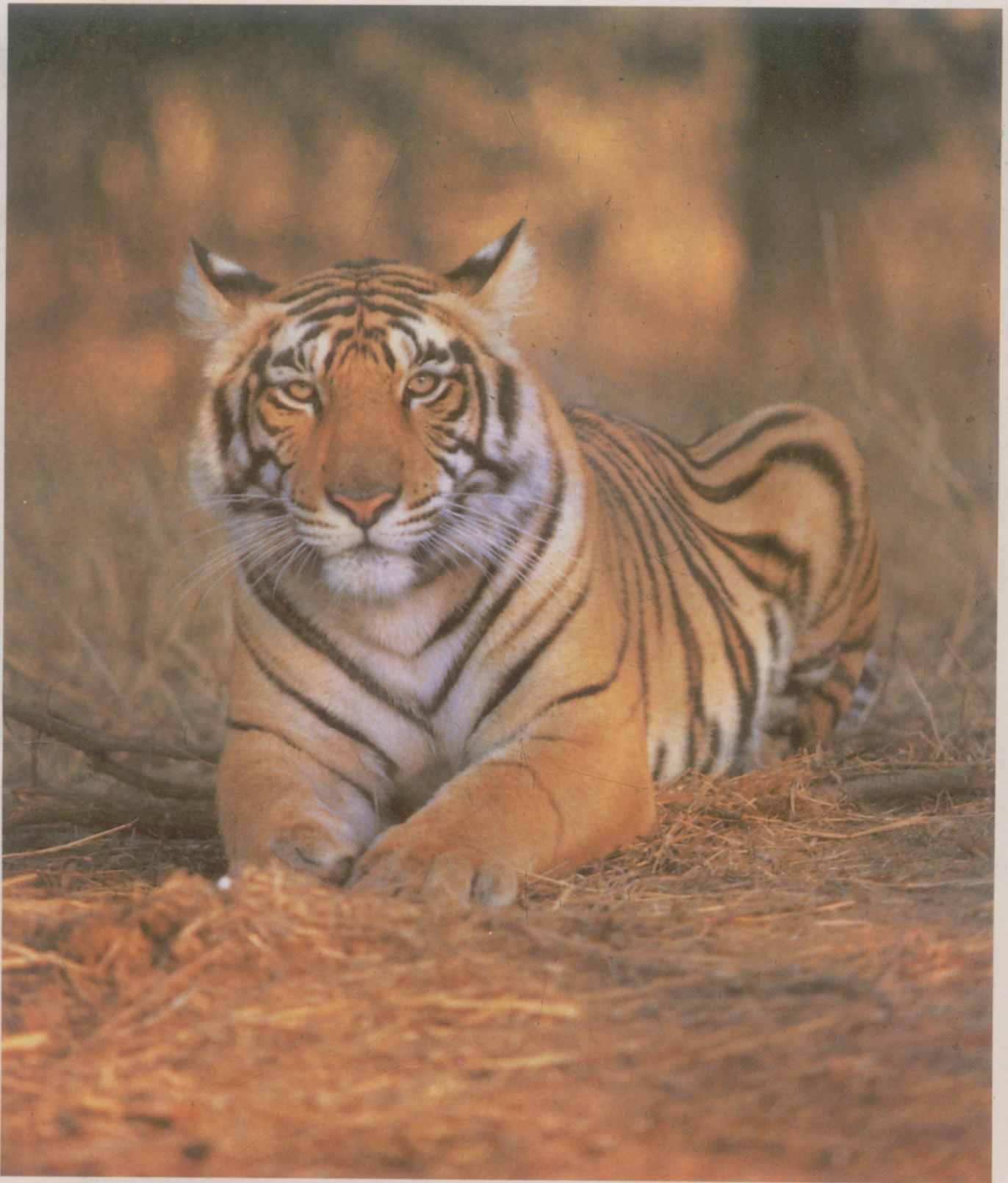


Annual Report 1993-94



MINISTRY OF ENVIRONMENT AND FORESTS
GOVERNMENT OF INDIA

सत्यमेव जयते

Contents

Serial No.	Chapter
1.	Introduction and the year under review
2.	Survey of Natural Resources
3.	Conservation of Natural Resources including Forestry and Wildlife
4.	Environmental Impact Assessment
5.	Environment Protection and Pollution Control
6.	Regeneration and Development
7.	Research
8.	Education, Training and Information
9.	Legislation and Institutional Support
10.	International Co-operation
11.	Advisory Inputs, Administration, Plan Co-ordination and Budget
	Annexures

Page No.

5

15

29

44

50

62

71

83

98

100

104

111



Fig.1 A common plant of the Leguminaceae family

1

INTRODUCTION AND THE YEAR UNDER REVIEW

Role and Organisation

The Ministry of Environment and Forests serves as the nodal agency in the administrative structure of the Central Government for the planning, promotion and co-ordination of environmental, and forestry programmes. The main activities of the Ministry are: conservation and survey of flora, fauna, forests and wildlife; prevention and control of pollution; afforestation and regeneration of degraded areas and protection of environment. These tasks are being fulfilled through environmental impact assessment; eco-regeneration, assistance to organizations implementing environmental and forestry programmes; promotion of environmental and forestry research, extension, education and training to augment the requisite manpower, dissemination of environmental information; international co-operation and creation of environmental awareness among all sectors of the country's population.

The organisational structure of the Ministry indicating various divisions, associated and autonomous offices/agencies is given in Annexure I.

Allocation of Business

The following items of work have been allocated to the Ministry of Environment and Forests:

- Environment and Ecology, including environment in coastal waters, in mangroves and coral reefs but excluding marine environment on the high seas.
- Botanical Survey of India and Botanical Gardens.
- Zoological Survey of India.
- National Museum of Natural History.
- The Water (Prevention and Control of Pollution) Act, 1974.
- The Water (Prevention and Control of Pollution) Cess Act. 1977.
- The Air (Prevention and Control of Pollution) Act, 1981.
- The Indian Forest Act, 1927.
- The Prevention of Cruelty to Animals Act, 1960.
- The Wildlife (Protection) Act, 1972.
- The Forest (Conservation) Act, 1980.
- The Environment (Protection) Act, 1986.
- The Public Liability Insurance Act, 1991.

- Biosphere Reserve Programme.
- National Forest Policy and Forestry Development in the country, including Social Forestry.
- Forest Policy and all matters relating to forests and forest administration in so far as the Andaman and Nicobar Islands are concerned.
- Indian Forest Service.
- Wildlife preservation and protection of wild birds and animals.
- Prevention of Cruelty to Animals.
- Central Zoo Authority.
- Fundamental research, including co-ordination thereof and higher education in forestry.
- Padmaja Naidu Himalayan Zoological Park.
- National Assistance to Forestry Development Schemes.
- Central Ganga Authority.
- Indian Plywood Industries Research and Training Institute, Bangalore.
- National Afforestation and Eco-Development Board.
- Desert and Desertification.

An overview of the activities of the Ministry and its associated offices/organisations during the year

Survey of Natural Resources

Flora

- Intensive floral surveys were undertaken by the various circles and units of Botanical Survey of India in priority areas of Manipur, Meghalaya, Arunachal Pradesh, Sikkim, Bihar, Uttar Pradesh, N.W. Himalayas, Kerala, Andaman and Nicobar Islands and various wetlands and sub-tropical bio-diversity areas of the country.
- Compilation of data on 125 rare and endangered species has been completed for inclusion in Vol. IV of the Red Data Book of Indian Plants.
- Work on inventorization of the "Cultivated Palms in India" has been completed as part of the National Data Base on Herbarium collections.

Fauna

- A total of 48 surveys covering 79 districts falling under

different eco-systems were conducted by the Zoological Survey of India during the year.

- A report on the status of the endangered 'Satyr' and 'Western Tragopan' has been prepared.
- The National Zoological Collections have been enriched by the addition of 50,637 identified specimens pertaining to 2,522 species.
- At the 5th meeting of the contracting parties of Ramsar Convention for Conservation of Wetlands held at Kushiro, Japan, India has been elected as a member of the International Steering Committee on Wetlands for the next three years.
- The ENVIS Centre on Animal Ecology at the Zoological Survey of India has started functioning and publication of the ENVIS Newsletter has commenced.

Forests

- Since the beginning of the thematic mapping cycle in 1986, the Forest Survey of India has covered 1682 topographic sheets corresponding to an area of about 24,26,400 sq. kms., spread over the states of Madhya Pradesh, Orissa, Bihar, Kerala, Rajasthan, Manipur, Nagaland, Tamil Nadu, Karnataka, West Bengal, Maharashtra, Gujarat, Himachal Pradesh, Meghalaya, Punjab, Delhi, Uttar Pradesh, Assam and Arunachal Pradesh.
- A GIS (Geographical Information System) project sponsored by the National Wastelands Development Board has been completed.

Conservation of Natural Resources including Forestry and Wildlife

National Conservation Strategy and Policy Statement on Environment and Development

- To ensure that all the concerned Ministries/Departments take appropriate action, especially for re-orienting their policies and programmes in conformity with the National Conservation Strategy, the action points pertaining to particular Ministries/Departments have been communicated and a series of discussions have been held.

Biosphere Reserves

- Based on the recommendations of the National

Committee, Management Action Plans prepared by the concerned State Governments have been sanctioned for Nilgiri, Gulf of Mannar, Sunderbans, Nokrek, Nanda Devi and Great Nicobar Biosphere Reserves.

- A training programme on various aspects of conservation of Biosphere Reserves in the country was organised at the Indian Institute of Science, Bangalore, during the year for middle-level officers.

Wetlands, Mangroves and Coral Reefs

- With the inclusion of five more wetlands to the list of wetlands for national importance, the number of wetlands identified for intensive conservation and management purposes has gone upto 21 and Management Action Plans for 11 Wetlands have been sanctioned.
- Management Action Plans for all the 15 Mangrove areas identified so far for intensive conservation and management purposes have been sanctioned.
- Considering the importance of coral reefs and the factors responsible for their deterioration, the areas viz., Lakshadweep, Andaman and Nicobar, Gulf of Mannar and Gulf of Kutch in the country have been identified for conservation and management.
- During the year, a Management Action Plan for the Coral Reefs of Andaman and Nicobar has been prepared by the Andaman and Nicobar Administration.

Bio-diversity Conservation

- The Convention on the Conservation of Biological Diversity, which has been ratified by 37 countries came into force from 29th December, 1993 in India and necessary action has been initiated for ratifying it.
- Fifty action points with reference to the Convention have been identified for implementation at the national, state and local levels.
- The first draft of Volume-1 of the Status Report on Bio-diversity Conservation has been received.
- An Indian delegation participated in the first meeting of the Inter-governmental Committee on the Convention on Biological Diversity (ICCBD) held in Geneva in October, 1993.

Ex-Situ Conservation

Assistance to Botanic Gardens and Field Centres

- Financial assistance was provided to three Botanic

Gardens for strengthening their existing facilities for conservation and propagation of threatened and endangered endemic plant species of that region.

- An approach paper on networking and upgradation of botanic gardens in the country was prepared and discussed and a group of experts have been identified for selecting those gardens which have the potential to be integrated into a national network.

Central Zoo Authority

- The Central Zoo Authority has finalized and notified the rules for recognition of the Zoos which, *inter-alia* stipulate the standards for upkeep and maintenance and veterinary care of the zoo animals.

Forest Conservation

- Out of 5,715 proposals received under the Forest (Conservation) Act, 1980, for forest clearance, 2,817 proposals have been approved so far.
- A draft of the revised Indian Forest Act has been circulated among the State Governments for obtaining their views.
- Fourteen states have so far issued usufruct sharing orders with a view to involving village communities and voluntary organizations in protection and regeneration of degraded forests.
- The UNDP assisted project on the formulation of the "National Forestry Action Plan" has become operational from 1.7.1993.
- The Second All India Forest Sports Meet was organized by the Ministry during the year at Dehradun and about 2,000 participants from various State Forest Departments, Autonomous Institutes and other officers of the Ministry attended the Meet.
- In order to implement the recommendations of the Policy Advisory Group on Wood Substitution, several measures are being adopted to encourage the substitution of wood with suitable alternatives with respect to doors, windows, furniture, packaging, railway sleepers, etc.
- During the year, 11 states which have valuable forests, prone to fires, were provided financial assistance under the Centrally Sponsored 'Modern Forest Fire Control Methods' Scheme.

Wildlife Conservation

- The network of protected areas in the country now consists of 75 National Parks and 421 Sanctuaries covering an area of 1,40,675.46 sq. kms.
- Assistance was provided to various states for taking up 'eco-development' programmes around National Parks and Sanctuaries.
- Two new Tiger Reserves, namely, Tadoba-Andheri (Maharashtra) and Bandhavgarh (Madhya Pradesh) have been established during the year, taking the number of Tiger Reserves in the country to 21.
- An all India Tiger/Leopard census was conducted during the year.
- Preparation of a Tiger Action Plan and formation of a Global Tiger Forum have been initiated and India has been elected as the Chairperson for the first meeting of the Global Tiger Forum.
- Formation of a 'Tiger Crisis Cell' under the chairmanship of the Minister for Environment and Forests has been taken up.
- To commemorate 20 years of Project Tiger, various activities were undertaken in all Tiger Reserves with a view to disseminating the message of Project Tiger to the people.

Animal Welfare

- Sixteen states have formed State Advisory Boards for Animal Welfare activities under the Prevention of Cruelty to Animals Act, 1960.
- The Animal Welfare Board of India is conducting a series of camps all over the country in collaboration with the Royal Society for Prevention of Cruelty to Animals, London, for the members of SPCAs/Animal Welfare Organisations and staff of other relevant departments.

Environmental Impact Assessment

- Out of 228 projects appraised/re-appraised during the year, 105 were granted environmental clearance, 20 were rejected and additional information has been sought for the remaining projects.
- The Coastal Zone Management Plans for the Union Territories of Pondicherry and Daman have been finalized and those for the States of Goa, Tamil Nadu, Kerala

and Union Territories of Andaman and Nicobar and Lakshdweep are under consideration.

- Based on the recommendations of the Expert Committee constituted last year to examine issues relating to tourism and hotel facilities in coastal areas, a fresh draft Coastal Zone Regulation Notification, containing the proposed amendments, has been issued on 11th November, 1993 inviting suggestion from the public.
- A notification making Environmental Impact Assessment statutory for 29 different activities in Industries, Mining, Irrigation, Power, Transport, Tourism, etc. was issued by the Ministry on 27-1-1994.
- An agreement has been signed with the Asian Development Bank for providing technical assistance for a project titled "Environmental Management of Coal Fired Power Generation" which includes detailed studies on various aspects of coal mining, studies of Talcher and Madras regions and a training programme for managers of thermal power plants.
- Three studies on carrying capacity of Doon Valley, National Capital Region and Damodar River Basin are being implemented by a network of organisations.

Environment Protection and Prevention of Pollution

- The Gazette Notification on Environmental Audit issued last year has been amended; all industries applying for environmental clearance are required to submit environmental statements for the period ending 31st March, before 30th September of that year, beginning from 1993 to the concerned State Pollution Control Boards (SPCBs).
- Model environmental statement reports in respect of six industries have been prepared and sent to the concerned SPCBs during the year.
- The Central Pollution Control Board (CPCB) has completed environmental audits of 120 industries.
- Several Research and Development proposals relating to innovation, identification and diffusion of clean technology, creation of a data base, awareness creation and personnel training of the small scale industries are being considered under the scheme on "Adoption of Clean Technology to the Small Scale Industries."
- It has been agreed that a network of clean technology centres, with a National Centre co-ordinating their activities, needs to be set up to encourage identification,

acquisition, development and promotion of cleaner technologies at all levels. Setting up of a Sectoral Clean Technology Centre on Coal has been recommended.

