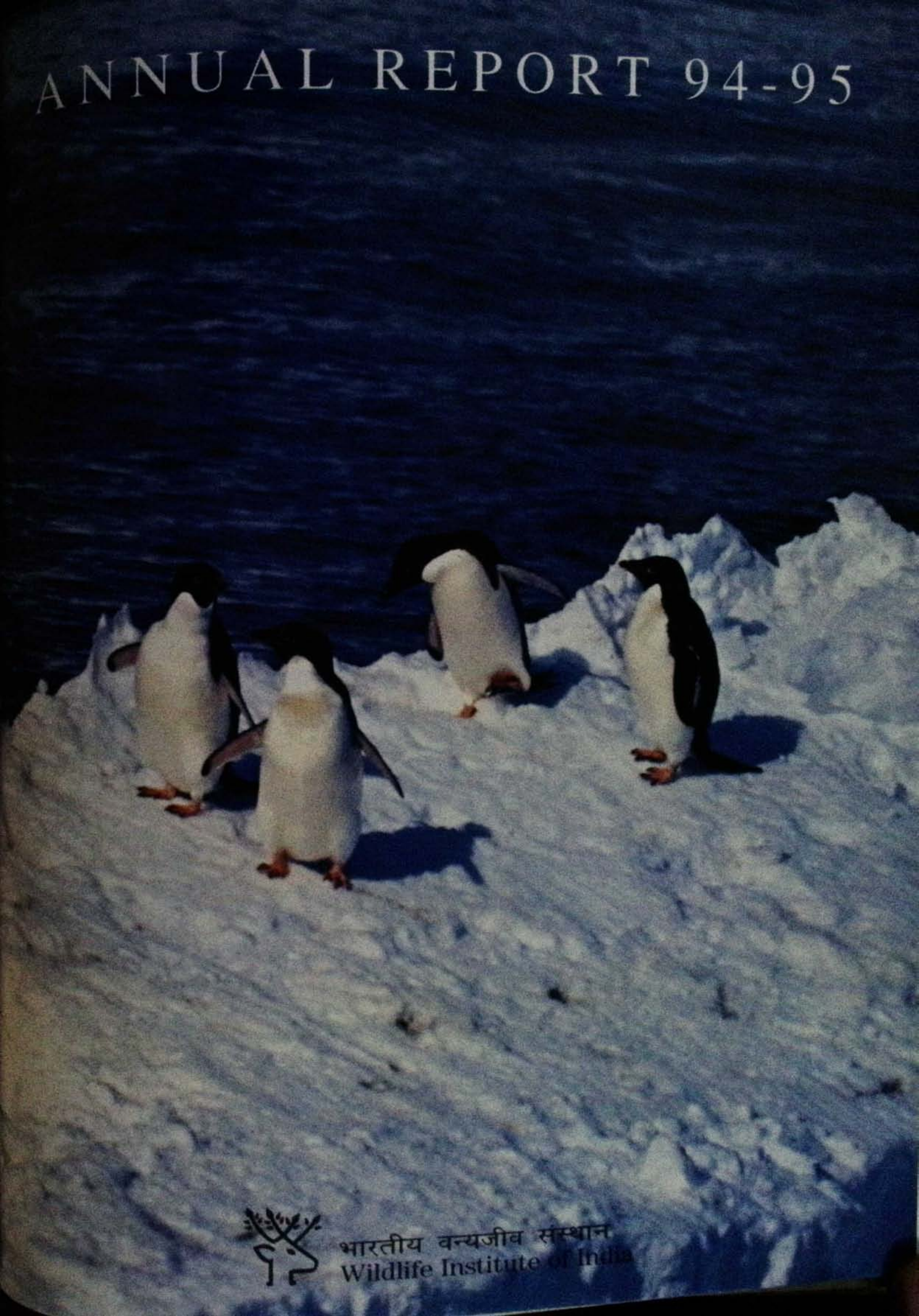
ANNUAL REPORT 94-95



भारतीय वन्यजीव संस्थान
Wildlife Institute of India

DIRECTOR'S NOTE

For WII, 1994-95 has been a year of change. It is generally believed that change, when properly managed, provides opportunities for growth. And so it has been too, at WII.

The year began with the evaluation of WII's work by a committee appointed by the institute's Governing Body. The committee's indepth study and report, in two volumes, concluded that considering its workload, WII was understaffed; infact, to ease the heavy work pressure on the existing staff, and further improve the work quality, would require almost double the present number of employees. The report helped us in framing WII's infrastructural needs in the EFC memorandum. The Governing Body as well as the Ministry of Environment and Forests have agreed to the staff requirement recommendations, and have now placed these before the Planning Commission for approval.

Sh HS Panwar, Director-WII, took retirement from the institute to join FAO. For us, this was a big change. However, due largely to the work culture inculcated by him, his departure saw the faculty and staff members work with greater vigour and commitment.

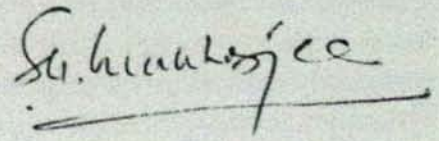
WII's training courses and programmes have received wide appreciation within and outside the country. Study tours conducted for delegates from Sri Lanka, Vietnam and China were well received and an immediate outcome was the signing of an MOU with FAO for conducting a special diploma course for in service officers of the Wildlife Department of Sri Lanka. Two members of the faculty also visited Vietnam and Bhutan as consultants.

The year of change has also been a year of many firsts. The cooperative wildlife health programme, begun this year in collaboration with USFWS, will provide much needed support to the Indian Veterinary Council in its efforts to strengthen the faculty in the various veterinary colleges for assisting state wildlife departments in diagnosis and prevention of wildlife disease outbreaks.

Our maiden attempt to bring together PA managers, tour operators and the tourism department is also likely to bring about perceptive changes in the field of wildlife tourism management. Similarly, WII's participation in the Indian scientific expedition to Antarctica has opened up new avenues and approaches for wildlife monitoring and research in the Indian Ocean and Antarctica regions.

WII was also called upon by the Government of India and some state governments to provide consultancy to several World Bank aided forestry programmes. While such responsibility clearly reflects the growing stature of WII, it also offers new challenges to its faculty.

WII's achievements during 1994-95 have largely been as a result of effective partnerships with state organizations, other institutions and NGOs. I wish to extend my sincere thanks to all who helped make our efforts successful. The newfound skills and talent of our staff and their dedication have given me a lot of encouragement and strength.



YEAR AT A GLANCE

Environmental concerns are becoming more and more acute and pressing. The urban and rural issues are now standing in tandem, with each affecting the other in a far reaching manner. With the passing of each year, the role of organizations like the Wildlife Institute of India (WII) which are working in the nature conservation sector is becoming ever more challenging. That WII has been soundly following its agenda and fulfilling its tasks is reflected in the progressive growth in its tasks and programmes, and shiftings in its stance in accordance with the demands of the field. This can also be seen in the fact that for WII, wildlife no longer means only animals but as much includes people who inhabit the surrounds of the protected areas.

The year 1994-95 has been eventful, marked by the departure of HS Panwar from the Directorship of the institute. Panwar, who has been the driving force behind the spectacular rise of WII during the last decade, has now joined the FAO. As a befitting example of the work culture inculcated by Panwar, his departure saw the institute faculty and staff work with a greater vigour.

WII is now well into the second decade of its existence, and has completed eight years since it became autonomous. Its training courses and programmes for in-service foresters and others are now beginning to receive wider acceptance and appreciation. Although it is not possible - nor indeed desirable - to change the mindset of an entire service force at one go, WII's efforts to encourage PA managers and other officials adopt a holistic, people-friendly approach are likely to bear fruit in the years to come, if not immediately. An indication of the validity of these programmes is the virtually regular participation by overseas forest personnel in the training courses. The diploma course being conducted at present includes a participant from Sri Lanka. The major feature of this year's course, however, is the participation for the first time by veterinarians from the veterinary and agriculture universities in three different states. Their attendance was made possible under a WII-USFWS joint programme on "Cooperative Wildlife Health Programme" which has been started with the aim of enhancing the capabilities of professionals from such institutions in providing dignostic and disease investigation services along with health education and information exchange for the conservation of wildlife.

Last year two new courses were started on Ecodevelopment Planning and Management Planning under a joint GOI-UNDP project. The courses have been designed partly to augment the availability of wildlife managers and planners in the country, and also to reorder rural development in the buffer and adjacent areas around PAs in a way so as to promote people's support for conservation. Thus far, two courses have been conducted on the former and one on the latter topic. A significant feature of these courses was an overseas study tour this year undertaken by 16 trainees from these courses.

WII's course in M Sc in Wildlife Science seeks to provide trained wildlife biologists and scientists for wildlife conservation. The present batch is the fourth, and is now in its final term of completion.

Other than its regular courses and programmes, WII organized a number of workshops and seminars, of which the institute's research seminar is a regular, annual feature to which leading foresters, wildlife scientists and other academicians are invited. The highlight of this year's annual research seminar was the concurrent organization of a workshop on coordination and monitoring of wildlife research in the country. This was a responsibility which the Ministry of Environment and Forests had accorded four institutions in the country. WII, besides looking after the northern region, was given the additional responsibility of coordinating this effort at the national level as well. Other workshops and seminars covered themes and topics such as wetlands, wildlife tourism, biodiversity conservation, project planning, etc.

Research is one of the primary items on WII's agenda and covers ecological, biological, behavioral studies on big and small, rare and endangered faunal and floral species including their people related ramifications. During 1994-95, four Ph.D degrees were awarded for research completed last year; and six other research studies were

completed. The Environment Impact Assessment of the Narmada and Omkareshwar projects made recommendations on alternative sites for the restoration and preservation of wildlife and people related values of the proposed submerged areas. An alternative site in Madhya Pradesh was also proposed (and which has been accepted) for a second population of free ranging lions outside the Gir in Gujarat in view of the long-term survival of this species.

In a survey project, a major nesting site of Olive Ridley turtles in Orissa was discovered where an estimated two lakh female turtles lay eggs. The discovered site and associated aspects for conservation and management of sea turtles in the coasts off Orissa are now being studies in greater detail. In two other projects, skin biopsy for collection of blood samples from wild animals was performed by a technique that does not require the animal to be tranquillized and which was used in the wild for the first time in the country.

A significant achievement for WII this year has been its participation for the first time in the Indian Scientific Expedition to the Antarctica, wherein a project was developed for a long-term monitoring programme for mammals and birds of Dakshin Gangotri and Maitri regions of Antarctica.

Other research projects included, among others, issues like wildlife-human conflicts, socio-economics, computerised database and GIS application and survey studies.

The faculty members, in their individual as well as institutional capacities, provided consultancy on wildlife matters to external agencies and organizations within and outside the country - such forestry training in Vietnam, floristic survey in Bhutan, turtle management in UP, elephant problems in West Bengal, etc. Teaching resource inputs continued to be regularly provided to sister organizations and in external conferences, seminars and workshops. They have also availed of fellowship assistance and other grants for undertaking study tours overseas to improve their individual and institutional capabilities.

In the international collaboration arena, the Indo-US project on the "Development of Wildlife Institute of India", jointly carried out by WII and US FWS, has been completed. The project completed in June 1994, but was given a further six month extension for rounding up. The project has been immensely successful, in that it has brought the institute's faculty at par with the best in international standards. In order to drive home the benefits of this project, a second phase has been proposed and accepted, which would see the technical gains made under Phase-I being implemented under specific project situations and conditions. This Phase-II is awaiting the mandatory clearance from the Economic Affairs department of the Government of India.

The support provided by USFWS and UNDP towards developing WII's computer centre, to make it one of the best and most advanced in its field in the country, needs to be acknowledged. The centre, and particularly the GIS, is now being increasingly used for data analysis in the institute's research projects.

WII's Library and Documentation Centre today houses over 16,000 titles, over 6000 reprints and topographic maps besides subscribing to over 200 national and international journals. The Laboratory is fast developing it capabilities in forensic analysis, and provides assistance in identification of confiscated wildlife materials in criminal cases.

During 1994-95, among other publications, *Impact Assessment Studies of Narmada Sagar and Omkareshwar Projects on Flora and Fauna and Attendant Human Aspects* was issued as a priced item, and is available for sale.

On the home front, work on Phase-II contruction is well under progress wherein, among others, a sports complex is coming up and a small earthern dam is being constructed which would add to the beauty of the landscape and provide a valuable waterbody, hopefully attracting migratory birds in the years to come.

All in all, 1994-95 has been a busy year in which WII gained newer heights and horizons.

Main Programme 1994-95

Regular training courses

1. XV PG Diploma Course (9 month)
2. XVI PG Diploma Course (9 month)
3. IV M.Sc in Wildlife (2 year)
4. II Ecodevelopment Planning (100 days)
5. II Management Planning (100 days)

Short courses, workshops, seminars

6. Annual Research Seminar
7. Capsule Course for IFS Officers (1 week)
8. Capsule Course for IFS Officers (3 week)
9. Short course in Zoo Management
10. Workshop - Wildlife Tourism Management
11. Computer Training - Diploma Trainees
12. Computer Training - Management Planning Trainees
13. Computer Training - WII Faculty & Staff
14. Workshop for PCCFs/CCFs on Integrated Programmes to Support Biodiversity Conservation
15. Orientation Training - New Research Scholars(1 1/2 month)

Campus development

Work completed

1. Storm water channel
2. Sports complex levelling
3. Servant quarters extension in Type V houses

Work undertaken

4. Road construction in Block III
5. Approach road and retaining wall for new hostel block
6. Earthen dam construction
7. Water proofing of Types II and III houses; also some houses in Types I and IV.
8. Tender finalization for miscellaneous work.

Publications

1. Impact Assessment Studies of Narmada Sagar and Omkareshwar Projects on Flora and Fauna with Attendant Human Aspects.
2. The Development of International Principles of Wildlife Research and Management: Asian and American Approaches.

Sarvan Kumar

A splendid little creature in the wild

BACKGROUND

In biological diversity, India is among the better endowed countries, unique in terms of species richness as well as the range of its diverse habitats from cold deserts to tropical rainforests. With the new-found commercial value of biodiversity, much of India's economic strength in the 21st century will depend upon our ability to conserve this biodiversity and make use of it.

However, in the last fifty or so years, the country's population has more than trebled and that of the livestock grown about two and half times. Development has not been allround and the rural countryside, particularly in the vicinity of wilderness areas such as forests, arid grasslands, deserts or coasts, have primarily got sidetracked. Mega-development projects, ignoring the views of the local area population and unconcerned at their plight, have been heavy consumers of natural resources like minerals, water and wood, and have effectively diverted their landuse and other resources. Such acts, together with insidious market forces, have alienated the people from their commons and forests, and have forced them to pillage their own livelihood resources. All this has naturally had a negative effect on the country's biodiversity.

While it is becoming more and more obvious that the country's critical biodiversity can be largely conserved only in protected wilderness areas, the management of such areas in the present scenario is not the easiest of tasks. More so, when such management must simultaneously conserve biological diversity, ensure sustainable productivity and secure human life-support systems. The stakes are high because the man-land ratio is becoming increasingly unsustainable, and drought, flood, soil erosion, impoverished water regime are becoming regular features.

The signs of the country's degrading environment were beginning to become apparent in the sixties, and the Government of India had taken a few measures to protect its wilderness areas. However, these early initiatives suffered from lack of clear direction and initial teething problems.

Wildlife management and conservation called for a scientific as well as a practical approach but, in India, such an approach was not yet a defined reality. The country had an excellent forest service with a long history; and the wilderness areas - the then over 200 national parks and sanctuaries - were (and continue to be) under its charge. But the forest department's concern seemed more to be guided by the industrial and economic potential of the forests rather than by their invisible ecological values; and its personnel were trained in forestry and not so in managing wildlife. The situation called for an organization that could marry the two, effectively and holistically.

Thus, in 1982, came into being the Wildlife Institute of India (WII) at Dehra Dun, with a mandate to -

* Train personnel at various levels for the conservation and management of wildlife resources as well as provide orientation to all those concerned therewith;

* Carry out research relevant to management including the development of techniques appropriate to Indian conditions;

* Build up a body of scientific knowledge on the wildlife resources of the country;

* Provide information and advice on specific wildlife management problems;

* Provide a basis for cooperation with international organizations concerned with wildlife management, research and training;

* Work towards developing an autonomous institution of university status which provides graduates in natural resource conservation and management for both government and non-government institutions including university faculty and wildlife and conservation organizations. It should ultimately become a regional centre of international importance in studies of Asian wildlife and natural resource management.

For WII, the path was neither easy nor, in fact, cut out.

Wildlife, as a subject discipline, was yet to be introduced in the country in any significant measure. As such, interventions and initiatives had to be taken on many fronts: developing a wildlife bias among foresters, nursing a cadre of biologists and socio-economists for studies and research in the field - not merely from the point of view of study and employment potential but just as much to become the resource for future training needs. In other words, WII had to not only give forest management a wildlife slant, but also create and develop the very resources with which it could go about its tasks. Moreover, as the experiences in Project Tiger had driven home, conservation efforts needed to have a holistic approach rather than be concentrated on protecting mainly a few individual species and, more importantly, have sociological considerations as well.

Over the years, keeping in mind the country's above everchaning conservation scenario and environmental demands, WII has sincerely geared its programmes to fulfill its assigned mandate. Accordingly, its wide range of activities have sought to achieve the integration of biological, managerial, socio-economic and human aspects of large regional landscapes. Its training courses and research studies cover wildlife ecology and biology, management, education-interpretation, zoo management, management planning for protected areas and ecodevelopment planning around them. The research studies, with field sites spread out over the country, are the primary sources of scientific information to help conservation. These are also seen as means of keeping the institute's faculty abreast of field situations and the latest technology, which helps their teaching always remain updated and relevant to field requirements.

WII was accorded an autonomous status in April 1986. This paved the way for speedy recruitment of scientific and other staff in order to expedite the institute's academic activities, maintain professional excellence and add on new programmes in response to the felt needs emerging from the field. The institute has also had the benefit of international and bilateral collaborations for institutioinal building, faculty development, infusion of modern technology and creation of a scientific instrastructure.

WII works in close collaboration with state wildlife organizations, scientific institutions and universities. The institute's scientific faculty has undertaken consultancies on wildlife scientific and management problems within India as well as several countries in the region. The other countries in the region too, e.g. **Afghanistan, Bangladesh, Bhutan, China, Iran, Laos PDR, Maldives, Mauritius, Mongolia, Myanmar, Nepal, Pakistan, Sri Lanka** and **Zambia,** impressed with the institute's standard, have sent their personnel for its training programmes. Hopefully, such overseas participation will increase in the years to come.

OBJECTIVES

In its efforts to find workable solutions and techniques to the many field problems concerning the management and conservation of wildlife, WII has set itself the following task objectives :

* Training managers and biologists for protected area management and wildlife research;
* Training education and extension specialists for protected areas to get public support for wildlife conservation;
* Providing orientation courses for those involved in landuse management;
* Conducting and coordinating applied wildlife research and evolving relevant techniques suited to Indian conditions;
* Creating a database for building up a wildlife information system employing modern analytical techniques and computer equipment; and
* Providing advisory and consultancy services to central and state governments, universities, research institutions and other official and non-official agencies.

INSTITUTIONAL INFRASTRUCTURE

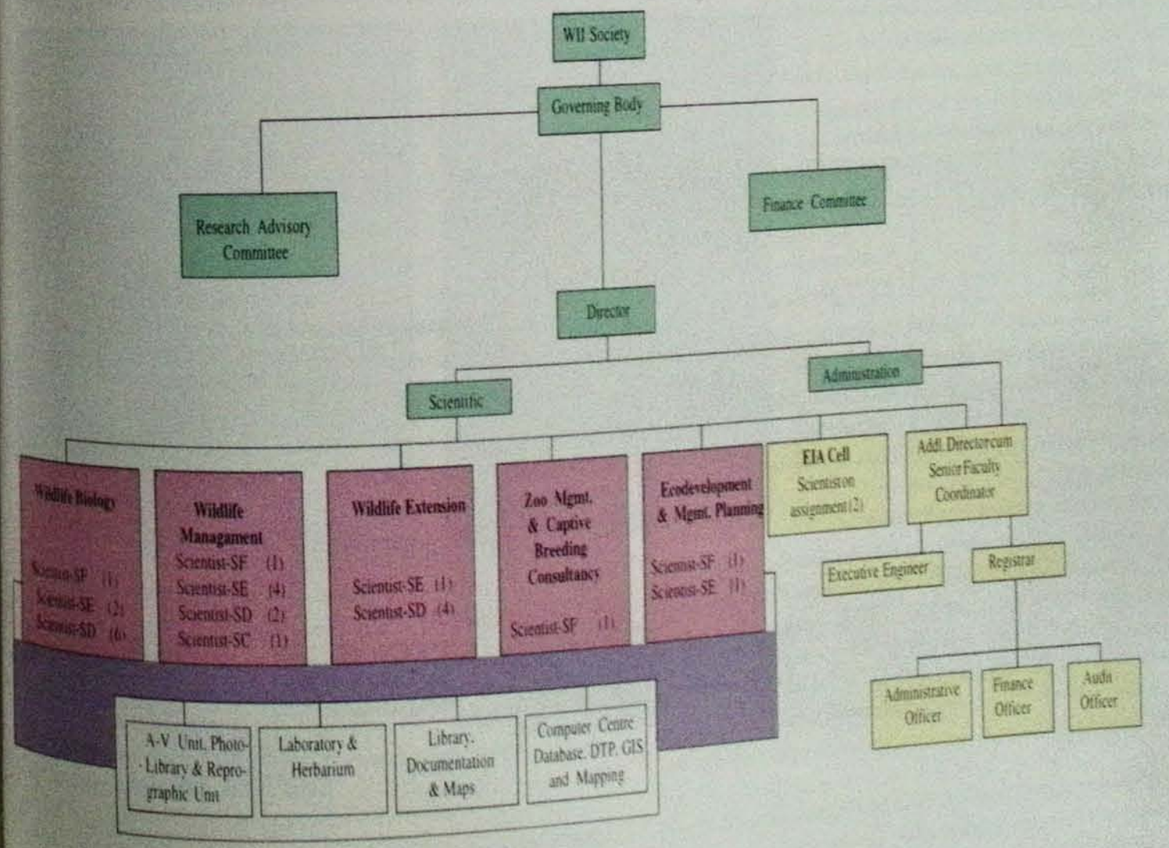
There are three faculty divisions in WII - **Biology, Management** and **Extension**. Other than these, there's a division handling training programmes in **Ecodevelopment and Management Planning** as well as the internationally aided projects. There is also an **Environment Impact Assessment Cell** which undertakes consultancies for previewing the impact of proposed industrial or commercial projects on wildlife. The **Library, Laboratory, Computer Cell** and **AV Unit** support the institute's various scientific and academic functions. The **Administration** division is headed by the Additional Director-cum-Senior Faculty Coordinator, with a Registrar for assistance. The gamut of employees covers scientific, technical and administrative categories.(See charts below)

WII's programmes and activities are classified as follows :

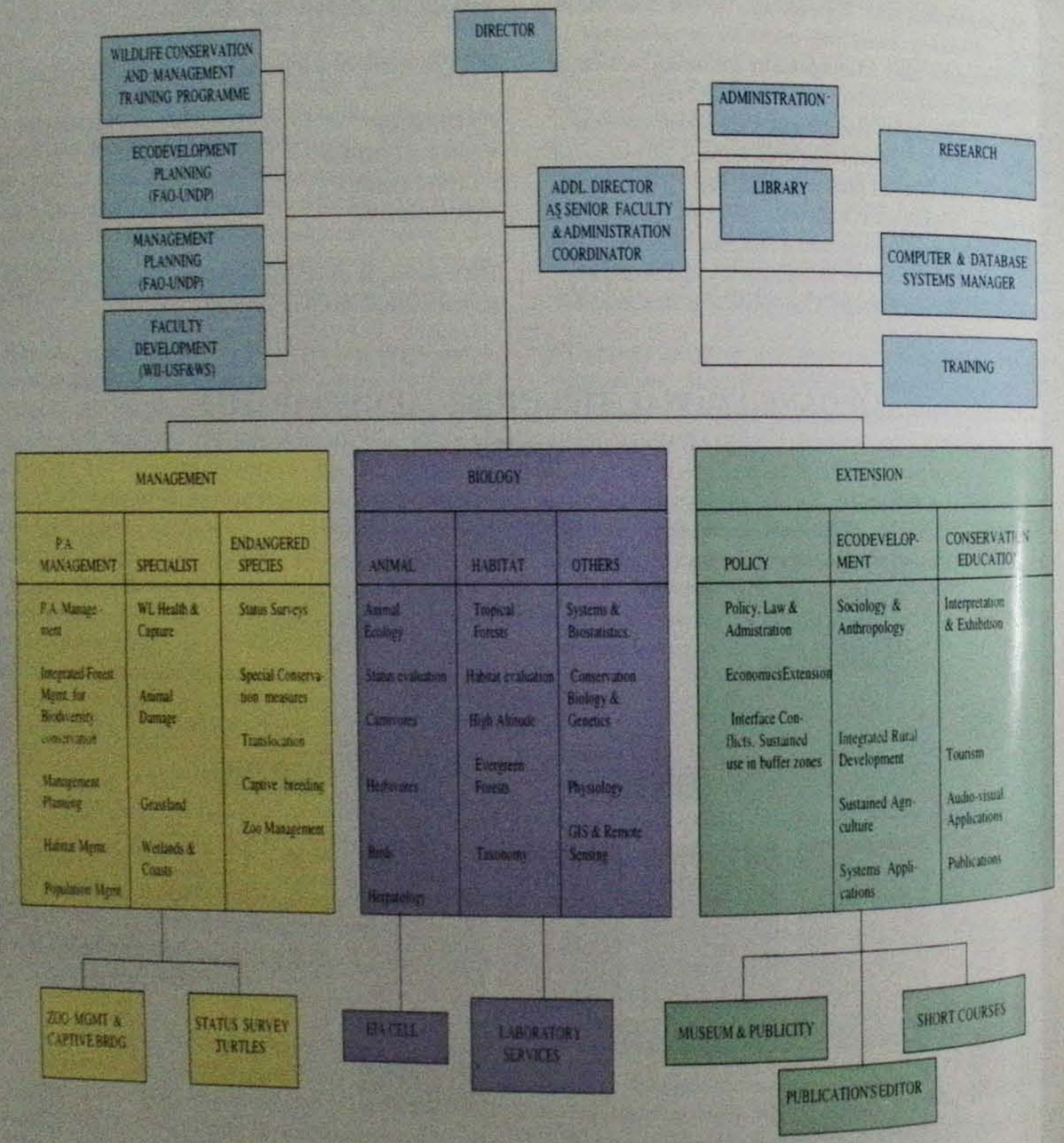
* ACADEMIC
* ORGANIZATION
* DEVELOPMENT
* EXTENSION

The following is an account of WII and its programmes and activities during the year 1994-95.

ORGANISATIONAL STRUCTURE - ADMINISTRATIVE



ORGANISATIONAL STRUCTURE - SCIENTIFIC



ACADEMIC

TRAINING PROGRAMMES

Post-Graduate Diploma in Wildlife Management

The *XV Course* was reported in detail in the previous Annual Report. The course, however, concluded on 31 May 1994. Of the 15 trainees in the course, the top honours and institute gold medal was bagged by AK Mishra from Orissa. Other awards for excellent performances were given to VK Yadav (West Bengal), GP Garad (Maharashtra) and V Ganeshan (Tamil Nadu).

The *XVI Course* began on 1 September 1994 with 12 officer trainees representing nine states, one overseas trainee from Sri Lanka and three participants from Veterinary & Agriculture Universities in three states. The veterinarians were a new feature for the diploma course and part of a WII-FWS(US) joint project on "Coorperative Wildlife Health Programme". At the time of reporting, the course has completed most of its classroom lectures, group discussions and workshops on various themes, besides three months of field visits and training. The first term papers were conducted in December 1994.

The field visits began with a one-week Orientation Tour to Sariska Tiger Reserve (Rajasthan) in the fourth week of October 1994. The tour introduced the trainees to the wildlife values of a protected area, the different wildlife habitats, tourism and human-wildlife interface situations, and familiarized them with the various animal and bird signs.

A Techniques Tour was planned to cover a protected area in Garhwal, but had to be postponed because of unrest in the region following the Uttarakhand agitation. It has now been planned for the next year (April 1995). However, in early December 1994, a two-week Techniques Tour was conducted in Rajaji national park. The tour entailed discussions on different methods for vegetation analysis and habitat evaluation, ungulate census, and assessment of biotic pressure on wildlife habitats. The trainees carried out field exercises in order to understand these methods and techniques better.

