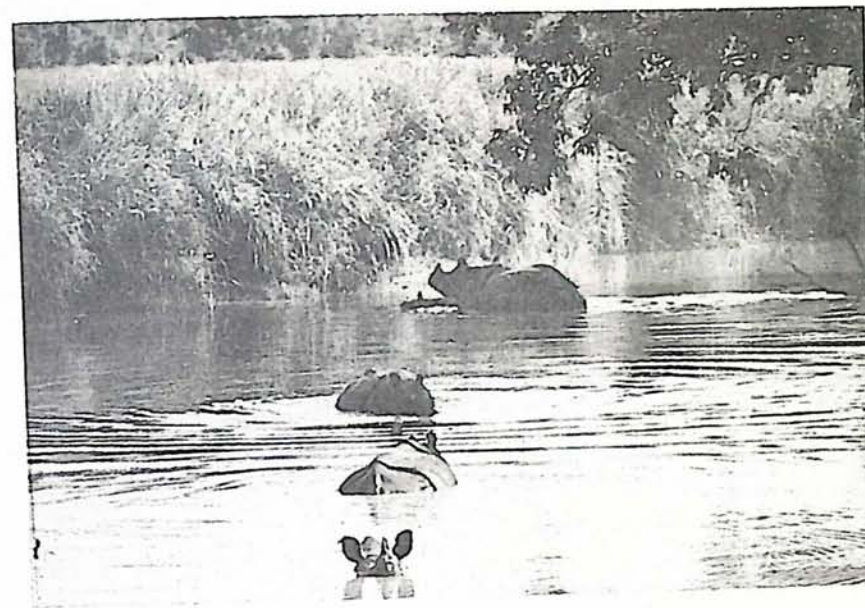
was found that the winter home range size (9.4 sq.km.) was comparatively larger than the monsoon (4 sq.km.) and summer (3.8 sq.km.) ranges. Khurs exhibited a seasonal pattern of habitat use. Animals preferred scrubland during summer and winter while grassland was preferred during monsoon. Under the study on human dimension aspects, the major threats to animal habitats were mainly due to the activities of people during salt work operation inside the rann, livestock (resident and migrant) grazing, fuel wood collection and agriculture. Status of the people around sanctuary was studied in a focal village 'Narali' on southern fringe of the sanctuary. Population and households of the focal village have increased by 140 and 200 per cent respectively, over a period of 28 years. Sheep (7.7 animal/ha) and goat (11.7 animal/ha) are two major livestock holdings of the village. Effect of livestock grazing on grass biomass was studied in the sanctuary. Protected areas support 10 times more grass biomass during summer than the areas grazed by the livestock species. Villagers meet fuel demands by cutting *Prosopis juliflora* tree and preferred the branches ranged between 5 and 15 cm girth. Due to this preferential selection, they leave the thin thorny twigs or branches and such areas (29 per cent) were found inaccessible by the animals in



our intensive study area. Cropping pattern and crop raiding problems by animals have been studied in-depth. The area under salt production has increased by 140 per cent from 1959 to 1988 in Little Rann of Kachch. Habitat use by animals was studied in three areas viz. Koparni, Nimaknagar and Bajana having low, medium and high intensity of human disturbance, respectively. In the area of low disturbance (Koparni), the wild ass dung density was 2/sq.m. against a value of

1/sq.m. in highly disturbed area (Bajana). More animals were found outside the sanctuary in the highly disturbed area.

v) **Monitoring of rhinoceros reintroduced in Dudhwa National Park:** Detailed studies on habitat use by rhinos continued during the year. Three more calves were born during 1989; however one of the total of four calves died in



January 1990 due to natural causes. Six adults and three calves were monitored for food habits studies and the home ranging pattern was also assessed. Habitat parameters are being co-related. It was estimated that at least five tigers had overlapping home-ranges in the rhino area but no threat to calves was perceived.

vi) **Management and ecology of swamp deer (*Cervus duvauceli duvauceli*) in Dudhwa Tiger Reserve:** This study focussed on population and habitat parameters of the swamp deer. The population structure did not show any disturbing pattern, however there is a steady decline in the number of swamp deer in its western sub-population in Sathiana. The critical factor is the maintenance of its rutting and fawning areas outside the Tiger Reserve where the deer are exposed to a range of threats. A series of immediate and long term measures were communicated to the management authorities. Use of prescribed burning as a tool for maintaining swamp deer habitat along with other grassland was taken up for study with systematic data collection. Preliminary findings on fire regimes and problems of weeds have been documented.

vii) **Genetical and ecological studies on the Asiatic wild buffalo:** A three year study on wild buffaloes (*Bubalus bubalis* Linn.) was initiated in January, 1989. The problem of conserving this species is two pronged: (1) population in the North-East India is facing genetic swamping due to contamination from interbreeding with domestic buffaloes, and (2) the scattered and small fragmented populations are facing problems related to inbreeding, protection and habitat ravage.



In order to achieve the first objective of identifying different categories of genetic contamination (probably pure wild, low contamination, heavy contamination and domestic), collection of data on morphometry was continued on wild and domestic buffaloes at Kaziranga NP, Assam. A field laboratory at Kaziranga Research base was also set up for conducting polyacrylamide gel electrophoresis using blood samples. An attempt was made to standardise the electrophoretic techniques by using blood samples collected from domestic buffaloes.

The Udanti Sanctuary, Madhya Pradesh was visited during November, 1989 for collecting basic data on population, morphometry, habitat relationship, interaction with livestock and other herbivores and also to assess feasibility of carrying out chemical capture operations to collect blood samples for genetical studies. During the visit it was estimated that there are atleast two herds of wild buffaloes in the sanctuary, each comprising of seven to ten individuals.

Field studies in Kaziranga NP with a view to collect data on ecology of wild buffaloes, and mechanics of interbreeding with domestic buffaloes maintained in cattle camps on northern fringes of the National Park is in progress.

viii) **Introduction and monitoring of Sangai (*Cervus eldi eldi*) in Pabitora Wildlife Sanctuary, Assam:** This study was initiated by the Institute in order to develop a better scientific understanding of the introduction programme for the conservation of this endangered cervid. The proposed introduction of captive born Sangai into Pabitora sanctuary, Assam was delayed on account of unforeseen reasons.

However, the researcher visited Pabitora to familiarize himself with the area and to collect base line data on habitat parameters. Although the researcher spent four months in the field, for want of permission from State Wildlife authorities, the researcher could not conduct field studies as planned. Some data on socio-economic aspects was collected in villages adjacent to the sanctuary to assess livestock grazing pressure and dependence of people for thatch grass on the sanctuary resources.

The researcher also visited National Zoological Park, New Delhi and collected information on captive sangai and made observations on segregated animals for the proposed introduction programme.

ix) **Study of interrelationship between village ecosystems and elephant corridor habitat in the forest linking Rajaji and Corbett National Parks with**



**a view to developing compatible management strategies:** Assessment of human pressure on corridor forest was done on the basis of staff statements followed by intensive sampling. Experienced forest staff were interviewed and all the 107 compartments were classified into high, medium and low pressure categories and unaffected compartments. Fifteen percent of the compartments from each of these categories were sampled intensively. The results were compared and contrasted, mis-classifications were rectified and a final pressure map was developed. Results of the preliminary analysis show that the pressure is more towards the south of the corridor forest and in the areas dominated by the Gujars and the Bhotias. Regeneration of major fodder species was found to be low and their survival extremely low.