- The National Productivity Council has been sanctioned a project to prepare a general guideline book on waste minimisation and a sector-specific manual for the identified small scale industry sectors.
- Vehicular pollution surveys were conducted in the cities of Delhi, Bangalore, Vadodara and Kanpur during the year.
- The cities of Delhi, Lucknow and Indore were surveyed for noise pollution.
- The 290 stations operating under the National Ambient Air Quality Monitoring programme continued to function.
- Water quality monitoring of Indian aquatic resources was also continued by the 480 stations functioning under the Global Environmental Monitoring System (GEMS), Monitoring of Indian National Aquatic Resources (MINARS) and Ganga Action Plan (GAP) programmes.
- A project has been initiated to assess the ground water quality in the identified critically polluted areas.
- During the year, Ankleshwar (Gujarat) and Tarapur (Maharashtra) have also been identified as critically polluted areas, thus taking the number of critically polluted areas in the country to 22.
- A notification consolidating all the environmental standards including general effluent, emission and noise standards has been issued under the Environment (Protection) Act, 1986.
- Future mass emission norms which would come into effect from 1.4.1996, have been issued for petrol and diesel driven vehicles under the Central Motor Vehicles Rules, 1989, by the Ministry of Surface Transport.
- Final notifications have been issued for the environmental criteria in respect of toilet soaps, detergents, paper, architectural points and laundry soaps for awarding the 'Eco-mark' label.
- As per the latest amendments of the Rules of the Water and Air Acts, the SPCBs shall issue consent to industries only after the industry has installed all the required pollution control equipments, no conditional consent would be issued by the SPCBs.

Management of Hazardous Substances

- With the finalisation of the amendments to the Manufacture, Storage and Import of Hazardous Chemical Rules, 1989, Safety Audit in Major Accident Hazard Units has become mandatory.
- A guide entitled "Introduction to Vulnerability Analysis of Eight Extremely Hazardous Chemicals" and a guide on "Safe Road Transport of Hazardous Chemicals" have been prepared.
- Funds have been released for the establishment of Emergency Response Centres at Bhopal (Madhya Pradesh) and Manali (Tamil Nadu).
- Hazardous analysis of industrial pockets at Delhi, Vapi, Ankleshwar, Mettur, Mandi Udyog Manali, Patalganga and Raigarh have been initiated during the year.
- Basic infrastructure (hardware and software) has been installed for setting up a National Register for Potentially Toxic Chemicals (NRPTC) at the Ministry.
- Proposals for the establishment of Regional Registers for Potentially Toxic Chemicals (RRPTC) at the six regional offices of the Ministry have also been received and some are under consideration.
- A training programme on Data Base has been conducted with the help of UNITAR and experts from IRPTC, IPCL and ILO.
- H-acid and other naphthol based dye intermediates have been identified as one of the priority chemical for assessment of environment and health risk.
- The Ministry participated in consultations arranged by the UNEP to provide a legal packing to the London Guidelines for Exchange of Information on Chemicals in International Trade and India has been elected as Vice-Chairman of the Task Force appointed for the purpose.
- Amendments to Hazardous Waste (Management and Handling) Rules, 1989 have been finalized and are being processed for notification.
- Draft Rules for the Handling and Management of Bio-medical Wastes have been prepared under the Environment (Protection) Act, 1986.
- Financial assistance has been given to 17 cities for conducting surveys on urban municipal solid waste.
- Rules for owners seeking exemptions under the Public

Liability Insurance Act, 1991, have been amended.

Regeneration and Development

Ganga Action Plan

- Out of a total of 261 schemes sanctioned under the Ganga Action Plan (GAP), 211 schemes have been completed so far.
- Six automatic water quality monitoring stations have been installed and made operational for monitoring the quality of the water of river Ganga continuously.
- Infrastructure capable of intercepting and diverting 543 mld and treating 297 mld of municipal sewerage has been created; most of the low cost sanitation schemes and electric crematoria construction have also been completed.
- The Supreme Court has directed that industries must set up effluent treatment plants to the satisfaction of the concerned SPCBs.
- Under GAP phase-II, a scheme of Pollution Abatement of Yamuna and Gomti rivers at an estimated cost of Rs. 421 crores has been approved.
- An approach paper on the National River Action Plan has been approved at an estimated outlay of Rs. 1,000 crores spread over a period of 10 years of which the share of the Central Government would be Rs. 500 crores.

National Afforestation and Eco-development Board

- Various Centrally Sponsored Schemes to promote afforestation, wastelands development, fuelwood and fodder production, conservation of minor forest produce, aerial seeding etc. were continued.
- The three Eco-Task Forces of ex-servicemen deployed in the States of Uttar Pradesh, Rajasthan, Jammu & Kashmir continued their activities related to afforestation, pasture development, soil and water conservation and eco-regeneration in selected environmentally degraded areas.
- The reports of the Policy Advisory Groups on 'Grazing and Livestock Management' and on 'Benefit Distribution' have been considered and the report on Benefit Distribution from Common Lands has been accepted and forwarded to the National Wastelands Development Board (NWDB) for further necessary action.

- An Expert Committee has been constituted to consider various issues of Joint Forestry Management.
- A new scheme titled 'Rajiv Paryavaran Pariyojana' is proposed to be implemented in selected districts of the country.

Research

Environmental Research

- During the year, 24 new projects were sanctioned, 20 projects were completed and 122 were on-gong under the three major research schemes, viz. Man and Biosphere Programme, Environmental Research Scheme and the Integrated Action-oriented Research Demonstration and Extension Programmes on Eastern and Western Ghats.
- The second Volume of the Publication "Environmental Research: Executive Summaries of Completed Projects" containing summaries of 138 research projects was published during the year.
- The second phase of the project "National Methane Campaign" was launched during the year.
- The G.B. Pant Institute for Himalayan Ecology and Development completed 9 research projects and continued with 12 on-going action-oriented research projects during the year.
- Two new programmes viz. Mountain Environment Resource Information System (MENRIS) and Eco-System Rehabilitation Project were initiated and three weather monitoring stations for collecting and analysing climatic data for the Himalayan region have been installed by the Institute.
- During the year, three new projects on Wetlands, three projects on 'Mangroves' and seven projects on 'Biosphere Reserves' were sanctioned to selected nodal institutions/universities.

Forestry Research

- The Indian Council of Forestry Research and Education (ICFRE) continued to organise, direct and manage research and education in the field of forestry.
- All the research institutes and centres under the ICFRE continued to cater to the research needs of the different eco-climatic zones in which they are located.
- The Indian Plywood Industries Research and Training

Institute initiated work on four new projects, besides continuing with 35 on-going research projects. The appropriate technology developed under the project "Development of Bamboo Mat Board" has resulted in the revival of bamboo mat weaving for rural and tribal women in backward and remote areas.

- The Indian Institute of Forest Management, Bhopal has initiated work relating to preparation of a project on 'Eco-development for Pench Tiger Reserve' to be funded by the GEF. Survey of nearly 40 villages around the Park and field exercises for Participatory Rural Appraisal for six villages have been completed.

Wildlife Research

- During the year, the Wildlife Institute of India (WII) completed seven research projects and two studies on the 'Snow Leopard' and 'Giant Squirrel', and has initiated three studies on the 'Wild Ass', 'Gir Lion' and 'Crocodiles'.
- A survey report on 'Turtles and Tortoises' has been published in collaboration with WWF-India and TRAFFIC-India.
- An Environment Impact Assessment Cell has been established at the WII which completed two EIA studies for the HBJ Gas Pipeline Upgradation and the Vishakhapatnam-Vijaywada pipeline project.
- The WII is actively involved in the health check and the proposed release of two captive bred young Siberian Cranes at Bharatpur during this season.
- The Salim Ali Centre for Ornithology and Natural History (SACON), an autonomous organisation of the Ministry at Coimbatore, continued work on nearly 16 on-going and new research projects on various issues related to conservation of bio-diversity in the country.
- The Centre conducted an assessment of the impact of 12 years of closure of the core area of the Nanda Devi National Park on the avifauna, which indicates that rare avifauna population has increased due to the ban.

Research in the Ganga Action Plan

- Twenty-two research projects and studies on thrust areas like pollution monitoring, resource recovery, bio-monitoring, bio-conservation, etc. have been initiated during the year.
- The water quality monitoring schedule of river Ganga

has been revamped. While the number of parameters monitored has been reduced to 21 from 42, the scope of monitoring has been enlarged to include sediment analysis and pollution source identification.

- Water quality monitoring of river Yamuna including WJC Hindon and Gomti has been initiated to collect base-line data on water quality of these rivers.
- The works completed under the Ganga Action Plan Phase-I have been evaluated by four experts from reputed Universities and evaluation reports have been submitted.

National Natural Resources Management System (NNRMS)

- Out of 17 research projects sanctioned so far under the scheme, nine projects have been completed; two more projects have been sanctioned during the year.

Education, Training and Information

Forestry Education, Training and Extension

- The ICFRE, the focal point for forestry research, education and extension continued with its activities of publication of brochures and books, organisation of short courses and seminars, production of films and other audio-visuals etc. on various aspects of forests.
- About 102 candidates are registered for Ph.D in various disciplines of forestry at the FRI, which has received requests from several Asian countries to assist them in the education of their forestry professionals.
- The Indian Plywood Industries Research and Training Institute, Bangalore, conducted six vocational training courses for 43 candidates besides an one year certificate course in 'Mechanical Wood Industries' Technology.
- The Indian Institute of Forest Management, Bhopal conducted several workshops, seminars and management development programmes on various aspects of forestry, besides the regular two year Post Graduate Diploma Course in Forestry Management.
- The Indira Gandhi National Forest Academy continued to provide initial in-service training to IFS probationers.
- The three State Forests Service Colleges at Dehradun, Coimbatore and Burnihat continued with their two year Diploma Course in Forestry for SFS officers.

Wildlife Education and Training

- The Wildlife Institute of India continued its activities to provide in-service training in wildlife management to forest officers, wildlife ecologists and other professionals.
- Besides conducting the regular diploma/certificate courses, capsule courses, research, seminars, workshops etc., the Institute brought out a poster and a survey report on India's turtles and tortoises and a primer on 'Bio-diversity conservation' for school children.

Non-formal Environmental Education and Awareness

National Environmental Awareness Campaign (NEAC)

- The Ministry conducted the NEAC-93 with the main theme on 'Animal Welfare and Waste Management' during the year. About 1500 organisations comprising of NGOs, schools and colleges, universities, women and youth organisations, including NCC/NSS etc. were supported to organise a variety of activities aimed at creating environmental awareness among different target groups of the country's population.
- Seventeen Regional Resource Agencies (RRAs) assisted the Ministry in planning, implementing, monitoring and evaluating the activities of the campaign all over the country.
- About 200 Eco-clubs have been established in Government recognized schools.
- During the year, 26 documentary films on various environmental themes have been commissioned by the Ministry. The NAEB also provided financial assistance for production of two films on afforestation during the year. VHS copies of the completed films have been distributed to the Forest Department of all States/UTs and to training institutes.
- Panels with environmental messages were displayed on State Transport buses in three states.
- So far, 110 districts spread over 25 states and four Union Territories have been identified for constitution of 'Paryavaran Vahinis' which aim to create environmental awareness through peoples' participation.

Formal Environmental Education

- The Ministry continued its interaction with UGC,

NCERT, Department of Education, etc. for implementing programmes related to environmental education. A Committee has also been constituted to review the facilities available for training in Management of Resources and Environmental Management and school and college level environmental education at various educational institutions.

Centres of Excellence

- The two Centres of Excellence on environment education-Centre for Environment Education (CEE), Ahmedabad and the CPR Environmental Education Centre (CPREEC), Madras continued their activities relating to the development of environmental educational resource materials, organisation of training and interpretation programmes and exhibitions and creation of environmental awareness among all sections of the society.
- Organisation of short, theme-specific training programmes titled "Teach and Learn Environmental Education Modules (TALEEM) has been started during the year by CEE, Ahmedabad.
- CEE-NFS carried out a newspaper campaign on the de-notification of the Narayan Sarovar Wildlife Sanctuary which resulted in reversing the de-notification.
- The North-Eastern Regional Cell of CEE has been opened at Guwahati during the year.
- An Environment Law Cell has been set up at the CPR EEC at Madras to familiarise NGOs with environmental legislations.
- A village adjoining Mudumalai is being developed as an eco-model village and a Teachers' Environmental Education Kit has been developed for use in schools by the Centre.
- The Centre for Ecological Sciences, Bangalore continued to undertake research work focussing on the ecology and environment of the Western Ghats.
- The financial liability of the permanent establishment of the Centre for Mining Environment at Dhanbad has been taken over by the UGC w.e.f. 1-4-1993.
- The Centre continued to run the integrated M.Tech programme in Environmental science and Engineering, besides organizing workshops and seminars and continuing with various research projects in mining and allied fields.

National Museum of Natural History

- Besides a number temporary exhibitions, the Museum organised two major exhibitions during the year - one on 'Forests and Ecosystems of India' during the first Ministerial Conference of the Forestry Forum for Developing Countries at New Delhi and the other on "Environment and Development" at the Indian International Trade Fair 93' at New Delhi, which was awarded a Gold Medal by the Indian Trade Promotion Organisation.
- A total of 344 prizes were awarded to the winners of various categories of the nation-wide 'Care for the Environment Contest' organised during 1992-93.
- Building plans and estimates have been finalized for the Regional Museums at Bhopal and Bhubaneswar and the foundation stone for the Bhopal Museum was also laid during the year.

Fellowships and Awards

- A new "Maha Vriksha Puraskar" has been instituted by the National Afforestation and Eco-development Board during the year.
- Dr. S.M. Nair, Director, NMNH and Dr. S.Karthikeyan of BSI, Pune, have been awarded the Paryavaran Evam Van Mantralaya Vishisht Vaigyanik Puraskar for the year.
- The Pitambar Pant National Environment Fellowship Award for the year 1993 was awarded to Dr. S. Sriramachari in recognition of his valuable contribution in field of environmental sciences.
- The Ministry is in the process of institution of 'B.P. Pal National Environment Fellowship Award for Biodiversity' as recommended by the Advisory Committee.

Environmental Information

- ENVIS, (Environmental Information System) continued its activities in environmental information collection, collation, storage, retrieval and dissemination to all concerned.
- During the year, the ENVIS Network responded to 5662 queries out of which 847 were international.
- Four issues of the journal 'Paryavaran Abstracts' containing about 1200 abstracts were published during the year.

- The ENVIS focal point is now in the process of developing a computer network interconnecting all the ENVIS Centres with each other and with the focal point.
- Information on more than 250 Indian sources engaged in environmental activities has been updated by ENVIS for inclusion in the International INFOTERRA Directory of Environmental Sources published by UNEP.
- All the 17 ENVIS Centres continued their activities in information collection, collation, storage, retrieval and dissemination in the subject areas allotted to them during the year.

Legislation and Institutional Support

- The Gazette Notification on environmental audit issued in March 1992 has been amended.
- Amendments to manufacture, storage and import of Hazardous Chemical Rules have been finalized.
- Amendments to Hazardous Waste (Management and Handling) Rules, 1989 have also been finalised.
- A Notification regarding authorisation of various agencies under Sections 13 and 18 of the PLI Act has been issued.
- A fresh Coastal Zone Regulation Notification containing certain amendments has been issued and suggestions from the public have been invited.
- Out of 5896 cases filed by the SPCBs under the Water and Air Acts, 2323 cases have been decided, and 3573 are pending in various courts.
- The scheme of assistance to SPCBs and State/UT Departments of Environment for strengthening their manpower and procurement of scientific equipment was continued.

International Co-operation

- India has ratified the Convention on 'Climate Change' during the year and the 'Convention on Biological Diversity' is also being ratified.
- India had hosted the 'First Ministerial Conference of the Forestry Forum for Developing Countries' in September 1993 and the Delhi Declaration issued at this conference highlights the priorities of the developing countries in the forestry sector.
- India's Country Programme on the phasing out of

Ozone Depleting Substances has been prepared and subsequently approved by the Montreal Protocol Executive Committee in November, 1993.

- An Environment Action Programme has been drawn up for the country which attempts to integrate the concerns for conservation, sustainable development and human welfare with the quest for a dynamic economy.
- Nine projects on afforestation and wastelands development have been implemented during the year with assistance from World Bank, SIDA, EEC, OECF etc. and several other forestry projects from different states of the country have been posed to various donor agencies.
- Several projects relating to control and prevention of pollution are being implemented in different parts of the country under bilateral programmes with countries such as Sweden, Norway, Denmark, Netherlands, Japan, Australia, Germany, etc.
- The World Bank supported project on 'Industrial Pollution Control' aimed at prevention and alleviation of environmental degradation caused by individual operations continued during the year and the project is scheduled to be completed by the end of the VIII Five Year Plan Period.
- Memoranda of Understanding have been signed with Austria and China on issues relating to sustainable development and environment.

Advisory Inputs, Administration, Plan Co-ordination & Budget

Advisory Inputs

- The National Environmental Advisory Committee has been reconstituted as the National Environmental Council under the chairmanship of the Prime Minister and will act as a think-tank on important environmental policy matters.