Management Tour-I, taking up the entire of January 1995, covered : *Project Tiger areas* - Corbett and Dudhwa tiger reserves, both in Uttar Pradesh; *Wetlands* - Keoladeo national park (Rajasthan), Marine national park (Gujarat) and Khijadia wildlife sanctuary; *Special significance PAs* - Gir national park (Gujarat), Dhrangdhra wild ass sanctuary (Gujarat) and Asola wildlife sanctuary (Delhi); *Zoos* - National zoological park (Delhi) and Sakkarbagh zoological park (Gujarat); and *Institutions* - Centre for Environment Education and GEER (Gujarat) and National Museum of Natural History (Delhi). Besides getting aquainted with the environmental and conservational values of these various areas, and their management issues - problems and mitigation strategies, including management capabilities and the human dimensions, the trainees also looked into the role of protected areas, zoos and institutions in interpretation and conservation education.

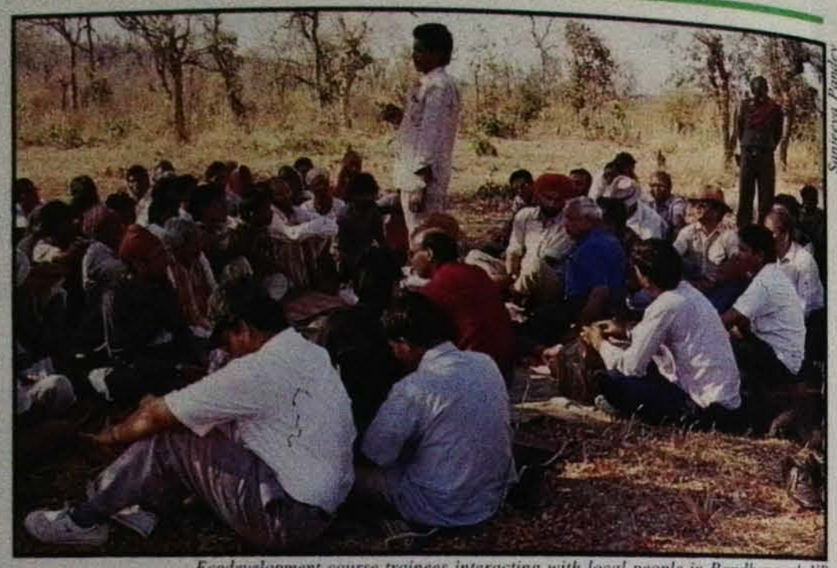
The tour effectively exposed the trainees to a variety of management practices across several protected areas and zoological parks in the country. In contrast, Management Tour-II required the trainees to concentrate on a single protected area. In this ten-day tour to Ranthambhore tiger reserve (Rajasthan), the trainees were assigned specific topics on the various aspects of the resources and their management in the protected area. The trainees studied and collected data on their respective assigned topics, which would later be developed into term papers for the final examinations.

Ecodevelopment Planning

Started last year under the GOI-UNDP joint project titled *Strengthening Wildlife Management and Ecodevelopment Planning Capabilities*, this course offers natural resource managers and environmental organizations a training in principles and practices of appropriate natural resource management with people's participation. The objective of this course is to reorder rural development so as to improve the socio-economic conditions of the people, and do this in a sustainable manner vis-a-vis resource productivity and optimal utilization. At the same time, the course also aims to promote the people's traditional bonds with their land and resources so as to ultimately support the conservation of protected areas. The course has a mix of theory classes and practical exercises including extensive field tours.

The *II Course*, which began in the previous reporting year (1 February 1994) had 11 participants - seven from various

state forest departments, three from NGOs and one from Indian Institute of Remote Sensing. It may be mentioned that the participation was much below the expected capacity.


Sanjeeva Pandey

Ecodevelopment course trainees interacting with local people in Bandhavgarh NP

On their field tours, the trainees were taken to various sites across the country for seeing government and NGO initiatives in natural resource conservation through appropriate technology and people's participation. The high point of the course was a three-week test planning exercise conducted in Bandhavgarh tiger reserve (Madhya Pradesh), wherein the trainees prepared ecodevelopment plans for five villages - Tala, Bijharia, Rakhi, Kathli and Lakhumar - in the northern part of the reserve. The trainees employed various PRA techniques to elicit the villagers' participation in the planning process, and prepared micro plans for each of the five villages, which were later consolidated into a single ecodevelopment plan for Bandhavgarh tiger reserve. The recommendations emerging from the exercise are expected to be implemented by the park/forest authorities.The course got over on 11 May 1994.

Wildlife Management Planning

There is considerable gap between the requirement and availability of trained wildlife managers and planners in the country. This course, also begun last year under the GOI-UNDP joint project *Strengthening Wildlife Management Planning and Ecodevelopment Planning Capabilities*, is an effort to supplement the institute's turnover of diploma trainees in order to bridge that gap in trained management manpower. However, the response and nominations from state forest departments to this course has been far from encouraging. The *II Course* was conducted from 1 September - 9 December 1994, with only four officer trainees - from Arunachal Pradesh, Gujarat, Madhya Pradesh and Kerala. This has been given serious thought and the lacunae identified and discussed with the states, and now WII is working on developing an integrated and modular course to combine wildlife management planning and ecodevelopment planning.

The trainees undertook a wildlife management technique tour to the Ranthambhore national park (Rajasthan), and the test management planning exercise was carried out in Tadoba national park (Maharashtra).

SHORT COURSES

Capsule Course for IFS officers - I : A vertically integrated course was organized (9-13 May 1994) for officers of the Indian Forest Service. This is a compulsory course planned for the officers of the CF, DCF and ACF levels. The objective of the course is to impart to the participants a basic understanding of wildlife and biodiversity conservation through a well managed network of PAs, the need for addressing socio-economic problems of the communities adjoining the PAs, and enhancing the productivity of buffer and multiple use lands as a strategy for effective wildlife and forest conservation. Special emphasis is laid on providing insights into strategies to accommodate concerns for conservation of biodiversity in the forest areas outside the PAs.

The Ministry of Environment and Forests nominated 33 officers for the course, of which 23 attended. These represented Andamans, Bihar, Gujarat, Himachal Pradesh, Rajasthan, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Sikkim, Tripura, Uttar Pradesh and West Bengal.

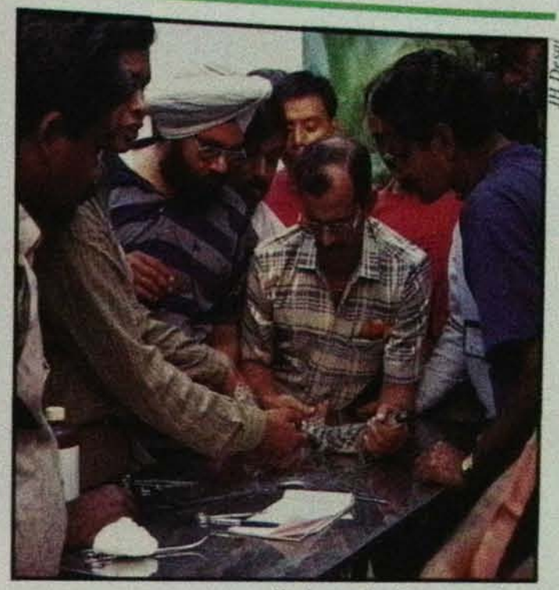
Capsule Course for IFS Officers - II : A three-week course, held at Rishikesh (7-25 November 1994), was attended by 16 officers from Kerala, Madhya Pradesh, Manipur, Meghalaya, Orissa, Rajasthan, Tamil Nadu, West Bengal, and from the central government. The course curriculum was planned to provide an overview of the conservation scene in India and also acquaint the participants with the World Conservation Strategy.

Besides theory classes, the participants visited several field sites - Rajaji national park for a demonstration of census technique and also look at the socio-cultural aspects of a Gujjar lifestyle; Corbett tiger reserve to see the management initiatives in the biological control of weeds; and Asan reservoir near Herbetpur, outside Dehra Dun, for an introduction to wetlands and the need to protect them, and discussions on the disturbance caused to migratory birds by tourism and watersports. As the participants were senior forest officers, a visit was also organized to the WII campus to aquaint them with the Wildlife Database at the institute, and how they could benefit from and also contribute to it.

Zoo Management : In view of the rapidly developing concepts of managing wildlife in captivity, the capacity of the zoos to complement field conservation efforts and the need of close cooperation among the zoo fraternity, WII has been organizing this course regularly since 1990. Meant for zoo professionals, the training is broadly designed to emphasize the essential tasks and techniques involved in the day to day management of zoos and captive breeding areas and sanctuaries.

This year, the course was funded by Central Zoo Authority and held in collaboration with the National Zoological Park at the latter venue in New Delhi on 28 December1994-10 January 1995. There were 23 participants of the level of Director and Deputy Director from the various zoos around the country.

As part of the course there were regular lectures, demonstrations, short projects and presentations by participants. The emphasis was on policy issues as well as matters pertaining to animals management and husbandry. A tour was organized to Van Vihar, Bhopal which, with its large enclosures, provided a unique setting for participants


JH Desai

Hands-on at Zoo Management Course

to take a fresh look at captive management of animals. Another study tour was conducted to the MC Zoological Park, Chatbir (Chandigarh).

EDUCATION PROGRAMMES

M. Sc. in Wildlife Science : Wildlife and animal ecology are relatively new subject disciplines in the Indian university education system. So far, only two other institutions in the country offer a full-time post-graduate degree in wildlife science. This course at WII thus tries to fulfill a vital need for trained research biologists and wildlife scientists to further the cause of wildlife conservation in India and elsewhere. The present batch is the *IV Course* which started last year (July 1993) and, at the time of reporting, is into its fourth and last semester.

The term examinations for the second semester took place in April 1994, and included three theory papers - wildlife ecology, habitat ecology and conservation, quantitative methods and techniques, and behaviour; one laboratory practical in ecology; and one field practical test on study techniques. The subjects covered in the third semester (July-November 1994) included advanced plant ecology, geographical information systems (GIS), wildlife nutrition and feeding ecology, captive breeding and propagation, tropical evergreen forest ecology, human ecology and wildlife management. During the semester, a Conservation

Practice Tour-II was conducted in Great Himalayan National Park, Himachal Pradesh.

In the ongoing fourth semester (November 1994 onwards), the students are doing field data collection work for their final term projects. The dissertation topics and sites selected for these projects are - *Impacts of habitat conversion on the leaf litter* ***Anuran*** *community of Varagaliar, Western Ghats* (Eravikulam national park, Kerala); *Utilization of major fodder tree species with respect to the food habits of domestic buffaloes in Rajaji national park* (Uttar Pradesh); *Sexual segregation in the Nilgiri tahr* ***Hemitragus hylocrius*** (Anamalai wildlife sanctuary, Tamil Nadu); *Shifting cultivation and conservation of tropical forest bird communities in Mizoram, north-east India* (Dampa wildlife sanctuary, Mizoram); *The grey tit* ***Parus major caschmerensis*** *in northern India : behaviour and ecology in the non-breeding season* (Naina Devi wildlife sanctuary, Himachal Pradesh); *Disturbance and coral community structure in the inter-tidal coral reefs of the southern Gulf of Kutch* (Gulf of Kutch national park, Gujarat); and *A study of lekking in blackbuck* ***Antilope cervicapra rajputanae*** (Velavadar national park, Gujarat).

WORKSHOPS, SEMINARS, CONFERENCES

Organized

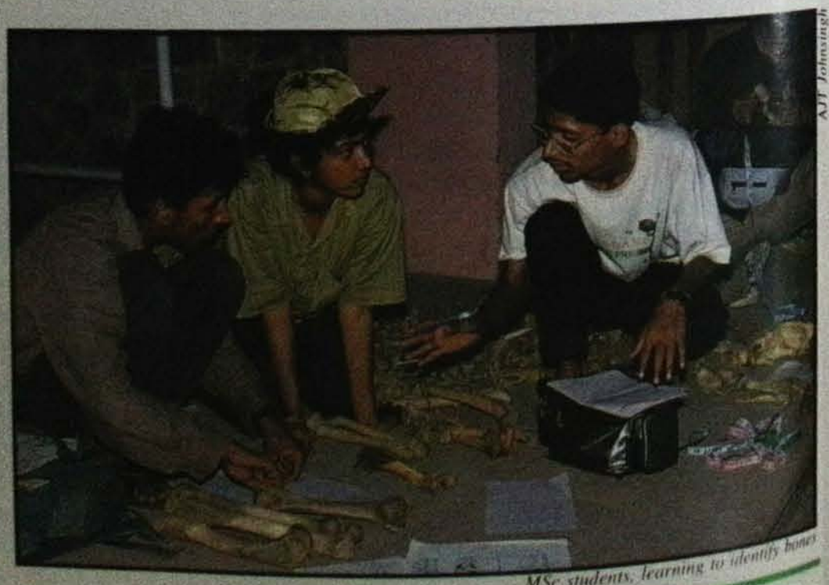
During the reporting year, 1994-95, WII organized the following :

Coasts and wetlands

Coastal wetlands are unique in terms of zoning because their richest parts are not at the 'core' (or centre) but rather at the periphery. But, less than one-third of coastal protected areas have proper management plans and no inter-state networking programme exists. Considering these shortcomings, WII organized a workshop *Coastal and Marine Protected Areas* at its campus on 7-8 April 1994. The objective of the workshop, conducted under the WII-UNDP collaborative project "Strengthening Wildlife Management Planning & Ecodevelopment Planning Capabilities", was to examine the constraints in the conservation of these protected areas, and underline the training needs. Meant specially for PA managers in the coastal areas, it was also attended by representatives from WWF and other NGOs, besides the institute's own staff. In all, there were 15 participants.

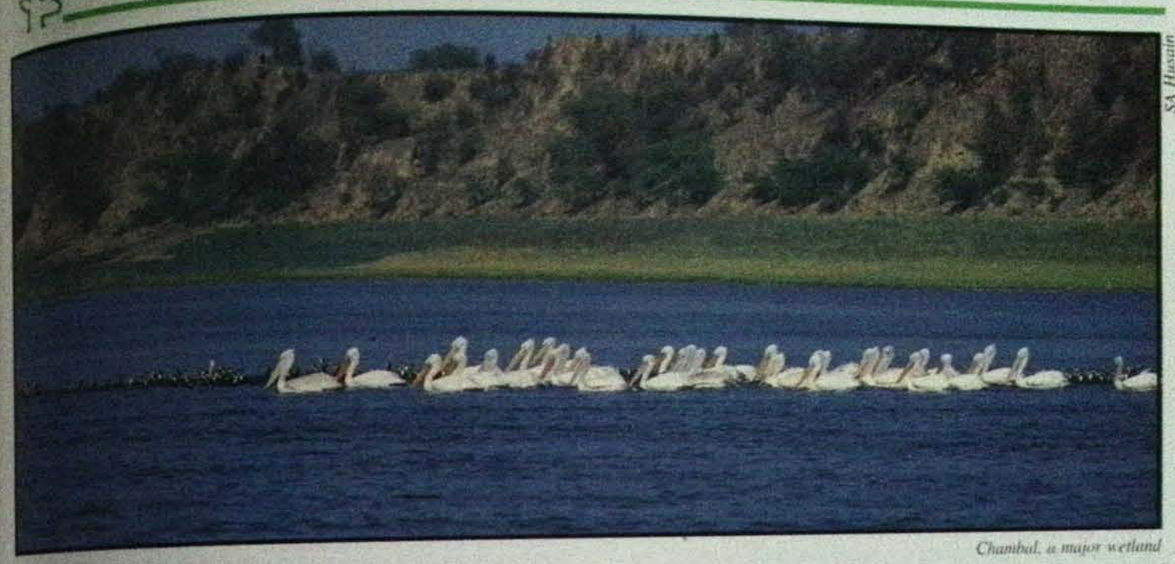
Presentations on the status of the important coastal and marine protected areas were made by the respective state participants or WII representatives. The reports highlighted the restoration of degraded mangrove forests as a priority programme, and it was recommended that WII should document the techniques of mangrove propagation and produce a state-of-art document on such afforestation techniques.

The workshop also recommended that WII should start a special course for the managerial staff of coastal and marine PAs, including Coast Guard personnel. The venue for such a course could be either the Gulf of Kutch or Gulf of Mannar Marine national park. The UNDP consultant on coastal wetlands outlined a preliminary syllabus for such a course, which now needs to be developed by the WII faculty. The trained managerial staff, under the supervision of WII faculty, could subsequently train their junior staff members. The syllabus for this follow-up training would be developed in consultation with the state PA managers.



AJT Johnsingh

MSc students, learning to identify bones



SA Husain

Chambal, a major wetland

WII could also look into the feasibility of creating a small research centre to cater to the special needs of coastal and marine PA, and investigate the funding sources for such a centre.

Ecodevelopment planning

Under the WII-UNDP joint project "Strengthening Wildlife Management Planning and Ecodevelopment Planning Capabilities", 27 in-service forest officers who were trained, subsequently got their postings as Field Project Officers at the project's planned field development sites. In order to review the progress of the field planning process at these sites and help sort out the initial problem and hurdles, if any, a meeting was called at WII on 14-15 July 1995. The participants included the Field Project Officers, representatives of the Ministry of Enviroment and Forests and some faculty members from the institute. At the meeting, the progress on ecodevelopment plans and their constituent micro-plans were reviewed and discussed. The involvement of local people, NGOs, various rural development agencies and forest departments in the making of these plans was also debated upon.

Annual research seminar

The VIII *Annual Research Seminar* of WII was held at the institute's campus on 28-30 September 1994. Like always, the seminar proved valuable in terms of evaluating the institute's completed and current study projects and thereby its research agenda. It also provided the budding researchers and biologists an exercise in public presentation of research studies.

The seminar was chaired by the Additional Inspector General of Forests (Wildlife) who was also the Chairman of WII's Research Advisory Committee (RAC). The invitees to the seminar totalled 65 from outside the station and included members of the WII Society, Governing Body (GB) and RAC, senior forest officers, park officials, eminent scientists, wildlifers and NGO representatives. Besides, about 30 eminent wildlife scientists and 40 other senior foresters and scientists from sister institutions located in Dehra Dun also attended the seminar.

As many as 29 research presentations, spread over 11 technical sessions, were made by WII's researchers and a few faculty members. The presentations were based on four completed and 20 ongoing research studies during the year. The abstracts of these presentation were compiled and distributed among the audience. The chairman and chairpersons for the technical sessions were among the PCCFs, CWLWs, members of GB and RAC, and eminent scientists. Awards consisting of a merit certificate and books worth Rs 750/- each were given to the five best presentations. These were : Latika Nath - *Evaluation of Kanha-Bandhavgarh corridor linkages*; Bivash Pandav - *A status survey of Olive Ridley sea turtle (****Lepidochelys olivacea****) and its nesting habitats along the Orissa coast*; Charudutt Mishra - *Population and conservation of the*

Nilgiri tahr in Annamalai Hills, south India; Yogesh Dubey - *Establishing spatial database for conservation and monitoring in Tadoba tiger reserve*; and Diwakar Sharma - *Habitat utilization for ungulates in Gir forests.*

Research coordination

Last year, the Ministry of Environment and Forests (Government of India) had identified four institutions/ organizations for the coordination and monitoring of wildlife research in the country on a zonal basis. Wildlife Institute of India was one of these (the others being BNHS, WWF-India and SACON), and was given the additional responsibility of coordinating the effort at the national level as well. Accordingly, WII organized a *Regional Workshop on Coordination and Monitoring of Wildlife Research* at its campus on 30 September 1994. As the workshop coincided with the institute's Annual Research Seminar, the participants were common to both the functions and included, among others, distinguished forest officers from 17 states and two union territories.

The aim of the workshop was to review the existing wildlife research on state/zone-wise basis, set the criteria for research priority, and evolve an effective mechanism for the appraisal of wildlife research and its further coordination and monitoring through the designated regional institutions/organizations. Spread over six sessions, eminent foresters and scientists from the various parts of the country acted as resource persons and presented the review of wildlife research in their respective states. Presentations were made on the wildlife research scenario in the states of Uttar Pradesh, Madhya Pradesh, Orissa, West Bengal, Sikkim, Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura. Regional review presentations were also given, followed by critical comments on research priorities and wildlife research coordination. A compilation of these pre-prepared review papers was circulated among the participants.

While appreciating the timely organizing of such a workshop, the deliberations highlighted the need to evolve a mechanism for the flow of information amongst the funding agencies, creation of research database and dissemination of research information to user groups. It was also underlined that the success in wildlife research coordination would largely depend upon a proper interlinking of the various agencies/ institutions involved in wildlife research, and in conducting periodic regional meetings and national seminars.

Biodiversity conservation

An interactive workshop titled *Forestry in Support of Biodiversity Conservation* was organized by WII (5-7 December 1994) in Bandipur tiger reserve, Karnataka, with the objectives of (i) providing an applied interpretation of the new mandate for forest and wildlife managers, with stress on the ecological and economic relationships between protected areas and managed forests; ii) presenting an overview of new ecological and economic challenges, *inter-alia* the changes necessary in professional traditions, training, attitude and managerial approach; iii) generating ideas on improving the overall management capability by underpinning the operational problems faced by forest and wildlife managers; and iv) eliciting guidance from the highest echelons of forest management and building a vision of the future of forest ecosystems.

Organized for PCCFs and CCFs, there were 16 participants at the workshop. The resource persons were J. Datta, (Retd. PCCF, Madhya Pradesh), S Shyamsunder (Retd.

S Wilson

Ecodevelopment and wildlife management planning review meeting

PCCF, Karnataka) and RN Indurkar (Retd. CCF, Maharashtra), besides three faculty members, including the Director, from WII.

Detailed discussions were also held on the National Forest Policy, 1988; the Draft Conservation of Forests and Natural Ecosystems Act, 1994; protected areas network, working plans and the forest-people interface. The recommendations of this workshop have been circulated to the states.

Wildlife tourism

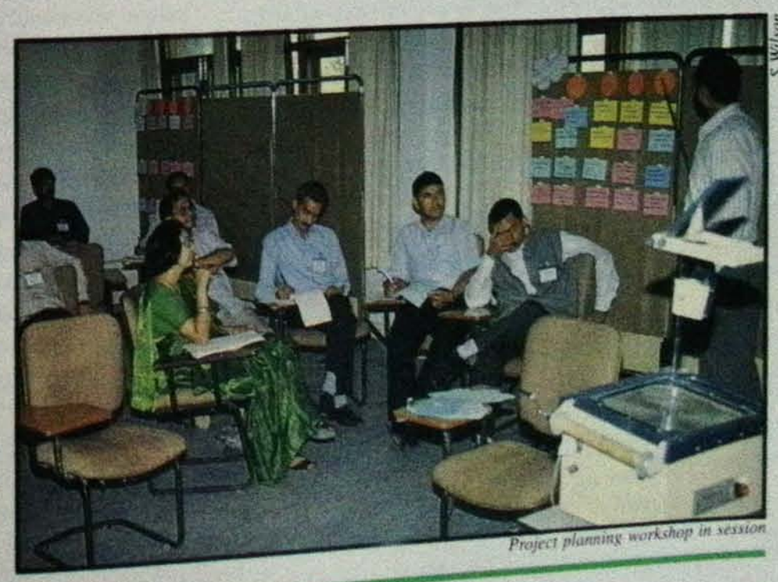
Tourism in the wildlife protected areas in India has been accorded a low priority. This is partly because of the ecologically fragile status of most of these protected areas, already faced with intense human and livestock pressures; and their managers loathe to adding to the pressures by encouraging tourism. However, because of a felt need for public support for wildlife conservation, and development of the concept of eco-tourism, tourism is beginning to become acceptable. But, with rapid increase in tourism and in the number of stakeholders in the field - state forest departments, central and state tourism departments, private entrepreneurs, each entertaining a different perspective on tourism - there are sufficient grounds for conflicts and, consequently mismanagement.

It was with an idea of providing the major stakeholders in wildlife tourism a common forum for discussions that WII organized a workshop on *Wildlife Tourism and Management in India* at Rishikesh (13-16 February 1995). The aim was that these various interest groups interact with one another and mutually evolve a strategy that, on the one hand, helps create conservation awareness among the public, and on the other, meets the needs of visitors, PA managers, tourism departments and private entrepreneurs through the development of compatible and sustainable wildlife tourism. There were 13 participants in the workshop - six from the forest department, three from the tourism department and four private entrepreneurs.

The themes and issues covered in the workshop included India's rich natural heritage; current wildlife tourism scenario; impact of tourism on flora, fauna and habitats; visitor carrying capacity; interpretation principles, objectives and methodologies; strategies for planning compatible and sustainable wildlife tourism in protected areas. Discussions and opinions were also set forth on visitor definition; appropriate visitor management; support staff and training; people's involvement, generating funds; guide training; environment impact assessment for tourism development in ecologically fragile areas; and the need to allocate a special niche for wildlife tourism in the GOI's and state governments' tourism policies.

Project planning

It is now being generally felt that there is need for better coordination between government officials, people and all others concerned in order to have better ecodevelopment planning. Underlining this felt need, WII conducted an inter-departmental workshop on *Objective Project Planning* at Melghat Tiger Reserve (Maharashtra) on 16-18 February 1995. The idea was that the district line agencies, while appreciating the need for conservation of the biodiversity, should give equal importance to the ecologically sustainable economic development of the people living in and around the protected areas. The workshop proved helpful in demonstrating that a team approach would make planning ecodevelopment in an around protected areas more meaningful and realistic.



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Project planning workshop in session

Bottom-up planning

In a new initiative, the Ecodevelopment Cell of WII conducted a *Bottom-up Project Planning Workshop* at its campus on 20-24 March 1995 for the trainee officers of the XVI Diploma Course. The workshop advocated the use of team approach and participatory planning methods, so as to overcome the discrepancies and shortcomings in the conventional top-down blueprint approach. Known as the logical-frame (or log-frame) approach, it is a planning methodology for ecodevelopment by using participation analysis, problem analysis, objective analysis to ultimately lead to a project planning matrix. The workshop demonstrated how such an approach can systematise the entire planning process.

Attended

The WII faculty members and other staff attended the following workshops, conferences, ect. during 1994-95 :

Conservation of Shiwalik ecosystem

The institute actively participated in the proceedings of the Indian People's Tribunal on Environment and Human Rights, investigating people-wildlife conflict in Rajaji national park, in April-May 1994. The investigation team, headed by Justice PS Poti, a retired Supreme Court Judge, was apprised of the conservation significance of the Shiwalik ecosystem and desired actions in order to bring compatibility between the needs of local people without jeopardising the conservation objectives of the park. WII Director along with some other faculty members played a major role in facilitating discussions with representatives of Gujjars, Tongya villagers, *Baan* workers, NGOs and the park officials. A meeting with the representatives of various agencies viz. BHEL, IDPL, army, park officials and members of the tribunal was also organized to evolve measures which will safeguard their respective concerns while establishing/revitalising the crucial corridor for the migrating elephants.

Resource management

The Colorado State University, Colorado (USA) conducted the *Fifth International Symposium on Society and Resource Management* on 7-10 June 1994. This symposium has been conducted regularly, once every two years, since 1986. Premised on the notion that complex natural resource issues are societal problems not amenable to solution by a single disciplinary view, the aim of the symposium is to create research, education and management partnerships among natural resource professionals.

The symposium attracted over a thousand participants who deliberated on a wide range of issues which included developing a framework for natural resource curricula, raising public appreciation for natural resources, and environmental and socio-economic determinants of landscape transformation and natural resource conservation.

Dr Asha Rajvanshi, Scientist-SD (EIA) attended the symposium and presented a paper "Impacts of the Developmental Initiatives on the Natural Resource Conservation and Economy of the Resource Dependent Society of the Developing Countries". The paper drew the attention of several universities and federal agencies in the USA towards supporting more research projects in the tropics so as to promote natural resource and biodiversity conservation as part of their international programmes.

Viability assessment

Conservation Breeding Specialist Group (CBSG) of the IUCN/SSC organized a *Population Habitat Viability Assessment (PHVA) Facilitator's Workshop* at the Minnesota Zoo in Minneapolis (USA) on 11-15 July 1994. This was an intensive training course aimed at training people who would initiate, organize and conduct PHVA for various endangered species. The group of trainees was international and included Dr Ravi Chellam, Scientist-SD (Biology) from WII.

The lectures not only focused on the scientific aspects of a PHVA but also on its organizational and workshop process aspects, including an emphasis on human behaviour. Among the resource faculty were consultants with a background in organisational behaviour and human psychology. The training was based on the participants undertaking short projects and giving presentations.

While vacationing in Houston, preceding the workshop, Chellam gave a talk on the lion ecology and the efforts to establish a second free ranging population, at Rice University.

Sustainable forestry

The Government of India and the Government of UK, with support from the FAO organised a workshop *Towards Sustainable Forestry : Preparing for Commission on Sustainable Development - 1995* at Vigyan Bhawan, New Delhi on 25-27 July 1994. The purpose of the workshop was to draw up a format for preparing information to be submitted to the UN Commission on Sustainable Development (CSD) for its meeting next year to be held in Canada.