Four major and eleven cross foot-transects were used to collect both direct and indirect evidence of elephant use of the corridor. An analysis of the overall movement pattern showed that lone elephants (probably bulls) use the entire corridor more intensively than the herds. While there is evidence of elephant bulls crossing the Khoh river, there is no evidence of herds using or crossing this river. However, herds use the western portion of the corridor upto the Gwalgod Sot. Investigations are on to find out as to why the herds do not use the eastern part of the corridor forest.

**x) Study of impact of the Narmada Sagar Project on flora & fauna with attendant human aspects:** A memorandum of understanding between the Narmada Valley Development Authority (NVDA) and WII has been signed for a three year consultancy project on EIA of Narmada Sagar Project. The main objectives of this study are to identify nature and extent of impacts on different vegetation types in and around the project area, devise special measures for conservation of rare and threatened species/communities both floral and faunal, assess habitat quality for wild animals, identify habitat usage by major bird communities in the project area, quantify existing levels of human use in the submergence and the adjoining areas, determine pressures on vegetational communities, identify suitable habitats for displaced wildlife and suggest mitigation measures for people living near escape areas, corridors and compensatory reserves in order to mitigate impact of humans pressure upon such areas.

A team comprising of three research fellows has already initiated field studies in the area. Two Research Associates are being recruited to join this team. Reconnaissance survey of the study area has been completed. Secondary information is being collected from different sources. Sites for detailed studies on faunal and floral component aspects are being finalised. Data on socio-economic aspects has been collected for all villages from secondary sources for cluster sampling

of intensive study villages. Data collection in selected sites will now progress both in the submergence and the adjoining areas on the different aspects outlined in the objectives of the study.

**xi) Ecological studies to evaluate crop damage by nilgai and blackbuck in Haryana and to formulate mitigation strategies:** During the year intensive studies continued at Nahar and Kairo areas of Rohtak and Bhiwani districts



respectively to collect data on the relative abundance, social structure, habitat use, activity and movement pattern, food and feeding habits, and reproductive biology of nilgai and blackbuck. Quantitative assessment of damage to agricultural crops was also done using fenced and unfenced plots in the crop area.

**xii) Movement and habitat utilisation of elephants in north-western U.P.:** A new research fellow joined the project in June 1989. He followed an elephant herd intensively in Chilla Wildlife Sanctuary. This herd included a radio-colored adult female, but the radio transmitter stopped functioning in early July 1989. Data on activity pattern and habitat use were recorded by scan sampling technique. Each month a minimum of 30 hours of information was collected. The herd size varied between 2 and 32. During monsoon the herd used Shyampur RF outside Chilla WLS and fed on bamboo. In winter they moved into Chilla and used the sal forest and fed mainly on bark of *Mallotus* and *Ehretia*.

This herd is being followed to collect data on their ranging pattern for one complete year (till June '90).

**xiii) Ecology of aquatic mammals in National Chambal Sanctuary:** The two target species of this study are the gangetic dolphin and the otter. Field work was continued to study the status and distribution pattern of these two species in the study area. Their preferred habitats were also identified which meet the basic needs of shelter food and breeding. After sustained experimentation with different types of traps, it was possible to trap an otter for radio tagging and thereafter valuable data was collected on movement and activity pattern of this species. In addition to this monitoring work, a census of the species was also conducted over a stretch of 425 kms of the study area. Scat analysis was also carried out to get an idea of the food of the otter.

**xiv) Monitoring of restocked mugger crocodile in Manjira, Ethipothalla and Siwaram wildlife sanctuaries in Andhra Pradesh:** The field work of this monitoring project which was started in 1987 was nearing completion at the end



*Sex determination of crock before release*

of the year. During this period, a fresh batch of reintroduced crocodiles was marked and their movement, dispersal and home range studied. Survival and dispersal of hatchlings was also studied to record reproductive success and recruitment into the adult age classes. Species habitat preferences of different

age classes was also identified and recorded. Further data analysis and writing up of final report will be taken up after completion of the field work in May 1990.

**xv) Strengthening of national wildlife data base:** The objectives of this study are: to develop a model for enhancing the predictive ability of the evolving wildlife data base at WII with regard to distribution and numbers of wildlife species in the country; to investigate and quantify the ecological relationship between animal abundance, major habitat components and factors causing destruction and habitat degradation; to evolve simple methodologies for quantifying the above parameters which can be widely used by field investigators to obtain standardised information for the country's wildlife areas; to update information on vegetation types of conservation interests; and to add references to the existing bibliography collection for use in teaching and research in wildlife. To achieve the second mentioned objective, data was collected in the Sariska Tiger Reserve and in the Kanha and Tadoba National Parks. This data is currently being analysed. More than 4000 references related to flora and fauna, socio-economic problems and other aspects were added to the bibliography collection. A new vegetation classification was developed incorporating information from earlier classifications, including the Institute's biogeographic classification. A simple 3 digit code was devised to classify the vegetation and area for each vegetation type. It is now proposed to develop the capability to obtain a map output of the data from the wildlife data base.

**xvi) Biology, ecology and conservation of Phayre's leaf monkey in Tripura:** A limited survey of this species was carried out in the Gumti wildlife sanctuary to obtain an estimate of group size and composition of the species and to select a group for intensive ecological and behavioural studies. Based on this, data is being collected on the behaviour and feeding ecology of the focal group. In addition, vegetation and phenological studies were also carried out. Thirty major food plant species have been identified so far. The species is largely a folivore preferring immature leaves and rarely fruits. Field work on the ecology and behaviour of the leaf monkey would be continued during the coming year.

**xvii) Study of the rural 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:** The objectives of this study are to quantify and analyse pressures of local people and their cattle on the sanctuary, to investigate the socioeconomic, political and cultural dimensions of the sustenance problems of the local people, and to formulate a model project oriented plan for ecodevelopment aimed at reducing pressures on the resources of the sanctuary and mitigating the problems of the

local people. The study area comprises of about 200 sq. kms. A preliminary survey of the area was carried out. To build a profile of the villages, data was collected from various sources on land use and ownership, demography of people and cattle, milk production and employment and so on. Cattle movement patterns were recorded and villagers were interviewed for gathering socio-economic data. Following this work a picture of the economy based on the land resources of the area has emerged. Estimation of income from cattle was done by monitoring selected households to determine average milk yields and revenue generated from its sale. It is now proposed to undertake a study to quantify and analyse pressure on the forest due to cattle grazing and fuelwood cutting.

**xviii) Ecological factors pertinent to improved management of the Asiatic lions in India:** In summer 1989 (April-May) the third ungulate count was conducted. A few selected road transects were repeated to test the reliability of the census method. Collection of kills and scats continued. Radio-tracking of the collared lions was intensively carried out. For the first time lions were tracked during the rainy season (June-August). Seasonal changes in habitat utilisation were observed. The radio-collared male lion in eastern Gir was followed continuously for 13 days and nights. The resultant data gave an insight into the male's territorial defence mechanisms and predation patterns. Fieldwork ended in December 1989 and the research fellow returned to the Institute in March 1990.

### CONSULTANCY SERVICES

**i) Study on the Management of Wildlife in Captivity including Captive Breeding and Rehabilitation of Threatened and Endangered Species and the Design and Management of Zoos:** During the period under report data collected from thirty zoos was computerised and a data base was developed. A list of existing and planned captive wildlife facilities in the country (including zoos, deer parks, safari parks, snake parks, nature/breeding/ education centres and aquaria) was prepared.