Administration

- Direct recruitment of three Group 'A' scientific posts in the associated offices of the Ministry was made during the year.
- Under the Flexible Complementing Scheme, 89 Group 'A' Scientific Officers were reviewed and 76 were promoted to the next higher grades.
- Action is being taken to recruit 100 IFS Probationers on

the basis of the results of Indian Forest Service (IFS); 28 State Forest Service have been promoted to the Indian Forest Service during the year.

- The Grievance Cell attended to more than 300 complaints during the year.
- Two hundred and forty references were received and attended to by the NGO Cell.
- A one-week training programme on office procedure was organised through the faculty members of the ISTM.
- The Study Team constituted in 1991 for undertaking a work measurement study in respect of scientific and non-scientific posts in the Ministry has submitted its report.
- During the year, three employees passed Hindi typewriting, one Hindi stenography and one each in Hindi Prabodh, Praveen and Pragya examination under the Hindi Teaching Team.
- Hindi Week was organised from 6-9 September, 1993 during which various competitions were held and prizes distributed to winners.
- The quarterly Hindi Journal "Paryavaran" continued to be published by the Ministry. A book titled 'Sanskriti Evam Paryavaran' was published and 5 training books were also translated into Hindi.
- The Civil construction Unit (CCU) of the Ministry has taken up 70 major schemes so far with a total estimated cost of Rs. 83 crores. At present, 18 major works are under execution by the CCU.
- The CCU has adopted the use of a number of alternatives for timber in the buildings being constructed by them with a view to substituting wood, wherever possible.
- Several other environmentally friendly measures such as solar water heating system, recycling of sewage water for horticultural purpose, generation of electricity from sewage etc., are also being adopted by the CCU.

Plan Co-ordination and Budget

- The Budget allocation of the Ministry for 1993-94 is Rs. 318 crores as against Rs. 280 crores for 1992-93.
- Ministry has been allocated an outlay of Rs. 360 cores for the year 1994-95 under various sectors.

2

SURVEY OF NATURAL RESOURCES

Survey of Flora

The Botanical Survey for India (B.S.I.) was established in 1890 with the objective of surveying and identifying the plant resources of the country. The Survey has its headquarters at Calcutta and nine Circles located in different phytogeographical regions of the country. The primary and secondary objectives of B.S.I. after its restructuring are as follows:

Primary objectives

- To survey the plant resources of the country;
- To undertake and complete taxonomic studies of all the flora of the country;
- To enlist the endangered species, to undertake measures for the effective conservation and to collect and maintain germplasm and gene bank of endangered, threatened and vulnerable species;
- To bring out volumes of National and State Flora of States/Union Territories;
- To identify, collect and preserve specimens of plants which are economically and otherwise beneficial to human beings; and
- To prepare National Data Base on herbarium collections including types, live collections, plant genetic resources, plant distribution and nomenclature.

Secondary objectives

- To undertake studies on selected critical and fragile ecosystems;
- To undertake assessment of flora relating to environmental impact studies as and when called for;
- To undertake ethonobotanical studies/research and evaluate plants of economic utility in specified areas; and
- To carry out geobotanical studies/research in specified areas.

The activities of the B.S.I. during the year were as follows:

Survey of Floral Resources of the Country

More than 20 tours were undertaken by the various Circles and Unites of the BSI in different priority areas of Manipur, Meghalaya, Arunachal Pradesh, Sikkim, Bihar,

U.P., N.W. Himalyas, Kerala, Andaman and Nicobar Islands and various wetland and sub-tropical bio-diversity areas of the country. Nearly 3,800 specimens were collected and these are being processed by the different Circles/Units.



Fig.2 An Orchid from Andamans



Fig.3 An ornamental garden plant

National Flora/Flora of India

So far Volumes I, II and III of 'Flora of India' have been published and compilation work relating to Volumes V, XII and XIII have been completed. Draft manuscripts have been prepared and are being edited.

Revisionary studies of the families Asclepiadaceae, Oxalidaceae, Stynaceae and Alliaceae have been completed. Studies on Tropioliaceae and Avoerrhoeaceae are in progress.

Studies on Rare and Endangered Species

Compilation of data on 125 rare and endangered species has been completed for inclusion in Volume IV of the Red Data of Indian Plants.

Studies on selected fragil eco-systems/Mangroves of India

Manuscripts on the mangroves of Andaman and Nicobar Islands, Godavari Delta, Pitchavaram and Point Calimer and Vembanad Lake are being edited for publication.



Fig.4 Spider Lily-a garden plant



Fig.5 A common garden plant of the Liliaceae family

State/Regional Flora

- **Flora of Assam:** Work on identification of 4500 specimens and description of 410 species belonging to Magnoliaceae, Annonaceae, Menispermaceae, Combretaceae, Myrtaceae, Lythraceae, Caprifoliaceae, Clusiaceae and Orchidaceae have been completed.

Flora of Nagaland: Manuscript of Vol. I has been completed. Work on critical study of 188 species be-

longing to family Poaceae and 28 illustrations were completed for Vol. II.

- **Flora of Mizoram:** Taxonomic description and nomenclature updating for 1100 species (Ranunculaceae to Myrsinaceae) is being finalised.
- **Flora of Manipur:** Compilation of 500 species has been completed.



Fig.6 An ornamental garden flower



Fig.7 *Mecamopsis paniculata*-flora of North Sikkim

- **Flora of Arunachal Pradesh:** Manuscript for the materials of Arunachal Pradesh has been finalised and is being edited.
- **Flora of Sikkim:** Work on the materials for the Flora of Sikkim is nearing completion.
- **Flora of Andaman & Nicobar Islands:** Compilation of 350 species towards the preparation of the Flora of the Islands has been completed.
- **Flora of Maharashtra (Vol.I):** The introductory chapter including Ethnobotany, Economic botany, plants of reclamation of Wasteland, endangered and endemic plants, etc. completed. Typed scripts of various families is being checked. 84 families from Ranunculaceae to Caricaceae are ready for publication.
- **Flora of Jammu & Kashmir:** Taxonomic description of 783 species was completed.
- **Flora of the Cold Deserts of High altitude of N.W. Himalayas:** Manuscript of the Introductory Chapters has been completed and identification and compilation of 385 critical specimens were also completed.
- **Flora of Madhya Pradesh:** The first volume of the Flora of Madhya Pradesh has been published. Compilation of 233 species were completed for Vol. II.
- **Flora of West Bengal:** Compilation of 400 species of

the families from Fabaceae to Asteraceae were completed for Vol. II.

- **Flora of Kerala:** Work on taxonomic description and systematic account for Vol. I is nearing completion and data is being computerized. Taxonomic description of 300 species has been completed for Vol. II.

Flora of South Western Ghats : Manuscript for the Flora of South Western Ghats has been finalised and is being edited.



Fig.8 *Dahlia*-pride of many gardens

Other Activities

- Work on inventorization of 'Cultivated palms in India' were completed and final manuscripts with photographs are being edited for preparing the National Data Base on Herbarium Collections.
- Evaluation of five useful plants has been completed under the programme of 'Scientific Evaluation of Useful plants.'
- Two tours of Delhi were undertaken for photographs to be included in the publication "Trees and Shrubs of Delhi."
- Work relating to the Geobotanical Studies in the Singhbhum Copper Belt of Bihar has been completed. Data collected is being computerized and final report is under preparation in collaboration with the Geological Survey of India.
- Flora of Nandadevi Biosphere Reserve is in press.
- Environmental Impact Assessment reports of the following projects were also prepared by BSI.
- Tipaimuk Dam Project, Assam.

- Siruvani Small Hydel Project, Tamil Nadu.
- Kameng Hydro Electric Project, Arunachal Pradesh.
- Purulia Pumped Storage Scheme, West Bengal.
- Gauripur T.P.S., West Bengal.
- Murshidabad T.P.S., West Bengal.
- Gorigada - Dhuliganga H.E. Project, U.P.
- Tehri Dam H.E. Project, U.P.

Publications

- Flora of Rajasthan, Vol. 3.
- Flora of Mahabaleshwar, Vol. I.
- Bulletin of the Botanical Survey of India, Vol. 32.
- Flora of Raigad District.
- Plant Resources of Jaldapara Rhino Sanctuary.
- Flora of Taroba National Park.
- Flora of India, Vols. 1, 2 and 3.
- Flora of Madhya Pradesh, Vol. I.

Survey of Fauna

The Zoological Survey of India (ZSI) with its headquarters at Calcutta and sixteen regional stations located in different parts of the country was established in 1916 with the main objective of carrying out surveys of the faunal resources of the country.

During the year, the ZSI stepped up its activities to achieve the national objective of Bio-Diversity Conservation, by undertaking surveys in different ecosystems for exploration of faunal resources, which resulted in the finalisation of 50 manuscripts on biodiversity ranging from Protozoa to Mammalia.

Survey and exploration of the North-Eastern States continued to be given priority.

The activities of ZSI during the year were as follows:

Exploration and Survey of Faunal Resources

Ecosystem survey

A total of 48 surveys covering 79 districts falling under different ecosystems were conducted during the year.



Fig.9 *Mochus chrysogaster* Hodgson, Musk Deer-a highly endangered species



Fig.10 *Bonnet macaque*

Tropical rain forest ecosystem

Surveys were conducted in Kerala (Kasargod and Mallapuram districts), Manipur (Senapati, Tamelong and Ukhrul districts), Mizoram, Nagaland and Sikkim.

Himalayan ecosystem

Exploration of Uttar Pradesh (Dehra Dun, Almora, Pithoragarh and Tehri Garhwal districts), Himachal Pradesh (Shimla and Chirgaon districts) and Sikkim, were undertaken.

Desert ecosystem

Surveys in Gujarat (Ahmedabad, Banskantha, Kheda, Mehsana, Sabarkantha and Surendranagar districts) and Rajasthan (Pali, Sirohi and Udaipur districts) were conducted.

Estuarine ecosystem

Exploration of Godavari Estuary (Orissa) and Sunderbans (West Bengal) was undertaken.

Freshwater ecosystem

Kolleru Lake (Andhra Pradesh) and Loktak Lake (Manipur) were surveyed.

Marine ecosystem

Parts of Andaman and Nicobar Islands (Great Nicobar,

North Andaman, South Andaman, Non Cowry and North Reef Barren Islands) and Gujarat coast were surveyed.

Conservation Area Survey

Faunistic surveys were also conducted in conservation areas covering Great Nicobar Biosphere Reserve, Nanda Devi Biosphere Reserve, Govind Pashu Vihar, Eravikulam National Park and Melghat Tiger conservation area.



Fig.11 *Achatina fulica*-a species of commercial importance

District-wise Survey

Under the districtwise survey programme, explorations were carried out in Bihar (Aurangabad, Rohtas, Deoghar, Godda and Rajnandangaon districts), Maharashtra (Raigad, Khed, Shivapur and Pimpri districts), Madhya Pradesh (Chattarpur and Tikamgarh districts), Tamil Nadu (Chidambarnar, Tirunelveli, Coimbatore and Nilgiri districts) and Uttar Pradesh (Azamgarh, Balia, Faizabad, Ghazipur, Mau, Allahabad, Jaunpur, Pratapgarh and Sultanpur districts).

Status Survey of Endangered Species

The status of Satyr and Western Tragopan was studied in the high altitude areas (Chirgaon district) of Himachal Pradesh by the Northern Regional Station, Dehradun and High Altitude Zoology Field Station, Solan. A report has been submitted.

A preliminary report on 'Status Survey of Chinkara and Desert Cat in Rajasthan' has been prepared. The data collected after survey of six districts in Rajasthan is being analysed.

Faunistic Studies

State Fauna

- **Fauna of Meghalaya:** Material on various groups of animals available in the survey was worked out. Studies

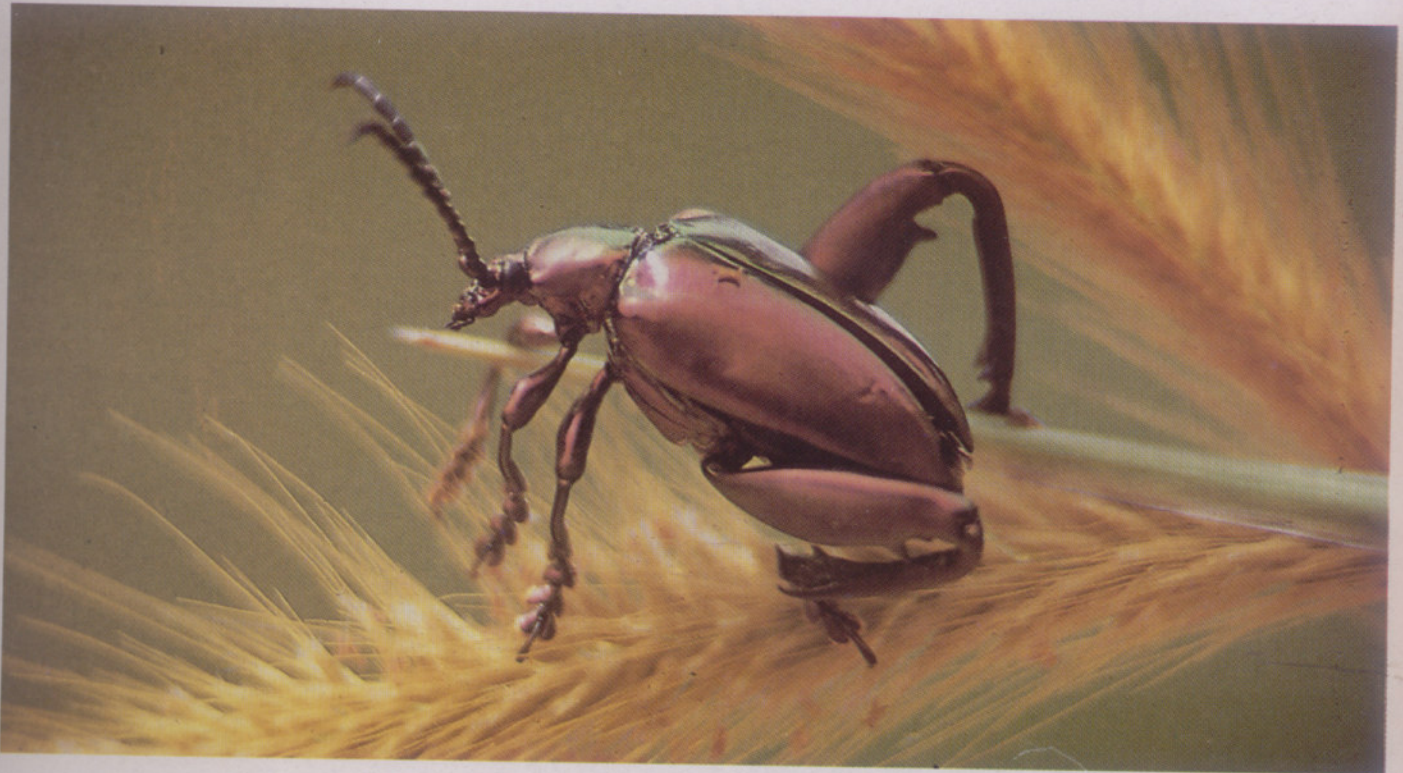


Fig.12 An insect pest of crops

on Crustacea (Copepoda), Insecta (Orthoptera, Hemiptera and Hymenoptera) and Mammalia were worked out. A list of Cestode and Nematode parasitic on vertebrates of Meghalaya was also prepared.

Fauna of Tripura: Material on Bryozoa, Annelida (Oligochaeta), Oribatid mites, Ixodid ticks, Crustacea, Insecta (Orthoptera, Isoptera, Thysanoptera, Hemiptera, Coleoptera) were completed.

Fauna of Manipur: Studies were conducted on



Fig.13 Female Hog Deer

Mollusca, Oribatid mites, Insecta (Isoptera and Lepidoptera), and Pisces. The result of this study would be incorporated in the State Fauna Series from the area to be brought out by the ZSI in 1995-96.