Participants at the workshop came from 43 countries and included officials from the Ministry of Environment and Forests (Government of India) and institutions and offices under it, and from many states, besides representatives from international organizations, the World Bank and the Asian Development Bank. The workshop was chaired by Prof. Kr Klaus Topfer, Federal Minister for Environment & Nature Conservation and Nuclear Safety, Germany, who is also the Chairman of CSD. Rt Hon'ble John Gummer, Secretary of State for Environment, UK and Kamal Nath, Minister for State for Environment and Forests, India were the co-hosts.

WII was represented at the workshop by SK Mukherjee, Director and Dr BK Mishra, Scientist-SE (Extension). They presented an audio-visual programme "We are Nature and Nature is our World" which was widely appreciated.

Ecology congress

The *VI International Congress on Ecology* was held at Manchester (UK) on 21-26 August 1994. The congress is held once every four years to provide an opportunity to ecologists from all over the world to meet and discuss their work. The theme of this year's congress was "Progress to Meet the Challenge of Environmental Change". The congress was spread over 15 sessions, with each session discussing three to five major subject areas. At the *Conservation Biology of Endangered Species* session, Dr Ravi Chellam, presented a paper co-authored with four other WII scientists and researchers, titled "Translocation of Asiatic Lions : An Evaluation of Probable Sites".

Biological diversity

At the Earth Summit (UNCED) in Brazil in June 1992, 171 countries signed the Convention on Biological Diversity which sought to establish their commitment on conservation, access to genetic resources, exchange of informaton, scientific and technical cooperation, transfer of technology, benefit sharing and financial resource generation, etc. The Convention came into effect from 29 December 1993.

The south-east Asian region is rich in genetic resources backed by a vast traditional knowledge of the local communities. The rapid development of biotechnologies and the economic gains being cornered by the technologically rich countries, however, is being seen as a cause for concern on the question of Intellectual Property Rights. It was in response to such a concern that the Ministry of Environment and Forests, India and United Nations Environment Programme (UNEP) sponsored an *International Consultation on Biological Diversity (SAARC, ASEAN and Other Regional Countries)* at the Indian Institute of Science, Bangalore (Karnataka) on 22-23 August 1994. The objective was to evolve a mechanism for regional cooperation on issues related to biological diversity and to ensure its due share to information as well as economic wealth on a long-term basis.

The participants came from Afghanistan, Bangladesh, Bhutan, Japan, Maldives, Malaysia, Myanmar, Phillippines, Thailand, Vietnam and India, besides representatives from UNEP and FAO. On behalf of WII, SK Mukherjee attended the consultation. After the inauguration, the participants were divided into two working groups for thorough discussions on the concerned issues, resulting in the Bangalore Declaration which was a direct follow-up of the Convention on Biological Diversity.

Planning and managing with people

Accepting the viability of foresters and local communities working together, the Government of Karnataka, issued orders on Joint Forest Planning and Management (JFPM) on 12 April 1993. Based on JFPM principles, the Karnataka Forest Department accordingly started a Western Ghat Forestry Project. Karnataka Forest Department and Overseas Development Administration (UK) jointly organized a workshop *Joint Forest Planning and Management* at Sirsi, Western Ghats on 22-24 August 1994 to share experiences, review the status of JFPM in the state, and to look at its future growth scenario.

The participants at the workshop included project area DCFs, ACFs, senior forest officers and NGO representatives. From WII, BMS Rathore, Scientist-SE (Ecodevelopment) attended the workshop and shared with others his experiences of working with the local communities at Harda (Madhya Pradesh). At the end of the workshop, in the light of the experiences gained so far, changes were proposed in the state government's order on JFPM.

Joint management

The Indian Institute of Public Administration (IIPA), New Delhi organized a workshop *Joint Protected Area Management* on 1-3 September 1994, with the idea of discussing its many aspects. The issues and themes deliberated upon were - policy, legal and institutional implications of joint management of protected areas; relevance of JFM approach and other experiments in participatory resource management; and the possibilities of sharing benefits, powers, rights and responsibilities between local communities, government agencies and other interested parties within and around the protected areas.

Workshop participants included PA managers, environmental NGOs and officials of the Ministry of Environment and Forests. WII was represented by BMS Rathore.

Sustainable tourism

World Tourism Organization (WTO), with its headquarters at Madrid (Spain), is a leading intergovernmental agency entrusted by the UN with developing tourism as a means for fostering international peace and understanding, economic development and international trade. Ministry of Tourism, India, in collaboration with WTO organized a workshop *Planning for Sustainable Tourism Development at the Local Level* on 5-9 September 1994 at the Indian Institute of Tourism and Travel Management, Gwalior (Madhya Pradesh).

The objective of the workshop was to introduce to the participants the concept of sustainable tourism development and its action strategy, and also train a small group of selected individuals for organizing similar workshops in other regions of the country. Sustainable tourism was defined as an economic development that helped maintain the quality of the environment on which both the host community and the visitor depended, and at the same time, provided better quality of life to the former and high quality experience to the latter. The resource persons were two tourism specialists from the University of Calgary, Canada - Dr Dianne Draper and Dr Walter Jamieson.

The workshop was attended by Suhas Kumar, Head (Extension). The workshop recommended, among other points, that it was important to inculcate values of sustainable tourism management among the senior level decision makers and planners, without which the local level planners and operators could not do much. Another recommendation was on organizing at least two such workshops every year at various locations.

Tiger status

An international conference was held *To Assess the Status of Tigers* at the Huay Kha Khaeng Wildlife Sanctuary, Thailand on 20-24 October 1994. It was organized by the Royal Forest Department of Thailand and the Asian Regional Representative to the Standing Committee of the CITES, in cooperation with the Survival Species Commission's Cat Specialist Group, the Environment Agency of the Japanese Government, WWF-International and the Council of Agriculture, Republic of China. The purpose of the conference was to prepare a report on the status of tigers in the world for the CITES meeting to be held in the USA in November 1994.

There were 58 participants - from Bangladesh, Bhutan, Cambodia, India, South Korea, Laos, Malaysia, Myanmar, Nepal, Thailand, Taiwan and Vietnam. The Indian delegation was funded by the Royal Forest Department, Thailand. Rajesh Thapa, System Manager at WII, was part of the Indian delegation participating in this conference as a GIS specialist.

Thapa made a presentation on the application of GIS in wildlife research, highlighting examples of such application from the Institute's projects viz. Narmada Valley, National Wildlife Database, Identification and Evaluation of Wildlife Corridor Network between Kanha and Bandhavgarh Tiger Reserves and the Wild Ass Research Project. He suggested mapping the distribution of tigers in India using the GIS by dividing the country into four or five zones, each

maintaining a separate GIS database with an integrated centralized database for the entire country. The conference recommended seeking WII's assistance in mapping the distribution of tigers in India.

PA review - terrestrial

The first regional workshop on the *Indo-Malayan Protected Areas Review* was held in Kathmandu (Nepal) on 3-5 November 1994. Organized by the Asian Bureau for Conservation, the workshop was part of the ongoing review of the protected areas in the Indo-Malayan realm, concentrating specifically on existing country descriptions, PA database files, habitat and PA maps for each country in the Indian sub-continent.

The workshop was attended by 28 delegates from Bangladesh, Bhutan, India, Nepal, Pakistan and Sri Lanka, besides representatives from the World Conservation Monitoring Centre. Dr VB Mathur, Scientist-SE (Management) was deputed by the institute to participate in the workshop. He made a presentation on the National Wildlife Database project of WII, and also gave a review of the PA network in India. The workshop recommended strengthening of this network in the Indian sub-continent.

MFP

The Centre for Minor Forest Products, Dehra Dun, in collaboration with the Ford Foundation, New Delhi conducted a seminar on *Management of Minor Forest Products* at Dehra Dun on 14-15 November 1994. The invitees comprised subject specialists from resident institutions, various universities, foresters and NGO representatives. BMS Rathore, was WII's representative at the seminar.

The focus of the seminar was on issues and aspects related to non-timber forest products - its status vis-a-vis current policies and management, use and distribution of different such species, their cultivation and economics including value addition, silviculture techniques, etc.

Biodiversity conservation

SK Mukherjee attended a workshop on *Trans-boundary Biodiversity Conservation*, held at the Kunming Institute of Zoology, Kunming, Yunan, China on 22-26 November 1994. The workshop was organized to bring together experts from various countries on issues of bilateral cooperation for wildlife conservation as the political boundaries between two countries often do not mark the ecological boundaries for faunal and floral species. At the workshop, Mukherjee presented a paper titled "Trans-boundary biodiversity conservation and protected area management".

Participatory management

FAO and the Ford Foundation sponsored *International Conference on Participatory Forest Management* which was jointly organized by the Forest Department of West Bengal and the Society for Promotion of Wasteland Development in Calcutta on 5-7 December 1994. The objective of the conference was to take a look at the current joint forest management programmes in India as well as the neighbouring countries, and discuss the various institutional, ecological, social and economic issues critical for spreading the programme in a meaningful way. NGOs working in the field of joint forest management, representatives of the forest department and other institutions and officials of the Ministry of Environment and Forests attended the conference. From WII, the participant was BMS Rathore.

Dolphin conservation

Asian River Dolphin Committee (ARDC) is an international volunteer group of scientists and conservationists from India, Bangladesh, Nepal, Pakistan and China, concerned with the conservation of river dolphins. ARDC was formally constituted at a meeting at Ocean Park, Hong Kong on 5-7 December 1994. The meeting was sponsored by the Ocean Park Conservation Foundation, the Whale and Dolphin Conservation Society, and IUCN/SSG Cetacean Specialist Group.

BC Choudhury, Scientist-SE (Management) is a member of ARDC and attended the meeting. He submitted three papers which were discussed. Among the recommendations for India emerging from the meeting were to - carry out an expansive survey of river dolphins and their habitats, and initiate research and conservation action; amend its Fisheries Act suitably to prevent fishermen from capturing dolphins or using gears and techniques harmful to them; propagate and make efforts to provide fishermen with dolphin oil substitutes (for fish

attractant); and rationalize its PA boundaries to include river stretches harbouring dolphins.

Tourism education

World Tourism Organization, in collaboration with the Indian Institute of Tourism and Travel Management organized an *International Seminar on Educating the Educators* at Gwalior on 19-23 December 1994. Meant for teachers and trainers, the seminar focussed on three key issues in tourism education - the nature of the subject area, the curriculam planning process and the education/training aspects. Besides providing the participants with a framework of tourism knowledge, the seminar aquainted them with a set of practical techniques in the teaching and training of tourism. There were 16 participants from different institutions and colleges, and including some tour operators. From WII, Bitapi Sinha, Scientist-SD (Extension) attended the seminar.

PA review - wetlands

Asian Bureau for Conservation organized its Third Regional Workshop on the *Review of Protected Areas System of Indo-Malayan Realm* in Cisarua, Bogor (Indonesia) on 23-25 January 1995. Part of the ongoing series of PA reviews, this one concentrated on marine protected areas (MPA) which are increasingly being recognized for the need to be protected against growing threats. The review was designed to evaluate the existing MPAs in terms of biogeographic representation, habitat, species and threats, and also for their management and conservation - to locate gaps and shortcomings, propose new reserves, identify priorities for protection and international support.

There were 54 participants at the workshop, representing ten countries in the Indo-Malayan realm, international agencies, NGOs, and Indonesian government officials. BC Choudhury, was the sole Indian participant. There were nine presentations given by the country representatives.

The recommendations for India included creation of a MPA in Lakshadweep islands, specialized training for MPA managers and other staff, development of integrated zonal management plans and prioritization of coastal and marine ecosystem conservation policy.

Inventories for micro-planning

Stressing the importance of inventories as an asset in field level micro-planning exercises for JFM and Ecodevelopment programmes, the Society for the Promotion of Wasteland Development and the Ford Foundation jointly organized a workshop *Participatory Mapping Procedure* in New Delhi on 6-8 February 1995. The workshop focused on creating inventories at the field level with the help of forest guards, and then cross-checking those with the local communities and through transect walks. The participants were NGOs and field foresters, and included BMS Rathore, Scientist-SE (Ecodevelopment) from WII.

Integrated conservation development

WWF-International sponsored a workshop *Training Need Analysis for Integrated Conservation Development Programme in Asia and Pacific* which was held in Bangkok (Thailand) on 26-28 February 1995. Based on experiences in similar programmes in various countries, the workshop focussed on the training needs for effective implementation of integrated conservation development/ ecodevelopment programmes, and aimed to enhance the in-house capacity of the participants working in the field. The workshop participants were WWF partners in the Asia-Pacific regions and representatives from various research and training institutions. From WII, BMS Rathore, attended the workshop.

COURSES, TRAINING AND STUDY TOURS

Satellite imagery

Last year, WII had selected 20 Junior Research Fellows (JRF) for its various new research programmes. As part of their Orientation Programme (15 March-15 May 1994), these JRFs attended a ten-day course on *Visual Interpretation of Satellite Imageries for Mapping Vegetation*, conducted by the Forest Survey of India, Dehra Dun. In this, the participants were introduced to remote sensing and satellite imagery, and were given lectures and practical lessons on the uses of satellite imagery. At the end of the course, each JRF had interpreted satellite imageries of his/her respective research study site.

Development competencies

A training course *Management Development Competencies* was conducted by Technical Teachers Training Institute at

Bhopal on 3-8 September 1994. BMS Rathore, attended this course, meant primarily for DFOs and their "village resource planning development" teams from four forest divisions of Madhya Pradesh. The topics covered included - role concept and working in a role-set; how to bring about constituency commitment; creative problem solving; and project formulation.

Trainers' training

Training is defined as a planned process which directs learning towards achieving performance objectives, and is thus deemed necessary for the systematic development of attitudes, knowledge and skills required by an individual to perform tasks. The MP Academy of Administration, Bhopal (Madhya Pradesh) conducted a series of courses on *Direct Trainer Skills* which has been developed by Thames Valley University, Slough (UK) in association with the Training Division, Department of Personnel and Training, Government of India and assisted by Overseas Development Administration, UK.

The course was designed to improve the skills of a trainer in the areas of coaching, lecturing, discussion and using audio-visuals. The training approach was learner-centred rather than trainer-centred, and each participant performed the roles of a learner (improve knowledge), trainer (improve skills) and an observer (learn to feedback).

WII sponsored K Ravi Chandran, Scientist-SC (Extension) to attend this course on 5-9 December 1994.

UNDP fellowships

Under the project "Strengthening Wildlife Management Planning and Ecodevelopment Planning Capabilities", UNDP provided the funds for the following study tours by WII faculty members :

* Dr VB Mathur, Scientist-SE (Management), to USA; May-July 1994. The tour enabled Mathur to be trained in GIS/GPS technologies. He also attended the *ESRI User's Conference* in Palm Springs, California where he presented a paper titled "Applications of Geographic Information Systems in Wildlife Conservation Planning and Management in India".

* Dr Asha Rajvanshi, Scientists-SD (EIA) to USA and UK; 5 June -12 August 1994. Environment Impact Assessment is today accepted as an essential tool in wildlife management planning, and WII is increasingly undertaking such studies. This fellowship was offered with the specific objectives to (i) develop computer aided techniques for EIA of development schemes such as river valley projects or those effecting linear expansion of rails, roads and industrial pipelines; (ii) enhance skills to develop simulation modelling techniques for assessing impacts of environmental contaminants on wildlife; (iii) learn principles of environmental economics and methods for environmental valuation and impact quantification now being applied globally; and (iv) establish linkages with international agencies, institutions and professionals so as to seek cooperation in the EIA related research and training at WII.

At a five-week training workshop organized by Harvard Institute of International Development, Harvard University (USA), Rajvanshi was exposed to concepts and techniques in integrating environmental concerns into the conventional economic decision-making through evaluation of environmental assets and development impacts. She also attended a course on "Environmental Management", conducted by the University of Aberdeen in Scotland (UK) which provided her with an advanced understanding of technical impact assessment procedures, and guidelines for environmental review and audit.

* As part of and follow-up to the *Ecodevelopment Planning* and *Wildlife Management Planning Courses* held in 1993-1994, 16 trainees (nine from the former and seven from the latter course) were selected to undertake four-week study tours in three groups to Nepal, Indonesia, Malaysia and Australia from 3 September - 2 October 1994. The groups were accompanied by four faculty members from WII (namely, HS Pabla - National Project Coordinator; VB Sawarkar - Head, Management; VK Uniyal - Scientist-SE, Management; and Sanjeeva Pandey - Scientist-SE, Ecodevelopment) and two officials from the Ministry of Environment and Forests, Government of India.

The study tours were an exercise in capacity building and acquainted the participants with ecodevelopment initiatives and wildlife management approaches in these countries which would have relevance to the Indian conditions. The

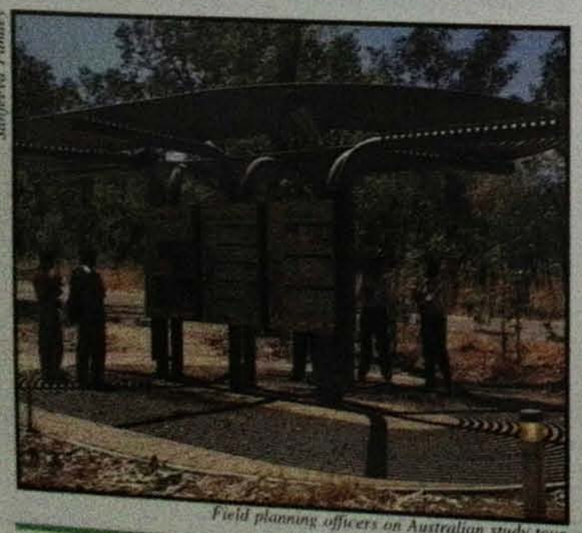
exposure would help the trainees in their field planning jobs, particularly in the implementation of ecodevelopment plans developed during the course periods at WII.

* Dr RS Chundawat, Scientist-SD (Biology) to USA and Norway; 22 September - 27 December 1994. Chundawat was awarded fellowship to attend courses on "Conservation Biology" and "Mammalogy" at the University of Minnesota, Minneapolis. The courses were part of a larger programme on conservation biology of the Departments of Ecology; Evolution and Behaviour; Fisheries and Wildlife; and Natural Resources.

While there, Chundawat gave a series of lectures on zoogeography and wildlife conservation in India, and on the ecology of snow leopard. He also visited the University of Washington, Seattle and lectured on the conservation of snow leopard in the Indian trans-Himalaya. Later, he participated at the board meeting of International Snow Leopard Trust in Seattle to discuss WII's participation in the Snow Leopard Information Management System.

Chundawat also visited the University of Tromso in Norway and lectured on the ecology of Himalaya and the conservation issues, besides participating in their research programme on wolverine.

* In October 1994, HS Pabla, National Project Coordinator, attended a meeting of Senior Forestry Officers at Rome, Italy. The meeting was aimed at providing project authorities in the various countries an opportunity to discuss managerial and operational issues related to international projects.



Sanjeeva Pandey

Field planning officers on Australian study tour

* Suhas Kumar, Head (Extension) to UK; 3-28 October 1994. Kumar attended a training course in environment education (EE) communication skills *Communicating for the Environment* at International Centre for Conservation Education, Cheltenham (UK). The fellowship was provided by FAO and coordinated by British Council Office, Manchester (UK).

The objectives of the course were to (i) underscore the vital role of environmental awareness and education; (ii) provide guidelines and strategies for the incorporation of education activities into one's work; (iii) expose and develop a range of communication techniques; (iv) inculcate in participants an ability to pass their skills and knowledge on to the others; and (v) provide participants an access to an international network of relevant colleges teaching EE and firms manufacturing EE materials, particularly in the developing countries.The course helped Kumar develop skills and knowledge in effective presentation techniques, interactive teaching methods, target writing, photography, print publications and audio-visuals.

* Dr K Shankar, Scientist-SD (Biology) to USA; 15 October - 8 December 1994. The interactions with American scientists and research fellows involved in large mammals research, helped Shankar train his skills in areas such as research methodology, management of endangered populations and management of small populations; and receive guidance on research design and techniques.

* SK Mukherjee, Director, to Australia, Indonesia and Malaysia; February-March 1995. In Australia, contacts were established with the Australian Natural Conservation Agency, CSIRO and Resource Information Network, and he also visited James Cook University and National Heritage Department for interactions on protection and conservation of rainforest coastal areas and marine resources. In Indonesia, the focus was on the management of rainforests, and the national plan for eco-tourism. In Malaysia, the interactions at the forest department, wildlife department and universities were related to *in situ* and *ex situ* natural resource management.

Other study tours

* Qamar Qureshi, Scientist-SD (Biology) to USA; January-June 1994. Under the WII-USFWS collaborative project "Development of the Wildlife Institute of India" that is aimed at strengthening the research and teaching inputs at WII, this visit to Colorado State University and National Ecology Research Centre, Colorado was undertaken with the purpose of studying the application of GIS, spatial modelling and remote sensing in natural resource management.

* Dr Pradeep K. Malik, Scientist-SE (Biology-Wildlife Health) to USA; March-April 1994. Under the WII-USFWS exchange programme this six-week study tour was undertaken to acquire training in the area of Wildlife Health. The training provided Malik valuable experience in wildlife population disease screening techniques, capture and handling of wildlife, and helped in the development of visual materials for use in WII's teaching programmes.

* Navneet Gupta, Programmer and Lekh Nath Sharma, Asst. Programmer to Indonesia; 15 November - 10 December 1994. The Ministry of Forestry (Indonesia) and FAO jointly organized a training course *Application of Remote Sensing and Geographic Information Systems in Managing Tropical Forests and Conserving Natural Resources in Southeast Asia* in Puncak, Indonesia from 15 November to 10 December 1994. The objectives of the course were to provide background knowledge and practical experience in the application of airborne and spaceborne remote sensing and in the use of GIS techniques for monitoring and managing tropical forests and natural resources. Course methodology included lectures, hands-on experience, field and thematic visits to relevant agencies and projects in Bogor and Jakarta.

The course was designed for specialists in the fields of forestry, geography, landscape planning and computers. There were 24 participants from 10 countries in the region. Gupta and Sharma were awarded fellowships by the German Foundation for International Development (on behalf of the Federal Republic of Germany) to attend this training course. They received training in PC based software ERDAS for digital image processing and PC ARC/INFO for GIS, and in Global Positioning System (GPS) which will be useful as WII already has or is shortly going to acquire all these packages. Sharma presented a paper on "How to Approach Band Combination", which has also been published in the proceedings of the course.

RESEARCH

The research undertaken by WII is being conducted in the different biogeographic zones of the country and probe the ecological, biological, managerial and socio-economic aspects of wildlife conservation. These are seen as foundational projects seeking to evolve relevant study techniques suited to the Indian conditions, strengthen conservation efforts through generation of scientific information and create a trained manpower base of biologists, wildlife ecologists, socio-economists and managers. The studies also help the institute faculty keep abreast of the current field situations, management needs and research trends, and thus constantly enhance its professional capabilities and update its teaching inputs.

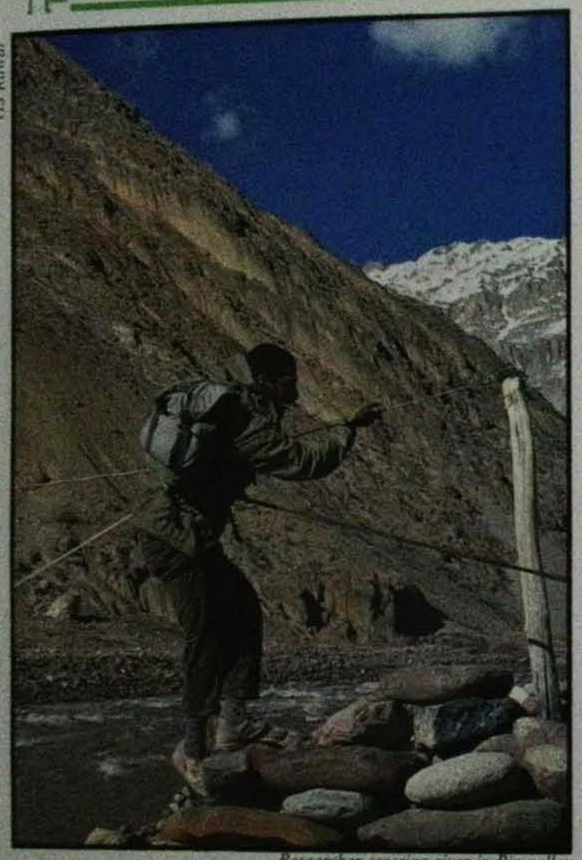
WII's research programmes are approved by its *Research Advisory Committee* (RAC) which ensures that they conform to the national conservation priorities. The RAC is a 17-member committee comprising eminent conservationists, academicians and representatives of scientific organizations as well as state wildlife organizations. It meets periodically to oversee and review the institute's current research and set the tone for its future programmes.

Orientation programme for researchers

As per the recommendations of the RAC last year, the new Junior Research Fellows who joined in March 1994, underwent an *Orientation Programme* from 15 March-15 May 1994 - the first organized and structured course of its kind for the researchers at WII.

The course content included lectures and discussions on general introduction to wildlife biology, management, extension, wildlife legislation, research methodologies, sampling wildlife ecology, and case study presentations of the institute's completed research projects. The programme also included a ten-day course on "Visual Interpretation of Satellite Imageries".

As approved by the RAC at its last meeting, six students



GS Rawat

Researcher crossing river in Pin valley

of the III M.Sc availed of short-term research assistance for writing research papers on the basis of their dissertation work. In all, nine papers were communicated to various journals. Five of these have received acceptance for publication.

In 1994-95, the XV RAC met on 29-30 September 1994 - coinciding with the institute's *VIII Annual Research Seminar*. It considered 12 new study projects proposed by the institute's faculty and, in principle, approved all. Of these, two projects have sought their funding from the "Project Elephant", and another is expecting its funding from the GEF. The remaining nine studies would be supported by the institute's research funds.

The ten proposed projects which the RAC had approved last year, and which are to be conducted in scientific collaboration with three US agencies, namely, US Fish & Wildlife Service (USFWS), US National Park Service (USNPS) and US Forest Service (USFS) under the Indo-US Sub-commission on Science and Technology - Environment and Ecology Sub-group, could not be initiated and are awaiting Indian government's approval.

Ph. D degrees awarded

During 1994-95, four Ph.D degrees were awarded for research projects completed last year. The awardees were - K Shankar (*Study of sympatric herbivores in Sariska tiger reserve*), SA Hussain (*Study of aquatic mammals in National Chambal sanctuary*), Nita Shah (*Ecology of wild ass in the Little Rann of Kutch*), and Vijay Kumar (*Monitoring of mugger crocodiles in Andhra Pradesh*). Besides, one dissertation (S Sathyakumar - *Habitat ecology of major ungulates in Kedarnath musk deer sanctuary, western Himalaya*) has been submitted for the Ph.D award.

At the beginning of the year, there were 19 ongoing research projects, of which six were completed during the year. Also, during 1994-95, 11 new projects were initiated. So, at the end of the year, WII has 24 ongoing projects. Besides, there are additional three projects being conducted under WII-USFWS collaborative programme, of which one got completed in 1994-95; and WII is the host institution for a study being done for WWF.

The following are brief descriptions of the institute's various research projects for the year 1994-95.

Completed projects

* **Status and conservation of the Nilgiri tahr (*Hemitragus hylocrious ogilby*) in Anamalai hills, south India.**

Faculty - Dr AJT Johnsingh
Researcher - Charudutt Mishra

The endangered Nilgiri tahr is endemic to the Western Ghats in south India. The Anamalai wildlife sanctuary (Tamil Nadu), Parambikulam wildlife sanctuary and Eravikulam national park (both in Kerala), along with the adjacent forests form a vital conservation unit for the animal.

This short survey of the Nilgiri tahr intended to estimate its population and evaluate its habitat in Anamalai and Parambikulam wildlife sanctuaries where no proper assessment of its status has been made since the mid-seventies. It was funded by Dr Fred Swengel, the Nilgiri Tahr Regional Stud-Book-keeper at Minnesota Zoo (USA). During the survey, 227 km of tahr grasslands were covered on foot and 348 tahr were seen in 12 surveyed areas. Two hitherto unreported tahr subpopulation were also discovered. One of these, at Pacchapal Malai, was sizeable (50-70) and located in an ideal tahr habitat, and so is important for the long-term conservation of the animal. The other population (about 25), at Kuchi Malai, is vulnerable to poaching.

The total tahr population in Anamalai and Parambikulam sanctuaries was estimated to be about 560-680 which is encouraging when compared with survey conducted in the late seventies. But, in no way does this finding under-rate the serious conservation problems that the Nilgiri tahr faces. Poaching is a serious threat and has been extensively reported from four areas. Two populations (at Nava Malai and Thadaganachi Malai) which were reported in 1978 have been almost wiped out, due to poaching.

Tahr habitat in two of the surveyed sites is threatened. In Grass Hills, the invasion of grasslands by wattle (*Acacia mearnsii)* is a matter of serious concern and the wattle needs to be removed immediately. At Thadaganachi Malai, grazing by livestock is a major problem as it has effected habitat alteration.