A Committee to invite external input and monitor the progress of work of the project study was constituted in April, 1989. The Committee met on 16 May, 1989 and noted the progress of work and made various suggestions regarding the conduct of the study.

In the meeting held on the 10th of September, 1989 at WII, Dehra Dun to discuss proposed "Zoo Policy", a drafting committee was constituted by the Chairman (Inspector General of Forests, Government of India, Ministry of Environment and Forests) to draft 'National Zoo Policy' on the basis of discussions held in the

meeting. The committee, which included two faculty members of WII, met on 16th September, 1989 and prepared a draft 'Zoo Policy'. A paragraph briefly delineating the role of 'Central Authority for Zoos' was included in the final draft of the 'National Zoo Policy'.

The structure, composition and functions of the 'Central Authority for Zoos' was evolved and a proposal for the establishment of a Central Coordination and Monitoring Unit for Zoos was sent to the Ministry of Environment and Forests.

Curricula for conducting different levels of training programmes for zoo personnel at the managerial (professional) and supervisory (Technician) levels with appropriate inputs in education/interpretation was developed. Simultaneously draft 'Standards/guidelines for Indian Zoos' were developed. These standards included model veterinary facilities and administrative set up.

Collection of data from various zoos and captive wildlife facilities was continued. Zoos at Junagarh, Ahmedabad, Baroda and Surat were visited and discussions were held with the directors of these zoos. An All India Zoo Directors' meeting held in January, 1990 at the Sakkarbaug Zoo, Junagarh was attended. The draft for 'Central Authority for Zoos' was also discussed in the meeting. Suggestions made by participants were incorporated in the draft which was then submitted to the Ministry of Environment and Forests.

**ii) IBWL Award:** A faculty member was appointed as the Member-secretary of an evaluation committee of the Indian Board for Wildlife (IBWL) set up by the Ministry to select the best managed national park and sanctuary for the IBWL award. In addition to the Member-secretary, the Committee comprised of the 4 regional representatives of the IBWL. In all 9 protected areas were nominated by the respective state governments for contesting the IBWL award. Of these, 5 were nominated in the national parks category and 4 in the sanctuary category. The committee visited all these protected areas and carried out an evaluation of the management based on an objective assessment format containing the different criteria on which evaluation was to be carried out. A report was also finalised by the Member-secretary on behalf of the committee and submitted to the Ministry for presentation to the IBWL.

**iii) The Field Director, Melghat Tiger Reserve (Maharashtra) during his visit to WII, Dehra Dun in January 1989 had requested the Institute's help in developing a suitable interpretation plan for a Museum-cum-Interpretation Centre. Consequently the available facilities, infrastructure and services at Semadoh**

were evaluated and an Interpretation plan was prepared by a faculty member of the extension faculty, on the basis of assessed requirements.

iv) **Technical guidance and advice** for the use, installation, construction and maintenance of electric fence has been provided to different states. This includes help and advice to Dudhwa National Park in the maintenance of a 6-strand fence for the rhino area at Salukapur and 3-strand fence at Sathiana. The Namdhari group of farmers at Jeevan Nagar, Sirsa district of Haryana were also helped in the installation and construction of a solar-panel operated 6-strand electric fence for protection of orchards and crop fields from damage caused by nilgai.

v) **Assistance was provided to the BNHS** for conducting a workshop on Wildlife Management Techniques at Mudumalai Sanctuary, Tamil Nadu in November, 1989. The workshop was organised by the BNHS and sponsored by the Department of Science & Technology, Govt. of India.

vi) **The India International Trade Fair '89** held at Pragati Maidan, New Delhi in the month of November had its focal theme as "Environment". Accordingly,



the Ministry of Environment and Forests organised an Exhibition entitled "Our Environment - Our Future" in which the Wildlife Institute of India actively

participated. Earlier, it had also participated in the National Agriculture Fair in March-April 1989. However, this time the WII participation was stronger and more effective for which the Institute was awarded a Certificate of Appreciation by the Ministry of Environment and Forests, Government of India. Thousands of school children, college students, eminent persons from different walks of life and general public visited the exhibition. The trainees of XI Diploma Course also visited the exhibition. A large number of these visitors showed keen interest in wildlife and its conservation. The exhibits were interpreted to the visitors by faculty members and staff of the Institute who were on duty exclusively for this purpose. A number of video films on wildlife and environmental conservation were also shown to the visitors.

The main thrusts of the WII pavilion in the exhibition were:

- (a) Biogeography of India and the protected areas of the country (by a huge 3-D relief map illuminated from inside, picture panels, transslides etc.);
- (b) Ecodevelopment in Park-side areas (by 2 dioramas depicting the before and after situation);
- (c) "Project Tiger" - A success story in wildlife conservation (by Picture panels); and
- (d) Research and training inputs for better conservation of natural resources (by Picture panels and transslides).

The Institute decided to utilize the various exhibition materials even after the exhibition was over as these will be very useful for interpretation at the Institute. The exhibits were therefore designed and fabricated for reassembly. After the exhibition, a large number of the transslides, both the dioramas and the illuminated relief map are now exhibited at the Institute in the FRI main building. It is also planned to shift the exhibition materials to the Institute's campus at Chandrabani where a permanent Interpretation Centre could be developed using these materials.

#### PUBLICATION

**T**he bi-monthly newsletter of the Institute entered its fourth year of publication. In response to the demand from wildlife personnel in the field, the coverage and circulation of the newsletter has been widened. It was originally envisaged as an in-house publication of the Institute. Now it is being circulated

to the managers of all major national parks, sanctuaries, zoos, Chief Wildlife Wardens and all alumni of WII, besides a large number of non-governmental organisations and individuals within the country and abroad.

A technical report on the snow leopard research project in Ladakh was published during the year. Reports of other research projects are in various stages of finalisation. The first edition of the two volume report on Planning a Wildlife Protected Areas Network in India continued to be updated with additional information being provided by the states. Manuscripts for other publications such as Manual on Census Techniques, Manual on Chemical Restraint Techniques, Guidelines for preparation of Management Plans for Protected Areas and Proceedings of the Discussion Forum on People and Wildlife were in various stages of preparation at the end of the year. These are likely to be finalised for publication during the next reporting period.

Over 48 papers by the Institute faculty members were published during the year. A list of these publications is appended.

#### ORGANISATIONAL

The 35 member WII Society, presided over by the Minister for Environment, Forests and Wildlife has a varied membership comprising Forest Ministers of some States, Members of Parliament, Members of the U.P. Legislative Assembly, officials of some concerned Ministries, and non-officials including representatives of NGOs connected with wildlife conservation. No meeting of the Society could be held in the year. The Institute functions under a 14 member Governing Body chaired by the Secretary, Environment, Forests and Wildlife. The Governing Body normally meets once every three months. Some of its functions have been delegated to Sub-committees in matters such as finance, research and building construction.

#### Faculty and other recruitments:

Three faculty appointments, two at the level of Scientist-SD and one at Scientist-SC were made during the year. Further, in view of the difficulty in finding suitable scientists for recruitment, all the existing positions of Scientist-SC have been raised to that of Scientist-SD. In addition, 9 persons were recruited as technical, administrative and support staff. Five posts of technicians were created with the approval of the Governing Body of which 4 posts are for strengthening the developing computer and computer-aided mapping facility in the Institute while one post is that of a wildlife field technician.