- **Fauna of Rajasthan:** Studies were made on the Nematelminthes infesting various crops in Rajasthan.
- **Fauna of Sikkim:** Studies are in progress on Bryozoa, Annelida, Oribatid mites, Ixodid ticks, Insecta (Plecoptera and Isoptera).
- **Fauna of Maharashtra:** Material on Insecta (Diptera), Amphibia and Reptilia was studied.
- **Fauna of Himachal Pradesh:** Earthworms comprising 41 species, including two species reported of the first time from India were studied.
- **Fauna of Arunachal Pradesh:** Plecoptera (Insecta) material available in the Department was studied.
- **Fauna of Tamil Nadu:** Studies were conducted on Crustacea (Cladocera), Insecta (Hemiptera and Diptera), Mollusca and Reptilia.
- **Fauna of Madhya Pradesh:** As a result of taxonomic studies on the fauna of the area, Mollusca, Crustacea,



Fig.14 One horned Rhinoceros-a protected species

Insecta (Odonata and Lepidoptera), Arachnida (Aranese and Acarina) and freshwater Pisces were worked out.

- **Fauna of Gujarat:** Studies were conducted on Mollusca, Sipunculata, Annelida (Oligochaeta), Crustacea, Insecta (Orthoptera, Isoptera), Acarina (Plant mites), freshwater, estuarine and marine Pisces and Amphibia from inland and coastal areas of the State.
- **Fauna of Uttar Pradesh:** Myriopoda, Insecta (Hymenoptera) and Pisces were identified and ecologically studied.

Fauna of Conservation Areas (Biosphere Reserves, National Parks and Tiger Reserves)

Studies on the Insecta (Coleoptera) of Great Nicobar Biosphere Reserve are in progress at the Andaman and Nicobar Regional Station, Port Blair.

Identification of Insecta (Hymenoptera and Lepidoptera) from Eravikulam National Park was completed by the Western Regional Station at Kozhikode.

Surveys of Balamiki Tiger Reserve, Agasthyamalai Tiger Reserve and Govind Pashu Vihar areas were undertaken and the faunal inventory of these areas were prepared.

Studies on the fauna of Nanda Devi Biosphere Reserve were completed.

On the occasion of the International Symposium on Tiger held in February 1993 at Delhi to commemorate 20 years of Project Tiger in India, ZSI brought out two booklets viz. "Fauna of Tiger Reserves - An Overview" and "Butterflies and Moths in Indian Tiger Reserves."

Fauna of Wetlands

Earthworms from Sukhna Lake, Chandigarh, were worked

out at High Altitude Zoology field Station, Solan. Limnological and faunistic investigations of the freshwater ecosystem of Lake Kolleru (Andhra Pradesh) and Kabar Lake (Bihar) were carried out. Studies on Rotifera, aquatic Hemiptera (Insecta) and Cladocera and Ostracoda (Crustacea) of Ujini Lake are in progress.

Limnological investigations and faunal studies on Loktak Lake, Manipur, were undertaken and zooplanktons were enumerated using total count methods for Crustacea. Major zooplankton groups include Rotifera and Crustacea (Copepoda, Cladocera and Ostracoda). In addition, 35 species of phytoplankton and 75 species of algal groups were identified.

Faunal inventory of Yamuna and Damodar rivers was prepared.

- **Fauna of Coastal and Marine Ecosystem:** Pisces from coral reefs of Rut Island and Bay Island, South Andaman and from Great Nicobar were studied.

Marine Mollusca and fishes from Gujarat coast were also worked out.

- **Fauna of Tropical Rain Forest Ecosystem:** Rotifera, Crustacea (Cladocera), Pisces, mammals from Manipur, Meghalaya, Mizoram, Nagaland and Tripura were studied.

Studies on the Hymenoptera of Mallapuram district (Kerala) are in progress.

Ecological Studies

In order to study the ecological succession at the newly emerged Naychar Island, Sunderban Delta, West Bengal, five surveys were conducted during pre, proper and post monsoon period. Some interesting observations have been recorded on the population fluctuations of Crustacea (Isopoda), Insecta (Collembola, Coleoptera, Diptera, Hymenoptera and Acarina).

Development of National Zoological Collections

The National Zoological Collections were further enriched by the addition of 50,637 identified specimens pertaining to 2,522 species. These include 97 examples of 20 species described as new to science by the staff of the Survey and 2 species (2 examples) are new addition to the National Zoological Collection.

Identification and Advisory Services

Zoological Survey of India continued to render identifi-



Fig.15 Mangrove forests in Andamans

cation and advisory services to various research and teaching institutes in India and abroad, different Central and State Government Departments and individuals. During the year, 825 zoological specimens pertaining to 160 species were identified. In addition, 226 enquiries of scientific and technical nature requiring information and advice on various zoological and allied problems were also attended to.

Other Activities

- Director, ZSI led a team for ecological study of the proposed hydel power project of North Eastern Electric Power Corporation (NEEPCO), Kameng District, Arunachal Pradesh. A detailed analytical report relating to environmental impact assessment on the fauna of Tehri Dam Hydro Complex, U.P. was completed by the Northern Regional Station, Dehradun.
- An Environmental Impact Assessment (EIA) clearance report on fauna was prepared by the Western Regional Station, Pune, for the Irrigation Department.
- A 'five weeks' basic course on 'Environmental Impact Assessment' was organized by ZSI at Calcutta under the auspices of the Ministry of Environment and

Forests.

- Director and other senior officers of the ZSI actively participated in a workshop on 'Bio-diversity in Wetland Ecosystem' organized by the British Council in Calcutta during the year.
- An inhouse debate on 'Environmental conservation - a luxury or reality' was organised during the celebration of 'World Environment Day' by the ZSI.
- The Director, ZSI, led the Government delegation to the 5th meeting of the contracting parties of Ramsar Convention 'For Conservation of Wetlands' held at Kushiro, Japan from 9-16 June, 1993. India has been elected as a member of the International Steering Committee on Wetlands for the next three years.
- On the occasion of the foundation day of ZSI, an illustrated lecture on "Contributions of Dr. T.N. Annandale towards Biodiversity Conservation in India" was organized at Calcutta on 2nd July, 1993.
- Four parts of the State Fauna of Orissa, published earlier, were all released formally at Bhubaneswar, Orissa, by the Hon'ble Minister of State, Forest and Environment Department, Govt. of Orissa on the 5th

August, 1993.

- A fortnight long programme on wildlife conservation was organized on the occasion of 'Wildlife Week' during October 1993 at Calcutta.
- Hindi day was observed at the auditorium of Zoological Survey of India, Calcutta, on 18-11-1993, during which a debate was organized both for Hindi and non-Hindi speaking employees of the ZSI, and prizes and certificates were distributed to successful candidates.
- ZSI participated in the Exhibition on Environment and Forests during the International Trade Fair held at Pragati Maidan, New Delhi in November, 1993.
- The ENVIS (Environmental Information System) Centre on Animal Ecology set up in the Headquarters (Calcutta) in March 1993 has installed the necessary hardware, and developed application software for storage, retrieval and dissemination of data. The first ENVIS Newsletter was published in October, 1993.

Publications

- Occ. Paper No. 145. Ichthyofauna of Konkan region of Maharashtra (India).
- Occ. Paper No. 147. Chromosomes and Phylogeny of Coleoptera.
- Occ. Paper No. 148. Catalogue of the protozoans occurring in Reptiles from India.
- Bibliography of Indian Zoology, Vol. 27.
- Bibliography of Indian Zoology, Vol. 26.
- Occ. Paper No. 131. On the biogeographical regions of India in relation to studies in the endemism of Acrididae fauna of India.
- Fauna of India: Cobitidae, Part 2.
- State Fauna Series - 1 : Fauna of Orissa, Part 3.
- State Fauna Series 3: Fauna of West Bengal, Part 12 (I).
- State Fauna Series 1: Fauna of Orissa, Part 4.
- Fauna of India: Aphidoidea, Part 6, Sub-family: Greenideinae.
- Occ. Paper No. 154. Chaetotaxy, Phylogeny and Biogeography of Paronellianae (Collembola: Entomobryidae).
- Occ. Paper No. 155, Littoral Meiofauna of Little Andaman.



Fig.16 Habitat of Andaman Teal-an endangered species

- Records Zoological Survey of India. Vol. 91, Part 2.

Forest Survey of India

The Forest Survey of India with its headquarter at Dehradun and four zonal offices located at Bangalore, Calcutta, Nagpur and Shimla has been set up with the following revised objectives:

- To assess the extent of forest cover and monitor on a two year cycle the broad changes in forest vegetation cover of the country by using multi satellite data on 1:2,50,000 scale.
- To prepare thematic maps through use of remote sensing data with maximum essential ground truth verification on a ten year cycle (most ground truth verification would be done by respective States).
- To collect, store and retrieve necessary forestry and forestry related data for national and state level planning and to create a computer based National Basic Forest Inventory System (NBFIS).
- To design methodologies relating to forest surveys and subsequent updating. This would include methodologies for—
- Vegetation mapping including thematic maps through the use of satellite imageries/aerial photographs.
- Ground truth verification; and
- Ground stock and volume assessment.
- To undertake forest inventory work in selected areas.
- To impart training in application of remote sensing techniques etc. in modern forest survey techniques to

foresters at various levels of responsibility in the States/ Union Territories of the Government of India.

- To keep abreast of the achievements in remote sensing technology and also build up a strong research and development base in remote sensing in the field of forestry alongwith development of new algorithms and software for both image processing and general applications.
- To support and oversee techniques/inventory work undertaken by State/UT Forest Departments.

The activities of the FSI during the year were as follows:

Thematic Mapping

Forest Survey of India is preparing maps on 1:50,000 scale by interpreting the details on aerial photographs and these maps are termed as Thematic Maps. Black and White aerial photographs on 1:50,000 scale procured from Survey of India are interpreted using stereoscope for various forest types and species composition and land-uses. The crown density of the forest cover is also determined.

These maps are prepared for the entire country on 10 year

cycle. The first cycle of mapping began in 1986-87 and is to end in 1995-96. Photographs of the entire country are not available for security reasons. Thus the yearly target works out to 260 sheets for thematic map. This corresponds to 5,000 aerial photographs. Since the beginning of thematic mapping cycle in 1986, the FSI has covered 1682 topographic sheets by November, 1992 which corresponds to an area of about 24,26,400 sq. kms. The coverage includes the States of Madhya Pradesh, Orissa, Bihar, Kerala, Rajasthan, Manipur, Nagaland, Tamil Nadu, Karnataka, West Bengal, Maharashtra, Gujarat, Himachal Pradesh, Meghalaya, Punjab, Delhi, Uttar Pradesh, Assam and Arunachal Pradesh.

Vegetation Mapping

Forest Survey of India is using remote sensing technology for obtaining information about the forest cover of the country. The first attempt to assess the forest cover of the country by visual interpretation of satellite imageries was made in 1984-85 when a National Vegetation Map on 1:1 million scale of the country was prepared. This exercise put the forest cover of the country at 64.2 million ha. which works out to 19.52% of geographical area as against the



Fig.17 Shola forests of Western Ghats

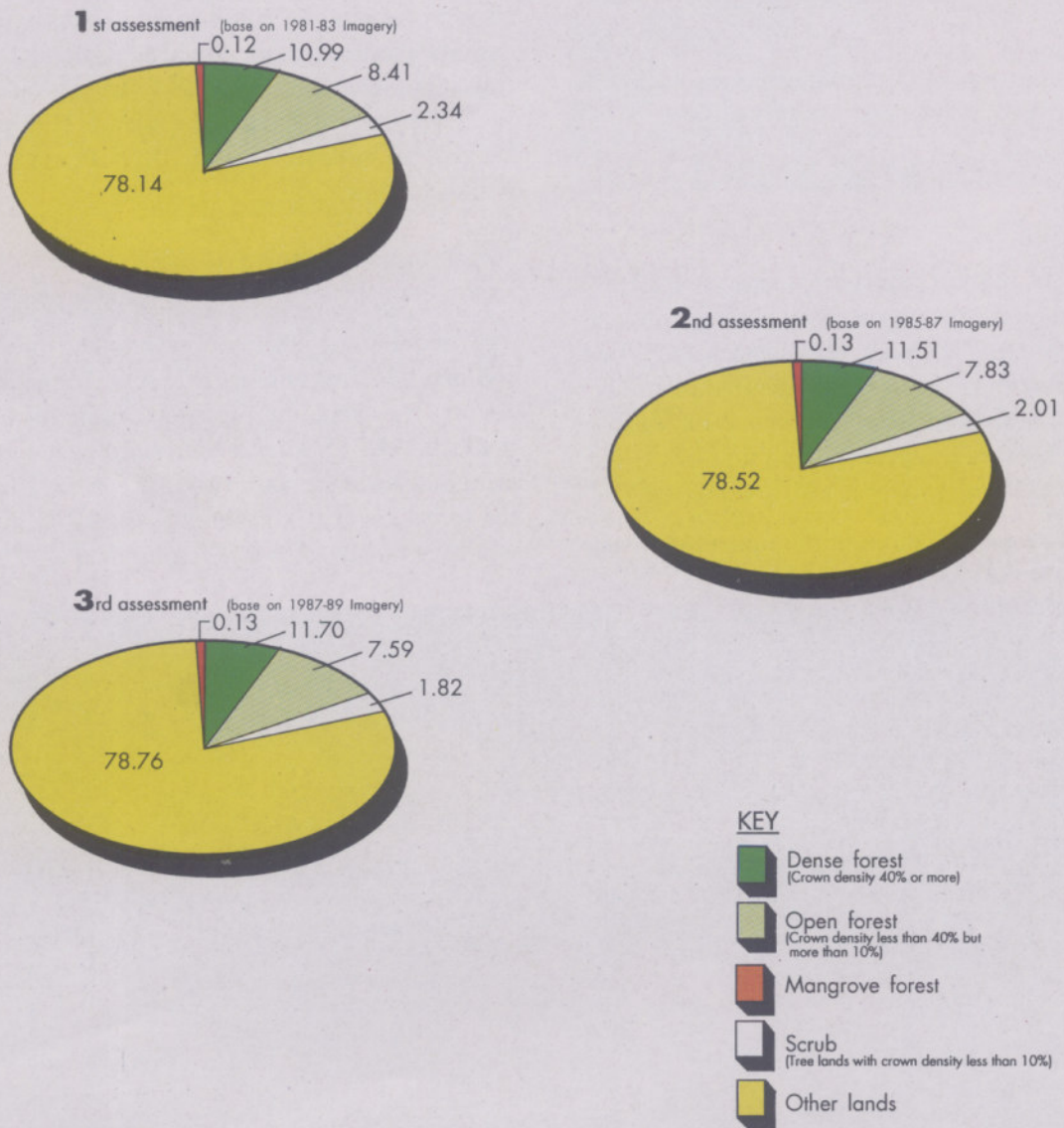


Fig. 18 FOREST COVER SITUATION IN INDIA
(in % age)

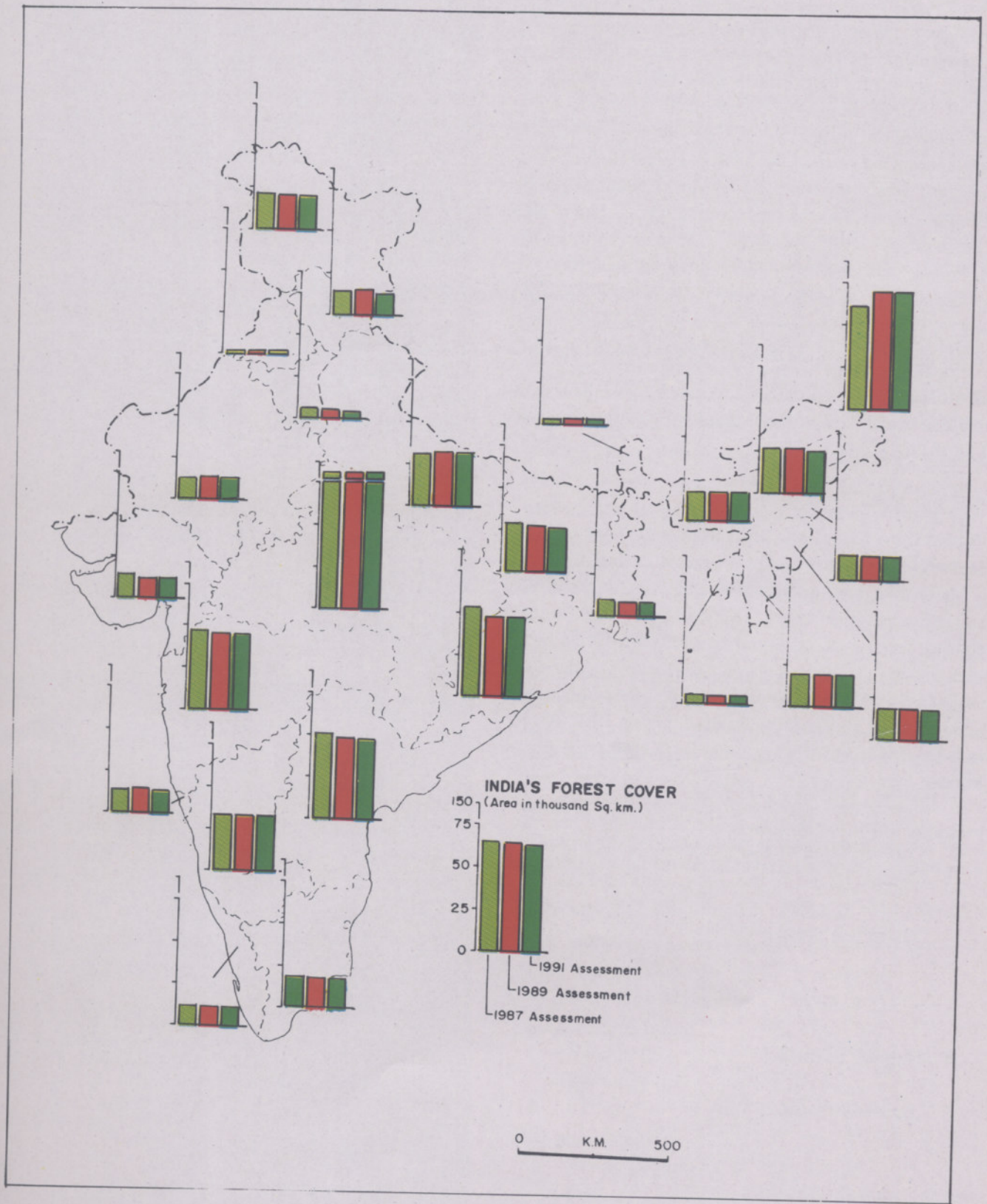


Fig. 19 COMPARATIVE SITUATION OF INDIA'S FOREST COVER

recorded forest areas of 22.8%.