The final report of the survey was completed in August 1994. Copies were sent to the state forest departments in Kerala and Tamil Nadu and also distributed to other research organizations and individuals interested in tahr conservation.

As tahr have been found in this survey to survive in small but stable numbers over the years even in areas less than one sq km, the report recommends that adequate protection be accorded to very small sub-populations (15-20) which occur in even 'poor' habitats. The report also emphasizes the role that local NGOs can play in strengthening the efforts of the forest departments in conserving the Nilgiri tahr.

Nilgiri tahr in Anamalai hills

* **A study on impacts of management practices on ungulate and lion habitats in Gir forests, Gujarat.**

Faculty - Dr AJT Johnsingh
Researcher - Diwakar Sharma

Gir, in Gujarat, is the only refuge of the Asiatic lion. This means that the long-term conservation of this species will remain an overriding management objective of Gir. Over the last 20-25 years, some management interventions have been made which have led to vegetational recovery and increase in wild ungulate and lion populations. However, the habitat has been continuously getting degraded around human settlements in and around the national park. Moreover, it has also been noticed that the vegetational growth trend in western Gir is more toward woody species but it is toward a grassland scenario in eastern Gir. What would the implications of such trends be, were yet to be assessed.

This study was considered necessary to assess the changes in habitat due to various management practices. Specifically, it aimed to - (i) assess the impact of *maldhari* (local graziers) settlements and their cattle on the vegetation; (ii) quantify habitat utilization by ungulates through direct/indirect evidence in strata; and (iii) evaluate the role of management practices on the vegetation and ungulates, and suggest the habitat manipulation needed.

Twelve habitat types and 15 vegetation associations were classified during the study. The results indicated that as

much as 70% of the area in Gir is dominated by teak and its associations. Teak which was planted and cut for timber in the sixties, hasn't been harvested since. This has made the area woody and of little purpose for the foraging ungulates. A certain amount of thinning may be desirable to promote chital population which is the most abundant and frequently preyed upon by the lion.

The current *maldhari* settlements are having a mixed impact on the vegetation and ungulate communities. As lions prey on livestock, the settlements need to be relocated or at least have considerable distance between one another to provide for a disturbance-free forest for the ungulates. However, the relocation needs to be done in a phased manner and with great care.

There are about 250-300 artificial and natural waterpoints in Gir. But these are not evenly distributed and are over-abundant at some places. As lions tend to kill the bulk of their prey near natural waterpoints, a higher density of artificial waterpoints could lead to a greater dispersal of prey thus affecting the lion's hunting efficiency. The overabundant artificial waterpoints should be removed, particularly those along the road, and instead, waterpoints near some of the 250 used and disused wells in riverbeds all over Gir should be managed during periods of scarcity. Other water retentive measures such as check dams should also be taken up.

Recommendations include regulated cutting of grass (by the people) and rotational burning during winters as a controlled fire management measure. With the study data analyzed, the writing of the report is due for completion.

* **EIA of Narmada Sagar Project - Study of impact on vegetation with attendant species of wildlife habitat and use by local people including recommendations for compensatory measures.**

Faculty - Dr Asha Rajvanshi and *Dr VB Mathur*
Researchers - Dr AM Dixit, Dr KS Rajpurohit, Tata Raghu Ram, Parikshit Gautam, and *Parthapriya Ghosh*

The multi-purpose river valley projects planned on the river Narmada, which envisage the construction of 30 large, 135 medium and over 300 small dams is possibly the single largest irrigation scheme in the world. Two of the projects contemplated under this are Narmada Sagar and Omkareshwar which would together generate 1390 MW electricity and irrigate over 2.5 lakh ha land. But they would also submerge over 1 lakh ha land, including more than fortyfive thousand hectares of forests, and displace 1.6 lakh people in 284 villages. Besides displacement and inadequate rehabilitation of a vast human population, the diversion, decimation and fragmentation of forests, reduction in terrestrial habitat quality and transformation of free river ecosystem to a completely different reservoir system can have dire consequences.

Narmada Valley Development Authority (NVDA) sought WII's assistance to enquire into the impacts of the Narmada Sagar and Omkareshwar projects, particularly on the wildlife values and attendant human aspects. The multi-disciplinary team of the institute undertook an extensive field research in the submergence and adjoining areas of the projects in order to establish baseline status of the biological environment and the socio-economic conditions of the local people, and suggest compensatory and mitigatory measures.

WII's study focused on the use of the GIS technology to look into the complex interactions between vegetation, wildlife and people and a range of other spatial and non-spatial attributes. This was among the first studies in the country to have used advanced computer-aided EIA technique.

The study, initiated in 1990, was completed in 1994. Its final report was submitted to the NVDA in July 1994. The establishment of three new protected areas that would meet the twin objectives of conserving wildlife and providing sustenance to forest dependent communities in a post-dam scenario was the major recommendation arising from the report.

WII and the Indian Institute of Remote Sensing, Dehra Dun subsequently undertook a joint survey of these proposed protected areas for the preparation of thematic maps on geomorphology, vegetation, drainage, landuse and water resources. The proposal for setting up protected areas outside the submergence zone has received considerable support from NVDA and from Ministry of Environment and Forests, GOI.

* **Survey of sea turtle nesting beaches along Orissa coast.**

Faculty - BC Choudhury
Researcher - Bivash Pandav

Concerned at the fragmentation of the nesting sites on the Gahirmatha coast in Orissa, this short duration survey was an attempt to identify other Olive Ridley nesting beaches in the Orissa coast, determine the biotic and abiotic factors that operate on coastal sand dunes to alter the nesting habitat quality, and assess the overall importance of the entire coastline in terms of sea turtle conservation and the need for additional coastal protected areas.

The project was immensely successful in that during the survey a new mass nesting beach of the Olive Ridley turtle was discovered at the mouth of Rushikulya river in Ganjam district where an estimated 2,00,000 females lay eggs. Considering the threats to the Gahirmatha nesting site, this discovery underlined the need of according protected area status to areas like Rushikulya. The discovery has also led to a detailed study seeking to develop a conservation and management action plan for turtles in Orissa.

* **The Asiatic wild buffalo (*Bubalus bubalus linn*) : Population genetics and ecology for its management in Kaziranga national park, Assam.**

Faculty - Dr PK Mathur and *Dr Pradip K Malik*
Researcher - Parag D Muley

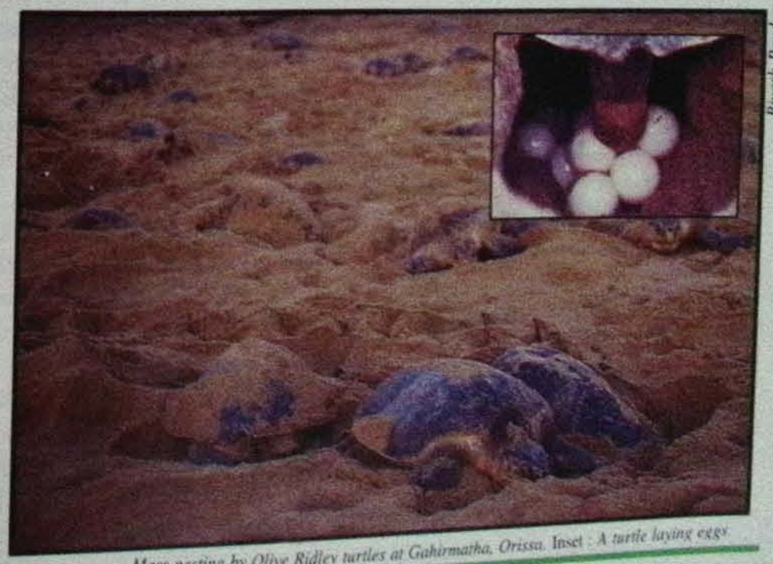
This study was started in 1989. Molecular genetic studies have been taken up in order to distinguish a wild buffalo from domestic buffalo. About 170 skin biopsy samples of wild, hybrid and domestic buffaloes in and around the Kaziranga national park were collected through simple and safe techniques using skin biopsy darts. This simple technique for the collection of skin samples has been standardized for the first time in the country and avoids chemical immobilization of the animal.

Skin tissue was removed from the biopsy dart in phosphate buffered saline containing antibiotics. Each sample was then stored in cryotubes separately and frozen in liquid Nitrogen. Later, DNA was extracted and purified from these samples by Phenol extraction method, using the laboratory facilities at the University of Delhi, and stored for further analysis in absolute alcohol at room temperature. DNA will be amplified by Polymerase Chain Reaction (PCR) for DNA fingerprinting and Restriction Fragment Length Polymorphism (RFLP), using (i) Random Amplified Polymorphic DNA markers, (ii) Microsatellite Variable Nucleotide Tandem Repeats (Microsatellite VNTR), and (iii) Universal Primers for Mitochondrial DNA.The final report of the research project in being prepared. The analysis of DNA samples is awaited.

* **Survey of potential sites for reintroduction of Asiatic lion.**

Research team - Dr Ravi Chellam, Dr Justus Joshua, Christy A Williams, Vidya R Athreya and *Dr AJT Johnsingh*

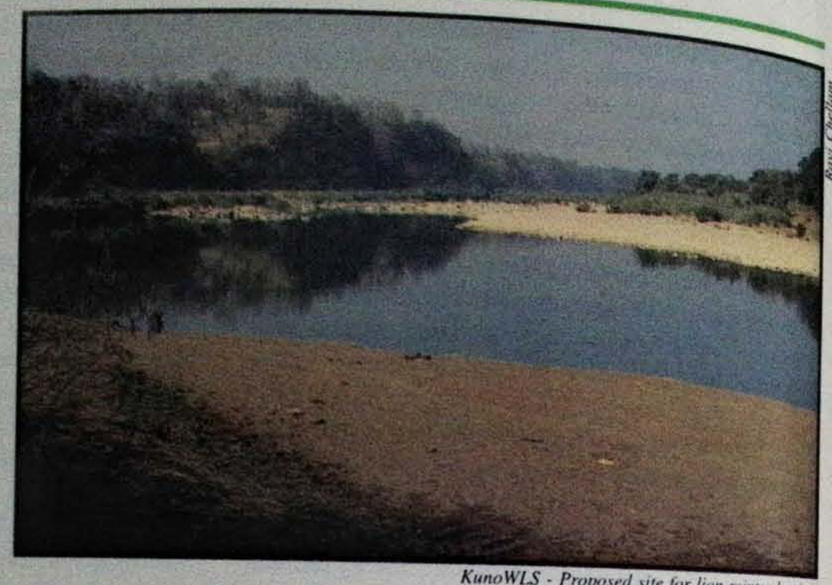
Free ranging lions are today found only in the Gir forest in Gujarat. This has raised concern about the conservation status of this endangered animal; and in order to safeguard it against extinction due to catastrophes, it has been suggested to establish a second free-ranging population of lions outside the Gir. An attempt was made about 30 years ago to establish a second population of lion in Chandraprabha wildlife sanctuary in Uttar Pradesh. However, due to lack of protection and monitoring, the attempt proved short-lived. The idea of translocating and establishing a second free-ranging population of lions has now again gained ground.



Bivash Pandav

Mass nesting by Olive Ridley turtles at Gahirmatha, Orissa. Inset : A turtle laying eggs.

This survey was conducted with the objective of locating the area where the lions from Gir could be reintroduced. During the year under reporting, the field work under this short term-project was completed. The preliminary report submitted in June 1994, followed by informal consultations for comments. The draft final report was widely circulated in December 1994. Comments on it have been received and the final report is currently under preparation.



Ravi Chellam

KunoWLS - Proposed site for lion reintroduction

Darrah Jawaharsagar and Sitamata wildlife sanctuaries in Rajasthan and Kuno wildlife sanctuary in Madhya Pradesh were considered potential sites for an alternative home for the Gir lion. The choice ultimately fell on Kuno and was accordingly recommended. However, keeping in mind the failure of the first attempt, it was also recommended to approach the project in a stepwise manner. The villagers involved and the public at large have to be informed and educated on the conservation merits of this project, and due considerations need to be given to the proper resettlement of the villages that would have to be moved out. Kuno wildlife sanctuary also has to be given better protection, supplemented with translocation of wild ungulates to build up a prey base. The recommendations also stressed on a strong research and monitoring component. Only when the project progresses along expected lines would the lions be captured, radio-collared and translocated from Gir to Kuno, where they will have to be monitored intensively. All this means developing a long-term plan of about 20 years for the reintroduction programme. The plan is being prepared by the forest department of Madhya Pradesh.

The findings of this research study were presented at a special meeting called by the Secretary, Ministry of Environment and Forests. The invitees to the meeting were senior forest officials from the ministry and the states of Gujarat and Madhya Pradesh, and the Member-Secretary of the Central Zoo Authority. From WII, SK Mukherjee, Director along with HS Pabla, Dr AJT Johnsingh and Dr Ravi Chellam attended the meeting. In the ensuing discussion at the meeting, most of the recommendations made in the presentation were accepted.

Ongoing projects

*** Strengthening National Wildlife Database : Phase II.**

Faculty - Dr VB Mathur

Technical assistants - Ratna Singh and *JS Kathayat*

The objectives of the computer-based National Wildlife Database are to (a) provide information on the conservation status of animal species, habitat and the network of PAs in India; (b) establish linkages with similar computer based data centres; and (c) provide extensive bibliographic support to wildlife researchers, park managers and other interested users.

During 1994-95, spatial linkage with the Arc/Info, ArcView GIS package was done, enabling the database to provide spatial representation of data. This provides better visualisation and analysis, and helps in extraction of a lot of spatial information.

Other than this, the Bibliography database now contains about 12,000 records. The Reptiles and Birds database too have been built up and species entered for different PAs. Basic information pertaining to a PA, e.g. the nearest town, nearest railhead, nearest airport have been added, including details of approach, human habitations, research and monitoring, and addresses for correspondence. The PA notification number and date in various states have been entered on a priority basis.

A separate database has been created for tiger reserves and a separate programme TIGER, on the lines of National Wildlife Database Manager (NWDM) is being used for this. Mammalian and reptilian species distribution for all tiger reserves have been completed.

State-level informations have been obtained and updated in the database, with the help of Protected Area Network Cell (PANC). The NWDM software has been modified to create a separate state-level programme, called State Wildlife Database Manager (SWDM). The data has been split for different states, and the programme and data have been installed in some states for their use in collaboration with the PANC.

A new slide-show on the database has been created, using the APPLAUSE package, which describes the functions and outputs of the database. A demonstration of the National Wildlife Database are organized for participants of all wildlife management courses, workshops and seminars as well as for the visitors to the institute.

The National Wildlife Database was exhibited and demonstrated at the First National Conservation Congress and the opening of the Indira Gandhi Conservation Monitoring Centre at New Delhi, on 21-23 November 1994. A special demonstration was also organized for HRH The Duke of Edinburgh and Mrs Sonia Gandhi, Chairperson, Rajiv Gandhi Foundation, on 22 November 1994 at the silver jubilee celebrations of WWF in New Delhi.

*** Standardization of forensic techniques for species identification from mammalian tissues.**

Faculty - Dr SP Goyal

Researchers - Dr Aradhana and *Aparajita Dutta*

According to WWF, the international illegal trade in endangered species alone is valued at about 1-2 billion dollars per year. Deer and big cats are poached for their skin, meat and bones; rhinos and elephants for their tusks; and bears for their gall bladders, etc.

WILDLIFE INSTITUTE OF INDIA

There are laws against poaching but it becomes difficult to pin down the culprits even when caught with biologicial materials as these materials cannot be identified just on the basis of morphological characteristics. Such identification can be possible only if large and distinct body parts are available whereas often the evidences are in the form of blood stains, a few hair samples, small pieces of meat and bones or as a highly processed product. These evidences can be identified using forensic techniques such as hair characteristics, morphometric measurements, electrophoresis and DNA fingerprinting. But in India, there haven't been any systematic studies to standardize wildlife forensic techniques.

From time to time, WII itself has been receiving confiscated samples - ranging from skin pieces to animal bile to even leather footwear - from various state forest departments for identification of the animal species. While hair sample can be identified, it has generally been difficult in the case of other samples.

This project was initiated to standardize forensic techniques and strengthen WII's laboratory capabilities in identifying species from biological samples. As an outcome of the project, the institute plans to bring out an extensive identification manual and reference key which would prove useful in wildlife identification in offence cases.

Till July 1994, about a hundred samples had been referred to WII by various forest and other government departments. Examination of the samples indicated that 88% of these were related to wildlife species; the rest being spurious. The samples seized in offence cases comprise mainly skin, hair, claws, bone, meat, etc. Skin and hair constitute 55% and bones 12% of the samples. Based on these, work has also been started to develop keys to identification of species from hair and bones, and accordingly develop a manual for field managers.

WII wishes to acknowledge the assistance in the collection of reference materials provided by BNHS, Bombay and the ZSI, Calcutta.

Other than the above, techniques have been standardized to identify tiger and leopard claws based on morphometric measurements and radiography.

* **Developing area specific management guidelines for conservation of biodiversity in Satpura Conservation Area, taking into account the forestry objectives and the local people's needs.**

Faculty - VB Sawarkar

Researchers - Sonali Pandit, Prachi Mehta and *Azra Musavi*

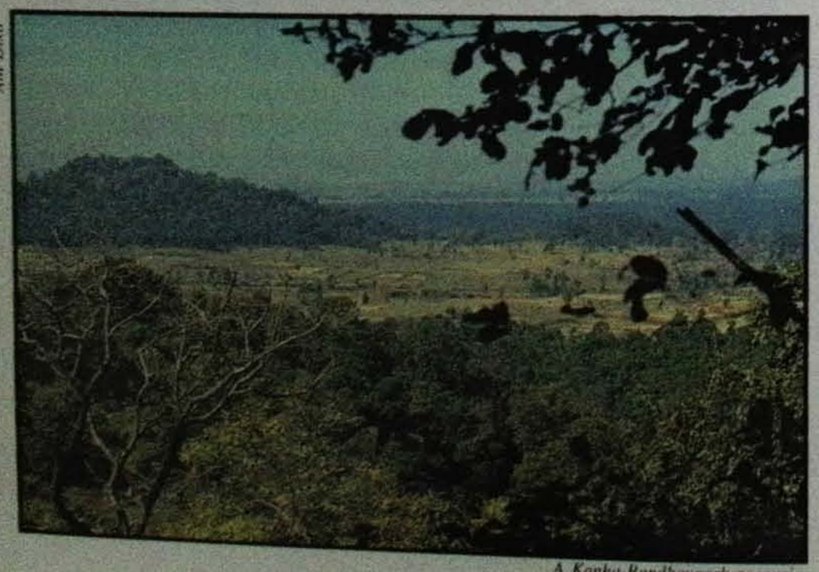
A study by Pandit on the vegetation structure of the earlier managed forests in the Bori wildlife sanctuary (Madhya Pradesh) established a classification into eight vegetation types - ranging from the very dry deciduous to riparian vegetation. The tree species richness showed a significant difference across the vegetation types, while the shrub layers did not.

There were five silvicultural systems. Each was categorised into three successional classes according to the history of logging viz. *recent* (4-5 yrs old), *intermediate* (15-30 yrs) and *old* (30-60 yrs). Girth class distribution of tree species of logging interest in logged and unlogged stands in each of the systems was not found to be significantly different. Other tree species too showed similar results. Variation in the vegetational composition was mainly a result of interplay of environmental conditions rather than logging.

Avian assemblages and richness were investigated by Mehta in various logged classes and plantations. Variations in vegetation structure, phenology, ground insect abundance were measured in 440 plots across seasons. Nine broad associations for 98 species of birds was indicated. The spatial heterogeneity and plant species diversity seemed to govern the various assemblages and species richness of the bird communities. The results indicated that the presence of all species assemblages can be encouraged by selective felling and maintenance of a gradient of successional conditions.

One of the components of the project addresses the forest-people interface which is being looked into by Musavi. Tribals and agro-pastoralists have differing gradients of dependency on forest based resources. The monthly per capita fuelwood consumption is found to be 43 kg. From the sample, 15% of the population in villages are landless and an equal percentage do not own livestock. Agricultural crops, in order of importance, are corn, paddy and gram. About 90% of the cultivators reported damage to crops by wild ungulates. *Ghee* preparation is an important component of the agro-pastoralists' economy and is reflected in the correlation between number of cattle and fuel consumption per day. While the agro-pastoralists largely depend on the forests for fodder and grazing of livestock, the tribals depend on the forests more for fruits, vegetables, roots and tubers. The needs for fuelwood, construction material, fencing are common to both categories.

AM Dixit



A Kanha-Bandhavgarh scenario

* **Application of GIS for evaluation of wildlife corridor between Kanha tiger reserve and Bandhavgarh national park.**

Faculty - Dr VB Mathur

Researchers - Shrish A Ravan, Latika Nath and *Dr AM Dixit*

India harbours about 55% of the world tiger population (estimated 3500 out of 6370). Madhya Pradesh accounts for 22% of India's tiger population which, in effect, means that the state has about one-sixth the world tiger population, making it one of the most important states for tiger conservation today.

However, as in other parts of the country, the protected areas in Madhya Pradesh too are like islands surrounded by mounting human pressures which are making management planning an increasingly difficult exercise. Kanha tiger reserve in the state, one of the premier protected areas in the country, is no exception.

It has been realized that isolated PAs may not be able to contain viable wildlife populations. Nor is it necessary that such PAs always represent the biodiversity of the entire region. The National Wildlife Action Plan (1982) has recognized the need to create and conserve corridor links between protected areas to enable long range dispersals of the floral and faunal genes. Kanha is fortunate in that at least three protected areas surround it, around which corridors can be found and established.

This project was initiated in May 1994 with the primary aim of developing a field data gathering methodology to facilitate the use of GIS and satellite remote sensing technologies as a rapid and reliable means of assessing the conservation status of corridors. This will lead to the visualisation and prescription of remedial management actions as well as the identification of satellitic core areas deserving special attention.

The landscape between Kanha and Bandhavgarh is viewed as area between - (i) Kanha and Bandhavgarh; (ii) Kanha and Achanakmar wildlife sanctuary; and (iii) Achanakmar to Ghungati range in Shahdol forest division near Bandhavgarh. As first part of the study, the area between Kanha and Achanakmar has been surveyed and studied, and modelled using the spatial patterns of landscape and biotic pressure zones, in GIS domain. Several patches crucial in providing refuge to dispersing tiger populations, important links between the two PAs and pressure areas have been identified. The study so far has also underlined the need to upgrade the status of Achanakmar and also make some management interventions in some areas.

The report on this portion of the study has been submitted to the Madhya Pradesh forest department. The study on the remaining two landscapes between Kanha and Bandvgarh is ongoing, and only after its completion will a composite report be prepared and final recommendations made.

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

Faculty - VK Uniyal and *Dr GS Rawat*

Researchers - CP Kala, and *PV Karunakaran*

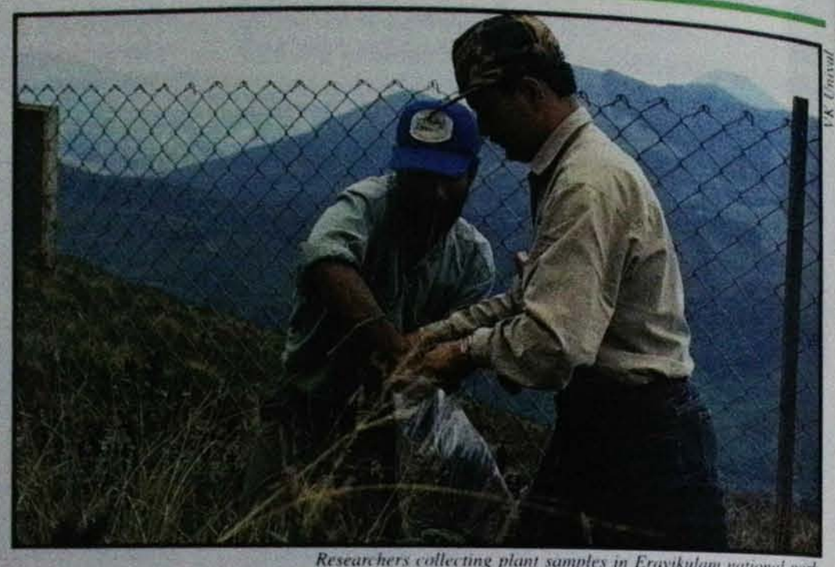
The temperate and tropical montane grasslands of India, located in the mid-elevations of the Himalaya (1800-3500 mts msl) and the Nilgiri (>2000 mts msl) mountains are most interesting in terms of structure and functions. They differ from alluvial grasslands and savannah woodlands in their nature, ecological stability and distinct bio-climatic conditions.

Between themselves, the montane grasslands of Himalaya and Nilgiri occur in different biogeographic zones exhibiting ecological differences as also some similarities - different bio-climates but comparable ecological niches too. Each has a high level of endemism, yet there are also similarities in flora and fauna such as the occurrence of species like rhododendron and tahr.

The mosaic of factors that helps these grasslands remain stable and functional calls for a closer evaluation. Since they signify great human use value (and experience considerable human pressure), their long-term conservation can be ensured by according them legal protection. However, their conservation planning suffers from lack of information. Though studies have been conducted on these montane grasslands in Himalaya and Nilgiri, these have largely been scattered and lack precise quantitative data on structural and functional attributes of these grasslands. Very little information is available on the use of these grasslands by resident fauna and domestic livestock. This study was begun in 1992 with the objectives of collecting baseline information on the floral diversity, community structure, composition and dynamics in the two regions. The two sites selected for the study are Valley of Flowers national park (Garhwal Himalaya) and Eravikulam national park (Nilgiri).

During the year under reporting, the floristic inventory, community composition for both the study sites was completed. In Eravikulam, now data is being collected on the effects of grazing and fire, for which six chain link

exclosures measuring 10 mts x 10 mts have been established. The comparative data on controlled grazing for the Valley of Flowers is being collected from the grazed pastures in Khiron valley adjacent to the park. Interim reports were communicated to the respective state forest departments for their comments and feedback.



VK Unival

Researchers collecting plant samples in Eravikulam national park.

*** Release of captive Himalayan musk deer in Kedarnath wildlife sanctuary, Western Himalaya.**

Faculty - S Sathyakumar and *Dr Pradip K Malik*

Researcher - S Saunand

The Himalayan musk deer was once continuously distributed all along the southern side of the Greater Himalaya between 2500 mts and the 'treeline'. Poaching for 'musk' and large scale destruction of its habitat has led to a decline in musk deer population in the Himalaya and restricted its distribution to isolated pockets.

In order to have a captive stock for a possible "reintroduction" in the future, the UP state forest department created a Captive Breeding Centre for this species at Kanchulakharak, near Kedarnath wildlife sanctuary. This project by WII was started with the aim of conducting studies on the captive musk deer and reintroducing a few individuals in an area where musk deer had become locally extinct in the recent past.

The field work for this research project commenced in June 1994 with a field orientation for the researcher, setting up of base camp and design of study. During 1994-95, pre-release actions (Phase-I) were carried out. The potential sites for relocation were selected and habitat evaluation studies were undertaken in these sites.

Studies were also conducted on the captive Himalayan musk deer at the Musk Deer Breeding Centre. These included experiments on modification of feeding behaviour, cafeteria experiments and genetic studies. The histopathological and parasitological investigations on the captive musk deer and livestock in and around Kedarnath wildlife sanctuary were conducted as well.

As part of the study, disease investigation studies were taken up. The Himalayan musk deer was successfully immobilized using Xylazine Hcl and Yohimbine Hcl as reversing agent. The salient features of mortalities at the Breeding Centre during the last ten years were also studied. Respiratory swabs of immobilized animals were collected in PDC 102 Amies modified medium. Bacteriological investigations conducted by GB Pant University suggested the occurrence of *Pasteurella hemolytica* which is commonly associated with various stresses. Stresses or predisposing factors (weather, nutrition, fear, and handling) allow bacterial penetration of the mucous membranes in the respiratory tract. The outcome is often fatal.

Faecal samples of all captive musk deer were found positive for lung worms *(Dictyocaulus viviparous)*. The decline in the nutritional status of the animals in May-August, along with other stress factors, makes them vulnerable to significant damage of respiratory, mucocialliary function by the lung worm. And this allows *Pasteurella* sp. to invade, causing "lung worm pneumonia complex". Based on our findings, certain health management recommendations were made to the forest department in charge of the Breeding Centre.

*** Integrated landuse approach for conservation of biological diversity of *terai* grasslands.**

Faculty - VB Sawarkar

Researcher - Dr SA Hussain

The *terai* grasslands represent a high level of biological diversity and harbour a large number of endangered species. However, on account of their limited distribution, severe fragmentation, loss of habitat quality and mounting pressures on forest based resources, these grasslands are also among the most threatened ecosystems in India.

The objectives of this study were to assess the extent of tall grasslands in Valmiki tiger reserve in Bihar, identify the factors affecting their conservation values, examine the potential of these grasslands for the conservation of associated fauna, particularly barasingha, hog deer, rhinoceros and the swamp francolin, and make recommendations for their improved management.