#### DEVELOPMENTAL

##### WII-FWS Project:

A 5-year project on faculty development was initiated in May 1989 in collaboration with the US Fish and Wildlife Service. This project is aimed at enhancing the professional competence of the Institute's faculty in diverse fields of frontier technology so as to upgrade the quality of the various training and research activities of WII. The subject areas which have been identified for this collaborative effort are:

- Systems Approach (SA)
- Geographic Information Systems (GIS)
- Field Research Methods (FRM)
- Wildlife Interpretation & Extension (WIE)
- Habitat Evaluation (HE)
- Animal Damage Control (ADC)
- High Altitude Ecology (HAE)
- Wildlife Health & Disease Control (WH)
- Captive Breeding Mammals & Birds (CBB & CBM)
- Wetland Ecology and Management (WEM)
- Wildlife in Managed Forests (WMF)

Each of the Institute faculty, depending upon his or her background and interest, has selected one of the above listed subjects for specialisation. Transfer of tech-



nology is achieved in two stages. Firstly, one or more U.S. specialists in each of the subject areas are based at WII for periods ranging from 6 weeks to 6 months to work with their counterpart faculty staff on specific tasks and projects. The concerned research scholars are also involved in this interaction. It also involves joint visits to the field and research project sites where field personnel also benefit from discussions with these specialists. This is followed by a short period of overseas training in the U.S. which allows the faculty to visit relevant institutions and agencies related to that particular discipline and to interact with other specialists. This phase thus provides them with the opportunity to continue and top-up the training which they have received at WII. The last phase of the collaboration involves a workshop which is organised jointly by the U.S. specialist and his/her counterpart WII faculty in each subject component of the project. The principle objective is to involve a larger number of people, from both within and outside the Institute, and to extend to them the benefits of this specialised training.

While the U.S. Fish & Wildlife Service is the nodal agency which is coordinating this project on the U.S. side, a number of other agencies and institutions are also providing inputs by way of personnel and facilities for training. Foremost amongst these are the U.S. National Parks Service and the U.S. Forest Service. The National Wildlife Health Research Centre and the National Ecology Research Centre, both of the USF&WS, are important collaborating institutions. In addition, there are universities such as the University of Arizona, University of Tromso (Norway), and the Texas A&M University who are providing specialists in different fields.

WII is the premier institution in the country offering degree, diploma and certificate training programmes in wildlife management and research and it is hoped that the WII-FWS faculty development project will have a positive impact on wildlife conservation efforts in the country as a whole.

#### FAO-UNDP Project:

The 2-year FAO-UNDP project titled: Assistance to Wildlife Institute of India which was started in July 1988 is into its last phase. A senior FAO expert on wildlife biology/management continued at the Institute throughout the year making valuable inputs into teaching and research programmes. However, a computer expert as provided could not join and this component is likely to follow in the next year as a left over input. The project is moving successfully towards achieving its main objective of assisting the first M.Sc. course in wildlife science, started by the Institute in January 1988. This is likely to lead to

formulation and improved syllabus for this course. The other major involvement of the project has been in the Institute's research programme and in the overseas training programme for its faculty. During the year 6 faculty members availed of the FAO overseas training fellowships (in conjunction with the WII-FWS project) to specialise in different subject areas. Some specialised computer and field equipment was also procured through the project during this period.

#### Faculty Training Abroad:

Under the FAO-UNDP and the WII-FWS projects, 6 faculty members were deputed for specialised training in different subject areas to the US and U.K. as per details given below:

- i) One faculty member visited United States from 12 August to 4 September 1989 to have an overview of the progress made in managing forests for biological diversity by USDA Forest Service. This marked the beginning of development of an approach to managing wildlife in managed forests under the WII-FWS collaboration. This area is critical in view of the fresh management mandate of the National Forest Policy of India, 1988. The study tour included discussions with experts, field visits and exchange of management experience. Visits were made to Sequoia National Forest, California, the Caribou National Forest in Idaho, the Mount Hood National Forest and the Starkey experimental forest in Oregon, the Dry River District Range, West Virginia. Visits were also paid to the U.S. Forest Service Centres and laboratories at Fresno, California, Ogden, Logan in Utah, Le Grande and Portland in Oregon, Harrisonburgh in West Virginia and at Washington D.C. Application of a variety of silvicultural systems, species and habitat research projects and wide ranging management issues were included. The outcome is the formulation of the Satpura Hills Biodiversity Project to be implemented in India which would lead to preparation of a management handbook, and establishment of demonstration area for integrated forestry planning and management.
- ii) A faculty member was deputed to US to gain practical knowledge and experience in Wildlife Field Research Methods especially those relating to relative abundance and population estimation, foraging ecology, age estimation, capture techniques and impact of human activities on wildlife and their habitat.
- iii) Another field of specialisation for which a faculty member received training in the US is that of Wildlife Damage Control. Several research institu-

tions, agencies and universities were visited and valuable knowledge and experience acquired in working with researchers of these institutions and through interaction with various subject matter specialists. Various lethal and non-lethal methods in the prevention and control of wildlife damage problems were observed and the use of fertility control and embryo transfer techniques in the regulation of wild animal reproduction was discussed. The faculty member also availed of this opportunity to attend 3 conferences on the subject which were held during the period of his visit in the U.S.

- iv) A faculty member responsible for the development of the national wildlife data base at the Institute, undertook the final phase of training at Oxford University, U.K. This was preceded by several months of field data collection in Rajasthan, Madhya Pradesh and Maharashtra. This field investigation and the academic training at Oxford University will lead to the award of a Ph.D. degree to the faculty member. This specialised training will help in developing a computerised wildlife information system at the Institute based on simple field data gathering techniques. This will not only help in the development of the national wildlife data base but also prove invaluable to field personnel working in protected areas.
- v) The Veterinarian on the Institute's faculty was sent to the University of Wisconsin in USA for specialised training in wildlife health at disease monitoring aspects. In addition to the training at the University, he worked with scientists of the US Fish and Wildlife Service's National Wildlife Health Research Centre, located at Madison, Wisconsin and other field locations.
- vi) One of the subject areas of specialisation which has been identified under the WII-FWS faculty development project is that of Systems Analysis. Two of the Institute's faculty members are specialising in this modern technology, one looking at the biological system and the other the social system. During the year one of the faculty members was deputed to the US to acquire additional expertise in working with different specialists and institutions involved in Systems Analysis work.

#### Computer facility:

The period saw a steady growth in the computer hardware and software at WII. The hardware grew with the addition of 6 XTs, 2 ATs and an OASYS-386 multi-user system with 6 terminals. Other notable additions include an image scanner which would enhance the DTP capabilities of WII and a Macintosh Plus com-

puter for systems analysis using a very user friendly software package called STELLA. The computer facility at WII currently consists of 8 PC/XTs, 5 ATs, 2 Apple SEs, OASYS-386 and the Mac.

Our software library also continued to grow during the year. The major addition was SACIMAGE operating under XENIX on the OASYS-386, for digital analysis of satellite imageries, other significant ones being EPPL7, a Geographical Information System (GIS) package and STELLA on Mac for systems analysis. Also added were SPSS/PC Advanced Statistics module, DECORANA, TWINSPAN, TRANSECT and a number of other specialized application softwares.