The FSI has been assigned the task of preparing forest vegetation maps on 1:250,000 scale for the entire country on a 2 years cycle. This is with a view to know the exact situation of the forest cover in the country and also to monitor changes that have taken place. The third cycle assessment of the period covered has been completed and brought out in the form of the State of Forest Report 1991. According to this, the forest cover of the country is 63.92 million hectares, of 19.44% of the total geographical area of the country. The new feature of this report is the districtwise estimates of the forest cover of the country. It has been found that on account of conservation measures taken up by the Government, there has been an annual increase of 28,000 hectare in the forest cover of the country.

The country as a whole is covered by 363 sheets on 1:250,000 scale. The yearly target for 2 year cycle works out to 181/182 sheets.

Electronic Data Processing

Forest Survey of India has an independent unit for processing of inventory data with the objective of providing qualitative and quantitative information about the forest resources (growing stock) within precision limits in preparing reports on potentiality and other forest based investigation in order to serve the data needs of development planning. While data processing covering an area of 24,282 sq.kms. has been completed during 1992-93, the unit is targeted to cover an area of 24,000 sq.kms. during the year.

Inventory of Forest Resources

One of the revised objectives of Forest Survey of India is

to undertake work relating to the preparation of forest inventory. FSI has prepared forest inventory for entire North-Eastern region on the request of North-East Council Secretariat. After the re-organization of FSI in 1986, its field inventory work was largely confined to North-Eastern Hill States. The inventory in Nagaland, Meghalaya, Mizoram, Manipur, Assam, Arunachal Pradesh and Tripura have been completed.

Training of Personnel

In order to impart training to forest technicians in modern techniques of forest surveys, a training unit has been created. The various specialised activities in which training is given are: application of remote sensing techniques in forest inventory management, ground truth verification of vegetation maps, etc. During the year, 50 such personnel have been trained and 450 personnel have been targeted in the VIII Five Year Plan period.

Digital Image Processing

The vegetation maps prepared by visual interpretation are likely to be influenced by human bias. To eliminate the element of subjectivity in interpretation of satellite data, FSI decided to switch over to computer aided interpretation. For this purpose, FSI has acquired a computer system configured around VAX-11/780. The system was installed at Dehradun and the staff recruited for National Forest Data Management Centre was trained in digital interpretation of satellite data during 1989-90 and 1990-91.

APC based Geographical Information System (GIS) was installed in March 1990 and staff trained on it. A GIS project sponsored by the National Wasteland Development Board has been completed.

3

CONSERVATION OF NATURAL RESOURCES INCLUDING FORESTRY AND WILDLIFE

Conservation Strategy and Policy Statement on *Environment and Development*

The National Conservation Strategy and Policy Statement on Environment and Development has been prepared *and adopted by the Government of India after extensive* consultations at various levels of the Central and State Governments, Universities, academic institutions, non-governmental organizations and informed individuals.

This document, along with the National Forest Policy, 1988 and the Policy Statement for Abatement of Pollution, 1992, is a major policy instrument of the Government for dealing with various facets of environment and development in a comprehensive manner. Besides providing a perspective, this will help in devising the norms and regulations for integration of environmental considerations in the development activities of the various sectors, thus paying the way for achieving sustainable development.

To ensure that all the concerned Ministries/Departments take appropriate action, especially for re-orienting their policies and programmes in conformity with the strategy, the action points pertaining to particular Ministries/Departments have been communicated to them and a series of discussions have also been held.

Biosphere Reserves

The Biosphere Reserve Programme is intended to conserve representative ecosystems. It is aimed at providing in-situ conservation of plants, animals and micro-organisms and emphasizes the need for the conservation of entire ecosystems of suitable size, to ensure self-perpetuation and unhindered evolution of the living resources.

Seven Biosphere Reserves have been set up so far as under:

Biogeographic Region	Name of the Biosphere Reserve and States
Himalayas:	
West Himalayas	Nanda Devi (U.P.)
North-eastern India:	
Assam Hills	Nokrek (Meghalaya)
Brahmaputra Valley	Manas (Assam)
Gangetic Plains:	
Lower Gangetic Plain	Sunderbans (West Bengal)



Fig.20 Aquatic vegetation in Dal Lake, Kashmir

Coast:	
East Coast	Gulf of Mannar (Tamil Nadu)
Western Ghats:	Nilgiri (Karnataka, Kerala and Tamil Nadu)
Islands:	
Nicobar	Great Nicobar

The National Committee constituted last year to oversee the implementation and monitoring of the Biosphere Reserve Programme in place of Management Councils and Research Committees set up earlier for individual Biosphere Reserves, had its first meeting on 11th May, 1993. Based on the Committee's recommendations, Management Action Plans prepared by the concerned State Governments, have been sanctioned for Nilgiri, Gulf of Mannar, Sunderbans, Nokrek, Nanda Devi and Great Nicobar Biosphere Reserves for undertaking the following activities:

- Eco-restoration and Eco-development
- Development of Data base
- Education, Awareness and Training; and
- Management activities

A training programme was organised at the Indian Insti-

tute of Science, Bangalore from 5 to 9 November, 1993 for middle-level officers on various aspects of conservation of Biosphere Reserves in the country.

Wetlands, Mangroves and Coral Reefs

Wetlands

Wetlands are transitional areas between aquatic and terrestrial ecosystems where the water table is usually at or near the surface or the land is covered by shallow water. They include marshes, floodplains, bogs, peatlands, shallow ponds, littoral zones of large water bodies, tidal marshes etc. In India wetlands are distributed in different geographical regions. They provide suitable habitats for fish and act as winter resorts for a variety of birds besides being very good sources of food, fodder and other important biological products. They also harbour a vast array of plants and animals of great economic, bio-aesthetic and scientific importance. Wetlands also play a significant role in flood control, treatment of waste water, reduction of sediment load, production of organic matter, pollution abatement etc.

Realising the importance of wetlands, a National Committee on Wetlands, Mangroves and Coral Reefs has been

constituted to advise the Government on policy guidelines for implementing programmes of conservation management and research on wetlands. The broad components of a management action plan of a wetland include survey and demarcation, notification, wildlife conservation, development of avifauna and fisheries, weed control, pollution abatement, water quality management, protection, environmental awareness, etc.

State level Steering Committees have been constituted for formulation and implementation of management action plans. So far 21 wetlands have been identified for intensive conservation and management purposes. During the year following five wetlands have been included in the list of wetlands of national importance.

- Tse Morari (J & K)
- Pongdam lake (Himachal Pradesh)
- Chandratal lake (Himachal Pradesh)
- Ropar (Punjab)
- East Calcutta Wetland (West Bengal)

Management action plans for 11 wetlands have been sanctioned so far.

India is a signatory to Convention on Wetlands of International importance especially as Waterfowl Habitat, generally referred to as Ramsar Convention (1971). The following six wetlands have been designated under this Convention:

- Chilka (Orissa)
- Keoladeo Ghana National Park (Rajasthan)
- Sambhar (Rajasthan)
- Wular (J & K)
- Loktak (Manipur)
- Harike (Punjab)

India participated and played a leading role in the 5th meeting of the Contracting Parties of the Ramsar Convention held in Kushiro, Japan in June, 1993. During this conference, India was elected as a member of the Standing Committee from Asia.

Mangroves

Mangroves are salt tolerant forest ecosystems, found mainly in the tropical and sub-tropical intertidal regions of



Fig.21 *Rhizophora* plantation-commonly found mangrove species.

the world. They are reservoirs of a large number of plant and animal species associated together over a long evolutionary time and exhibiting remarkable capacity for salt tolerance. They stabilise the shoreline and act as a bulwark against encroachments by the sea. The rich biological diversity provides sources of livelihood for the people around. Some mangroves are sources of flourishing apiary industries.

The Indian Pacific region is known for its luxuriant mangroves. The total area of mangroves in India is estimated to be 6,740 sq. kms. which is about 7% of the world's mangroves. Out of this, Sunderbans of West Bengal and Andaman and Nicobar Islands constitute about 80% of the mangroves in India. The remaining are scattered in the States of Andhra Pradesh, Tamil Nadu, Orissa, Maharashtra, Gujarat, Goa and Karnataka.

A National Committee on Wetlands, Mangroves and Coral Reefs has been constituted to advise the Government on appropriate policies and action programmes for conservation and management of mangroves. 15 mangrove areas have been identified in the country for intensive conservation and management purposes. Management action plans for all the areas have been drawn up. The main components of the management action plan include survey and demarcation, natural regeneration, afforestation, nursery development, protection, education and awareness, etc. At the State government level, Steering Committees have been constituted under the chairmanship of the Chief Secretary of the concerned State to formulate and implement management action plans for the identified areas.

Management action plans for all the fifteen mangrove areas have been sanctioned out of which the following were sanctioned during the year:

- Goa
- Achra/Ratnagiri (Maharashtra)
- Sunderbans (West Bengal)
- Coondapur (Karnataka)
- Andaman and Nicobar
- Point Calimere (Tamil Nadu)

Coral and Coral Reefs

The term 'Coral' refers to a particular class of animal belonging to phylum Cnidaria (Coelenterata), secreting a calcareous skeleton. The adult form is that of a polyp permanently attached inside a limestone cup called a corallite which the individual secretes and expands in height as it grows. These corals form a ridge of limestone, the upper surface of which lies near the level of the sea. There are three types of coral reefs- (i) Fringing reef; (ii) Barrier reef; and (iii) Atoll.



Fig.22 Swamp Deer herd at Kaziranga National Park

The major reef formations in India are restricted to Gulf of Mannar, Palk Bay, Gulf of Kutch, Andaman & Nicobar and Lakshadweep Islands. With the exception of Lakshadweep reefs which are atolls, others are all of fringing type. Besides these, patchy coral growth is known from the inter-tidal areas of the Central West Coast.

Taking into consideration the importance of coral reefs and the factors responsible for their deterioration, following areas in the country have been identified for conservation and management:

- Lakshadweep
- Andaman & Nicobar

- Gulf of Mannar
- Gulf of Kutch

The National Committee constituted for conservation and management of wetlands and mangroves, also oversees the formulation and implementation of programmes of conservation, management and research on coral reefs. State level Steering Committees have also been constituted for the formulation and implementation of the management action plans for the identified areas and a management action plan for the coral reefs of Andaman and Nicobar has been prepared by the Andaman and Nicobar Administration recently.

Lake Conservation

The lakes constitute primarily the fresh water bodies which provide habitats and breeding grounds for a variety of birds, fishes and other aquatic life. It also serves as an important life support system in flood control, recharging of groundwater and regulation of hydrological regime. Due to pressure of various human activities, a number of lakes are shrinking or getting polluted and immediately require effective management interventions. Some of the major threats to the lakes are identified as encroachments, siltation, weed-infestation, discharge of domestic sewage, industrial effluents and surface run-off carrying pesticides and fertilizers from agricultural field.

To check these threats to the lakes, particularly in urban areas, a National Lake Conservation Plan (NLCP) has been prepared. The activities envisaged under NLCP include the following :-

- Formulation of perspective plans for conservation based on resources survey using remote sensing technology and Geographical Information System (GIS).
- R & D studies on floral and faunal biodiversity and related ecological aspects.
- Prevention of pollution from point and non-point resources.
- Catchment area treatment.
- Desilting and weed control.
- Other location specific activities such as an integrated development approaches including interface with human population.

Based on the recommendations of the National Committee on Wetlands, Mangroves and Coral Reefs, 21 lakes

have been identified for intensive conservation and management purposes.

Bio-diversity Conservation

The scheme on biodiversity conservation was initiated during 1991-92 to ensure proper coordination among various agencies concerned with issues relating to conservation of biological diversity, and to review, monitor, and evolve adequate policy instruments for the same.

Subsequent to the signing of the Convention on Biological Diversity by India during the UNCED Earth Summit held at Rio de Janeiro, Brazil, in June, 1992, extensive consultations were organised at various levels to analyse the implications of the Convention. As a result, 50 action points were identified for implementation at the national, state and local levels. Nine Groups representing lead organisations and experts in specific areas of action were also identified for preparing detailed action programmes on the identified priority action points within a given time frame. Some of these reports have already been received and others are in the process of completion. These reports would be examined for formulating strategies for biodiversity conservation.

Since many of the action points emerging from the Convention are for implementation at the State and local levels, regional level consultations involving the concerned State Departments/agencies are being organised during January-February, 1994 through the Regional Offices of the Ministry.

The Government has recently accorded approval for ratifying the convention. Necessary action has been initiated to deposit the instrument of ratification to the United Nation by the Ministry of External Affairs. The convention, which has already been ratified by 37 countries, came into force on 29th December, 1993.

The first draft of Volume-I of the Status Report on Biodiversity Conservation has been received and is under examination for finalisation.

A project for compiling a monograph on tree species of India has also been sanctioned under this scheme.

An Indian delegation participated in the first meeting of the Inter-governmental Committee on the convention on Biological Diversity (ICCBD) held in October, 1993 in Geneva.

Ex-situ Conservation

Assistance to Botanic Gardens and Field Centres

The scheme was initiated during 1991-92, to augment the activities for conservation and propagation of plant

genetic resources in different regions of the country through a network of botanic gardens and field centres. Under this scheme, a one-time non-recurring financial assistance is provided to botanic gardens in different photogeographic regions of the country for strengthening their existing facilities for conservation and propagation of threatened and endangered endemic plant species of that region; and education and public awareness of endemic plant species.

An Expert Group, constituted for screening and examining the proposals received from various research institutes/universities/State Governments/UTs for strengthening the facilities of their existing botanic gardens, has identified certain criteria for consideration of these proposals. The Botanical Survey of India (BSI) has also identified a list of some of the most vulnerable or endangered flowering



Fig.23 Desert ecosystem

plants in different photogeographic regions of the country that need to be conserved and propagated on a priority basis.

During the year funds have been released for strengthening of three Botanic Gardens, in accordance with the criteria and the species as identified by the Expert Group and the BSI respectively.

Under this scheme, an initiative has been taken for networking and upgradation of botanic gardens in the country. An approach paper on this subject was prepared and discussed with experts and a group of experts has been identified for evaluating the botanic gardens to identify those which have the potential to be integrated into a national network. Action plans have been invited from six upswing gardens in different regions of the country.