The field work under this project was completed in May 1994. It has been observed that the tall grasslands in the tiger reserve are fragmented, severely degraded and under high anthropogenic pressure. As much as 87% of these grasslands have already been lost--to plantations (2079 ha, 57%), encroachments (1000 ha, 27%) and construction activities (100 ha, 3%). Only 465 ha of potential grasslands still exist, which is within the proposed core zone of the reserve. However, these remnant portions have retained significant wildlife values and have the potential for the conservation of associated fauna.

Fourteen compartments have been identified within the reserve, which have high conservation values. If management measures such as controlled burning and reduction in grazing pressure could be taken up immediately, the wildlife values of these grasslands would be amply restored.

The project has been allowed a one-year extension upto September 1995.

*** Evaluation of elephant habitat in Singhbhum in relation to fragmentation, degradation, mining and other disturbance factors.**

Faculty - Dr S Chowdhary

Researchers - RK Singh and *Prabhat K Bhagat*

Singhbhum forests in the Chotanagpur plateau biotic province in south Bihar encompass 60% of the 3300 sq km elephant habitat and 58% of the elephant population in the state. The sal forests in the Saranda forest division here are one of the finest in the country. However, in the absence of any protected area, and because of improper landuse including heavy mining, illegal felling and hunting, the Singhbhum forests are fast losing their floral and faunal values. The impacts of the threats to the habitat can be seen in the long distance disoriented movement by elephants from Singhbhum to Madhya Pradesh, leading to increasing man-elephant conflicts. This research project basically aims at finding the effects of habitat fragmentation and of iron-ore mining on the elephant populations and habitats.

A vegetation and landuse map of the study area has already been prepared and digitized for quantification, and for detecting forest and landuse changes in the habitat of three forest divisions - Saranda, Kolhan and Porahat, by using GIS and remote sensed data. The data collection work on habitat-species relationship is in progress, which would help quantify the varied responses of fragmentation on abundance, movement and utilization structure of the elephants in the habitat.

PK Malik

An immobilized musk deer in Kedarnath sanctuary.

As for mining, Singhbhum has Asia's largest single point deposits of iron ore. There are five mines operating within prime elephant habitat in the Saranda forest division - generating about 7.8 million tonnes of finished ore and 189.4 million tonnes of contaminated and overburden waste per year. Metal rich concentrates are produced by processing the ore by washing in water, in two mines and by compressed air in a third. In the remaining two mines, the product is despatched unprocessed.

Tailing and disposal of slime and slurry in the river Koina which meanders through 70 km of the reserve forest, causing serious pollution in the river in terms of total suspended solids, endangering the survival of aquatic micro-organisms and invertebrates. Excessive levels of three toxic heavy metals - lead, manganese and zinc - were detected in river water samples. Quantification of heavy metals along the river gradient and their effect on the abundance and biomass of aquatic fauna and flora is now under progress.

* **Effects of shifting cultivation on the ecology and conservation of mammals with special reference to *T phayrei* in north-east India.**

Faculty - SK Mukerjee
Researcher - AK Gupta, IFS

This project is a continuation of the previous project on Phayrei's langur undertaken by WII in 1989-92.

The proposed field work in Gumti wildlife sanctuary could not be initiated because of prevailing ethnic disturbances there. As such, a comparatively safe, alternative research site had to be selected - in the Sepahijala wildlife sanctuary, and a camp was established. The new site experiences severe biotic pressures from almost a dozen villages surrounding it and illicit felling of trees and poles is prevalent. Some of the trees marked by the researcher for phenological studies were lost because of this and therefore, two local persons had to be engaged to keep vigil and also assist in the project work. The researcher could not obtain the desired help from the regular forest staff in that sanctuary. Further, it may be noted that because of proximity to the capital town and rich agricultural fields in the surrounding areas, casual labour was not easily available for research work at the regular rates.

However, Gupta has been able to collect data on the Phayre's leaf monkey and how it is able to adjust in small protected area and utilize the habitat along with six other primate species in that area. Data has also been collected on shifting cultivation and its effect on the primate populations. The field work has been completed.

* **Sero-epidemiological studies on some infectious and parasitic diseases of wild and domestic ungulates in Sariska and Ranthambhore national parks, Rajasthan.**

Faculty - Dr Pradip K Malik
Researcher - Dr Pravin K Malik

The study of wildlife diseases and the practice of wildlife health management are new disciplines in India. While ecological and biological aspects of the ecosystem and wildlife have been widely studied, there has been hardly any attention paid to the health aspects in the management of wild populations.

In the past few decades there have been many bacterial and

S Chowdhury

Heavily polluted elephant habitat in Saranda

viral diseases which have seriously affected many wildlife populations. Restriction of wildlife to small geographic patches of protected areas, have given rise to epizootic and enzootic disease possibilities. Also, agricultural development has brought domestic and wild animals together to share common pastures. Being mutually prone to infections, the interactions between wild and domestic animals have resulted in highly contagious and fatal viral and bacterial disease outbreaks.

At the veterinary level, considerable progress has been made in the control of diseases in domestic animals, but not so in the case of wildlife. In fact, there have been meagre studies in wildlife diseases and their role in population dynamics. Veterinary institutions provide no formal training in wildlife health aspects.

The occurence of any disease and mortality from it becomes widespread before it is even noticed and recorded - at which time it is not possible to mount satisfactory disease investigations. As such there is need for continuous monitoring of diseases in wildlife, and to determine the nature and extent of major wildlife diseases and their role in population dynamics of wild species. The most affective method of monitoring infections in wildlife is by serological investigations.

In response to such a need, this research project was begun. The study will help define the transmission of various diseases and thus help in its control and prevention; establish a basic database of physiological reference values for both disease free and affected animals; and serve as a model for health management in various wildlife areas of the country.

During 1994-95, a base laboratory was established at Sariska for processing samples before onward transmission to specialised laboratories, and for bacteriological culturing. Wild animals were chemically immobilized, and blood, faecal, and respiratory samples were collected. Similar samples were drawn from domestic animals after physically restraining them.

The faecal samples were examined for endo-parasitic eggs and larvae, and preserved in 10% formalin. Rectal and nasal swabs were used for bacterial culturing. Haematological studies are being conducted at the base laboratory itself. Serum from blood was stored in liquid Nitrogen. The bacterial cultures and serum are being sent to specialized laboratories for identification of bacteria, serum biochemistry and prevalence of antibodies. The findings will enable the institute to establish health management guidelines for ungulates in Sariska tiger reserve.

* **Behavioural ecology of caracal in Sariska tiger reserve, Rajasthan.**

Faculty - Dr SP Goyal
Researcher - Shomita Mukherjee

India has the highest diversity of cats in the world, having 15 out of the 37 extant felid species found worldwide. However, only the large cats have been studies to some extent while the lesser cats have largely been ignored so far. Today, with the exception of the jungle cat, all other smaller cats in India are threatened or endangered. The caracal is one such species which needs urgent attention.

Caracal was once widely distributed in India and was even kept as pet and trained for hunting by Mughal emperors and shikaris. But, in the last few decades, considerable changes in landuse patterns due to rise in human population and uncontrolled expansion of agriculture in arid tracts have greatly affected the caracal habitat. This, coupled with poaching for its pelt in states such as Rajasthan, has led to such a reduction in caracal numbers that its survival in India is now uncertain. The habitat is highly fragmented and the species is now found in isolated patchy habitat islands within its zone of distribution.

This study is aimed at collecting information on the ecology and behaviour of caracal and its co-predators i.e. jungle cat and jackal in Sariska tiger reserve, and identify the crucial habitats in its range.

As in January 1994, reconnaissance of the study area was continued in June and July 1994 when various field methods were tested for studying the relative abundance and habitat use by the caracal, jungle cat and jackal. Based on earlier observations of predator movement, a 14 sq km scrubland was identified as the intensive study area (ISA). From the analysis of the preliminary vegetation data, the ISA was stratified into open and dense scrubs.

The track plots (n = 300), road counts (520 km) and camera traps (45 nights) set up earlier (January-February 1994) were compared for determining carnivore presence and indices of their relative abundance. Data from track plots indicates that the jungle cat shows relatively more movement in the dense scrubs whereas the jackal prefers to move more in the open scrubland. Caracal was twice sighted and its probable tracks seen 12 times in the ISA. Using camera traps, a tiger, a jackal, a donkey and a buffalo were photographed during the reconnaissance.

Birds, being potential prey species for the carnivores, were grouped into three body weight classes (BWC):- BWC 1 (10-250 gm), BWC 2 (250-400 gm), and BWC 3 (>400 gm). Based on 12 line transects in the ISA, it was concluded that BWC 1 has similar density, i.e. nos./sq km, in open and dense scrub (237 ± 18.47 and 226 ± 29.85 respectively); BWC 2 had a higher density estimate in the open scrub (78 ± 8.399) than in dense scrub (34 ± 9.966); whereas BWC 3 has lower densities in open scrub (38 ± 6.096) than in dense scrubland (66 ± 15.95).

A total of 250 scats of various predators were collected from the ISA for estimating their diet. Since there is considerable overlap in the scat size between leopard's and caracal's, and between jungle cat's and caracal's, it is very important to identify the scats correctly. Work on the identification of scats of various species by quantifying bile acids using Thin Layer Chromatography, has been initiated.

It is now endeavoured to radio collar caracal, jungle cat and jackal. Five clover traps baited with cat lure, meat and fish have accordingly been set up in the ISA.

Projects initiated

* **Nanda Devi Biosphere Reserve : A study on socio-economic aspects for the sustainable development of dependant population.**

Faculty - Ruchi Badola

Researcher - Chandrashekhar Silori

The Nanda Devi region in Chamoli Garhwal was declared a biosphere reserve in 1988 with a view to conserve the crucial Himalayan ecosystem. This region ranks among the least disturbed protected areas in the country. There are about 15 villages located in the buffer zone of the reserve, but as yet, no information on the extent and magnitude of their impact on the ecosystem was available. This study, with its budget sanctioned by the Ministry of Environment and Forests from the funds for Biosphere Reserves, aims to quantify the dependency and biotic pressures of the local villagers on the natural resources of the biosphere reserve. It will also investigate the socio-economic and cultural status of the villagers and identify hindrances preventing acceptance of ecologically sustainable alternatives, and suggest strategies for the sustainable utilization of natural resources in the reserve's buffer zone.

Field work for this project was initiated in June 1994. The first phase of the field work has been completed, which involved a detailed socio-economic study of the villages situated in the buffer of the reserve. The villages are small, inhabited by the Bhotia tribals who are mostly migratory. The family size is found to be small with no significant increase in populations in the last four decades. The main reasons for this are emigration and a large part of the migratory population taking up permanent residence in their erstwhile summer settlements.

Very few people have regular government jobs. Agriculture is an important occupation. It is mainly rainfed and cash crops are grown. Almost all the families own livestock, with a preponderance of sheep and goat. The manufacture and sale of woollen products contribute to a major share of the economy. But the marketing facilities are poorly developed. Some extraction of medicinal plants for bonafide use of the villagers was also noticed though no instances of sale were recorded. The cultivation of medicinal plants has good economic potential in the area but lack of technical knowhow and marketing uncertainties are major deterrent factors.

The next phase of the study will deal with quantification of resource use, the production and consumption of biomass by the villagers and its impact on the buffer of the reserve.

* **Assessment of elephant damage to woody vegetation in Rajaji national park, Uttar Pradesh.**

Faculty-Dr AJT Johnsingh and *Dr SP Goyal*

Increasing biotic disturbances and unplanned development have affected north-western elephant population. During

earlier studies in Rajaji national park, an increasing pressure on the habitat, particularly on woody vegetation which contribute to the bulk of the elephant food, was noticed. Consequently, a need had been felt for the assessment and long-term monitoring of damage to woody vegetation. Information gathered during this short-term project would help in assessing the degree of damage, changes in the richness and abundance of palatable woody species, and the status of their recruitment and regeneration. Work on the project was initiated by Johnsingh and Goyal with the help of three field assistants in December 1994.

Random plots of one hectare were selected in areas stratified into hills and plains. All trees of >20 cm girth in each plot were marked with numbered aluminium tags. Data on girth at 1.3 mt height, damage by elephant such as debarking, pushed and crown broken, and lopping by Gujjars for all trees in each plot have been collected. The target for data collection is to have 40 plots - 20 in Rajaji and 20 in Chilla. So far this has been completed 10 plots in the plains (Chilla) and 5 plots in the hills (Rajaji).

Of the 3230 trees marked in the plains, the dominant tree species are *Mallotus philippinensis* (24.2%), *Shorea robusta* (19.2%), *Tectona grandis* (16.9%), *Ehretia laevis* (7.4%) and *Largerstroemia parviflora* (7.6%). Trees debarked and pushed by elephants were 1.7 and 1.4 per cent respectively. Seventy percent of the trees pushed down by elephants were of *Mallotus philippinensis* and *Ehretia laevis*. The data from the hill plots is insufficient as yet, for discussion here.

* **Status survey of elephants, their habitats and an assessment of elephant-human conflict in Garo Hills, Meghalaya.**

Faculty - Dr AJT Johnsingh

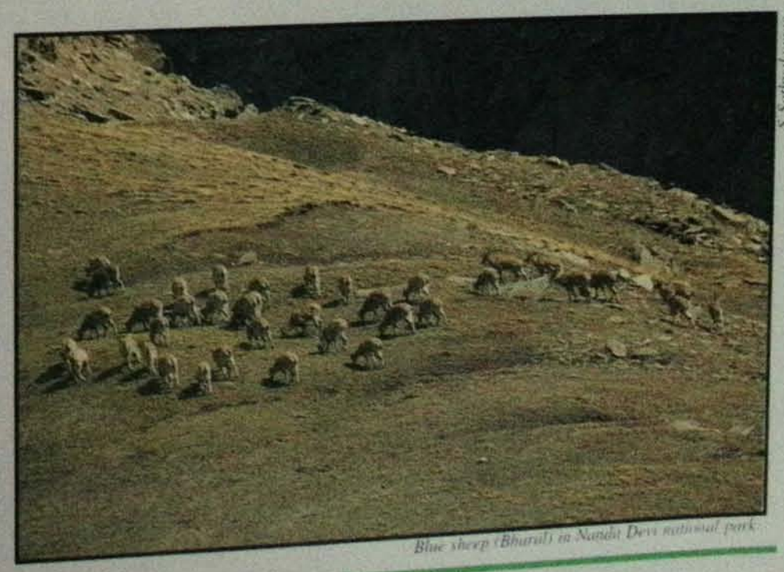
Researcher - Christy A Williams

This was one the two projects to receive funding from "Project Elephant", which was launched by the Government of India in 1991-92 to ensure the long-term survival of this highly endangered species.

Nearly half the population of the Asian elephant is found in India, and the north-east India is estimated to have as much as half the India's population of wild elephants. But, very little quantitative information is available on this. The latest census figures of the Meghalaya forest department estimate the total population of elephants in the state to be around 2200. Of these, 65% (n=1460) were counted in the Garo Hills. Roughly 56% (818) of these were present in protected areas. But since, the forest department controls only about 20% of an estimated 3000 sq km elephant habitat, the human-elephant conflict in Garo hills is inevitable. During the period 1984-93, 48 people have been recorded as killed and 56 injured by elephants, besides over 19,000 cases of crop depredation by elephants.

Till date, no detailed study or tested preventive measures have been undertaken in the severely affected areas. Nor, on the other hand, have the elephant populations been identified in terms of immediate threats or in terms of long-term viability.

This status survey was planned with the objective of evaluating the state of elephant habitat and relative densities in the Garo Hills, and suggesting measures for the mitigation of the serious elephant-human conflicts. A brief survey was carried out in August-September 1994 to identify the areas where baseline data was required urgently. There was also an urgent need to identify and assess the feasibility of the suggested corridors in terms of



S Sathyakumar

Blue sheep (Bharal) in Nanda Devi national park.

intensity of use by elephants and threats from human activities in and around these corridors and assign priority values.

The study was initiated in November 1994 and data on habitat use by elephants was collected in and around Balphakaram national park. Important corridors and forest areas were evaluated for the extent, contiguity and intensity of use by elephants. The suitability of enlarging the national park was also studied.

A survey was carried out in 19 seriously affected villages to gauge, among other things, the feasibility and people's willingness to participate in programmes designed to help reduce the conflict. It is desirable to visit the Garo Hills in the monsoons next year (August 1995), when crop depredation by elephants is reported to be maximum, to take a first-hand look at the crop raiding problem.

* **A survey of the clouded leopard (*Neofolis nebulosa*) in north-east India.**

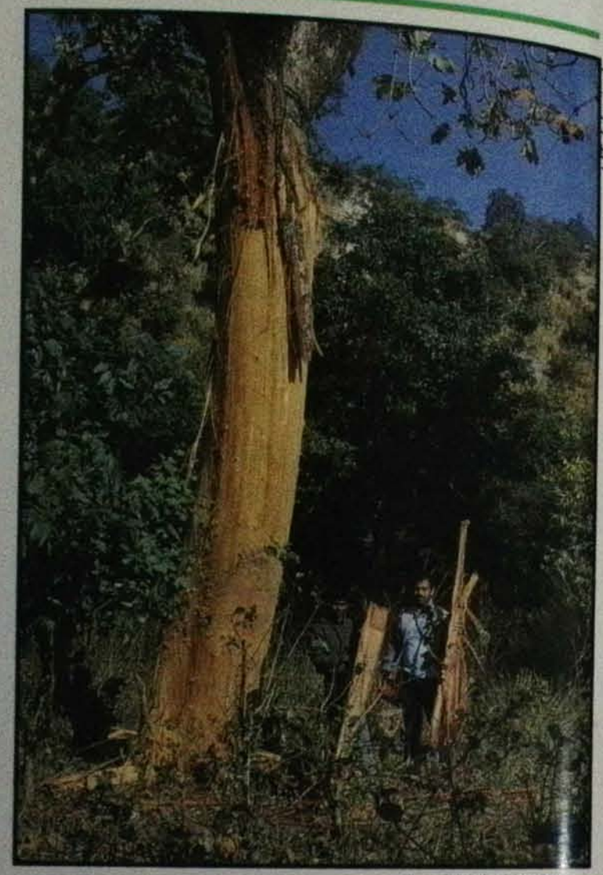
Faculty - Dr AJT Johnsingh
Researcher - Vidya R Athreya

Found only in the dense evergreen forests of the north-eastern states, the clouded leopard is among the most endangered and elusive medium-sized cats in India. It is listed in Schedule I of the Indian Wildlife (Protection) Act, 1972 and also in Appendix I of CITES.

The existing information on the clouded leopard is largely anecdotal or based on secondary sources. Not much is known about its status or ecology; neither have any intensive surveys or studies been carried for the purpose in India.

This short-term project is aimed at conducting a detailed survey of areas in north-east India where the clouded leopard has been reported. The survey would also assess the feasibility of a long term study of the animal and identify the area for that.

The field work began in October 1994, and a survey was carried out in Namdapha tiger reserve and Pakhui wildlife sanctuary in Arunachal Pradesh, and the Nongkhyllem wildlife sanctuary and Balapakharam national park in Meghalaya. Secondary information on the habits of the



AJT Johnsingh

Tree debarked by elephant

clouded leopard and other large felids was gathered from the local tribal communities. Camera traps were also set up, and though these did not yield a photograph of the clouded leopard, evidences were obtained of binturong, large Indian civet, Himalayan palm civet, kalij pheasant, Himalayan whistling thrush and green magpie at the bait sites.

Attempts were made to have data on relative abundance of potential prey species. Indirect field evidences in the form of scrapes and pugmarks of felids were also noted. Scat samples collected from the field will be analysed in the laboratory and compared with standard scat samples of captive clouded leopard using the thin layer chromatography technique.

The field work had to be extended by two months as four protected areas were to be surveyed.

* **An ecological analysis of critical sea turtle habitats along the Orissa coast for the development of a scientific sea turtle management strategy.**

Faculty - BC Choudhury
Researcher - Bivash K Pandav

Of the four sea turtle species found in the coastal waters of Orissa, only the Olive Ridley is known to nest. There are three mass nesting beaches (or rookeries) - Gahirmatha, the world's largest known, Devi and Rushikulya which was discovered last year during WII's survey project. Encouraged with the results of that survey (see section on "Completed projects"), and endorsing the urgent need for a detailed ecological analysis as emerged from the survey, this project was initiated in December 1994.

Since our existing knowledge on the subject is based on information from Gahirmatha alone, and no ecological information is available on the other two rookeries, one of the objectives of the study is to tag the nesting sea turtles at the newly discovered Rushikulya rookery and the more well known Gahirmatha rookery to study their dispersal in the coastal waters of Orissa. This is essential to determine whether the sea turtles at the two sites are the same (which disperse from Gahirmatha to nest in Rushikulya or vice versa) or different populations, since nesting at the two sites does not take place simultaneously. The tagging programme will help provide data on population size and characteristics, migratory paths and geographical ranges, feeding areas, breeding frequency, inter-nesting interval, nest site fixity, growth rate, etc. The monel metal tags or

Bivash Pandav

Results of changes in nesting beach profile

necessary funds for them are being sought from WWF or other international funding agencies.

Overall, the study project aims to develop a scientific management action plan to ensure the long-term survival of sea turtles that still nest in thousands at some selected beaches along the Orissa coast. The action plan would encompass nesting habitat protection and management strategies, habitat restoration plans, avenues for future scientific research and development of public awareness programmes.

* **Conservation of Indian wolf**

Faculty - Dr YV Jhala

After the extinction of the cheetah in India, the wolf remains the major predator in the grassland-scrubland habitats. However, this sub-species of the grey wolf in India is on the endangered list of the Indian fauna and on Schedule I of CITES. Despite its precarious status, it has hardly received attention in the form of detailed scientific studies or conservation efforts. From the limited studies conducted so far on the wolf, it is clear that this species can be effectively conserved provided efforts begin soon.

For any realistic action to save the wolf, it would be essential to have estimates of its abundance and distribution. But, apart from a couple of studies and a prelimnary status report, no scientific information is available on the Indian sub-species.

This study on the Indian wolf proposes to evaluate the parameters essential for its conservation by (1) estimating its population and distribution, and identifying viable populations for conservation; (2) evaluating population dynamics, prey biomass needs, and home range in three representative areas - Kutch and Bhal area of Gujarat and one site in Maharashtra; (3) studying its conservation genetics; and (4) understanding human-wolf conflicts and suggesting remedial measures.

Funds for this research project were raised from Earth Watch volunteer teams, and grants from the National Geographic Society and National Fish and Wildlife Foundation, Washington DC.

Field work was initiated at Velavadar national park in July

1994. Three wolves from two packs were live trapped and equipped with radio-collars. Data was collected on their home range, predation/kills and on denning, rendezvous sites and early survival of pups. Data was also gathered during the year on grassland productivity and blackbuck seasonal population counts. Wolves are to be radio-collared at two other sites (one in Kutch and one in Maharashtra) as well.

*** Validation of pugmark technique for individual identification and census of large felids.**

Faculty - Dr YV Jhala and *Qamar.Qureshi*
Researcher - Vimal Bhuva

A reliable census technique is a primary requisite for the management of large felids. Tiger pugmarks are believed to have characteristics that are unique to each individual. This trait along with other associated signs like the stride and the straddle in conjunction with monitoring of tiger movement within an area, form the basis of the tiger census technique which have been developed from empirical evidence by field personnel. The pugmark technique is currently the only feasible and economically viable technique available for census of large felids in India.

However, this technique has generated some controversy. It has not been tested scientifically for reliability and accuracy, and it gives no clue to the errors involved in the population estimates that are obtained. The ability to specify the errors is an important attribute of any scientific technique.

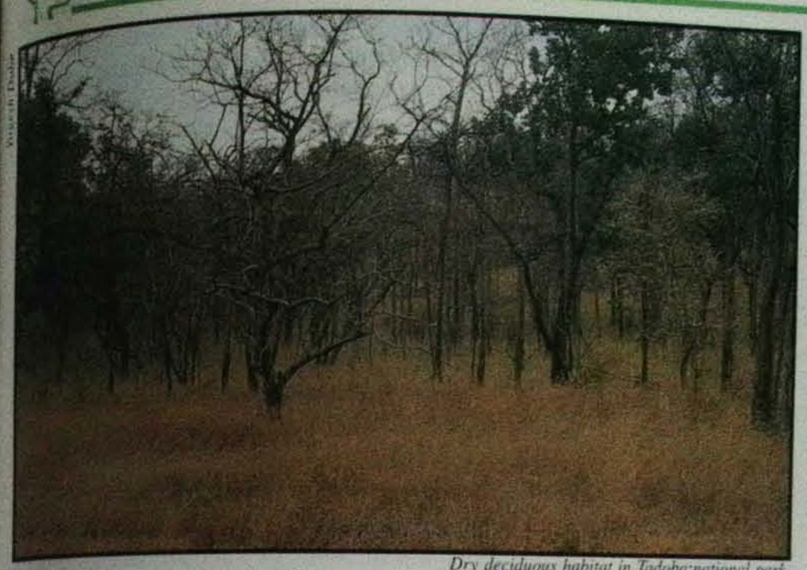
Since we rely solely on the pugmark technique to obtain information on the population size of tigers, it is important that this technique be evaluated for its reliability and accuracy. This study aims to test the ability to identify individual felids from their pugmarks and to estimate the reliability and accuracy of this technique as a census tool. If pugmarks are in reality unique to individuals then the errors associated with the use of the technique in estimating population size will arise from the following sources : 1) The inherent variation in an individual felids pugmark due to different strides and substratum; 2) Errors in producing tracings of pugmarks; and 3) Errors in analysis and interpretation of pugmark data. The study plans to devise a way of generating statistical confidence intervals on population estimates obtained from the pugmark technique that will account for the above errors. The census figures obtained from the pugmark technique would be compared with those from mark-recapture technique done by a non-invasive method in order to also look into the economic and otherwise feasibility of the latter technique in the Indian conditions.

The field work was initiated in Gir national park. During the year under reporting, a mark-recapture population estimation for lion was done, for which 84 wild individual lions were identified. The use of whisker pattern for individual Indian lions was also validated. Data were also collected on the pugmarks of lions, leopards and tigers. Currently, the analysis of the development and validation of statistical models is being done. This will be followed by collection of more data on tiger pugmarks and validation of the model by doing an actual census at a protected area.

*** Establishing computerised wildlife database for conservation monitoring and evaluation in Tadoba Andhari tiger reserve.**

Faculty - Dr VB Mathur
Researcher - Yogesh K Dubey

There are over 550 protected areas in the country. Yet only a few of these have developed capabilities to collect, collate, analyze and interpret ecological data using modern analytical techniques. The existing methods of data collection in PAs vary considerably in their assumptions, preciseness and accuracy. In fact, even in the routine field survey for monitoring changes in vegetation and animal distribution/abundance within a PA, the methodology has not been developed and/or standardized. In order to develop the management planning capabilities of PA managers and have their management plans succeed, it is essential that simple, rapid, field friendly and computer compatible methods for data collection, collation and analyses are developed. The data thus generated would also enhance the output from WII's computer based species-habitat conservation database on the PA network. This project seeks to establish computerized databases on spatial as well as non-spatial attributes for ecological monitoring and evaluation in Tadoba Andhari tiger reserve, Maharashtra, which is a Management Plan preparation site under WII-FAO-UNDP project on "Developing Wildlife Management Planning and Ecodevelopment Planning Capabilities". This project was initiated in May 1994 with



Yogesh Dubey

Dry deciduous habitat in Tadoba national park.

the specific aim to (i) assist the PA in the setting up of a computerised database on spatial as will as non-spatial attributes using ecological, management and socio-economic data in order to enhance the management planning, evaluation and monitoring capabilities; and (ii) motivate, train and involve field staff in conservation monitoring process.

During the year under reporting, satellite imageries (IRS, LISS II) were visually interpreted to prepare a habitat type map of the study area. Data on contour, drainage, roads, human settlements was digitized and stored in GIS domain. Unique habitat viz. caves, burrows and cliffs which are special habitats for tiger, leopard, sloth bear and wild dogs were surveyed and mapped using Global Positioning System (GPS). Vehicle based transect were carried out for estimating the ungulate abundance and densities in different habitat types and to generate habitat suitability maps. Also, training programmes were organized beatwise for the field staff.

*** Study of wild animal damage problems in and around protected areas and managed forests in India. Phase-I : Madhya Pradesh, Bihar and Orissa.**

Faculty - Dr NPS Chauhan
Researcher - Dr KS Rajpurohit

Rapid human population growth in India has led to increasing conversion of forests, commons and marginal lands for agricultural purposes. Over time, such conversions have disturbed and fragmented most of the wilderness areas. One of the effects of this has been that many wildlife populations have got ecologically dislocated from their former ranges. The disoriented animals stray into human habitations which is resulting in increasing conflicts and destruction of life and property. Cases of man killing, cattle lifting and crop raiding by wild animals are taking place almost in every state.