The computer facility was under heavy use during the last year. On the whole, most of the machines were under use for more than 80% of the normal working hours and on many of the week ends. While word-processing continued to account for a major part of the usage, last year saw substantial increase in the use of statistical packages, especially SPSS/PC. Computers were also heavily used for analysis of vegetation data (using DECORANA and TWINSPAN), for population density estimation (using TRANSECT), home range estimation (MCPAAL) etc. During the last year a few of the Faculty underwent training in the use of EPPL7 and STELLA under the WII-USFWS programme. SACIMAGE was also under heavy use for analysis of satellite imageries in connection with the snow leopard project.

#### Laboratory:

Wildlife biology laboratory has been established to support field research with analysis of materials collected in the field. Facility is now developed to meet the requirements of most of the research projects. At the lab, researchers can now estimate the quality of food in terms of energy value, crude protein and macro nutrients. Facility has been developed to estimate the age of ungulate species by cementum annuali count tooth section. Overhead projection microscope and automatic razor sharpner have been added for histological work.

#### Library and Documentation facility:

Academic work and training at the Institute is backed by a rapidly growing library service comprising text and reference books, research journals, reprint and documentation facilities.

A total of 1,185 new books were added to the library this year, bringing the total

to 8,295. A number of new titles were gifts for which the Institute is grateful to IUCN—the World Conservation Union, the Bombay Natural History Society, the Food and Agriculture Organisation, and the Fish and Wildlife Service and the Forest Service of the United States. The Library now subscribes to 140 journals, including 100 from overseas. Some one hundred and fifty newsletters from Indian and Foreign organizations are received at the library.

With the recruitment of new library staff, documentation work has started. Under the documentation work, whole library holdings (Reprints, Books, etc.) will be computerised. Different library services rendered by WII library are listed below:

1. Lending service: This is the basic and fundamental service of the WII Library. This service is also extended to members other than from WII.
2. Reference Service.
3. Inter-library loan service.
4. Reprography service.
5. Books and current periodical display.
6. Addition lists.

Shortly, we will introduce new computerised service dealing with Current Awareness Service, Selective Dissemination of Information and Bibliography.

#### Teaching Aids:

The Institute is enriching its teaching, research and training capability by adding suitable audio-visual material and equipments. The AV Unit of the Institute maintains these equipments and audio-visual materials. It also provides technical support for preparation of audio-visual materials. A film library and a slide collection form an important part of the AV Unit. The slide collection has slides categorised into 47 heads. During the reporting period nearly 500 slides were added to the slide collection. Five 16 mm films and eleven video films were added to the film library during this period. Environmental awareness, wildlife conservation, natural history and wildlife management issues are reflected in these films. All these are very helpful as an important source of visual material for teaching, extension and publication activities of the Institute.

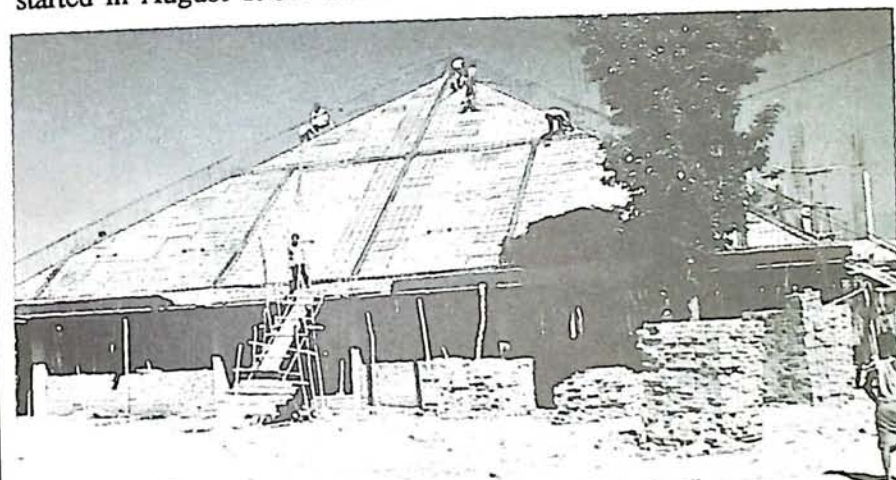
#### Herbarium:

During the year plant specimens were collected mainly from the following localities: Chandrabani, new campus of WII (600 specimens); Melghat Tiger Reserve, Maharashtra (100 specimens); Kamlang sanctuary, Arunachal Pradesh

(100 specimens), Dachigam national park, Jammu & Kashmir (50 specimens), Kedarnath wildlife sanctuary, U.P. (100 specimens). About 2000 herbarium sheets were processed and mounted bringing the total collection in the Institute Herbarium to about 12000 sheets. In addition, check-lists of plants were prepared for the Hemis national park, Jammu & Kashmir and the Rann of Kachch (Wild Ass Sanctuary), Gujarat.

#### Campus Development:

The work of new campus at the Chandrabani, Dehra Dun (comprising administrative, teaching and library block, hostels, 20 faculty houses and 32 staff houses including water supply and sanitary installation and internal roads) was started in August 1988. There was some initial delay and progress was slow.



Now the structure work of administrative and library block, hostel block (excluding dining hall), and faculty houses has already been completed. The other related work i.e. internal electrical work has also been awarded and being carried out side by side with civil work. The estimates for overhead tank, guest house and landscaping work have been approved and work will be taken up next year.

#### Deer enclosure:

The Institute has a small deer enclosure. At present, there are 25 spotted deer and 1 barking deer in captivity. These animals are being used for research work related to biochemical and physiological aspects. They are also used for demonstrations in chemical immobilisation to M.Sc. (Wildlife biology) students, Diploma and Certificate officer trainees of W.I.I. and for the study of veterinary aspects.

**EVALUATION (1989-90):**

The following carries an appraisal of the progress achieved during the year, vis-a-vis the work programme planned for 1989-90 as set out in the chart.

**MAIN WORK PROGRAMME 1989-90**

Sl. No.	Activity	Month of Commencement	
		1989	1990
<b>Regular Courses:</b>			
1.	2-year M.Sc. in Wildlife Biology	JUL	
2.	9-month Diploma Course in WL Management	AUG	
3.	3-month Certificate Course in WL Management	MAY	
<b>Other Activities:</b>			
4.	Capsule Course in WL Management (12 days)		JAN
5.	Senior Level Capsule Course (5 days)	NOV	
6.	One week course for IFS Officers	FEB	
7.	3 New Field Research Projects	SEP	
		OCT	
8.	Indo-US Exchange Project on Faculty Development	MAY	
9.	Workshop on Elephant Management Issues	MAY	
10.	Discussion Forum on People and Wildlife	APR	
11.	Faculty Training Workshop on Systems Analysis	SEP	
12.	Workshop on Wildlife Health and Disease Monitoring	SEP	
13.	Overseas Training Fellowship for Faculty	JUN	JAN
		AUG	APR
			MAY
14.	Construction of Guest House		JAN
15.	Landscapping of Block I and III		JAN
16.	<b>Publications:</b>		
	i) Manual on Habitat Evaluation Techniques		MAR
	ii) Manual on Chemical Restraints Techniques		JAN
	iii) Planning A Wildlife Protected Area Network in India - Final Edition		MAR
	iv) Manual on Wildlife Census Techniques		FEB
	v) Guidelines for Preparations of Management Plans of Protected Areas		MAY
	vi) Manual of Wildlife Techniques for India 2nd Edition		MAR
	vii) Research Report - Snow Leopard Study		MAR
	viii) Proceedings of the discussion forum on People and Wildlife		FEB

All the regular courses of WII were started as scheduled. The second 2-year M.Sc. course commenced on July 1, 1989 with seven students. The 9-month post-graduate diploma course and the 3-month certificate course in wildlife management were started in August and May, 1989 respectively. The latter concluded in July, 1989. Institute's capacity of 30 for each of these two courses generally remains underutilised. This year there were only 18 officer trainees in the Diploma course, while the Certificate course had a better utilisation with 26 trainees. The issue of better utilisation of WII's training courses is being regularly pursued with the states, through the Ministry. The Ministry was also urged to extend financial support to the states in the VIII Plan specifically for meeting the cost of inservice training of the officers at WII.