Central Zoo Authority

The Central Zoo Authority was established by the Ministry soon after the amendment of the Wildlife (Protection)

Act, 1991 to support, oversee, monitor and coordinate the management of the Zoos in the country. The main functions of the Authority are :

- to specify the minimum standards for the housing, upkeep and veterinary care of animals kept in zoos;
- to evaluate and assess the functioning of zoos with respect to the prescribed standards and norms and recognize or derecognize zoos on the basis of this evaluation;
- to coordinate the captive breeding programmes of rare and endangered species, including acquisition, exchange and loan of animals, and maintaining of stud books and such other measures as are necessary for maintaining appropriate genetic diversity.
- to organise training of zoos personnel and coordinate research on various aspects of captive breeding and animal behaviour;
- to coordinate the development of suitable educational programmes to disseminate knowledge and inculcate empathy for wild animals amongst the general public.

The Central Zoo Authority has finalised and notified the

Rules for recognition of the zoos which, inter alia, stipulate the standards for upkeep and maintenance and veterinary care of the zoo animals. Many zoos in the country have already been evaluated and efforts are being made to upgrade their management. The Authority gives financial assistance to selected zoos for this purpose.

Forest Conservation

Implementation of Forest (Conservation) Act, 1980

The Forest (Conservation) Act, 1980 has been enacted with a view to check indiscriminate diversion of forest land for non-forest purposes. Under this Act, prior approval of the Central Government is required before any forest land is diverted for non-forest purposes. In 1988, the Act was amended to make the existing provisions more stringent.

The State Governments/UTs are required to submit formal proposals for diversion of forest land for non-forest purposes in the prescribed proforma alongwith details such as flora, fauna, map of the area, compensatory afforestation proposed etc. In an effort to further decentralise and streamline the examination of proposals received under this Act, the Forest (Conservation) Rules, 1981 have been amended.



Fig.24 An adult male Nilgai in Sariska Tiger Reserve, Rajasthan

The Regional Chief Conservator of Forests have been delegated with powers to decide proposals involving forest land upto 5 hectares except those pertaining to regularisation of encroachment and mining. Proposals involving forest land between 5-20 ha. are to be processed by the Regional Chief Conservator in consultation with State Advisory Group consisting of representatives of the concerned State Governments. Proposals involving more than 20 hectares of forest land diversion are required to be placed before the Advisory Committee constituted under the Act for examination.

The present status of 5715 proposals received under the Forest (Conservation) Act, 1980 till 30.11.93 is as follows:

Approved	2817
Approved in principle	398
Rejected on merit	749
Rejected for non-furnishing of information/pending with State Governments	1409
Withdrawn by State/UT Govts.	116
Pending with Central Govt.	226

Forest Legislation

Indian Forest Act, 1927 is the principal legislation which regulates the management of forests by the States. In some states the Act is applicable as it is while some of the States have enacted their own Acts which in essence are the adopted versions of the Indian Forest Act, 1927. Since its adoption, forestry has undergone many conceptual changes

leading to the new National Forest Policy in 1988. Consequently a need has been felt for a revised and more comprehensive legislation which would take into account the new National Forest Policy and the emerging imperatives of conservation of forests and wildlife and preservation of the nation's biodiversity. The Indian Forest Act is, therefore, being amended and a draft of the revised legislation has been circulated among the State Governments for their views before taking up the process of finalising the legislation.

Regional Offices for Monitoring of Conditions/Safeguards

Six Regional Offices have been established at Bangalore, Bhopal, Bhubaneswar, Lucknow, Shillong and Chandigarh to monitor the implementation of the conditions imposed while conveying approval for diversion of forest land for non-forest uses and also to evaluate on-going forest development projects and schemes.

Regional Offices have been delegated powers to process proposals for diversion of forest land for non-forest uses upto 5 ha. and examination of such proposals to the extent of 20 ha. as amended in October, 1992.

Region-wise targets for monitoring of cases under Forest (Conservation) Act, 1980 and Environment Protection Act, 1986 and their achievements during the year are given in Table-1

Participatory Forest Management

The National Forest Policy, 1988 envisages people's involvement in management of forests for achieving the

Table-1

Regional Office	FCA		EPA		Site Inspections	No. of cases approved/processed under FCA (Upto 20 h)
	Target 1993-94	Achievement upto Sept., 1993	Target 1993-94	Achievement upto Sept., 1993		
1	2	3	4	5	6	7
Bangalore	175	76	80	87	22	25
Bhopal	175	32	80	14	-	59
Bhubaneswar	175	101	80	75	10	1
Lucknow	175	58	80	43	3	65
Shillong	120	45	45	20	2	-
Chandigarh	80	44	35	19	-	24
Total :	900	356	400	258	37	174

desired objectives of forest conservation, extension of tree cover and meeting the requirement of people. In this context the Government of India issued guidelines to the State Governments highlighting the need and the procedure to be adopted for the involvement of village communities and voluntary organisation in the protection and development of degraded forests on the basis of sharing of forest produce. As a follow up of these guidelines, fourteen States have issued appropriate orders enabling community participation in forest management on usufruct sharing basis. These States are West Bengal, Orissa, Bihar, Madhya Pradesh, Rajasthan, Gujarat, Maharashtra, Tripura, Himachal Pradesh, Haryana, Jammu & Kashmir, Andhra Pradesh, Karnataka and Tamil Nadu. Other States are being pursued to issue such orders.

Association of scheduled tribes and rural poor in regeneration of degraded forests on usufruct sharing basis

This scheme has been launched during 1992-93 to associate Scheduled Tribes and rural poor in regeneration of degraded forests with the aim of improving biomass re-



Fig.25 A tribal woman of Lahul-Spiti

source base in degraded forests. This will provide gainful employment and the resource so generated will be shared by the Scheduled Tribes and other rural poor, thus providing a sustainable economic base to these people.

The scheme is being implemented through the State

Forest Departments on the basis of projects formulated for the purpose.

National Forestry Action Programme (NFAP)

Government of India has decided to prepare a National Forestry Action Plan (NFAP) in consonance with its National Forest Policy, 1988. The primary objective of India's Forest Policy is sustainable management of the forests and forest lands to meet the environmental, socio-economic and cultural needs of the present and the future generations. Since the enunciation of the National Forest Policy in 1988, India has initiated various programmes which are aimed at achieving this objective. These programmes are broadly in conformity with the internationally agreed Forestry Principles, adopted at the Earth Summit at Rio in 1992, which set standards for management of all types of forests. However, there is need for further development of integrated planning for forest development at national level. There is also need for development of the country's institutional capacities and for involving greater participation by local communities. The National Forestry Action Programme is expected to comprehensively address these issues thereby facilitating fuller implementation of the National Forest Policy as also the Forest Principles. The exercise of formulating the NFAP, being undertaken with technical co-operation of FAO, will result in :

- i) A forestry sector review paper covering critical issues affecting forestry development in the country.
- ii) A perspective action programme for the long and mid term development of forestry sector at the national and state level, together with a short term priority action programme for the next five years.
- iii) Integration of approaches based on local initiatives, including projects supported by external donors.

While the focus of the NFAP would be on the increase in the sustainable management of forests and tree resources contributing to bio-diversity and conservational and climatic needs, this will be harmonised with national development goals.

Apart from the Government of India's contribution of Rs. 65 lakhs to the scheme, US \$ 7,16,000 are being provided as UNDP assistance. Project document has been signed on 21.6.1993 and the formulation of NFAP has become operational from 1-7-1993. The duration of the project is two years.



Fig.26 A bee-hive, natural source of honey

Forestry Welfare

The Ministry organised the Second All India Forest Sports Meet at Dehradun during November, 1993. The Meet was attended by about 2000 participants from various State Forest Departments, autonomous institutes and other offices under the Ministry. This Meet and the State Level Forest Sports Meets that preceded it, have, in addition to strengthen fraternity among foresters, given added emphasis on the need for maintaining physical fitness, a vital element for a disciplined service.

The Ministry is alive to the need for involving women in forestry and related activities. This is because of the growing realisation that women, who suffer the most from the adverse effects of forest degradation, can play a more potentially active and effective role in implementation of many of the forestry programmes. Involvement of women is sought to be enhanced through higher recruitment in executive jobs and forestry extension works, through better representation of women in decision making and implementing bodies like Forest Protection Committees, Forest Development Committees etc, and through more active participation of Mahila Mandals and other organisations of women in various plantation programmes including nursery activities.

Modern Forest Fire Control Methods

Rich natural forests as well as man made plantations in India are being severally affect by biotic interference, and Forest Fire is one of the major factors responsible for destruction/degradation of the forest areas. As per the State of Forest Report, total forest/tree cover of India is 6,39,182 sq. km. out of which 3,85,008 sq. km. is under dense forest

cover and 2,40,930 sq. km. is open forests. Another 59,641 sq. km. of the area has been described as scrub area.

Realising the importance of Forest Fire Control, the Government has decided to implement this scheme with following objectives :

- To contral forest fire with a view to protect and conserve forest.
- To improve productivity of forests by reducing the incidents and extent of forest fires.
- To devise test and demonstrate principles and techniques of prevention, detection and supersession of forest fires with the help of watch towers, wireless sets, hand tools etc., by setting up an effective communication network and training in the use of hand tools.

This Centrally Sponsored Scheme provides assistance to selected States which have valuable forests prone to fires. The cost of non-recurring items and non approved recurring items are to be borne by the concerned State Governments.

During the year following-11 States were provided assistance under the scheme :

- Andhra Pradesh
- Bihar
- Gujarat
- Himachal Pradesh
- Karnataka
- Kerala
- Madhya Pradesh
- Maharashtra
- Orissa
- Uttar Pradesh
- Tamil Nadu

The major items included in this scheme are use of hand tools, wire less communication sets, watch towers, fire finders, fire resistant clothing and creation of fire lines. Main components of the scheme are :

- Detection
- Suppression and
- Research and Development

Wood Substitution

A Policy Advisory Group (PAG), constituted to advise the Govt. of India on the implementation of the wood substitute policy stipulated in the National Forest Policy, 1988, had made certain recommendations with regard to substitution of wood, which has resulted in the adoption of the following measures :

- Returnable plastic trays, card boards, corrugated fibre board boxes, polythene laminated jute boxes and eucalyptus and other short-rotation wood of farm forestry plantations are being promoted for packaging horticultural products in stead of the traditionally used conifers.
- Supply of wood to Railways is now restricted for bridges and curves only.
- Steel doors and windows are being encouraged in place of wooden doors & windows and excise duty on these items has been waived. Recommendations have also been made to the Finance Ministry to exempt plastic, steel and aluminium furniture from excise duty to encourage their use.
- Wood panels, plywood, lignocellulosic based particle boards, MDF, rice husk board, bamboo board etc, are

being encouraged and excise duty on such items has either been waived or substantially reduced.

- On the advice of the Ministry of Environment & Forests, the Ministry of Urban Development has effected a ban on the use of wood in the construction works undertaken by the CPWD. State Govts have also been directed to follow suit with respect to the State Public Works Department.

Wildlife Conservation

The Activities to implement the National Wildlife Action Plan were continued during the year. The Major activities are as follows :

- The network of protected areas now comprises 75 National Parks and 421 Wildlife Sanctuaries covering 140675.46 sq. kms. area. This network is spread over all the biogeographic zones of the country including Himalayan peninsular, marine, estuarine, riverine, mangrove and desert ecosystems.
- Efforts to build up professional managers for protected areas through training of professional cadre in all aspects of wildlife were continued at the Wildlife



Fig.27 Moth-an important pollinator



Fig.28 An elephant herd

Institute of India. The new campus of the Institute at Chandrabani (Dehra Dun) has already been opened and is awaiting formal inauguration. (For more details on the activities of the Wildlife Institute of India, please refer to Chapter 8.).

- A number of research projects have been taken in hand; some research projects have been completed and reports published.
- The State Governments were extended financial and technical support for development and improved management of National Parks, Sanctuaries, Tiger Reserves.
- Central Assistance to State Government continued under the Centrally Sponsored Scheme of Eco-development during the year. The Scheme was initiated in 1991-92 and aims at improving the quality of life of the people living in and around the protected areas. This is sought to be achieved by increasing employment opportunities, reducing living conditions of the people in and around protected areas in general. This will also help in reducing man-animal conflict and will lead to ecologically sustainable economic development of the

area and Zoological Gardens in the country.

- Effective measures were taken for control of illegal trade in wildlife and its products at national and international level.
- An international programme of augmentation of the dwindling population of the Western flock of Siberian Cranes is being continued in the Keoladeo Ghana National Park of Bharatpur and India participated actively in similar experiments in Siberia in Russia.

Enforcement of Wildlife (Protection) Act, 1972 and Amendment of the Act

The Wildlife (Protection) Act, 1972, and the provisions of the Convention on International Trade in Endangered Species (CITES) and Export and Import Policy of Indian continued to be enforced through the office of the Regional Deputy Directors of Wildlife Preservation located at Delhi, Bombay, Calcutta and Madras, with the help of State Wildlife Wings and the Customs Departments. Sub-Regional Offices of wildlife Preservation at Guwahati, Cochin and Pathankot have also been made functional. Several cases of poaching and illegal trade in wildlife products were detected.

Conservation Programme

Under the Centrally Sponsored Scheme, financial assistance for development of National Parks and Sanctuaries was provided to 35 National Parks and 135 Sanctuaries during the year. Assistance was provided at the rate of 100% on selected items of non-recurring expenditure both to National Parks and Sanctuaries, while 50% for selected items of recurring nature was also supported in National Parks.

Assistance was provided to the States for taking up programmes of Eco-development around National Parks and Sanctuaries in order to achieve ecologically sustainable economic development of these areas.

Project Elephant

The Project Elephant, launched in 1991-92, aims at ensuring long term survival of identified viable populations of elephants and tackling the problematic elephant populations causing serious depredation. A total amount of Rs. 636.13 lakhs has been released under this Centrally Sponsored Scheme since its inception. The project provides for restoring the lost and degraded habitats of elephants, mitigation of man-elephant conflict and establishment of data base on the migration and population dynamics of elephants. It also aims at improving the quality of life of people living around elephant habitats through sustainable development. A Steering Committee on the Project Elephant constituted in October, 1992 under the Chairmanship of the Minister of Environment and Forests keeps a watch on the implementation of this project and also provides suitable guidance from time to time.

Zoological Parks

National Zoological Park, New Delhi

The National Zoological Park encompassing 214 acres of land, presently displays 1198 animals comprising 54 species of mammals, 85 species of birds and 16 species of reptiles. On an average 16 to 17 lakh people visit the zoo annually.

The main thrust of the management of the zoo was on creation of awareness amongst the visitors regarding nature conservation. On-the-spot painting and essay competitions for school children were organised during the Wildlife Week in order to inculcate awareness and empathy towards wildlife in the formative years of life.

The zoo continued to contribute to the conservation of



Fig.29 *Panthera tigris*-our National Animal

rare and endangered species by successful captive breeding of brow anteloped deer, swamp deer, Himalayan blackbear, hippopotamus and white tiger. The zoo also attracted about 400 painted storks from nearby areas for nesting and breeding.

Padmaja Naidu Himalayan Zoological Park, Darjeeling

This Zoological Park in Darjeeling, an autonomous organisation of the State Government of West Bengal, houses and breeds a number of endangered and rare species of wild animals and birds of the Himalayan region. During the year the Park continued its activities including research on the behaviour and breeding biology of the fauna of the East Himalayan region and provided visitors an opportunity to learn about the high altitude fauna and flora.

Project Tiger

The Centrally Sponsored Scheme 'Project Tiger' was launched on 1st April, 1973 to achieve the following objectives :

- To ensure maintenance of a viable population of tigers in India for scientific, economic, aesthetic, cultural and ecological values.
- To preserve for all times, areas of such biological importance as a national heritage for the benefit, education and enjoyment of the people.

Presently, there are twenty one Tiger Reserves in thirteen States of the country covering an area of 30,497 sq. kms.

During 1993-94, an amount of Rs. 750 lakhs has been provided as Central assistance for development and maintenance of nineteen Tiger Reserves and establishment of two new Tiger Reserve areas. The State Governments

contribute 50% of the recurring cost of the scheme and all non-plan expenditure of the Tiger Reserves.