However, the extent of the problem is still vaguely defined, and information on it is rather scattered. A need has been felt to study the man-wildlife conflicts in various states and thence develop strategies to minimize the problem. This study proposes to survey the problem areas in Madhya Pradesh, Bihar and Orissa to gauge the gravity of the problem and its socio-economic effect on the local people.

During 1994-95, various forest divisions including protected areas and managed forests in Madhya Pradesh, Bihar and Orissa have been surveyed for wildlife damage problems. The extent and the gravity of the problems have been recorded locality-wise. In northern parts of Bihar, damage to agricultural crops is mainly by nilgai. In southern Bihar, the damage problems caused by elephant, tiger, leopard and sloth bear are serious. Elephant damage to human lives, property and agricultural crops is enormous. High incidence of cattle lifting by tiger has been observed on the peripheries of Palamau tiger reserve, whereas cases of human killing by tiger are sporadic here. Child lifting by wolves has taken on serious proportions in northern Hazaribagh and southern Koderma forest divisions in the past two years.

In Madhya Pradesh, wildlife damage problem are mainly concentrated in and around the protected areas. Cattle depredation by tiger and leopard and crop damage by wild boar are widespread in and around the managed forests and protected areas. Crop damage by ungulates is common in

KS Rajpurohit

Victim of attack by a wild animal.

and around protected areas. Serious cases of crop depredation by blackbuck have been recorded in the Great Indian bustard sanctuary in Karera. Cases of human mauling and killing by sloth bear in alarming proportions have come to light in Bilaspur, Raipur and Raigarh districts.

In Orissa, elephants are widely distributed and are causing serious damage problems in terms of human loss, property destruction and crop depredation. There are sporadic cases of human casualties by sloth bear, tiger and leopard in and around protected areas. Data is being compiled and analysed.

* **Establishing Geographical Information System database for the management of Gir protected area.**

Faculty - Dr AJT Johnsingh and *Qamar Qureshi*
Researcher - Diwakar Sharma

Gir protected area (GPA) includes Gir wildlife sanctuary (1154 km²) and national park (258 km²). It is a part of the Gir Conservation Unit (GCU) which includes satellite reserve forests around the GPA. Being the only refuge of remnant population of about 250 Asiatic lions, the GPA has, over the decades, attracted numerous researchers to study its physiography, vegetation and animal components. All these studies on geology, vegetation, ungulates and lion ecology have significantly enhanced our knowledge of the habitat and the larger vertebrates of Gir.

Biological information always assists managers in decision making either directly or indirectly. But managers find it difficult to choose appropriate suggestions from studies dealing with different parameters. The recommendations from the many important studies which have been conducted here from late 1960's could not be implemented as the management was not sure of their possible undesirable after-effects.

There is an urgent need to create and synthesize all available information, hitherto scattered in the form of different reports, scientific papers and dissertations. This can be done by creating an integrated park level database using GIS database. The GIS database, with its ability to correlate various factors affecting vegetation and animals distribution, will help assess the future impact of biotic pressures and management practices on the basis of existing field data, spatial data and simulated data. The park level database can always be updated easily as new information comes in.

This short-term project to integrate and convert the existing scattered scientific information on Gir for management use, was initiated in January 1995 with the specific objectives of : (i) identifying the areas for habitat manipulation and predicting their possible impacts on vegetation; (ii) establishing baseline information on fires, preparing a fire prone zonation map and developing guidelines for fire management; (iii) identifying areas and determining the quantity for rotational grass harvesting; and (iv) determining the water distribution during the summers under varying rainfall and to assist in water management.

During the current reporting year, Sharma digitized the road network, hamlets, potential waterpoints and vegetation plot locations. The data is being analysed. The digital data has been ordered from NRSA, Hyderabad, part of which has been received, and its geocoding is in progress.

* **Developing a long-term monitoring programme for mammals and birds of Indian Ocean, Dakshin Gangotri and Maitri regions of Antarctica using GIS and GPS technologies.**

Faculty - S Sathyakumar, Dr PK Mathur, BC Choudhury and *Dr VB Mathur*

India's contribution to the international effort for the conservation of Antarctica's unique biodiversity by initiating research programmes in its Dakshin Gangotri and Maitri field stations, has been significant. Sathyakumar was selected by the National Coordination Committee on Antarctica Expeditions (NCCAE) - Department of Ocean Development (DOD) to participate in the XIV Indian Scientific Expedition to Antarctica (December 1994-March 1995). Accordingly, Sathyakumar developed this project which was approved by NCCAE. It may be mentioned that funds for such projects are to be made available by the parent organization, while logistics and all other support is provided by the DOD.

The objectives of the project are to (i) establish a baseline status for wildlife in the Indian Ocean, Dakshin Gangotri, Maitri and Indian Bay regions in Antarctica; (ii) identify species/taxa to monitor; and (iii) design monitoring protocols. During the expedition, the baseline status of mammals and birds in Indian Ocean, Dakshin Gangotri and Maitri was assessed and monitoring procedures initiated. Five species of mammals and 17 of birds were recorded during the expedition stay. Aerial surveys were also carried out to obtain abundance estimates for adelie penguins, emperor penguins and crabeater seals in the Indian Bay region there. A preliminary classification of wildlife habitats based on satellite imagery and limited ground truthing was also done.

S Sathyakumar

A close study of penguins in Antarctica.

Though this study, by itself, was a short-term project, the RAC has appreciated the merit of WII's participation in the forthcoming expeditions as well. As such, the project objectives - establishing the baseline status alongwith standardization of monitoring techniques and designing of monitoring protocols for the identified species/taxa - would be done over the next two or three years .

Collaborative projects

US - FISH AND WILDLIFE SERVICE

* **Conservation and management of freshwater turtles and land tortoises.**

Faculty - BC Choudhury
Researcher - S Bhupathy

Lack of information on the status and habitats of the 26 species of freshwater turtles and tortoises in India, necessitated a study that could rapidly assess the situation and come up with a conservation action plan. This project was initiated in May 1991 and got completed in June 1994. The stated objectives of the project have been successfully achieved - determining the current status of freshwater turtles and land tortoises and their habitats in India; identifying viable turtle populations and habitats for setting up protected areas; developing an *ex-situ* conservation programme for rare and endangered species of turtles and tortoises; and identifying scientific research and training needs of biologists and managers on Chelonian conservation.

During the year 1994-95, the project supervisor assisted several state governments to initiate *ex-situ* conservation programmes, and universities to start Chelonian research projects. The draft final report of the project has been sent to subject specialists for review, following which the final report would be prepared. It is planned to be printed for wider circulation.

*** Ecology of the Indian giant squirrel.**

Principal investigator - Dr Renee Borges

Researchers - Subhash Mali and *Hema Somanathan*

This project also involves BNHS, Bombay. A survey of Malabar giant squirrel habitats was carried out in Maharashtra, Gujarat, Goa, Karnataka, Madhya Pradesh, Andhra Pradesh and Tamil Nadu between January 1992 and October 1993. The present study is a follow-up of that survey, and it was started in November 1993. After careful consideration, it was decided to locate the study in Bhimashankar wildlife sanctuary (Maharashtra) which has a good squirrel population free from poaching pressures. The core study area (5 sq km), spanning the river Bhima valley, is the sacred grove of the Bhimashankar temple.

The objectives of the study are to investigate the food selection and ranging patterns of the Malabar giant squirrel and examine the relationship between food availability and the animal's reproductive success, which would help in developing a management plan for its conservation. During 1994-95, the activities conducted included tagging of trees, focal animal sampling, squirrel sampling in other areas, estimation of food availability, estimation of territory and home range, and chemical analysis of the food samples consumed and rejected in order to determine the extent to which food selection is influenced by nutritional and allelochemical components of plant parts.

Space utilization by the squirrels is rather stable in forest parts which have relatively low population density, while the shifts are more pronounced, showing spatial overlap, aggressive encounters and competition for food and nests, in edge areas which have high population densities. Variations in space size and location could partly be attributed to key food resources that are unevenly distributed in space.

The study so far indicates that the squirrel populations along fragmented edge areas are under stress due to restrictions in the use of food and space, and this might influence their short and long-term reproductive success.

*** Ecology and genetics of Himalayan ibex in Pin Valley national park, Himachal Pradesh.**

Faculty - Dr GS Rawat, Dr AJT Johnsingh and *Dr Pradip K Malik*

Researchers - Nima Manjrekar and *Yash Veer Bhatnagar*

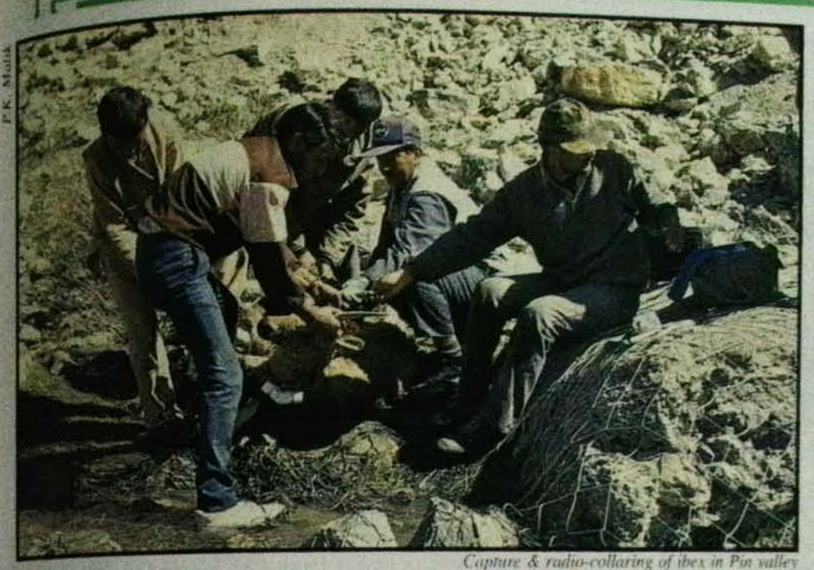
In 1989, Dr Michael Stuwe of the Smithsonian Institution, USA who has studied the Alpine ibex in Switzerland and Nubian ibex in Israel, suggested this project to study the genetics and ecology of the Himalayan ibex and compare it with the findings from the other two studies. Accordingly, this project was initiated in collaboration with the Smithsonian Institution in 1991. The objectives were to (i) study the ibex ecology; and (ii) compare the genetic heterozygosity and genetic distance with other sub-species of *Capra ibex*. Information on these aspects will prove useful for planning wildlife conservation and management in the high altitude areas.

The research site is Pin Valley national park in Himachal Pradesh which is one of the few protected areas located in the trans-Himalayan cold desert region of India. The park's altitude rises from 3600 mts to 6632 mts above msl, with temperature ranging between - 35°C and + 35°C.

The most significant event during the year was capturing and radio-collaring of ibex. Dropnets were fixed at two salt licks in the study area and the capture operation resulted in marking 13 and radio-collaring 7 ibex in May 1994. This made it the most successful capture and marking event in India. The specially designed radio-collars had two transmitters on separate frequencies. The failure of one circuit would still allow tracking of the animal on the other frequency.

Blood samples were collected from animals immobilized with the Xylaxine under sterile conditions, and serum and plasma were stored in liquid Nitrogen. The serum samples would be used for looking for antibody titre against important infectious diseases and for genetic study through iso-enzyme electrophoresis.

After fitting the radio-telemetry collars, the ibex were



P.K. Malik

Capture & radio-collaring of ibex in Pin valley

revived using Yohimbine Hcl. The animals were safely released and observed for several days following immobilization. The animals were tracked throughout the summer and winter seasons to collect valuable ecological information.

During the year, the vegetation in the area was quantified. So too was the availability of habitat attributes to compare it with utilization by the ibex. Data analysis is in progress. The project was to get completed in September 1994 but, due to justified unavoidable circumstances and high altitude field constraints, has been accorded a two-year extension.

WWF - INDIA

*** People's dependence, attitudes and development alternatives in Pin Valley national park, Himachal Pradesh.**

Faculty - Sanjeeva Pandey

Researcher - Krishna Bhatnagar

Being conducted under WWF's Conservation Corps Programme, WII is the host institution for this study providing advice, and assisting in making boarding and lodging arrangements in the field for the researcher, otherwise called a Conservation Corps Volunteer (CCV).

From about 16 villages in the Pin Valley, a few are directly dependent on the resources of the park for meeting their sustenance needs. Some of these villages have land rights inside the park, where temporary settlements are maintained. Moreover, shepherds from other areas too come here with their sheep and goats during the summers.

In the last two decades, the rise in human and cattle populations in the Pin valley has sharply increased the pressures on the national park, leading to recurrent conflict between the locals and the park officials. The park management, however, is beginning to realize that the human dimensions in the PA ecosystem have largely been ignored. People's support is vital for conservation and this must be elicited through development and adoption of ecodevelopment programmes. However, in order to plan any viable ecodevelopment programme, it is essential to have a proper understanding of the local people's socio-economy and their dependence on the PA. This study is being carried out to gather primary data on these issues, besides looking into the local people's opinions and expectations of the park, and suggesting ecodevelopment alternatives in line with the needs of the people.

The study was initiated in October 1993 and Bhatnagar formally started work in January 1994. The first quarter was spent in literature survey, reconnaisance of the study site, observing local winter activities and developing field survey questionnaires. April 1994 onwards the survey work started.

Survey has so far been conducted in six of eight villages which are directly dependent on the park. The households for the survey were selected through simple random sampling. Information was gathered on various socio-economic parametres. Of these eight villages, 21 households from three villages maintain temporary settlements inside the park, which are variously used from March-April until November-December. Their cattle, which comprise yaks, zso (yak-cow hybrid), cows, horses, donkeys, sheep and goats, arrive in the park in June-July

and stay for about six months. In July-August, migratory shepherds from the Shimla and Kinnaur districts also graze their sheep and goats in the national park area.

During the survey, about 35 individuals, considered and found to be sensitive to conservation issues, were also identified. Between January and March 1995, three meetings have been held with these individuals. It has been decided to form a group which would address issues of concern, and interact with government and other agencies for proper and speedy implementation of developments schemes in their area. The group is likely to develop into an NGO.

New initiative

Indian Wildlife Health Cooperative

Faculty - Dr Pradip K Malik

This project is an offshoot of a subject area under the WII-USFWS joint programme on "Development of the Wildlife Institute of India", which has been developing a wildlife health programme at WII for the last few years. The present project seeks to extend the idea and develop a wildlife health programme at selected veterinary medical institutions in India. The aim is to advance the capabilities of the selected veterinary medical institutions in providing diagnosis and investigation of disease outbreaks, prevention and control of diseases in the free ranging wildlife, information exchange, education and consultation to wildlife managers, biologists and veterinary medical specialists.

Five regional centres with appropriately trained staff are to be selected which would conduct wildlife health monitoring programmes and provide timely investigation of mortality events and for state wildlife agencies in their respective regions. This would be appropriate for India too because of the availability of veterinary medical institutions, with their associated diagnostic facilities, in close proximity to large wildlife areas.

ORGANIZATION

The WII Society has 35 members. Headed by the Union Minister for Environment and Forests, the members comprise some State Forest Ministers, nominated Members of Parliament and the Uttar Pradesh Legislative Assembly, officials from several central government ministries and departments, NGO representatives and eminent individuals. The II Annual General Meeting of the Society took place on 11 July 1994.

The actual functioning of the institute is orchestrated by a 15 member Governing Body, presided over by the Secretary, Ministry of Environment and Forests. During 1994-95, the Governing Body met three times : XXIV GB meeting on 17 May 1994 in New Delhi; XXV GB meeting on 21 July 1994 at Dehra Dun; and XXVI GB Meeting on 6 February 1995 at Dehra Dun.

At the XXIV GB meeting, in view of the institute's increased activities, permission was requested for additional staff and buildings. The GB then appointed a three-member committee to carry out an indepth assessment of the institute's present work load and its future growth prospects vis-a-vis the financial resources available during the remaining part of the VIII Plan period.

The committee submitted its report in July 1994, concluding that while there has been an appreciable increase in WII's activities in response to the needs of the field, there has been no comparative recruitment to enhance its staff strength. The committee feared that this situation might soon make it increasingly difficult for WII to maintain its tempo and high standard of work. Accordingly, the committee recommended a suitable increase in staff strength and pay scales. The report is now with the Government of India.

The Research Advisory Committee (RAC) meeting coincided with Annual Research Seminar on 29-30 September 1994.

Promotions

During 1994-95, SK Mukherjee, Director, was promoted from Scientist-SG category to Scientist-SH. Dr SP Goyal and Dr S Chowdhary were promoted to the next Scientist-SE category, their promotion was considered effective from January 1994. Dr NPS Chauhan was promoted to Scientist-SD grade, and his promotion was considered effective from January 1992.

Arrivals

During 1994-95, the following personnel joined WII on deputation :

BMS Rathore, Scientist-SE (Ecodevelopment)
DVS Khati, Scientist-SE (Extension)
Sugato Dutt, Scientist-SE (Management)
BS Chauhan, Accountant

The following joined the institute through direct recruitment :

K Ravi Chandran, Scientist-SC (Extension)
AK Sardar, Documentation Officer
Panna Lal, Computer Based Mapping Technician

Besides, Dr SA Hussain was appointed on contract and joined the Management faculty as Scientist-SD. Also appointed on contract was SAA Naqvi, Executive Engineer.

Departures

* HS Panwar, Director, was on extra-ordinary leave July 1994 onwards for a six-month FAO consultancy in Sri Lanka. Thereafter, FAO offered him a staff position as Senior Protected Area Planning Advisor. Panwar's premature retirement from the institute was accepted with effect from 24 January 1995. WII bid him farewell on 5 February 1995. At the XXVI GB meeting on 6 February 1995, his contribution in shaping and developing WII's infrastructure as well as its academic and training activities was placed on record.

* Dr Aradhana, Research Associate (Laboratory) also left the services of the institute during the year.

DEVELOPMENT

UNDP collaboration

The government of India-UNDP joint project titled **Strengthening Wildlife Management Planning and Ecodevelopment Planning Capabilities** entered its final year in December 1994. As part of this, two new courses were initiated - *Ecodevelopment Planning* and *Management Planning*. Two courses were conducted under the former, and one against the latter programme.

Field Planning Officers (FPO) - nine in ecodevelopment planning and seven in management planning - who trained under these programmes, were posted to their respective assigned sites, and work on planning commenced. The project faculty, national and international consultants, and faculty members of the institute assisted the FPOs in the planning work in the field. Issues covered were irrigation in ecodevelopment, wetland management, high altitude wildlife management, wildlife habitat management, non-conventional energy sources, sericulture, fisheries, etc. In addition, the project faculty is helping individual FPOs to organize workshops in order to strengthen their planning work. In February 1995, one such workshop was held in Melghat Tiger Reserve on achieving coordination among various stake holders (see section "Workshops, Seminars, Conferences").

In September - October 1994, 16 FPOs, four WII faculty members, and two officials of the Ministry of Environment and Forests went on study tours in three groups to Nepal, Indonesia, Malaysia, and Australia (see section "Courses, Training and Study Tours").

Besides, two more WII faculty members went on study tours, and six other faculty members availed fellowships to USA and UK on subject areas such as GIS, EIA, Ecology and Management of Small Populations, Wildlife Management Planning for Small Population, Conservation Education, and Zoo Management.

During 1994, equipment worth $ 47,066 was bought under the Project.

However, it may be added that as far as the training courses are concerned, the collaboration has suffered from a lack

of adequate response from the state forest departments. There were only four participants at the *II Ecodevelopment Planning Course*, and the *III Course* had to be cancelled for want of nominations. Following detailed discussions with the forest departments on the shortcomings or otherwise of the courses, it has now been decided to merge the two courses into one, providing a more cohesive and interactive curriculum.

Faculty development through USFWS

The WII-USFWS collaboration titled **Development of the Wildlife Institute of India,** aimed at enhancing faculty capabilities and technical facilities at WII was a five-year project which was given a six-month extension up to June 1994.

During the year, two American scientists visited WII as programme counterparts in the subject areas Wetland Ecology and Management (Dr A Lee Foote, National Wetland Centre, Lafayette, Louisiana), and High Altitude Ecology (Dr DA Walker, University of Colorado, Colorado).

The project can be said to have been immensely successful, with transfer of technology and faculty development in about dozen subject areas related to wildlife management and biodiversity conservation. Additionally, the project has supported the acquisition of a large range of hi-tech equipment by WII, production of audio-visual and other extension materials. The terminal report of the project is currently under preparation.

World Bank IDF grant

The International Bank for Reconstruction and Development (IBRD) has made an Institutional Development Fund (IDF) Grant of US $ 4,13,000 to the Ministry of Environment and Forests, Government of India, for the development of an *Environmental Resource Management Network* (ERMN) at the Wildlife Institute of India. ERMN is to be developed together with a supporting *Environmental Resource Information System* (ERIS). WII is to organize workshops to develop linkages between institutes involved in the conservation of biodiversity; provide training in conservation of biodiversity and assess the possibility of expansion of ERMN.

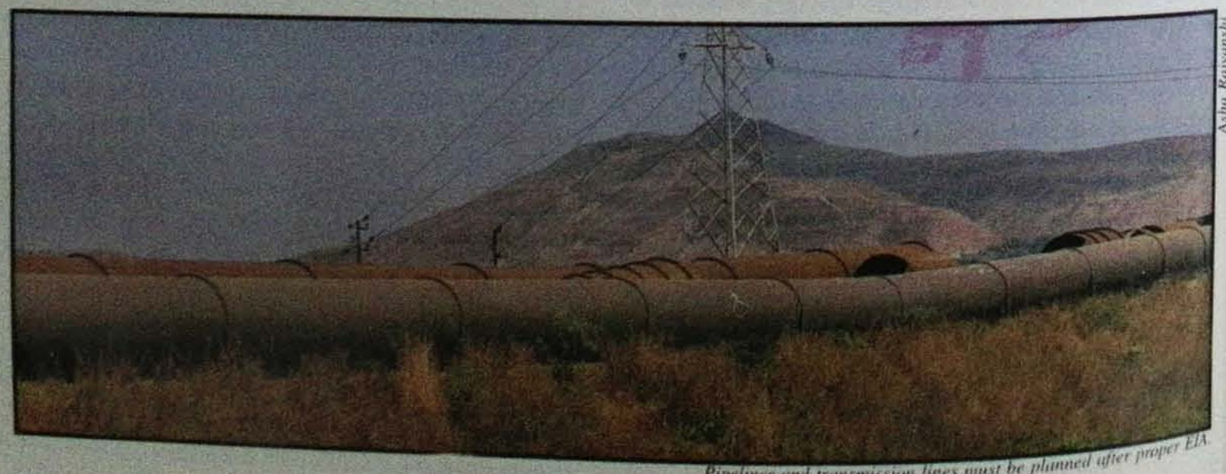
SERVICES AND FACILITIES

Consultancy

Environment impact assessment

In response to the mandatory need for reliable environmental impact assessment of development projects, and encouraged by its own experiences in carrying out such assessment in three large projects, WII has established a separate EIA Cell.

The EIA studies on Omkareshwar and Narmada Sagar Projects, initiated in the year 1991 under the consultancy offer of Narmada Valley Development Authority (NVDA), have been completed. The final technical report was submitted to the NVDA in July 1994.



Asha Rajvanshi

Pipelines and transmission lines must be planned after proper EIA.

During the reporting year, the EIA Cell was offered consultancies by M/s Engineers India Ltd., Indian Oil Corporation Ltd., and Bharat Petroleum Corporation Ltd. to evaluate the impacts of their pipeline projects on wildlife and their habitats, namely, Haldia-Barauni, Salaya-Viramgam, Viramgam-Koyali, Viramgam-Chaksu, Chaksu-Panipat, Mathura-Delhi-Ambala-Jalandhar hookup, Dahej-Gandhar-Baroda and Bombay-Manmad. EIA studies on these eight pipeline upgradation and expansion projects were conducted and report submitted during this period.

Among the recommendations made by WII in these studies were suggestions on the choice of construction technology and the time schedule for construction related activities so that these don't offset the biological events in wildlife habitats. These studies have also substantially generated and added to the existing database on the status and distribution of endangered species outside the protected areas.

Other consultancies

* *Training development* : Under the Vietnam Global Environment Facility, and Conservation Training and Biodiversity Action Plan, Dr AJT Johnsingh, Head (Biology) undertook a consultancy in two phases to develop a training curricula and train foresters working in protected area. The first consultancy took place in April-July 1994 when Johnsingh prepared a training manual and 28 forest guards were trained. During the second consultancy in October-December, he prepared another training manual and trained 20 PA managers. The trainings were conducted at Cuc Phong national park where a permanent field training centre has been constructed by the Global Environment Facility through WWF-China.

* *Biodiversity survey* : Dr GS Rawat, Scientist-SE was granted a consultancy by the Royal Government of Bhutan for a biodiversity survey of protected areas in Bhutan. The consultancy, operative during 1994-96, is part of a programme on "Establishment and Management of Protected Areas" being conducted by Nature Conservation Section (NCS), Forest Service Division, Bhutan in collaboration with WWF-Bhutan. The work so far was concentrated on Jigme Dorji national park, the country's largest protected area, and basic inventory, brief faunal survey and socio-economic survey had already been completed when Rawat was called upon to conduct a floral inventory of the national park, study the structure and species composition of various vegetation and habitat types, identify plants with ethnobotanical value and assess their conservation status. He was also to train NCS staff in survey techniques and plant identification in the field.

With work on Jigme Dorji national park completed and its report submitted, the management plan of the park is now being written. Following this, Rawat would survey the Black Mountain national park (central Bhutan) and some newly created sanctuaries (eastern Bhutan), sometimes during the next winter.

* *Ecodevelopment* : The Government of India awarded a two-month consultancy to WII to draft an "Ecodevelopment Action Plan for Biodiversity Conservation". This was sponsored by UNDP as part of its preparatory work for the *India Ecodevelopment Project* for GEF funding. HS Pabla, Joint Director, conducted the consultancy and the report was submitted in January 1995.

The report lists a set of goals and objectives for ecodevelopment in India and proposes a series of actions to achieve these objectives. The proposals relate to the involvement of development agencies and NGOs in ecodevelopment, legal and policy support, institution building, finance, monitoring and evaluation, etc. The report also suggests a consultative process with states and NGOs before formally adopting the Action Plan.

* Under the *India Ecodevelopment Project* for Supplemental Project Preparation, WII was awarded three consultancy tasks on the following : (a) Developing a strategy to review and update PA management plans; (b) Developing a research strategy for PA management; and (c) Conducting an environment review of four project sites - Gir, Ranthambhore, Pench and Palamau.

These assignments were undertaken by a nine-member faculty team, beginning February 1995, and are continuing. The findings of the three reports will be presented before the World Bank's Appraisal Mission in a workshop.

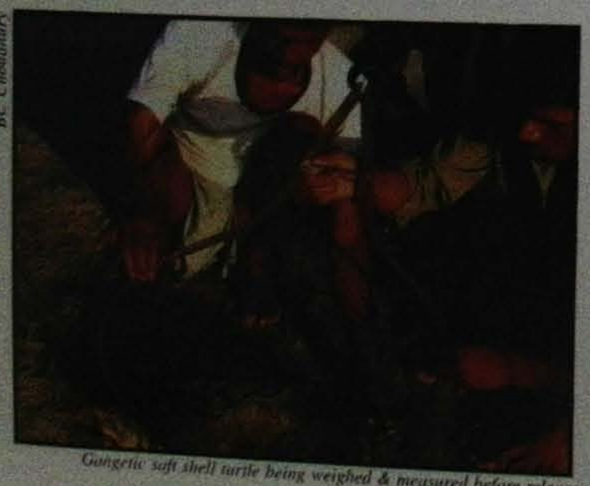
* *Elephant conflict in West Bengal* : At the invitation of the West Bengal Forest Department, Dr S Chowdhury,

Scientist-SE (Biology) formulated a consultancy project titled "Developing approaches for the management of elephant populations in West Bengal for mitigating man-elephant conflicts". Funding for the consultancy has been sanctioned by the concerned department under the wildlife and biodiversity components of the West Bengal Forestry Project. Planned to be conducted in two major elephant habitats in north and south Bengal over the next two years, the project plans to carry out radio-telemetry studies on the elephants' movement pattern, corridor use and habitat utilization.

* *Turtle rehabilitation in Ganga* : The Wildlife Wing of the Uttar Pradesh Forest Department, supported by the Ganga Action Plan programme, had started a project on freshwater turtle rehabilitation in the river Ganga, in 1986-87. The objective was to not only replenish the depleting population of these turtles in the Ganga, but also to clean the river of dead human and livestock carcasses which these turtles scavenge. Two hatcheries and rearing units - at Sarnath (Varanasi) and Kukrail (Lucknow) - were set up, and till 1994 about 30,000 soft-shell freshwater turtles had been reared and released in the Ganga at the 7km long Varanasi turtle sanctuary near Varanasi.