Three short-term training courses viz., a one week capsule course in wildlife management for senior officers, a two week capsule course in wildlife management for ACF & DCF level officers, and a one week vertically integrated course for IFS officers (as part of their compulsory training programme) were conducted. Capacity utilisation was again lower, 54 against a targeted 75. The main shortfall (10 officers) was in the first mentioned course due to the fact that its timing was very close to the general elections 1989. Similarly, although 35 IFS officers were nominated by the Ministry for the compulsory training course, only 19 attended. Cost of training (board & lodging) at these capsule courses is being met by WII from Central grant-in-aid.

Three new field research projects were initiated during the year with the approval of RAC. In addition, three short-term studies viz., Wildlife survey in Arunachal Pradesh, Problem of dispersing Gir lions, and Wildlife disease survey were also taken up using our recent graduates of the first batch of our M.Sc. course. The last two mentioned studies have resulted in a proposal for long-term research projects on these subjects.

The 5-year collaborative project on faculty development between WII and the U.S. Fish & Wildlife Service got off to a start in May 1989. During the year there was interaction between U.S. experts and WII faculty on a number of subject areas of specialisation, and 6 faculty members availed of overseas training fellowships in the U.S. Five of these fellowships were funded out of the FAO-UNDP project at WII.

All training workshops were conducted as scheduled. The subjects covered were: Elephant management issue, People & Wildlife, Systems Analysis, and Wildlife health and disease monitoring. Participants to these workshops included not only

WII faculty, trainees and researchers but also representatives from the states forest and wildlife organisations, voluntary agencies, and relevant research and training institutions including some universities.

Preparatory action has made considerable progress to launch new courses to meet the urgent field conservation needs. These are management planning for protected areas, ecodevelopment planning for buffer zones and surrounds of protected areas and training zoo management and captive breeding.

Work of the new campus development has been rather slow—mainly because of lack of profitability to the contractor whose tender was low rated. However, efforts are on to expedite the works. The progress is being monitored by the Buildings Committee set up by the Governing Body. Contracts were awarded for ancillary works e.g. electrification and construction of path-ways during the year. Similarly, contract for the landscaping work was also awarded during this period but the lowest tenderer backed out. Work has been undertaken departmentally. The work on guest house will start next year.

Publications brought out during the year include some research project reports. Work of compiling and editing manuscripts of several other publications is making headway and some are in final stages of completion. These will be printed & published in the coming year.

Computer equipment has been added to handle the new initiative in application of GIS to wildlife studies. Likewise equipment for satellite image analysis has been acquired in order to strengthen remote sensing applications to wildlife work. For the first time application of these techniques has been made in the snow leopard study in Ladakh.

In brief, the advance of WII towards achieving its objectives has progressed satisfactorily.

#### PERSPECTIVE FOR 1990-91:

**T**he current advance of Indian conservation is a mixed bag of expectations. Pressures on resources in the wild remain unrelenting because rural development in forested regions has failed to strengthen rural ecosystems economically or resurrect them ecologically. Yet, unless some tangible correctives are put to practice soon, the accumulating degradation is bound to make the process of recovery much more prolonged and expensive, even unaffordable or unachievable. VIII Five Year Plan is hence crucial not only for Indian conser-

vation but equally for the rural poor inhabiting the wilderness regions.

The steps planned for WII in 1990-91, the Year One of the VIII Plan, are strongly influenced by this daunting conservation milieu and the urgent need for correctives. Alongside consolidating and strengthening the ongoing programmes of academic and institutional development, the next year will be marked by the launch of several new initiatives. Evolving a landscape approach to management of wilderness regions, balancing the conservation, productivity and human need aspects, will be a new major task. Logical support for such an initiative will derive from two new programmes viz. training in and facilitating proper planning of management of protected areas and of ecodevelopment measures for their buffer zones and multiple use surrounds. Needless to say that these initiatives will stretch through the VIII Plan period as a part of the core programme thrust of WII.

The regular courses of the Institute will continue as per their normal schedule; the 9-month post-graduate diploma course will commence in August 1990 and the 3-month certificate course in May 1990. However, there will be no admission to the first year of the 2-year M.Sc. course in wildlife biology next year owing to severe constraints of available facilities in terms of computer, laboratory, library services and lecture halls, as well as non-availability of faculty time as several of them will be required to remain away on advanced training in the last year of FAO-UNDP project. The M.Sc. course will be resumed in July 1991, by which time facilities in the new campus at Chandrabani as well as the full faculty time are expected to become available.

Short-term courses, commenced during 1988-89 as capsule course in wildlife management, will focus on specific topics and address specific groups during the coming year. A one-week vertically integrated course will be offered to I.F.S. officers as part of their annual compulsory training programme. A seminar on wildlife management issues will be organised in December 1990 for SAARC countries on the request of the SAARC secretariat. Likewise, on the request of UNESCO, a training workshop on P.A. buffer zone management will be conducted at Dehra Dun in February 1991 for participants from South Asian countries. Another capsule course in zoo management to be held in November-December 1990 at the Nandankanan Zoological Park, Orissa is designed for in-service zoo personnel at various managerial levels.

Some of the other major activities planned for 1990-91 will include the following:

1. The research programme will be further strengthened with the launch of 4 new projects to cover subjects such as impacts of management in Gir national park & sanctuary on lions, ecology and genetics of ibex, wildlife health and disease surveys, and dependency of local people on the resources of Ranthambhore National Park. All ongoing research projects will be continued and periodically monitored to achieve their stated objectives. These projects will be reviewed by the RAC in the Annual Research Seminar (ARS) to be held in August, 1990.
2. Workshops and seminars planned for 1990-91 will include topics such as high altitude ecology and integrated forestry planning and management. Both these will be held under the aegis of the WII-FWS collaborative project on faculty development. The National Workshop on Integrated Forestry Planning and Management (IFPM) will be held in January 1991, but it will be preceded by a regional seminar on the subject to be held in September 1990. The regional seminar will bring together participants from the study area in Satpuras covering the states of Madhya Pradesh and Maharashtra to discuss the course of action for the larger workshop in January 1991. These workshops will lead to the development of a landscape approach to conservation planning including P.As as core conservation units, adjacent reserved forests managed for other objectives but oriented towards biodiversity conservation and nearby rural communities whose biomass needs are to be met on an ecologically sustainable basis. This is expected to result in the formulation of a demonstratable project in the Satpuras. Efforts are to involve the Indira Gandhi National Forest Academy into this programme so that forest and biodiversity conservation can be integrated in the training programmes of that Academy.
3. A FAO-UNDP project on P.A. Management and Ecodevelopment Planning will be launched in January 1991 to commence regular training courses in the preparation of P.A. management plans and ecodevelopment plans. These courses will have a project approach and lead to the formulation of model plans for selected P.As after the training of officers deputed to WII by the states for this purpose. Substantial financial assistance is expected to flow to the states in the VIII Plan in the form of centrally sponsored schemes to implement these model plans and other plans developed by this cadre of personnel trained at WII.
4. Overseas training of faculty will continue under the WII-FWS collaborative project. The subjects to be covered in the coming year include systems analysis, geographical information systems and wildlife interpretation and