The following major activities were undertaken during the year :

- All India Tiger/leopard census was conducted in all States.
- To commemorate twenty years of Project Tiger, various activities like organising of visits to parks by local people, local seminars, awareness programmes etc. were undertaken in all Tiger Reserves with a view to disseminating the message of Project Tiger.
- Follow-up action on the Delhi Declaration of Tiger Conservation 1993, which is the outcome of the deliberations of the International Symposium on Tiger held at Delhi in February, 1993 has been initiated. The preparation of a tiger action plan and formation of the Global Tiger Forum has already been initiated and India has been elected as the Chairperson for the 1st meeting of the Global Tiger Forum proposed to be held shortly at New Delhi.
- During the year, two Tiger Reserves, namely Tadoba-Andheri (Maharashtra) and Bandhavgarh (Madhya

Pradesh) have been established.

- Participatory eco-development programmes have been initiated in all Project Tiger areas and preparation of Project documents (with assistance of UNDP funds) has been taken up for eight sites.
- A fifteen days long study tour for the officers of the Project Tiger areas was undertaken to various National Parks/Game Reserves of Kenya and Tanzania in April, 1993.
- A workshop on eco-development was held in New Delhi during October, 1993.
- The setting up of a striking force in each Tiger Reserve area has been initiated to combat against poaching.
- Formation of a "Tiger Crisis Cell" under the Chairmanship of Hon'ble Minister for Environment and Forests has been taken up to make special efforts to obtain information on various aspects of conservation of tiger and suggest remedial measures.
- Central assistance was provided to all Tiger Reserve areas during the year for development and maintenance. Major activities include construction and strength-



Fig.30 Painted storks in pairs

ening of various buildings, roads, water conservation and communication network, setting up of research units and interpretation centres in all Tiger Reserves.

Animal Welfare

Prevention of Cruelty to Animals Act (PCA Act) 1960, was enacted to redress the suffering of animals. The Animal Welfare Board of India, established in 1962 under the provisions of the PCA Act, is an autonomous organisation working for the cause of animal welfare in the country. The functions of the Board are given below :

- To keep the law in force in India for the prevention of Cruelty to Animals under constant study and to advise Government on the amendments to be undertaken in any such law from time to time ;
- to advise the Central Government on making of rules under this Act with a view to preventing unnecessary pain or suffering to animals generally and more particularly when they are being transported from one place to another or when they are used as performing animals or when they are kept in captivity or confinement ;



Fig.31 A commonly occurring Arachnid

- to advise the Central or any local authority or other person on improvements in the design of vehicles so as to lessen the burden on draught animals ;
- to take all such steps as the Board may think fit for amelioration of animals by encouraging or providing for the construction of sheds, water-troughs and the like and by providing veterinary assistance to animals.
- to advise the Government or any local authority or other person in the design of slaughter houses or the maintenance of slaughter houses or in connection with slaugh-



Fig.32 *Calotes versicolor*-a common garden lizard in breeding phase

ter of animals so that unnecessary pain or suffering, whether physical or mental, is eliminated in the pre-slaughter stages as far as possible, and animals are killed, wherever necessary, in as humane a manner as possible;

- to take all such steps as the Board may think fit to ensure that unwanted animals are destroyed by local authorities, whenever it is necessary to do so, either instantaneously or after being rendered insensible to pain or suffering ;
- to encourage by the grant of financial assistance or otherwise, the formation or establishment of Pinjrapoles, rescue homes, animal shelters, sanctuaries and the like where animals and birds may find a shelter when they have become old and useless or when they need protection ;
- to co-operate with, and coordinate the work of, associations or bodies established for the purpose of preventing unnecessary pain or suffering to animals or for the protection of animals and birds ;
- to give financial assistance and other assistance to animal welfare organisations functioning in any local area or to encourage the formation of animal welfare organisations in any local area which shall work under the general supervision and guidance of the Board ;
- to advise the Government on matters relating to the medical care and attention which may be provided in animal hospitals and to give financial and other assistance to animal hospitals whenever the Board thinks it necessary to do so ;
- to impart education in relation to the humane treatment

of animals and to encourage the formation of public opinion against the infliction of unnecessary pain or suffering to animals and for the promotion of animal welfare by means of lectures, books, posters, cinematographic exhibitions and the like ;

- to advise the Government on any matter connected with animal welfare or the prevention of infliction of unnecessary pain or suffering on animals.

In order to involve the State Government in animal welfare and effectively implement the PCA Act, the State Government have been advised to constitute State Advisory Boards and appoint nodal officers. Sixteen States have so far notified the formation of such Advisory Boards. The committee constituted under the Prevention of Cruelty to Animals Act, with the main objective of supervising and controlling experiments on animals, has decided to prepare a status report on the use of animals for experiment purposes in the country and then to make recommendations to the Government of India in this regard.

In collaboration with the Royal Society for Prevention of Cruelty to Animals, London, Animal Welfare Board of India is conducting a training programme of 5-days duration in different parts of the country to educate the members of SPCAs/ Animal Welfare Organisations and the staff of other relevant departments. 98 such camps are proposed to be held during the year in different parts of the country. Animal Welfare Board of India celebrates Animal Welfare fortnight from 14th January every year. This year the celebrations started with the release of mercy stamp by the Hon'ble President of India. The proceeds from the sale of such stamps is being used for Animal Welfare activities. During this period, rallies for the cause of animal welfare, painting competitions, radio talks and film shows etc. are arranged.

The budget allocation for the Animal Welfare Board of India for the year 1993-94 is Rs. 120 lakhs.

4

ENVIRONMENTAL IMPACT ASSESSMENT

Introduction

Environment Impact Assessment (EIA) is an exercise to evaluate the beneficial and adverse effects of developmental projects/activities on the environment including socio-economic, cultural and aesthetic concerns.

Environmental Impact Assessment in this country was first started in 1977-78 with evaluation of River Valley Projects. This was later extended to Mining, Industries, Thermal Power, Port and Harbours, Atomic Power, Rail & Road Highways, Bridges, Airport, and Communications, etc. At present, Central Government appraises the following types of projects :

- Projects which require approval of the public Investment Board/Planning Commission/Central Water Commission/Central Electricity Authority etc.
- Projects referred to this Ministry by other Ministries.
- Projects which are sensitive and located in environmentally fragile areas.
- Projects under dispute.

Procedure for Environmental Impact Assessment

The Ministry has developed guidelines for preparation of environmental impact assessment statements along with questionnaires and checklists for the following sectors :

- Industries, (Siting guidelines)
- Mining,
- Thermal Power,
- River Valley,
- Rail, Road, Highway Projects,
- Airports,
- Communication Projects,

The project authorities are required to provide relevant information as indicated in the guidelines along with the Environmental Impact Assessment Statement/Environmental Management Plan (EMP). A preliminary scrutiny of the project proposals is made by the technical experts of the Ministry before consideration by the Appraisal Committees. The appraisal Committee evaluates the impact of the project based on the data furnished by the project authorities and, if necessary, site visits or on-the-spot assessment of various environmental aspects are organised. Based on the examination, the Appraisal Committee(s) make recom-



Fig.33 Environmental degradation by stone quarry
 mendations for approval or rejection of a project.

While recommending approval of a project the Committee may also suggest certain safeguards to be built in. In cases where the Committee is not satisfied about the environmental action plans as presented the project authorities are advised to revise the reports for reconsideration. The recommendation of the Committees form the basis for the Ministry's decision regarding approval/rejection of a project.

Notification

The notification making Environment Impact Assessment statutory for 29 different activities in Industries, Mining, Irrigation, Power, Transport, Tourism etc. was issued on 27th January, 1994 by the Ministry. The notification deals with the details of procedures for obtaining environmental clearance, constitution of Expert Committee, procedure for public hearing and a time schedule for taking a decision.

Committees for Environmental Clearance

The following expert Committees are at present functioning to appraise projects from environmental angle.

- River Valley - Multipurpose Irrigation and Hydro electrical projects,
- Atomic Power and Nuclear Fuel Projects,
- Mining Projects,
- Industrial Projects,
- Thermal Power projects
- Tourism/Transport and Miscellaneous Projects,

- Committee for Aravalli areas of Gurgaon District in Haryana and Alwar District in Rajasthan.

A two stage clearance procedure has been adopted for the site specific projects in the following types :

- Mining
- Pithead Thermal Power Station
- Multipurpose River Valley Projects

Monitoring

Environmental clearance to development projects is subject to implementation of stipulated safeguards. The projects are monitored through six Regional Offices of the Ministry located in different regions so as to cover the entire country. The procedure is as follows :

Project authorities are required to report every six months on the progress of implementation of the conditions/safeguards stipulated.

- Field visits of officers and expert teams from the Ministry and/or its Regional Offices are undertaken to collect and analyse performance data of development projects so that difficulties encountered are discussed with the proponents to find solutions.
- In case of poor or no response, the matter is taken up with the concerned State Government.
- Changes in scope of project are identified to check whether review of earlier decision is called for or not.

Status of Appraisal of Projects

During the year, 137 projects were received for environmental appraisal. Required information was also received in respect of 77 projects pending at the beginning of the year. Two hundred and twenty eight projects were appraised/re-appraised during the year, out of which 105 projects were granted environmental clearance and 20 projects were rejected. Additional information has been sought for the remaining 89 projects. Detailed break up of the status of the environmental appraisal of various projects received during the year is given in Table 2.

Mining Projects

During the year, 37 projects were received for environmental appraisal. Required information was also received in respect of 33 projects pending at the beginning of the year. All projects were appraised out of which 41 projects



Fig.34 Concrete jungles-a sign of urbanisation leading to environmental degradation

were cleared and additional information sought for the other 29 projects. Sixty projects were monitored during the year.

The appraisal Committee on Aravallis constituted in December, 1992 met five times and assessed the mining project in Sariska Tiger Reserve, referred to in the Supreme Court order.

Industrial Projects

During the year, 29 projects were received for environ-

mental appraisal. Required information was also received in respect of 8 pending projects. After appraisal, 17 projects were granted environmental clearance and 2 project were rejected. Additional information has been sought for the remaining 18 projects. While according environmental clearance necessary safeguards for pollution control, energy conservation, waste water re-cycling and adoption of clean technology were stipulated for avoiding adverse impact on the environment. 75 cleared projects were monitored during the year.

Nuclear Power and Nuclear Fuel Complex Projects

During the year one pending project was considered and accorded clearance. No new proposal was received. Draft guidelines for Nuclear Power and other related activities have been prepared.

Thermal Power Projects

During the year, 17 projects were received for appraisal and additional information was also received in respect of 7 pending projects. All projects were appraised/re-appraised, out of which 9 were cleared and one was rejected. Additional information was sought for the remaining 14 projects. While according clearance, emphasis was laid on the utilisation of fly ash, re-cycling/re-use of effluents etc.

Table-2

Status of Development Projects (From 1.2.1993 to 31.12.1993)

Sl. No.	Development Sector	Projects Pending at the beginning of the year	Projects Received	Projects* Appraised	Projects Cleared	Projects Rejected	Additional Information Sought
1.	Mining Projects	33	37	48	41	Nil	29
2.	Industrial Projects	8	29	19	17	2	18
3.	Atomic Power Projects	1	Nil	1	1	Nil	Nil
4.	Thermal Power Projects	7	17	49	9	1	14
5.	River Valley Projects	9	19	45	13	11	4
6.	Other sectors (including Transport, Tourism, Ports, Harbours, Airports, Highways, Communication Projects)	19	35	66	24	6	24
Total		77	137	228*	105	20	89

* Some of the Projects have been appraised more than once.

Fifty projects were monitored during the period.

River Valley Projects

During the year, 19 projects were received for environmental appraisal, and required information was received in respect of 9 pending projects. All projects were appraised/re-appraised, out of which 13 projects were cleared and 11 projects were rejected. Additional information was sought for the remaining 4 projects. While according clearer necessary safeguards were stipulated for catchment area treatment, command area development, rehabilitation, flora and fauna, health aspects etc. One hundred and fifty project were monitored during the year.

Other Sectors (including Transport, Tourism, Ports, Harbours, Airports, Highways and Communication Projects etc.)

During the year 35 projects were received for appraisal. Required information was also received in respect of 19 projects pending at the beginning of the year. All projects were appraised/re-appraised during the period, out of which 24 projects were cleared and 6 projects were rejected. Additional information was sought for remaining 24 projects. Forty cleared projects were monitored during the year.

Coastal Area Management

As per the provisions under the Coastal Regulation Zone notification of the Ministry, the coastal States and Union Territory Administrations are required to prepare draft Coastal Zone Management Plan (CZMP) identifying and classifying the areas under their jurisdiction into different categories as per the guidelines given in the Notification. The draft CZMPs are required to be approved by this Ministry, for which purpose the Ministry has constituted a Task Force. While the CZMPs for the Union Territories of Pondicherry and Daman have been finalised, draft plans for the States of Goa, Tamil Nadu and Kerala and Union Territories of Andaman & Nicobar and Lakshadweep are under consideration of the Ministry/Task force. The approved Coastal Zone Management Plans would be part of the local statutes for enforcing the norms and provisions of the Coastal Zone Regulation.

Review of the distance criterion from High Tide Line for location of hotels and resorts in Coastal Areas

An Expert Committee set up last year to examine issues



Fig.35 A cluster of coconut trees in the Nicobar Islands

relating to tourism and hotel facilities in coastal areas, submitted its report to the Ministry on 31st December 1992. Based on the recommendations of the Committee, certain modifications have been proposed in the existing Coastal Zone regulation Notification. A fresh draft Notification containing the proposed amendments has been issued on 11th November 1993 and suggestions from the public have been invited.

Island Development Authority (IDA)

The IDA set up in August, 1986 with a view to deciding on policies and programmes for integrated and environmentally sound development of Andaman & Nicobar and Lakshadweep Group of Islands, was reconstituted in November, 1993 with the Prime Minister continuing as the Chairman. The IDA has been issuing guidelines for ensuring that the natural resources of Andaman & Nicobar and Lakshadweep island are put to optimal use without creating adverse environmental impacts.



Fig.36 Unscientific agricultural practices on the hill slopes accelerate soil erosion

Development of Tourism in Andaman & Nicobar and Lakshadweep Islands

The Ministry has approved opening of more islands for tourism in Andaman & Nicobar Group of Islands, with the stipulation that important environmental issues should be addressed and adequate mitigative measures enforced while taking up any activity in these areas. In respect of Lakshadweep island it has been recommended that specific area should be identified for development of beach resorts/tourism facilities.

Studies

The progress of the studies continued/undertaken during the year is as follows :

Environmental Management of Coal Fired Power Generation

An agreement has been signed with the Asian Development Bank for providing technical assistance for Environmental Management of Coal Fired Power Generation. The programme involves the following components :

- A study of the Environmental Management of Coal Fired Power Plants in the country including detailed studies for mining of coal, its beneficiation, transportation, combustion, waste generation and disposal and suggestion of suitable measures to overcome adverse environmental impacts.
- A detailed study of Talcher and Madras regions.
- A training programme including 4 workshop for managers of thermal power plants.

The projects is expected to be completed by May, 1994.

Studies on Carrying Capacity

To ensure that development takes place in harmony with environment and is sustainable, various developmental activities have to be undertaken within the carrying Capacity of a particular region/area. Carrying Capacity has two components, namely, assimilative capacity which relates to the quality of air, land and water etc. and the supportive capacity relating to the physical resources and constraints. Most of our development activities have been going on without reference to these two and this is detrimental both to development and environment and to assess the Carrying Capacity of a particular area multidisciplinary studies need to be undertaken.

Carrying Capacity studies are expected to help in choosing appropriate technology, resources optimisation, improved efficiency of processes, reduction in waste & pollution.

Presently three such studies are in progress, as per details given below :

(a) Doon Valley - an ecologically sensitive area

The Carrying Capacity Study of the area covers the ecologically sensitive "Doon Valley" covering an area of about 2000 Sq. Km. The project was sanctioned in August, 1992 for a period of 27 months. The study is being coordinated and executed by National Environmental Engineering Research Institute, Nagpur in collaboration with the Roorkee University, Roorkee, Delhi University, Delhi and National Physical Laboratory, Delhi etc.

The Study is being carried out in 3 phases. In the first phase conceptual framework was evolved on the basis of secondary data collected, analyse and used for monitoring and modelling work. In the second phase now in progress, the base line primary data is being collected to come out with alternate development scenarios. This is likely to be completed by March, 1994. Under the third phase the portfolio of alternate development models would be evolved to suggest a preferred scenario along with restructuring of the administrative and organisational set up.