The Ganga Project Directorate requested WII to do an "Ecological evaluation of the freshwater turtle rehabilitation project in the river Ganga". BC Choudhury, Scientist-SE (Management) conducted this evaluation, beginning February 1995, and documented the occurrence, relative abundance, density of released and introduced turtles in the Ganga to judge the efficacy of the reintroduction programme. The ecological role of soft-shell turtles in maintaining healthy aquatic ecosystem was also studied. The integration of *ex-situ* conservation programmes at Sarnath and Kukrail with *in-situ* conservation and management of the Chelonian fauna is being examined and refined.

BC Choudhury



Gangetic soft shell turtle being weighed & measured before release.

* *Protected area networking, Andhra Pradesh* : WII undertook consultancy on a World Bank aided Government of Andhra Pradesh, Forest Department Project titled "Preparation of an integrated protected area system (IPAS)". The six-month consultancy, undertaken on a turnkey basis in January 1995, was to do the following tasks :

i) Identify ecologically significant areas for inclusion in the PA system with emphasis on currently under-represented north-eastern Ghats, southern thorn forests, dry evergreen forests, and significant habitats of rare and endangered species.

ii) Rationalize PA boundaries and zonation with consideration to biological, sociological and administrative aspects.

iii) Identify and recommend corridors which may be significant for wildlife management.

iv) Review the existing wildlife management plans and formulate guidelines for PA management plans.

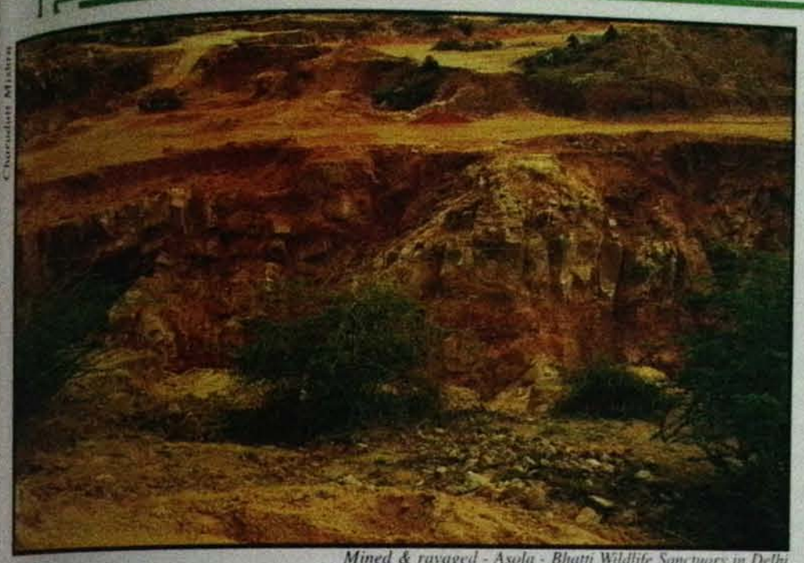
v) Suggest guidelines for management of forest plantations with reference to conservation concerns.

vi) Identify and prioritize research, extension and training needs for implementation of the IPAS plan.

vii) Design a database system for the implementation of IPAS.

The consultants' team, led by VB Sawarkar, Head (Management) included seven other WII faculty members besides JJ Dutta (formerly, PCCF, Madhya Pradesh). An approach to field work was developed at WII and the work began with meetings held between the team and the PCCF, CCF (Wildlife) Andhra Pradesh and other senior officials.

Chowdhuri Mishra



Mined & ravaged - Asola - Bhatti Wildlife Sanctuary in Delhi

The WII team worked in concert with all field officers and provided work status updates to Andhra Pradesh forest department headquarters. An Inception Report was furnished in March 1995. The draft final report is under preparation.

Technical support

* *Management plan for Delhi sanctuary* : Undertaken on behalf of the Government of the National Capital Territory of Delhi, WII undertook a project to develop a management plan for the "Asola-Bhatti wildlife sanctuary", the only protected area in Delhi. Data was collected and studies undertaken to make inventories of floral and faunal resources in the area, describing vegetation patterns, mapping water sources, identifying management problems, and assessing the extent of local people's dependence on the resources of the protected area. Lists of mammals and birds found in the area were also prepared, both showing important additions over earlier checklists. A wetland habitat near the Badarpur mines has potential for supporting diverse aquatic flora and fauna.

It has been recommended that the local people be allowed to take *Prosopis juliflora* for fuelwood on a controlled basis; and that the state government's plan for plantation be postponed because of heavy livestock grazing in the area. Instead, the area be provided protection, and plantation work taken up after a couple of years of natural regeneration.

Seven villages located within a radius of 5 km from the sanctuary boundary were taken for intensive study on the resource use pressure. Accordingly, recommendations were made on conflict mitigation, zonation and ecodevelopment measures. As the area is generally degraded, large scale tourism must be avoided. Low key educational tourism along with conservation education programmes for the locals and for school and college students need to be taken up on the area's vital historical, geological, biological and ecological importance for the capital.The results were summarized in a presentation made to the Development Commissioner of Delhi in March 1995. The detailed final report is under preparation.

* *Bear-man conflict in Madhya Pradesh* : In the last three years, there has been an increasing trend in bear-man conflict in the north Bilaspur Forest Division (Marwahi range and part of Pendra range), Madhya Pradesh. In January 1995 alone, seven people were killed by sloth bears in this divisional area. The same month, Dr K Shankar, Scientist-SD (Biology) surveyed Marwahi and part of Pendra forest ranges to assess the situation and suggest mitigation measures in the affected areas.

The major reasons for the conflict were found to be - (a) the fragmented and degraded state of the forest compartments, in the sloth bear habitat, with additional human pressures; (b) heavy lopping of vegetation around the bear den sites; (c) presence of bear food trees, e.g. mahuwa (*Bassica latifolia*), *Ficus bengalensis*, *Ficus religiosa* and *Zizyphus mauritiana*, in villages bordering the forest areas; and (d) maize and groundnut crop raid by bear.

Clearly, the bear population around the worst affected villages is more than what the area can support. Considering the degraded state of the habitat in these areas, one of the recommendations made was to capture two-three

bears from each identified problematic site by using 'culvert traps' and translocate them to better habitats. Additionally, a detailed study on the 'Ecology of sloth bear in the north Bilaspur Forest Division' was recommended to plan its long-term management.

The report has been submitted to the DFO, North Bilaspur Forest Division, Bilaspur, Madhya Pradesh.

* *Interpretation strategy for Mizoram :* At the request of Secretary-cum-PCCF, Mizoram, WII deputed DVS Khati, Scientist-SE (Extension) and Bitapi Sinha, Scientist-SD (Extension) to help the state forest department prepare an interpretation and communication strategy for wildlife conservation. They visited several protected areas in Mizoram including the zoological at Aizawl and interacted with forest officials, environmental groups and individuals. The faculty members were to visit the state again in January before developing the final detailed plan but could not. Meanwhile, the report of the preliminary tour is to be sent to the concerned state authorities.

Teaching inputs

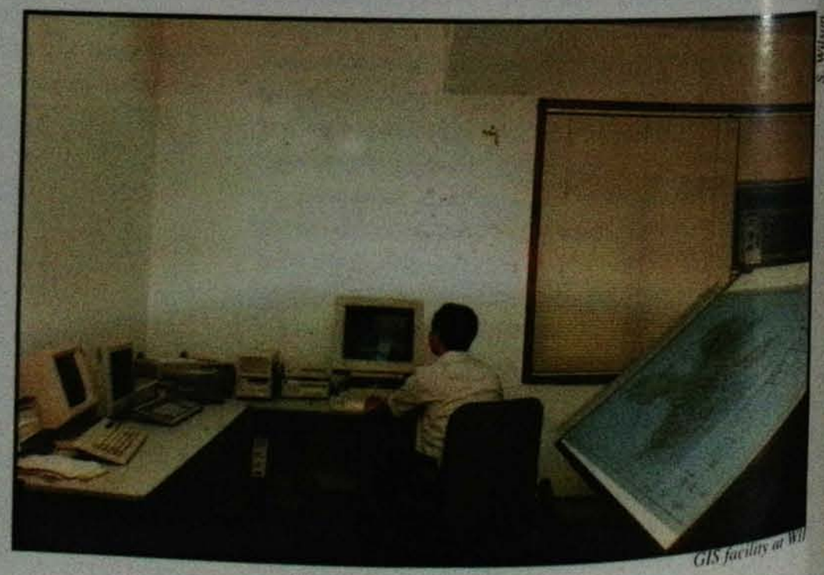
* Bitapi Sinha, Scientist-SD (Extension) was invited to deliver a talk on "Biodiversity Conservation in India" at the workshop *Training the Leaders*, organized by Centre for Integrated Development, on 28-31 July 1994 in Gwalior (Madhya Pradesh). The workshop participants were teachers, NGO representatives and personnel from various industrial houses in Gwalior.

* The Institute of Economic Growth, University of Delhi, had organized a training course for in-service Class I officers from different states. On 28 October 1994 BMS Rathore, Scientist-SE (Ecodevelopment) lectured to the trainees on "Participatory Resource Management".

* WWF-India, under its wetland conservation programme, organized a *Training Workshop on Wetland Management*, in collaboration with the Ministry of Environment and Forests at Keoladeo national park, Bharatpur on 16-22 January 1995. It was funded by the Ramsar Convention Bureau, Switzerland, through its Wetlands Conservation Fund. The objective of the workshop was to give the participants an overview of the issues related to wetlands and their conservation and management.

The workshop was targeted at the managers of the Indian Ramsar sites. The sites are so called because of their inclusion in the list of Wetlands of International Importance especially as Waterfowl Habitats, as designated by the Ramsar Convention. There were 24 participants - state government officials and NGO representative, and managers from selected wetlands including from the currently six Ramsar sites in India - the lakes Chilika (Orissa), Loktak (Manipur),Harike (Punjab), Sambhar (Rajasthan), and Wular (J&K) and Keoladeo national park.

BC Choudhury, Scientist-SE (Management) was one of the resource persons at the workshop. He delivered two talks - (i) "Preparing a Management Plan" with an emphasis on protecting the system and providing for sustainable utilization without jeopardising the ecosystem; and (ii) "Managing Wetlands for Other Wildlife Species" i.e. maintaining the special character of a wetland so as to provide a proper habitat for the benefit of species such as frogs, purely aquatic mammals or partly aquatic mammals downstream.



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GIS facility at WII

* Qamar Qureshi, Scientist-SD (Biology) visited the University College, London (UK) during February-March 1995 under a WII-UCL exchange programme. There he gave lectures to the students of the MSc (Conservation Biology) course. While there, he also participated in seminars and workshops.

* Besides the inputs mentioned above, various faculty members have been regularly contributing towards the teaching at IGNFA, Dehra Dun, IIFM (Bhopal), and LBS National Administration Academy (Mussoorie).

Computer

The computer facilities available at WII, among the best in the country for wildlife conservation, serves the training, research, database, cartographic including GIS, digital image processing of remotely sensed data and desktop publishing needs of the institute. A Computer Committee provides the necessary guidance and supervision for managing the facility.

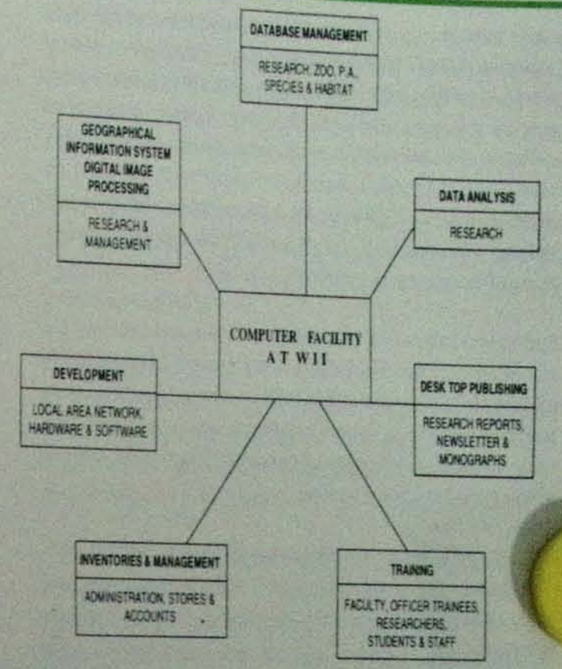
During the year under reporting, the institute acquired e-mail connectivity through Business India Axcess network.

The hardware procured in 1994-95 was mainly for the computerisation of the library and internetworking it to the Institute's existing LAN setup. For this, a Pentium @60Mhz fileserver with 16MB RAM having two hard disk drives of 1.75GB each (duplexed) along with 17 386DX systems, 13 Dot Matrix Printers, a 1KVA UPS system and 11 CVTs were procured, including a hand held bar code reader along with a printer for the library.

A new hard disk drive of 2.0 GB was procured for the SUN Sparcstation system. The hard disk drive of an IBM 486DX used for GIS was upgraded from 130MB to 1.0 GB. Six old 286 computer systems were upgraded to 386SX.

In 1994-95, two GPS (Global Positioning System) of Magellan make were also procured. This equipment is capable of giving the geographical coordinates and altitude of any place at an accuracy of 30 metres with one unit and 5 metres using differential mode with the help of two units.

The software packages procured were Novel Netware Ver. 3.12 (for 25 users), AutoCAD Rel.12, Omnipage



Professional, PageMaker Ver. 5.0, Microsoft Fortran 77 compiler and LibSys, which is a library automation package.

A four-week training course on the use of computers and various software packages has been started for the WII staff. So far this has been conducted twice - August 1994 and February 1995. Similar training courses are already being conducted for the officer trainees of various wildlife management courses at the institute.

Library & Documentation Centre

Libraries and documentation centres are like the backbone of a research institution. The rapid technological development the world over has increased manifold the value of information dissemination, and no research or training programme, or institutional development anywhere can be said to be pragmatic and complete if libraries don't have a role in it. So is the case at WII too.

During the year, 1658 new titles were added to the library collection, bringing the total to 16,228, besides 6260 reprints and over 6331 topographic maps. The library also subscribes to 200 national and international journals.

Apart from the usual lending and reference services, library provides current awareness service, retrospective search service, bibliographical service and inter-library loan service. During the year, a press clipping service on environment and related issues was started on a monthly basis. E-CD(CAB), covering literature with abstracts on deforestation, soil erosion, land degradation, conservation biology, etc. from 1973 to March 1994 was procured to strengthen retrospective service.

For easy retrieval of information, books and reprints are available in computer readable form, using a LIBSYS-LAN multi-user system providing online retrieval facilities with Barcode technology for information control. A project was undertaken for placing topographic maps and journal holdings in computer format.

Library services like literature search from CD-ROM, WII Database, current contents of WII periodicals and document supply are now available to outsiders on payment.

Laboratory

The laboratory at WII was established to support research work by analysing the samples collected from the field so that these can be used in the different training programmes as well. During the year, plant samples collected from Pin Valley national park were analyzed for forage quality based on crude protein, calorific value and silica. Soil samples brought from Gir national park (Gujarat) and Asola-Bhatti wildlife sanctuary (Delhi) have been analyzed for soil texture, pH, organic matter, and total dissolved solutes. Techniques have also been standardized to identify tiger and leopard claws by morphometric measurements and radiography.

The laboratory facilities are available to wildlife managers, the police departments and the Directorate of Revenue Intelligence (New Delhi) as well for identification of confiscated materials in offence cases. In 1994-95, eighteen wildlife offence cases were referred to WII for forensic assistance (*see box below*).

Services provided by WII laboratory in species identification, during 1994-95

Sample	*Organization*	*WII Report*
1. 3 skins	Munsif Magistrate,Didihat, Pithoragarh	Leopard
2. 1 skin, 1 skull, 4 leg pieces	-do-	Barking deer
3. 2 skins	- do -	Goral
4. 2 skins	- do -	Goral
5. 3 skins & 1.262 kg bones	Chief Judicial Magistrate, Pithoragarh	Leopard
6. 2 skins, claws	Office of CF, Rajaji NP, Dehra Dun	Domestic dog,fake claws
7. 1 skin	Chief Judicial Magistrate, Dehra Dun	Leopard
8. 2 pkts red sander powder	DRI (REG Unit), Amritsar	*Ongoing*
9. 2 claws	Dy Chief WL Warden, Govt of Haryana, Panchkula	one leopard,one fake
10. Reg. peafowl deaths	Addl PCCF (WL) - Madhya Pradesh, Bhopal	Ref. to CDRI, Lucknow
11. 1 pkt bones	Superintendent of Police, Shivni, Madhya Pradesh	Leopard bones
12. 3 pkts-hair,	DFO, Raisen, Madhya Pradesh	*Ongoing*
13. Flesh, hair	Director, Satpura NP, Pachmarhi, Madhya Pradesh	*Ongoing*
14. 10 articles	DFO, Thiruvananthapuram, Tamil Nadu	*Ongoing*
15. 40 pkts wool	Dy Director (WL)-Reg. Office, Dept. of E,F & WL, New Delhi	10 shatoosh, 30 pashmina goat
16. 2 skin pcs	Reg Dy Director (WR), WLP WL Reg. Office, Bombay	*Ongoing*
17. 2 skin pcs	- do -	*Ongoing*
18. 1 pkt wool	Dept of Forests, Kathmandu, Nepal	Shatoosh goat

Audio-Visual Unit

The audio-visual unit in the Extension faculty maintains equipment like cameras and accessories, slide projectors, film projectors, overhead projectors, TV, VCR which are extensively used as teaching aids in classroom lectures as well as in the field. During the year, the AV unit acquired one 16mm film, 4 video films and about 1000 slides.

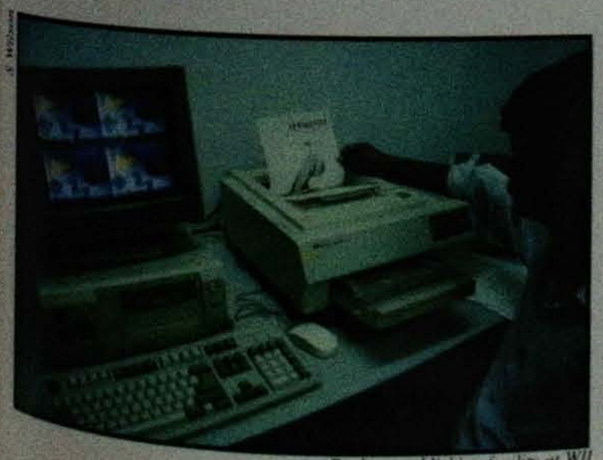
At the Annual General Meeting of the WII Society on 11 June 1994, the slide programme, syncronized on nine projectors, entitled "We are nature, nature is our world" was screened. It was highly appreciated by the Hon'ble Minister for Environment and Forests, GOI, and on his instructions repeated at Vigyan Bhawan on 25 July 1994 at the inauguration of the Indo-British International Workshop Towards Sustainable Forestry: Preparing for Commission on Sustainable Development - 1995. The video format of the programme has been telecast over Doordarshan, the national TV channel.

Herbarium

The institute herbarium houses angiosperms, gymnosperms and ferns samples collected by students, researchers, trainees and faculty members from the various protected areas all over the country. During the year, plant specimens collected from Valley of Flowers national park (200 specimens), Eravikulam national park (100 specimens), Pin Valley national park (50 specimens) and Dudhwa national Park (25 specimens) were received for identification, mounting and processing.

Work has also been initiated on the computerization of plant specimens housed in the herbarium. So far, about 4000 specimens along with relevant field information have been entered in Foxbase data file. This will help in fast retrieval and sorting out of species collected from a particular locality or habitat.

The checklist of plants found in the institute campus comprising 410 spicies belonging to 276 genera and 85 families, has been brought out as a miscellaneous publication of WII.



Desktop publishing facility at WII

Publication

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

During the year under reporting, WII issued a comprehensive report : *Impact Assessment Studies of Narmada Sagar and Omkasreshwar Projects on Flora and Fauna with Attendant Human Aspects*, which was an outcome of an EIA consultancy project and a priced publication. Also published was a report on *Mobile Training Seminar -For PA Managers for South and Central Asia*.

Campus development

For the VIII Annual Research Seminar, the existing store was converted into a seminar hall. The conversion proved excellent so much so that until the time a proper seminar hall is constructed at the institute, this will be used for the purpose.

Work on Phase II construction is in progress, for which a contract for building works at an estimated cost of Rs 1,45,39,934.00 was awarded in June 1994. Contract for internal electrification of the hostel building and Type I, II and III quarters has also been awarded. The financial implications of campus development and civil works during the year 1994-95 was to the tune of Rs 1.74 crores.

Works completed in 1994-95

1. Storm-water channel
2. Levelling work at the sports complex
3. Extension of servant quarters in Type V houses

Works undertaken in 1994-95

1. Construction of road in Block III.
2. Approach road and retaining wall for new hostel block
3. Construction of earthen dam
4. Waterproofing in Types II and III houses, and some houses in Types I and IV
5. Processing and finalization of tenders for miscellaneous works, e.g. boundary wall gate, boundary wall, barbed wire fencing in Block IV, pitching work in storm-water channel, etc.

EXTENSION

Ecodevelopment initiatives

The ecodevelopment initiatives taken up by WII around the campus has taken deeper roots during the reporting period. During the 1994 monsoon, fibre yielding trees, shrubs and bamboo were planted in the block-II forest of the institute, with the help of people of Chandrabani village. The villagers participated in selection of species and removal of lantana and other weeds before assisting in the actual plantation work. *Rambaance* (*Agave sislana*) has been planted in double rows all along the inner boundary of the forest. While this acts as a bio-fence, it would also provide fibre for the village cottage industry. Bamboo and *Grewia oppositifolia* were planted in the open patches inside the forest. Villagers have to provided effective social fencing for this plantation. It is hoped that this afforestation programme will gradually help mitigate the villagers' pressure on the natural forest around the village

World Environment Day

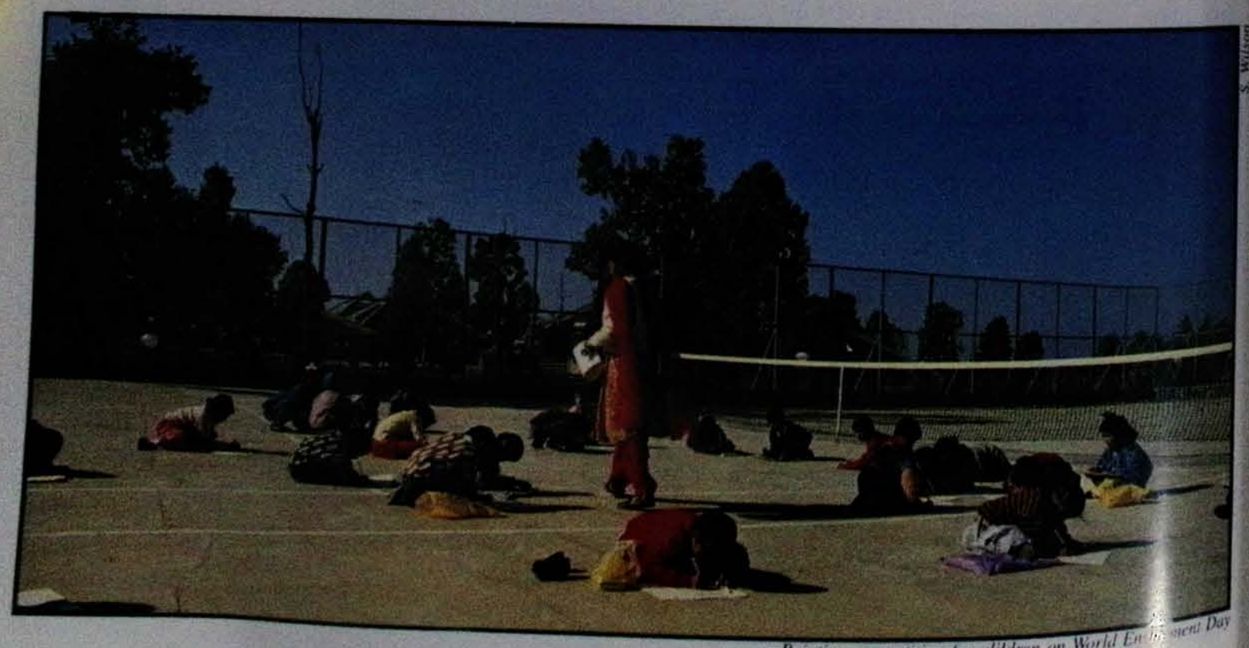
On the occasion of the World Environment Day, drawing and debate competitions were organized for the children of WII staff and the Chandrabani village. These children were also taken on a nature excursion to the Rajaji national park.

Wildlife Week

For the Wildlife Week, a wildlife film show and drama on wildlife were planned for the residents of the Chandrabani village. However, owing to the Uttarakhand agitation which intensified right at the time, these programmes could be not be carried out.

Other activities

A number of local schools as well as from other parts of the country visited the WII campus. Popular talks, film shows on wildlife and nature conservation were organised for them. They were also exposed to WII's important facilities viz. library, laboratory, GIS, etc.



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Painting competition for children on World Environment Day

WII helped the local Army Command organize an "Environment and Nature Conservation Workshop" on 29 December-7 January 1995. Five faculty members provided teaching inputs to this workshop, on various topics ranging from biogeography to sustainable development.

Extra curricular

* 1994-95 has been a good year for the WII cricket team. It won two tournaments during the year - the *District League Cricket Championship 1994-95*, organized by Dehra Dun District Sports Association; and the *Central Government Employees Coordination Committee Cricket Tournament (High Power Tournament)*, organized by Survey of India, Dehra Dun.

* The *3rd All India Forest Sports and Games Meet* was held at Bhubaneswar (Orissa) on 15-21 December 1994. WII participated in this meet in the following events - cricket, tennis, table tennis, badminton, chess, carrom and billiards. The cricket team reached the quarter finals, and the tennis team semi-finals where they lost to the eventual champions in their respective categories.

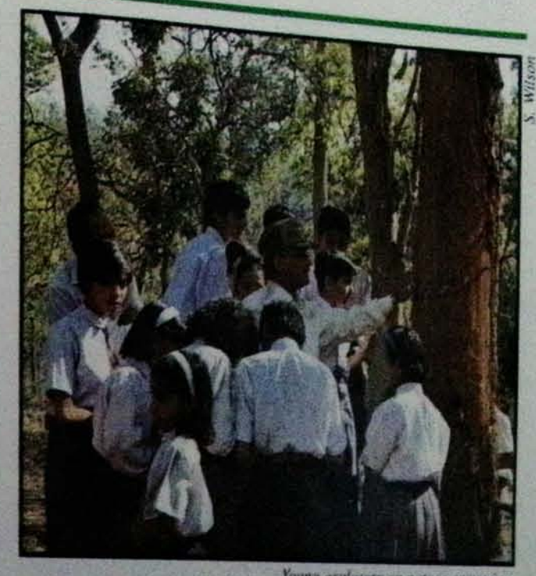
Visitors

* Dr Padmakumari D'Silva, Professor University of Peradeniya, Sri Lanka visited WII during August 1994 for one month on a fellowship from the Third World Academy of Science, Italy, to develop her capabilities in wildlife research.

* Jessica Mott, Natural Resource Economist at the World Bank, who is also Task Manager for the IDF grant to WII for the development of Environmental Resource Management Network (ERMN), visited on 28-30 October 1994 to discuss the various activities being proposed for the utilization of this grant. An ERMN cell has been established at the Institute to facilitate its development.

* A group of eight officers of the Department of Wildlife Conservation, Sri Lanka on a FAO supported study tour from 31 December-8 January 1995.

* Kira Glover, who took over as the new Science Officer, US Embassy, after the untimely demise of VV Nanda, came on a familiarization visit to WII, along with Fred Bagley, SFC Coordinator, Office of International Affairs, USFWS on 25-26 February 1995.



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Young explorers on nature excursion

* A delegation of 12 forest/wildlife officers from Ministry of Forestry, Vietnam on 26-27 March 1995. The objective of the visit, which was coordinated by WII, was to see the training, teaching and research facilities at the institute, and also the wildlife management practices in different protected areas in the country.

* Other important international visitors were the World Bank Team; delegations from Bangladesh, and Seychelles; and Chairman, Gallaghar Group, New Zealand.

* Important Indian visitors to the institute were Inspector General of Forests, Ministry of Environment & Forests, GOI; Secretary of Forests, Tamil Nadu; Chairman of the People's Tribunal on Rajaji; Development Commissioner of Latur; Director, CEE; Astt. Resident Representative (Programme), UNDP; Members of the *Jungle Jeevan Bachao Pad Yatra*; and PCCF of Mizoram.

* A number of graduate and post-graduate trainees and probationers from SFS College, IIFM, EFRC, Lal Bahadur Shastri National Academy of Administration, CMC Novitiate Training Centre, a few agriculture and general universities visited WII and were exposed to WII's important facilities.