- extension. This period of overseas training has been preceded by visit U.S. experts to WII in each of the above fields imparting on-the-job training to the counterpart WII faculty. Top-up training in the U.S. gives an opportunity to refine the skills acquired and to interact with other experts and institutions active in the particular field of specialisation.
5. Work of the new campus development will continue with added thrust so as to make up for initial delays as its early completion is critical for the smooth conduct of the Institute's training programmes.
  6. Several publications will be brought out in the coming year. These include research project reports, technical manuals and reports, and proceedings of workshops and symposia.
  7. The library and documentation facilities will continue to be strengthened to keep pace with the academic programmes of the Institute. With the filling up of the newly sanctioned posts of librarian and documentation officer these services will be developed on established scientific lines. Expert inputs into the development of these facilities will be acquired under the WII-FWS project.
  8. The Institute's computer and laboratory facilities will be further augmented to meet the growing needs of the faculty, researchers and students. Acquisition of additional equipment and software will be need based and will be so planned as to fully establish these facilities after the Institute moves into the new campus.

The main work programme for 1990-91 is depicted in the chart.

Sl. No.	Activity	Month of Commencement	
		1990	1991
<b>Regular Courses:</b>			
1.	9-month Diploma Course in WL Management	AUG	
2.	3-month Certificate Course in WL Management	MAY	
3.	Second Year of second batch of 2-Year M.Sc. Wildlife Biology	On-going	
<b>Other Activities:</b>			
4.	Overseas Fellowships for Faculty	APR/MAY	
5.	High Altitude Ecology Workshop	JUL	
6.	Annual Research Review Seminar	AUG	
7.	Regional Seminar on Integrated Forestry Planning and Management	SEP	
8.	One week Course for IFS Officers (Compulsory Training)	OCT	
9.	SAARC Seminar on Wildlife Management	DEC	
10.	National Workshop on Integrated Forestry Planning and Management		JAN
11.	UNESCO Buffer Zone Management Workshop		FEB
12.	4 New Field Research Projects	AUG/SEP DEC	JAN
13.	FAO-UNDP Project on P.A. Management & Ecodevelopment Planning		JAN
<b>Campus Development:</b>			
14.	Construction of guest house	AUG	
15.	Land acquisition	SEP	
16.	Interiors & Furnishing	OCT	
17.	Airconditioning of Library & Computer Rooms		JAN
<b>Publications:</b>			
i)	Guidelines for Management Plans	MAY	
ii)	Census Techniques Manual	MAY	
iii)	Research Project Reports		JAN FEB MAR

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**AUDIT REPORT**

**&**

**ACCOUNTS**

**AUDIT CERTIFICATE**

I have examined the accounts and the Balance Sheet of Wildlife Institute of India, Dehra Dun for the year ending 31st March, 1990. I have obtained all the informations and explanations that I have required and subject to the observations in the appended Inspection Report, I Certify, as a result of my audit, that in my opinion these accounts and Balance Sheet are properly drawn up so as to exhibit a true and fair view of the state of affairs of the Institute according to the best of my informations and explanations given to me and as shown by the books of the organisation.

Dated: 14.9.90  
Place: Dehra Dun.

(A.C. Shahi)  
Audit Officer,  
Office of the Principal Director of Audit (SD)  
A.G.C.R. Building, New Delhi.



B/F 4,35,30,787.60

B/F 2,86,90,699.83

Interest on CPF	35,384.00	36,308.00	71,692.00	Architect fee &	6,82,675.00	5,10,384.00	13,43,059.00
Interest on GPF	5,255.00	5,272.00	10,527.00	Supervision charges	—	—	—
Withheld amount	—	4,25,000.00	4,25,000.00	Grant-in aid	—	—	—
				Accrued not received			
				Training cost	70,350.00	83,800.00	
				Accrued not received			
				Advanced to	3,38,437.26	(-),2,37,437.26	1,01,000.00
				conduct trainees tour,			
				workshop and seminar			
				Advanced to staff	4,74,532.53	(-),1,76,862.39	2,97,670.14
				(for expenses)			
				Loan &	1,94,115.20	4,13,489.00	6,07,604.20
				Advances to staff			
				To Sundry	16,17,867.00	(-),5,03,986.00	19,51,262.00
				Debtors	(+),8,37,381.00		
				To Material	14,12,360.12*	+ 3,83,120.83	11,24,432.18
				Advance to contractor		- 6,71,048.77	
				CASH AND BANK BALANCES			
				With U.B.I., Dehra Dun	1,32,575.37		
				(Trainees A/C)			
				With U.B.I. & S.B.I.	96,92,216.82		
				Dehra Dun.			
				Cash in hand	13,687.06	98,38,479.25	
							4,40,38,006

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

Finance Officer

Director

Director of Audit

Commerce, Works, and Miscellaneous II  
New Delhi

NOTE -1. \*Rs.6,71,048.77 out of Material Advance has been capitalised.

2. Against the amount of Rs.1,00,00,000 accounted for in the year 1989-90, expenditure has been booked in this year. Hence, it resulted in excess of expenditure over income.

#### WILDLIFE INSTITUTE OF INDIA, DEHRA DUN INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDING 31ST MARCH, 1990.

EXPENDITURE	Amount (Rs.)	INCOME	Amount (Rs.)	Amount (Rs.)
To salaries and allowances (including LTC)	31,66,859.90	By Grant-in-aid	1,30,00,000.00	
To Leave Salary & Pension Contribution	70,285.00	Deptt. of Env.,		
To Bonus	79,009.00	Forests & WL., New Delhi		
To Honorarium	16,530.00	Less transfer to	1,04,83,283.63	25,16,716.37
To Fellowship	5,83,185.65	Capital expenditure		
To Wages	7,35,303.25	By Grant-in-aid		
To Travel Expenses	5,83,746.90	accrued but not received		
To Newspapers & Magazines	18,492.55	By Training Cost	1,74,364.00	
To Publicity & Advertisement	23,277.90	9-months Dip.Course	3,96,600.00	6,76,628.41
To Operational Expenses	3,82,260.74	3-months Cert.Course	1,05,664.41	70,350.00
To Stationery	2,09,652.00	Other receipts		
To Maintenance of animals (Deer Park)	42,875.00	By Training Cost		
To Rent for Hired Buildings	1,84,087.00	accrued but not received		
To Postage & Telegram	66,269.95	By Interest on Bank		5,19,901.90
To Sports Goods	19,710.60	By Earnest Money Forfeited		21,613.00
To Uniforms	23,429.00			
To Telephone & Trunk calls	2,33,540.20			
To Conveyance	13,197.25			
To Electricity & Water charges	51,521.84			
To Entertainment	45,346.45			
To Printing & Binding	1,49,686.00			
To Repair & Maintenance of Office equipment	16,498.00			

C/F 67,14,764.18

C/F 38,05,209.68

	B/F		B/F	
To Seminar & Workshops		67,14,764.18		38,05,209.68
To Insurance (Research Fellow and Faculty Members)		21,594.26	By Workshops & Seminars	43,500.00
To Exhibition		21,285.00	By Interest on Mobilisation Advance	1,35,368.00
To Stipend to M.Sc.Students		7,44,150.00	By Misc.Receipts	10,793.12
To Food Allowance		97,470.00	By Other Receipts for consultancy (MPEB & Sri Lankan candidates)	1,06,130.00
To Legal Expenses		21,000.00	By Narmada Valley Project	8,00,000.00
To CPF Contributions (WII shares)		6,300.00		
To Training Programme		1,03,491.00		
To Repair & Maintenance of vehicles		8,42,147.97		
To Vehicle Insurance		2,85,162.37		
To POL for vehicles		6,413.00		
To Provision for interest on CPF		3,05,060.53		
To Provision for interest on GPF		36,308.00		
To Provision for Audit Fee		5,272.00		
To Minor Works		-		
To Sales Tax on purchase of Cement		99,037.00		
		1,13,914.00	*Excess of Expenditure over Income.	45,22,368.51
<b>Total</b>		<b>94,23,369.31</b>	<b>Total</b>	<b>94,23,369.31</b>

Finance Officer  
 Examined and found correct as per books of accounts, vouchers, etc. produced before me as per information and explanation given to me.

Dated:  
Place:

Audit Officer

\*This is due to account of Rs.1,00,000.00 received at the end of year 1988-89 in that year. But expenditure against this booked in 1989-90.

### RECEIPTS AND PAYMENTS ACCOUNT FOR THE YEAR ENDING 31ST MARCH,1990.

RECEIPTS	Amount (Rs.)	Amount (Rs.)	PAYMENTS	Amount (Rs.)
To Opening Balance:			By Salaries	31,66,859.90
Cash in Hand	38,930.93		By Leave Salary & Pension	70,285.00
Cash in Bank	41,62,947.44	42,01,878.37	By Bonus	79,009.00
To Training Account			By Honorarium	16,530.00
Opening balance		60,657.67	By Fellowship	5,83,185.65
To Grant-in-aid			By Wages	7,35,303.25
Department of Environment, Forests, New Delhi.ehhi.		2,30,00,000.00	By Travel Expenses	5,83,746.90
To Training Cost			By Newspaper & Magazines	18,492.55
9-months Diploma Course		1,74,364.00		
3-months Certificate Course		3,96,600.00	By Publicity & Advertisement	23,277.90
Other receipts		1,05,664.41	By Operational Expenses	3,82,260.74
To Interest Credited by Bank		5,19,901.90	By Stationery	2,09,652.00
To Workshop & Seminar		43,500.00	By Maintenance of Deer Park	42,875.00
To Interest on Mobilisation Advance		1,35,368.00	By Rent for hired Building	1,84,087.00
			By Postage & Telegram	66,269.95
To Recovery of Mobilisation Advance		3,90,061.00	By Sports Goods	19,710.60
To Recovery of Income Tax from Contractor		1,42,791.00	By Uniforms	23,429.00
To Recovery of Sale Tax from Contractor		1,36,150.00	By Telephone & Trunk calls	2,33,540.20
To Recovery of Security Deposits from Contractor		3,79,837.00	By Conveyance Charges	13,197.25
To Earnest Money		7,200.00	By Electricity & Water Charges	51,521.84
To Recoveries from Pay Bills to be remitted to Govt. Depts./other bodies.		1,43,336.00	By Entertainment	45,346.45
To Miscellaneous Receipts & Penal recovery from Contractor(withheld)		4,25,000.00	By Printing & Binding	1,49,686.00
			By Repair of Office Equipment	16,498.00
			By Seminar & Workshop	21,594.26
			By Insurance of Research Fellows & Faculty Members	21,285.00
			By Exhibition	7,44,150.00
				75,01,793.44
				C/F
				C/F

B/F	3,02,62,309.35	B/F	75,01,793.44
To Refund of unspent Advance for Expenses	4,74,532.53	By Stipend	97,470.00
To Refund of Advance for Expenses (Training)	3,38,437.26	By Food Allowance	21,000.00
To Recovery of Electricity charges from Contractor		By Legal Expenses	6,300.00
To Miscellaneous Receipts		By CPF Contribution by WII	1,03,491.00
i) Sale of Tender documents		By Training Cost	8,42,147.97
ii) Guest House Charges		By Minor Work	99,037.00
iii) Photocopy Charges		By repair and maintenance of vehicle	2,85,162.37
iv) Private use of vehicle	10,793.12	By Vehicle Insurance	6,413.00
To Forfeiture of Earnest Money	21,613.00	By POL for Vehicle	3,05,060.53
To Receipt from Narmada Valley Project	8,00,000.00	By Purchase of Vehicle	4,13,588.00
		By Journals & Periodicals	2,85,649.25
To Account with State Bank of India (Srilankan Candidate & MPSEB)	1,06,130.00	By Scientific Publication	74,300.00
To CGEGIS from LIC of India	40,301.75	By Audiovisual, Computers & Training Equipment	9,64,920.36
Meerut in r/o Shri S.B.Prasad		By Laboratory Equipment & Chemicals	2,05,007.95
To Recovery of Secured Advance	1,13,925.00	By Office Equipment	1,76,618.00
		By Camp Equipment	31,839.00
		By Photographs & Photographic materials	76,790.70
		By Educational Films	74,785.00
		By Furniture & Fixtures	1,09,330.15
		By Material & Supplies	1,502.00
		By Library Books	3,91,877.00
		By Avenue Plantation	49,446.00
		By Advance for Expenses	2,97,670.14
		By Advance for Expenses (Training)	1,01,000.00
C/F	3,21,68,042.01	C/F	1,25,22,198.86

B/F 3,21,68,042.01

B/F	1,25,22,198.86	By GPF Advance/Withdrawal	1,02,636.00
		By CPF Advance/Withdrawal	52,299.00
		By Motor Car Advance	75,000.00
		By Housebuilding Advance	1,03,700.00
		By Scooter Advance	1,28,560.00
		By Cycle Advance	10,200.00
		By Festival Advance	17,200.00
		By Remittance of Income Tax deduction from pay bills	67,230.00
		By Remittance or Income Tax deduction from Contractor Bills	1,51,642.85
		By Remittance or Sales Tax deduction from Contractor Bills	1,36,150.00
		By Sales Tax on Purchase of cement	1,13,914.00
		By Procurement of Cement & Steel	3,83,120.83
		By Testing Charges of Cement	7,930.00
		By Construction of Building (including escalation and Advertisement)	70,04,698.22
		By Electrical Fitting	18,752.00
		By Boundary Wall Block I,II,III & Gat	73,213.00
		By Campus Development	12,653.00
		By Refund of Earnest Money	700.00
		By Construction & Architectural Management	5,10,384.00
		By Secured Advance	8,37,381.00
		By Cash-in-hand	13,687.06
		By Bank Balances with UBI and SBI	96,92,216.82
		By Cash with UBI (Trainees Account)	1,32,575.37
		<b>Total</b>	<b>3,21,68,042.01</b>

Total 3,21,68,042.01

Finance Officer  
W.I.I

Director  
W.I.I.

Examined and found correct as per books of Accounts, Vouchers produced before me and as per information and explanations given to me.

Dated,

1990

Director of Audit

Commerce, Works & Miscellaneous II,  
New Delhi.