PERSPECTIVE : 1995-96

In 1994-95, a study was conducted on behalf of the Ministry of Environment and Forests to look into the workload of the WII faculty and its future staff and infrastructural requirements. This initiated an exercise in self-appraisal which was indeed revealing. Thereafter, WII submitted its revised EFC Memorandum for consideration to the Centre. There has been no outcome of this as yet, though we are hopeful of a positive response from the Central government.

The new initiatives undertaken last year, namely the FAO/ UNDP Project for Ecodevelopment Planning and Management Planning courses will continue in the coming year and are expected to develop some excellent plans which would become model programmes. The WII-UCL joint programme on the exchange of expertise in the discipline of conservation biology will continue.

The Integrated Forestry Programme to Support Biodiversity Conservation, an interactive session with PCCFs and CCFs which was undertaken last year provided very encouraging results and so, would be repeated in 1995-96. The Indo-US research proposals - with FWS, NPS and FS under the Indo-US Subcommission on Science and Technology - which are pending Indian government approval are expected to be cleared. These would give WII a good opportunity for further capacity building and improving professional skills in the field of wildlife research.

The IDF grant of World Bank for ERMN will help the WII National Wildlife Database, and in the networking of institutions and PAs for better decision making. WII's involvement in World Bank aided forestry projects for some states will provide opportunities to work closely with states, leading to a better understanding between the two.

Among the new initiatives in 1995-96, a special Diploma course for the in-service officers of the Wildlife Department, Sri Lanka has been visualized and will be undertaken this year. Besides, several short courses for different target groups such as customs and other law countering officials, tourism, GIS technology, environment resource management networking, etc. are also planned.

The institute's report and recommendations on establishing a second population of free ranging lions outside Gir has been accepted by the Central government and also by the state government of Madhya Pradesh, where this population is recommended to be translocated. In fact, Madhya pradesh is seriously going ahead with making this second home suggestion a reality and it has asked WII to assist with all research and technical inputs in this prestigious project.

WII is working on the development of wildlife forensic technique and its technical reports on the subject are being sent to the central/state governments. This subject is also being considered important by Indo-US Subcommission under Science and Technology, and field guides and manuals are planned for 1995-96.

EIA consultancy work continues to earn both name and additional funding for WII. Bharat Petroleum, Indian Oil, Gas Authority of India, Oil India, Government of Uttar Pradesh and Government of Andhra Pradesh have shown interest in WII taking up EIA of their various developmental projects. Some international institutions too have requested WII for EIA field assistance as well as for providing academic inputs in their international training programmes. Some universities have also evinced interest in placing WII MSc students in their dissertation works on EIA.

On the WII publications front, there are plans to bring out monographs and research bulletins in 1995-96.

During 1995-96, phase-II of construction works in the Chandrabani campus is expected to be complete. The phase-III construction i.e. a modular institutional building, interpretation room and a large seminar hall would be taken up if adequate budget provisions are made available.

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Hussain, SA (In communication) - **Distribution pattern and conservation status of smooth coated otters in National Chambal Sanctuary**; *Biological Conservation*, UK.

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Goyal, SP and N Shah (1995) - **A review of the use of radio telemetry in Indian wildlife research with a special reference to Indian wild ass**; at *13th International Symposium on Biotelemetry*; Virginia, USA; 26-31 March 1995. (Abstract)

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EIA Technical Report 7 (1994) - **Impact Assessment Study of the Augmentation of Viramgam-Koyali Pipeline on Wildlife Values**; WII, Dehra Dun.

EIA Technical Report 8 (1994) - **Impact Assessment Study of the Augmentation of Salaya-Viramgam Pipeline on Wildlife Values**; WII, Dehra Dun.

EIA Technical Report 9 (1994) - **Impact Assessment Studies of Narmada Sagar and Omkareshwar Projects on Flora and Fauna with Attendant Human Aspects**; WII, Dehra Dun.

EIA Technical Report 10 (1994) - **An Ecological Assessment of the Proposed Protected Areas in Narmada Sagar and Omkareshwar Project Areas using Remote Sensing and Geographical Information System**; WII, Dehra Dun.

EIA Technical Report 11 (1994) - **Impact Assessment of Dahej-Gandhar-Baroda Pipeline Project on Wildlife Values**; WII, Dehra Dun.

EIA Technical Report 12 (1995) - **Impact Assessment of Bombay-Manmad Pipeline Project on Wildlife Values**; WII, Dehra Dun.

Hussain, SA and VB Sawarkar (1994) - **Conservation status of *terai* grasslands in Valmiki tiger reserve**; Wildlife Institute of India.

Sathyakumar, S (Submission) - **Habitat ecology of major ungulates in Kedarnath musk deer sanctuary, western Himalaya**; PhD thesis, Saurashtra University.

RESEARCH ADVISORY COMMITTEE

Ex-Officio Members

1.	Director, Wildlife Preservation, Government of India	-------	Chairman
2.	Director, Botanical Survey of India	-------	Member
3.	Director, Zoological Survey of India	-------	Member
4.	Five Chief Wildlife Wardens, each to represent five regions conterminous with the jurisdiction of Regional Offices of the MEF, on one year rotational tenure	-------	Members
5.	Director, Wildlife Institute of India	-------	Member-Secretary
6.	Dr ML Thakur, ICFRE, Dehra Dun (Representative of Director General, ICFRE, Dehradun)	-------	Member

Nominated Members of Eminence

7.	Shri JC Daniel (Wildlife Scientist with the background of research organisation)	-------	Member
8.	Prof JS Singh, BHU, Varanasi (Ecologist with University background)	-------	Member
9.	Dr AH Musavi, AMU Aligarh (Wildlife Scientist with University background)	-------	Member
10.	Shri S Deb Roy (Experienced WildlifeManager)	-------	Member

WII Faculty

11.	Shri SK Mukherjee, Additional Director,WII	-------	Member
12.	Dr. AJT Johnsingh, Joint Director (Faculty member nominated by the Director,WII)	-------	Member
13.	Dr. PK Mathur, Research Co-ordinator,WII	-------	Member

GOVERNING BODY

1 Shri NR Krishnan, IAS
Chairman Governing Body &
Secretary to the Govt. of India,
Ministry of Environment & Forests,
Paryavaran Bhavan, B-Block,
CGO Complex, Lodi Road,
NEW DELHI - 110 003

2. Shri MF Ahmed,
Inspector General of Forests,
Ministry of Environment & Forests,
Paryavaran Bhavan, B-Block,
CGO Complex, Lodi Road,
NEW DELHI - 110 003

3. Shri S Deb Roy,
A/16, Shalimar apartment,
South Ex. Plaza II, 209 Masjid Moth,
NEW DELHI - 110 049

4. Shri Shivbhadrasinhji,
'Bhav Vilas', Near Gaurishankar Lake,
BHAVNAGER - 364 003

5. Shri Ashish Chandola,
H-6B, Hauz Hkas,
NEW DELHI - 110 016

6. Dr. Ishwar Dass,
E-1/154, ARERA - Colony,
BHOPAL - 462 016
MADHYA PRADESH

7. Shri SC Dey,
Addl. Inspector General of Forests &
Director Wildlife Preservation,
Ministry of Environment & Forests,
Paryavaran Bhavan, B-Block,
CGO Complex, Lodi Road,
NEW DELHI - 110 003

8. Shri GS Rajamani,
Joint Secretary (Finance),
Ministry of Environment & Forests,
Paryavaran Bhavan, B-Block,
CGO Complex, Lodi Road,
NEW DELHI - 110 003

9. Dr DN Tewari,
Director General,
Indian Council of Forestry Research &
Education, New Forest,
DEHRA DUN - 248 006

10. Dr KJS Chatrath,
Joint Secretary (Education),
Ministry of Human Resource Development,
Shastri Bhavan,
NEW DELHI.

11. Shri Ashok Singh, IFS
Chief Wildlife Warden,
Government of Uttar Pradesh,
17, Rana Pratap Marg,
LUCKNOW - 226 001

12. Shri BC Choudhury,
Scientist-SE,
Wildlife Institute of India,
Post Box 18,
Chandrabani,
DEHRA DUN - 248 001

13. Shri SK Mukherjee,
Director,
Wildlife Institute of India,
Post Box 18,
Chandrabani,
DEHRA DUN - 248 001

AUDIT CERTIFICATE

I have examined the Receipt and Payment Account, Income and Expenditure Account for the year ended 31st March, 1995 and the Balance Sheet as on 31st March, 1995 of the Wildlife Institute of India, Dehradun. I have obtained all the information and explanations that I have required, and subject to the observations in the appended Audit Report, I certify, as a result of my audit, that in my opinion these Accounts and Balance Sheet are properly drawn up so as to exhibit a true and fair view of the state of affairs of the Wildlife Institute of India according to the best of information and explanations given to me and as shown by the books of the organisation.

Sd/-
T.K. Sanyal
Principal Director of Audit

New Delhi
Dated : 27th December, 1995.

RECEIPTS AND PAYMENTS ACCOUNT FOR THE YEAR ENDING 31ST MARCH,1995.

RECEIPTS			PAYMENTS	NON PLAN	PLAN	TOTAL
To Opening Balance:			By Salaries	32,00,956.00	46,02,000.00	78,02,956.00
Cash in Hand	1,40,153.80					
Cash in Bank	1,95,01,448.88	1,96,41,602.68	By Leave Salary & Pension Contribution	72,910.00	-	72,910.00
Balance in Bank (Training Account)		75,528.41	By Bonus	87,986.00	-	87,986.00
			By Honorarium	63,690.00	50,007.00	1,13,697.00
			By Fellowship	-	8,44,071.00	8,44,071.00
To Grant-in-aid Department of Environment, Forests, New Delhi		4,35,00,000.00	By Wages	2,50,000.00	6,72,009.94	9,22,009.94
			By Travel Expenses	4,00,147.00	11,24,000.00	15,24,147.00
To Training Cost		6,60,080.00	By Newspaper & Magazines	-	22,264.00	22,264.00
			By Publicity & Advertisement	1,29,447.00	-	1,29,447.00
Other Receipts	1,17,402.00					
Outstanding Advance for Expenses	1,90,000.00		By Operational Expenses	15,10,000.00	27,37,601.50	42,47,601.50
					(+)1,195.00	(+)1,195.00
Interest of Bank A/c (Training)		10,757.00	By Stationery	-	5,22,331.50	5,22,331.50
To Interest Credited by Bank		7,65,202.00	By Over Time Allowences	-	2,24,670.00	2,24,670.00
			By Rent for hired Building	89,825.00	-	89,825.00
To G.P.Fund		32,17,250.03	By Postage & Telegram	1,85,217.00	-	1,85,217.00
To Pension Fund		17,92,493.00	By Sports Goods	-	44,967.00	44,967.00
			By Telephone & Trunk Calls	2,10,500.00	5,30,086.40	7,40,586.40
			By Conveyance Charges	-	22,528.00	22,528.00
To Recovery of Security Deposits from Contractor		7,96,644.00	By Electricity & Water Charges	4,15,000.00	8,32,658.80	12,47,658.80
			By Entertainment	38,600.00	1,47,069.00	1,85,669.00
To Withheld amount from Contractor Bills		9,323.00				
			By Printing & Binding	32,000.00	50,087.00	[illegible]087.00
Balance C/F		7,07,76,282.12	Balance C/F	66,86,278.00	1,24,27,546.14	1,91,[illegible]24.14

RECEIPTS			PAYMENTS	NON PLAN	PLAN	TOTAL
Balance B/F		7,07,76,282.12	Balance B/F	66,86,278.00	1,24,27,546.14	1,91,13,824.14
To CGEGIS Refund		1,650.00	By Repair of Office Equipment	-	13,875.00	13,875.00
To Secured Advance		9,06,563.00	By L.T.C.	12,000.00	1,00,043.00	1,12,043.00
To Mobilisation Advance		13,26,146.82	By Food Allowance Researchers	-	6,903.00	6,903.00
To Publication of Books for Central Zoo Authority		2,05,000.00	By Audit Fees	13,900.00	-	13,900.00
To Revenue of WII		70,780.00	By Co-operative	50.00	-	50.00
To Income Tax from salary		902.00	By Auditorium	-	7,74,669.00	7,74,669.00
To Fund from Vietnamese Delegates		2,30,625.00	By Vietnames Delegates	1,34,000.00	-	25,00,000.00
To Land		14,25,580.35	By F.D.R.	-	-	98,486.00
To Loan & Advances (Staff)		1,24,439.00	By Seminar & Workshop	98,486.00	-	7,168.00
			By Insurance of Research Fellows & Faculty Members	-	7,168.00	4,56,247.50
To Advance for Expenses		1,10,774.26	By Land Scaping	-	4,56,247.50	1,20,569.00
			By Stipend to M.Sc students	1,20,569.00	-	29,770.00
			By Legal Expenses	-	29,770.00	3,25,372.00
			By Publication	-	3,25,372.00	6,84,791.00
To Miscellaneous Receipts			By Training Cost on Course	-	-	42,365.00
i) Sale of Tender	23,700.00		By Govt. Contribution to Pension Fund	-	42,365.00	3,89,416.00
ii) Guest House Charges	46,643.00	1,72,256.00	By Repair and Maintenance of Vehicle	3,89,416.00	-	
iii) Lab.Testing	150.00					
iv) H.L.Fee	1,01,763.00					
Balance C/F		7,53,50,998.55	Balance C/F	73,20,699.00	1,41,83,958.64	2,48,23,448.64

RECEIPTS		PAYMENTS	NON PLAN	PLAN	TOTAL
Balance B/F	7,53,50,998.55	Balance B/F	73,20,699.00	1,41,83,958.64	2,48,23,448.64
		By POL for Vehicle	2,00,022.00	5,36,000.00	7,36,022.00
		By WII contribution to G.P.Fund	3,76,495.00		3,76,495.00
		By Purchase of Vehicle	4,00,004.00	3,00,800.74	7,00,804.74
		By Journals & Periodicals	-	12,28,177.60	12,28,177.60
		By AudioVisual,Computers & Training Equipment	-	28,63,944.00	28,63,944.00
		By Laboratory Equipment	-	53,322.00	53,322.00
		By Laboratory Chemicals	30,000.00	6,586.00	36,586.00
		By Office Equipment	3,22,000.00	12,00,505.00	15,22,505.00
		By Photographs & Photographic materials	-	2,16,487.00	2,16,487.00
		By Educational Films	-	2,000.00	2,000.00
		By Furniture & Fixtures	-	10,20,377.80	10,20,377.80
		By Library Books	-	14,43,498.00	14,43,498.00
		By Avenue Plantation	-	5,62,800.50	5,62,800.50
		By Advance for Expenses (Training)	-	-	2,52,802.00
		By Tennis Court	-	3,95,734.32	3,95,734.32
		By Loans and Advances	-	-	1,37,481.00
		By Remittance of Income Tax (Contractors)	-	-	13,889.00
		By Remittance of Sales Tax (Contractors)	-	-	302.01
Balance C/F	7,53,50,998.00	Balance C/F	86,49,220.00	2,40,14,191.60	63,86,676.61

RECEIPTS		PAYMENTS	NON PLAN	PLAN	TOTAL
Balance B/F	7,53,50,998.00	Balance B/F	86,49,220.00	2,40,14,191.60	3,63,86,676.61
		By Procurement of Cement, Steel	-	-	16,42,194.00
		By Construction of Building	-	1,70,49,466.82	1,70,49,466.82
		By Campus Development	-	(-) 1,195.00 2,29,908.00	(-) 1,195.00 2,29,908.00
		By Construction & Architectural Management Fee	-	59,401.00	59,401.00
		By EPABX	-	1,60,680.00	1,60,680.00
		By Camp Equipment	-	33,666.00	33,666.00
		By Road & Culverts	-	1,37,446.00	1,37,446.00
		By Estate Maintainance	19,079.00		19,079.00
		Closing Balance			
		By Cash-in-hand	-	-	93,268.80
		By Bank Balance with UBI	-	-	1,44,14,489.88
		By Cash with UBI (Trainees Account)	-	-	1,16,174.41
		Pension Fund			
		(i) Bank Balance	3,42,493.00		17,92,493.00
		(ii) Kisan Vikas Patra	14,50,000.00		
		G.P.Fund			
		(i) Bank Balance	2,17,250.03		32,17,250.03
		(ii) Kisan Vikas Patra	30,00,000.00		
Total	7,53,50,998.55	Total	86,68,299.00	4,16,83,564.42	7,53,50,998.55

Sd/-
(SS Oberoi)
Finance Officer

Sd/-
(DVSKhati)
Registrar

Sd/-
(SKMukherjee)
Director

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDING 31ST MARCH,1995.

EXPENDITURE		INCOME		
To Salaries and allowances	78,02,956.00	By Grant-in-aid Deptt. of Env., Forests & WL., New Delhi.	4,35,00,000.00	
To Leave Salary & Pension Contribution	72,910.00	Less transfer to Capital Expenditure	2,70,29,307.43 (-)1,195.00	1,64,71,887.57
To Bonus	87,986.00			
To Honorarium	1,13,697.00			
To Fellowship	8,44,071.00	By Training Cost	6,60,080.00	
To Wages	9,22,009.94	Other Receipts	1,17,402.00	7,77,482.00
To Travel Expenses	15,24,147.00			
To Newspapers & Magazines	22,264.00			
To Publicity & Advertisement	1,29,447.00	By Interest on Training Account		10,757.00
To Operational Expenses	42,47,601.50			
	(+) 1,195.00			
To Stationery	5,22,331.50	By Interest on Bank Deposits		7,65,202.00
To Rent for Hired Buildings	89,825.00	By Miscellaneous Receipt		1,72,256.00
To Postage & Telegram	1,85,217.00	By Training Cost Accrued but not Received		6,92,080.00
To Sports Goods	44,967.00	By Revenue of W.I.I.	96,625.00	
			70,780.00	1,67,405.00
To Telephone & Trunk calls	7,40,586.40			
To Conveyance	22,528.00			
To Electricity & Water Charges	12,47,658.80			
To Entertainment	1,85,669.00			
To Printing & Binding	82,087.00			
To Repair & Maintenance of Office equipment	13,875.00			
C/F	1,89,03,029.14	C/F		1,90,57,069.57

EXPENDITURE		INCOME	
B/F	1,89,03,029.14	B/F	1,90,57,069.57
To Govt. Contribution to Pension Fund	42,365.00		
To LTC	1,12,043.00		
To Food Allowance to Researchers	6,903.00		
To Audit Fee	13,900.00		
To Seminar & Workshops	98,486.00		
To Insurance (Research Fellow and Faculty Members)	7,168.00		
To Stipend	1,20,569.00		
To Over Time Allowences	2,24,670.00		
To Legal Expenses	29,770.00		
To Training Cost	6,84,791.00		
To Repair & Maintenance of Vehicles	3,89,416.00		
To POL for Vehicles	7,36,022.00		
To Lab Chemicals	36,586.00		
To Estate Maintainance	19,079.00		
To Land Scaping	4,56,247.50		
To Publication	3,25,372.00		
To WII Contribution to G.P.F (1993-94)	3,76,495.00	Excess of Expenditure over Income	35,25,842.07
Total	2,25,82,911.64	Total	2,25,82,911.64

Sd/-
(SS Oberoi)
Finance Officer

Sd/-
(DVSKhati)
Registrar

Sd/-
(SKMukherjee)
Director

BALANCE SHEET AS ON 31ST MARCH 1995

FUNDS & LIABILITIES	As on 31.3.94 Amount Rs. Ps.	Addition during Amount Rs. Ps.	As on 31.3.95 Amount Rs. Ps.
Excess of income over expenditure	2,28,49,560.06	(-)35,25,842.07	1,93,23,717.99
Pension Fund	-	-	17,92,493.00
G.P. Fund	-	-	32,17,250.03
Amount capitalised	11,18,29,395.70	2,70,28,112.43	13,88,57,508.13
CGEGIS Refund	13,656.00	1,650.00	15,306.00
C/F			16,32,06,275.15

ASSETS	As on 31.3.94 1994-95 Amount Rs. Ps.	Addition during 1994-95 Amount Rs. Ps.	As on 31.3.95 Amount Rs. Ps.
Land	80,32,795.00	(-)14,25,580.35	66,07,214.65
Trees	24,32,709.00	—	24,32,709.00
Avenue Plantation	14,68,368.65	5,62,800.50	20,31,169.15
Campus Development	22,72,209.31	2,29,908.00	25,02,117.31
Lab Eqpt	12,08,152.07	53,322.00	12,61,474.07
Furniture & Fixture	56,16,939.89	10,20,377.80	66,37,317.69
Vehicles	41,89,182.47	7,00,804.74	48,89,987.21
Library books	40,66,388.28	14,43,498.00	55,09,886.28
Office Eqpt	12,71,860.90	15,22,505.00	27,94,365.90
Camp Eqpt	3,58,479.34	33,666.00	3,92,145.34
Photographs and Photos Material	6,81,464.20	2,16,487.00	8,97,951.20
Educational Films	10,57,107.35	2,000.00	10,59,107.35
Journals & Periodicals	38,42,399.50	12,28,177.60	50,70,577.10
Material & Supplies	38,63,727.95		38,63,727.95
C/F			4,59,750.20

FUNDS & LIABILITIES			
B/F			16,32,06,275.15
Security Deposit	8,08,904.95	7,96,644.00	16,05,548.95
Withheld Amount	2,26,402.00	9,323.00	2,35,725.00
Security Deposit (Hostel)	2,500.00	-	2,500.00
Cooperative	50.00	(-) 50.00	
Publication of Book for Central Zoo Authority	-	2,05,000.00	2,05,000.00
			16,52,55,049.10

ASSETS			
B/F			4,59,49,750.20
Training Equpt	88,85,664.24	28,63,944.00	1,17,49,608.24
Boundry Wall Block I & Gate	14,46,200.59	-	14,46,200.59
Boundry Fencing	8,17,934.93	-	8,17,934.93
Building Complex	4,85,87,389.18	1,70,49,466.82 (-)1,195.00	6,56,36,856.00 (-) 1,195.00
Architectural & Supervision fee	36,07,830.85	59,401.00	36,67,231.85
D.G. Set	7,15,126.00	-	7,15,126.00
EPBAX	10,15,804.00	1,60,680.00	11,76,484.00
A.C. Plant	25,97,452.00	-	25,97,452.00
Advance for Expenses for Training	-	2,52,802.00	2,52,802.00
Advance to Staff (for Expenses)	2,30,325.00	(-)1,10,774.26	1,19,550.74
Loan & Advances to staff	12,71,255.20	13,042.00	12,84,297.20
Staff Quarters	31,75,520.00	-	31,75,520.00
Road & Culverts	4,83,572.00	1,37,446.00	6,21,018.00
C/F			13,92,08,636.75

FUNDS & LIABILITIES		ASSETS			
B/F	16,52,55,049.10	B/F			13,92,08,636.75
		Tennis Courts	1,35,118.00	3,95,734.32	5,30,852.32
		Sundry-Debtors	22,32,709.82	(-)22,32,709.82	
		To Closing Stock of Steel, Cement and Wood	2,59,651.90	16,42,194.00	19,01,845.90
		Auditorium	-	7,74,669.00	7,74,669.00
		Income Tax Contractor	-	13,289.01	13,289.01
		Closing Bank Balance (Training Account)			1,16,174.41
		Closing Bank Balance			1,44,14,489.88
		Closing Cash Balance			93,268.80
		FDR		25,00,000.00	25,00,000.00
		Pension Fund			
		(i) Bank Balance		3,42,493.00]	17,92,493.00
		(ii) Kisan Vikas Patra		14,50,000.00]	
		G.P. Fund			
		(i) Bank Balance		2,17,250.03]	32,17,250.03
		(ii) Kisan Vikas Patra		30,00,000.00]	
		Training Cost Accrued but not Received			6,92,080.00
Grand Total	16,52,55,049.10	Grand Total			16,52,55,049.10

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

Sd/-
(SS Oberoi)
Finance Officer

Sd/-
(DVSKhati)
Registrar

Sd/-
(SKM[illegible]rjee)
Directo[illegible]

PERMANENT ASSETS AS ON 31.3.1995

S.No.	Particulars	Opening stock	Addition during the year	Total
1.	Land	80,32,795.00	(-)14,25,580.35	66,07,214.65
2.	Trees	24,32,709.00		24,32,709.00
3.	Avenue Plantation	14,68,368.65	5,62,800.50	20,31,169.15
4.	Furniture & Fixtures	56,16,939.89	10,20,377.80	66,37,317.69
5.	Lab Equipment	12,08,152.07	53,322.00	12,61,474.07
6.	Office Equipment	12,71,860.90	15,22,505.00	27,94,365.90
7.	Training Equipment	88,85,664.24	28,63,944.00	1,17,49,608.24
8.	Camp Equipment	3,58,479.34	33,666.00	3,92,145.34
9.	Photographs & photographic material	6,81,464.20	2,16,487.00	8,97,951.20
10.	Educational Films	10,57,107.35	2,000.00	10,59,107.35
11.	Library Books	40,66,388.28	14,43,498.00	55,09,886.28
12.	Journals & Periodicals	38,42,399.50	12,28,177.60	50,70,577.10
13.	Materials & Supply	38,63,727.95	-	38,63,727.95
14.	Vehicles	41,89,182.47	7,00,804.74	48,89,987.21
15.	Campus Development	22,72,209.31	2,29,908.00	25,02,117.31
16.	Boundary Wall Block I	14,46,200.59	-	14,46,200.59
17.	Boundary Fencing 1&3	8,17,934.93	-	8,17,934.93
18.	Construction of Bldg	4,85,87,389.18	1,70,49,466.82	6,56,36,856.00
			(-) 1,195.00	(-)1,195.00
19.	Architectural Fee, Supervision & Completion	36,07,830.85	59,401.00	36,67,231.85
20.	DG Set	7,15,126.00	-	7,15,126.00
21.	EPABX	10,15,804.00	1,60,680.00	11,76,484.00
22.	Air Conditioner	25,97,452.00	-	25,97,452.00
23.	Staff Quarters	31,75,520.00	-	31,75,520.00
24.	Road & Culverts	4,83,572.00	1,37,446.00	6,21,018.00
25.	Tennis Court	1,35,118.00	3,95,734.32	5,30,852.32
26.	Auditorium		7,74,669.00	7,74,669.00
	Total	11,18,29,395.70	2,70,28,112.43	13,88,57,508.13

ECO-DEVELOPMENT PROJECT

(STRENGTHENING WILDLIFE MANAGEMENT AND ECO-DEVELOPMENT PLANNING CAPABILITIES)

BALANCE SHEET AS ON 31ST MARCH 1995

LIABILITIES	AMOUNT	ASSETS	AMOUNT
Excess of income Over Expenditure	34,81,797.17	Office Furniture & Fixture	7,235.00
Amount Capitalized	7,235.00	Cash in hand	7,707.40
		Cash at Bank	34,74,089.77
Total	34,89,032.17	Total	34,89,032.17

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Wildlife Institute of India
Dehra Dun

Sd-
(National Project Coordinator)
WII-UNDP Project
Wildlife Institute of India
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INCOME & EXPENDITURE STATEMENT FOR THE YEAR ENDING 31ST MARCH 1995

EXPENDITURE		AMOUNT	INCOME	AMOUNTS
Personnel	3,41,000.00	3,38,595.00		
Refunds	2,405.00			
Adm.Support to UNDP		1,16,887.00	Less expenses to be capitalised	7,235.00
Maintenance of Hostel		53,998.30	ADD INTEREST	5,61,557.00
Operation and Maintenance	10,99,964.00	8,10,094.53		
Refunds	2,89,869.47			
Travel of Staff	5,44,739.00	252,804.00		
Refunds	2,91,935.00			
Sundries	2,21,853.00	2,21,357.00		
Refunds	496.00			
Hiring of hostels		1,16,499.00		
Office Expenses		3,81,497.00		
Expert Consultancy		32,476.00		
EXCESS INCOME OVER EXPENDITURE		34,81,797.17	Total	58,06,005.00
GRANT-IN-AID	52,51,683.00	52,44,448.00		

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RECEIPT & PAYMENT STATEMENT FOR THE YEAR ENDING 31ST MARCH 1995

RECEIPT		AMOUNT	PAYMENTS		AMOUNT
Opening Balance		52,51,683.00	Personnel	3,41,000.00	
			Refunds	2,405.00	3,38,595.00
Interest from Banks		25,944.00			
			Adm.Support to UNDP		1,16,887.00
Interest on FDR		5,35,613.00			
			Maintenance of Hostel		53,998.30
			Operation and Maintenance		8,10,094.53
				10,99,964.00	
			Refunds	2,89,869.47	
			Travel of Staff	5,44,739.00	2,52,804.00
			Refunds	2,91,935.00	
			Sundries	2,21,853.00	2,21,357.00
			Refunds	496.00	
			Hiring of hostels		1,16,499.00
			Office Expenses		3,81,497.00
			Expert Consultancy		32,476.00
			Office Furniture & Fixtures		7,235.00
			Cash in Hand		7,707.40
			Cast at Bank		34,74,089.77
	Total	58,13,240.00		Total	58,13,240.00

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