(b) National Capital Region

This study covers an area of about 36,000 sq. km. lying in the territory of Delhi and parts of the adjoining states of Uttar Pradesh, Rajashtan and Haryana. The Project was sanctioned in October, 1992 for a period of 36 months, and is being carried out by a multi-disciplinary, multi institutional team with NEERI, Nagpur as the Principal Coordinator and Indian Institute of Technology, Delhi, Delhi University, Delhi and National Institute of Urban Affairs, New Delhi, as participating institutions. The first phase of the programme involving inventorisation of resources and environmental quality from secondary data and evaluation of the same for identification of "hot spots" has been completed and the second phase of the work viz. primary data collection has been taken up.

(c) Damodar River Basin

Damodar River Basin, spread over an area of about 25,820 Sq. Kms. is well-known for its rich mineral resources. It also Contains highly polluting power plants,

industries and a number of multi purpose hydro electric projects. While there are vast agricultural lands on the eastern side, the western part of the basin is covered by natural forests. Various developmental activities have brought the area under severe environmental stress as evidenced by wastage of resources, increase in pollution levels and general ecodegradation.

To evolve a methodology for Carrying Capacity based Basin Planning, a study has been undertaken with the Central Mining Research Station, Dhanbad as the Coordinating agency. The other participating institutions are Metallurgical and Engineering Consultants (India) Ltd., Ranchi, Delhi University, Delhi Centre for Mining Environment, Dhanbad and National Environmental Engineering Research Institute, Nagpur, The project was sanctioned in March, 1993 for a period of 36 months. A part of the secondary data required for identifying the "hot spots" has

been collected. Further data collection is in progress.

Training Programmes and Workshops

- A training programme on Environmental Impact Assessment of Thermal Power Plants was held at Jawaharlal Nehru University, New Delhi, from 15th to 20th March, 1993.
- A workshop on Watershed Management and Catchment Area Treatment Programme was held at the Centre for Inter Disciplinary Studies of Mountain and Hill Environment, University of Delhi, Delhi from 13th to 16th October, 1993.
- A workshop on Methodologies and Procedures in Environmental Impact Assessment was held at National Environmental Engineering Research Institute, Nagpur from 22nd to 26th November, 1993.

5

ENVIRONMENT PROTECTION AND PREVENTION OF POLLUTION

Introduction

The Policy Statement for Abatement of Pollution, the Forest Policy Statement and the National Conservation Strategy cover a wider ground integrating various facets of environment protection. The Ministry has been following up these activities in several ways like by discussions with Central Ministries, State Governments and other organisations and also by commissioning studies wherever necessary. These include studies related to the Environment Action Programme which cover a wide ambit of subjects such as promotion of clean and low waste technologies, improvement of water quality, formulation of mass based standards, time bound targets for compliance of pollution control requirements in highly polluting industries, institutional and human resource development, forestry and natural resource accounting which would lead by stages, to concrete action plans in each sector to supplement efforts already underway. The whole range of pollution prevention and abatement is dealt with by looking at both command and control methods as well as voluntary regulations, fiscal measures promotion of awareness etc. many of which are sketched in the following paragraphs.

Pollution Prevention

According to the Policy Statement for Abatement of Pollution, the key elements for pollution prevention are adoption of best available, clean and practicable technologies rather than end of the pipe treatment. The focus is, therefore, on source reduction and substitution of chemicals with safe alternatives. These programmes go beyond identifying changes in disposal techniques, The thrust has, therefore, been made for considering process changes which involve significant improvement in energy and water conservation. One of the significant benefits in this economical approach is that when wastes are reduced or eliminated, cost savings in material are ensured. To achieve these objectives, a mix of instruments including legislation and regulation, fiscal incentives, educational programmes and information campaigns is being used.

Environmental Audit Statement

The Gazette Notification on Environmental Audit, issued by the Ministry earlier, under the Environment Protection Act, 1986 has been amended during the year. This notification applies to all the units seeking consent either under the Air (Prevention and Control of pollution) Act, 1981 or Water (Prevention and Control of Pollution) Act,

1974 of authorisation under the Hazardous wastes (Management and Handling) Rules, 1989, and such units are required to submit environmental statement for the period ending 31st March on or before 30th September every year beginning from 1993 to the concerned State Pollution Control Boards.

In the Environmental Statement, every industry is required to provide information on the water and raw material consumption, pollution generated, information on hazardous wastes and solid wastes along with the disposal practices. The industries are also required to specify the impact of pollution control measures on conservation of natural resources. A provision for coding has been made to ensure confidentiality of certain information. Implementation of this scheme is expected to promote not only smooth monitoring of the industrial activities but also adoption of low waste technology and minimisation of resource consumption by industrial units.

The environmental statements received during the year by the respective State Pollution Control Boards are being analysed to assess the efficacy of the Statements.

Work relating to the preparation on model environmental statement reports for identified industries belonging to the 17 categories of heavily polluting industries has been initiated. These model reports would guide the State Pollution Control Boards (SPCBs)/Pollution Control Committees for evaluating the environmental statement filed by the polluting units. During the year, model environmental statement reports for the following industries have been prepared and sent to the concerned SPCBs :

- Sugar
- Distillery
- Aluminium
- Copper & Zinc Smelter
- Sulphuric Acid Plant
- Cement

A training programme on "Environmental Audit and Waste Minimisation" was organised during the year through the Confederation of Industry (CII), for the personnel of Central and State Pollution Control Boards.

A project titled 'Development of Industrial Production Pollution Inventory Based on Waste Audit' has been sanctioned to IIT Bombay, which involves development of

formats, data structure and data base management system for computerization of the data in the environmental statements for better waste management practices and decision making.

A booklet titled 'Environmental Statement (as part of environmental audit)' describing the concept, methods of conducting, preparation and the benefits accruing from the Environmental Statements has been prepared by the Ministry during the year.

The Central Pollution Control Boards (CPCB) has completed environmental audits of 120 industries, and a report containing brief details of such studies is being published by the CPCB. Based on the studies carried out in various pesticides industries, a publication titled 'Guidelines for Environmental Audit and a Case Study' has also been brought out by the CPCB.

Environmental Statistics and Mapping

Realising the need for authoritative statistical data on environment especially to integrate natural resource accounting into the national accounting process, work relating to collection, collation and analysis of environmental data and its depiction in an atlas has been taken up. The major objectives of this works are as follows :

- to determine the status of pollution
- to develop a concise set of environmental indicators for monitoring the effects of pollution, and
- to disseminate the necessary information to all concerned.

A project 'Environmental Statistics and Mapping' using Geographic Information System (GIS) and remote sensing with specific reference to abatement of pollution has been sponsored to the National Institute for Science Technology and Development Studies (NISTADS), New Delhi. Under this project, base thematic maps on 1:6M scale for the country have been prepared. The main themes include:

- major river basins and drains and drainage network;
- administrative divisions;
- designated best use classification of streams;
- location of water and air pollution monitoring stations;
- location of critically polluted areas; and
- major cities of India (above one lakh population).

These maps have also been digitized and the related attribute data are entered using ARC/INFO GIS package.

Clean Technology

Economic development of any nation depends upon several factors such as energy production and conservation: raw materials like water, minerals, forest produce and capability and skill to manage the resources optimally. Adoption of cleaner modes of production helps in resource conservation and elimination of gaseous, liquid or solid wastes.

Clean technology therefore entails :

- waste prevention and reduction by reduced consumption of raw materials,
- modification and upgradation of the technological processes so that optimal utilisation of natural resources is made possible,
- adoption of preventive rather than corrective approaches to pollution control.

To encourage identification, acquisition, development and promotion of cleaner technologies at all levels, a network of clean technology centres needs to be set up, with a National Centre coordination their activities. A centre for clean technology should be able to carry out the following :

- identify the areas where introduction of clean technologies is possible;
- identify the source(s) from where clean technology and data/details thereof can be obtained;
- assess the technology available indigenously as well as those to be imported;
- modify the technology, if necessary and demonstrate it to the satisfaction of the users so that it can be replicated;
- undertake Research and Development efforts to develop technologies for cleaner production;
- collect, collate and disseminate information on clean technology ; and
- maintain interaction with the industry, financial institutions and Research and Development Laboratories for adoption of clean technologies.

Discussion with the concerned Central Govt. depart-

ments, industry associations, research organisations and financial institutions have recommended the setting up of a sectoral clean Technology Centre dealing with Coal mining, beneficiation, transportation, utilisation and waste disposal at the earliest.

In the pulp and paper manufacturing sector, several clean technologies such as anaerobic treatment, lignin recovery etc. can be adopted for pulp and paper production as the success of these efforts has been established with pilot plant tests. Other examples of clean technologies relate to:

- use of lignin to develop value added products.
- use of flyash generated during burning of lignin for brick-making.
- Reduction in raw-material consumption.

Plans are under preparation to initiate "Demonstration Projects" for promotion of cleaner modes of production in selected areas, as a large number of industrial units in our country are 35-40 years old and are ready to be discarded or upgraded and may therefore be persuaded to switch over to clean technologies.

Clean Technology for Small Scale Industries

The objectives of the scheme on "Adoption of clean technology to the small scale industries and to extend necessary technical support" are:

- to encourage modernisation of existing industrial units in the small scale sector by assisting small scale industries for adoption of cleaner technologies by way of interest subsidy;
- to create awareness among the small scale entrepreneurs regarding adoption of pollution abatement measures and their essentiality from the social angle and also creation of awareness among the staff of the prospective/existing entrepreneurs;
- to identify clean technologies from the research institutions through bilateral/multilateral programmes and diffusion of the same to the industries, particularly the 17 identified categories of polluting industries ;
- to create a data base for the availability of clean technology and the present status of clean technology used in the industries;
- to assist demonstration projects strictly for the isolated units the laboratory or the research institutions must

certify that the demonstration unit is the first case where industrial scale demonstration is being set up in that category of industry and is not upscaling or transferring available technology.

Several Research and Development proposals relating to innovation, identification and diffusion of clean technology, creation of a data base, awareness creation and personnel training of the small scale industries are being considered. Proposals relating to adoption of clean technologies through process technology changes including waste minimisation, recycling and reuse are also under consideration.

A project has been commissioned to National Productivity Council to prepare a general guideline book on waste minimisation and a sector specific manual in respect of the identified small scale industry sectors.

A project has been sponsored to the Development Commissioner, Small Scale Industries (DCSSI), Ministry of Industry during the year to organise training and awareness programmes for personnel in Small Industry Development Organisation (SIDO) through Small Industries Service Institute (SISIs).

Fiscal Measures

Fiscal measurements are potent weapon to ensure conformity to norms of Pollution Prevention & Control.

There are at present several fiscal incentives for installation of pollution control equipment. Steps have been taken to encourage the shift from curative to preventive measures, internalise the cost of pollution and to conserve resources. Fiscal incentives presently provided include the following :

- Incentives in terms of rebate on water cess payable under the Water (Prevention and Control of Pollution) Cess Amendment Act, 1991.
- Depreciation allowance at 100% for installing pollution control devices.
- Custom duty at reduced rates of 35% + 5% auxillary charges levied on equipment and spares for pollution control.
- Custom duty at the reduced rate of 25% and full exemption from additional duty for kits required for conversion of petrol driven vehicles to Compressed Natural Gas driven vehicles.

- Excise duty at reduced rate of 5% on manufactured goods that are used for pollution control.
 - Excise duty exemption for bricks and blocks manufactured of fly-ash and phosphogypsum.
 - Exemption under Section 35 CCB of the Income Tax Act is given to assesseees who incur expenditure by way of payments on any sum towards association or institutions which carry out programme of conservation of natural resources.
 - Financial assistance towards capital investment upto 25% or Rs. 50 lakhs whichever is less is given as subsidy to industrialists of small scale industries for setting up of common effluent treatment facilities.
- Provision of loans at reduced rates of interest by financial institutions for installing pollution control devices.
- The National Institute of Public Finance and Policy has been requested to suggest fiscal instruments for prevention of pollution.

Assessment of Pollution by Survey

River Basin Studies

There are 14 major, 44 medium and 55 minor river basins in the country. Intensive surveys to assess the pollution load in the basins and various other activities responsible for it have been conducted, and reports have been published on the Yamuna sub-basin, Ganga, Subarnarekha, Brahman-Baitarani, Sabarmati and Krishna basins.

Reports on the Mahanadi, Tapi, Narmada, Cauvery and Godavari basins are being published and those on Mahi and Indus basin: Part-I, are being prepared. Studies on Brahmaputra, Pennar and Ulhas basins are also in progress.

Vehicular Pollution Survey

Vehicular pollution surveys were conducted in the cities of Delhi, Bangalore, Vadodara and Kanpur during the year.

While ambient lead concentration values were recorded in the range of 0.098 $\mu\text{g}/\text{NM}^3$ to 0.862 $\mu\text{m}/\text{NM}^3$, the values of Suspended Particulate Matter (SPM) ranged between 388 $\mu\text{g}/\text{NM}^3$ and 613 $\mu\text{g}/\text{NM}^3$ in the capital city of Delhi.

Noise Pollution Survey

Noise pollution surveys were also conducted during the year in Delhi, Lucknow and Indore. At all the locations surveyed, the noise levels were found to be exceeding the

prescribed limits except for some areas in Indore.

Pollution Control in Agra-Mathura Trapezium

With a view to regulating the industrial development activities in the Agra-Mathura trapezium, setting up of highly polluting industries are prohibited within the trapezium.

A project on assessment of pollution load and studies on assimilative capacity of the trapezium have been entrusted to the National Environmental Engineering Research Institute (NEERI), Nagpur, during the year, to evaluate the status to pollution in the area and suggest remedial measures as well as to redefine the Agra-Mathura trapezium. Recommendations of the studies are being implemented through the concerned Ministries and Government of Uttar Pradesh.

Assessment of Pollution by Monitoring

Air Quality Monitoring

Under the National Ambient Air Quality Monitoring (NAAQM) programme, there are 290 monitoring stations spread over 92 cities and towns of the country. The air quality parameters monitored include the conventional parameters such as Sulphur dioxide (SO_2) Nitrogen dioxide (NO_2) and Suspended Particulate Matter (SPM), social

parameters like Ammonia (NH_3) Hydrogen Sulphide (H_2S) and Respirable Suspended Particulate Matter (RSPM), besides the meteorological parameters.

National Water Quality Monitoring Network

Water quality monitoring of Indian aquatic resources continued at 480 stations under the Global Environmental Monitoring System (GEMS), Monitoring of Indian National Aquatic Resources (MINARS), and Ganga Action Plan (GAP) programmes. The network of 480 stations comprises 51 stations under GEMS, 27 stations under GAP and 402 stations under MINARS programmes and covers all the major river basins of the country.

Automatic Water Quality Monitoring of River Ganga

Automatic Water Quality Monitoring Stations (AWQMS) have been commissioned at 5 locations along the river Ganga, at Nanemau (Kannauj), Shuklagunj (Kanpur U/S), Baksar (Kanpur U/S), Varanasi and Patna.

Coastal and Estuarine Water Quality Monitoring

Studies on pelagic and benthic occurrence, distribution and transport of toxic substances like heavy metals in the inter-tidal regime of the Ganga (Hoogly) have been undertaken to investigate the sources of pollution and causes of accumulation of pollutants in the benthic sediments in order to evolve necessary control measures.



Fig. 37 Gas Cleaning Plant at Bhilai Steel Plant before and after installation of pollution control devices

Ground Water Quality Monitoring

A project has been initiated to assess the ground water quality in the identified critically polluted areas. Eleven agencies shall be participating in this project and it is proposed to have a network of 134 ground water sampling locations where 30 ground water quality parameters shall be monitored.

Industrial Pollution Control along the River Ganga

The implementation of the provisions of the Pollution Control Acts in respect of the 68 industries identified along the River Ganga, was continued during the year.

The status of compliance in these 68 industries is as follows :

Status	No. of Industries
ETP installation	49
ETP under installation	01
No ETP at site	06
Units closed lock-out	12
Total	68

Critically Polluted Areas

The Central Pollution Control Board, in consultation with the State Pollution Control Boards has identified 22 critically polluted areas covering 15 States and the Union Territory of Delhi, for integrated action by the concerned authorities. Ankleswar (Gujarat) and Tarapur (Maharashtra) have been included as critically polluted areas during the year. The location are shown in Figure .



Fig. 38 Cowdung cakes, still used as fuel in our country-one of the sources of air pollution.



Fig. 39 Water pollution caused by various human activities

Out of these 22 areas, action plans have been prepared in respect of 14 areas and are being implemented by the concerned State Pollution Control Boards.

Environmental Epidemiological Study

Environmental epidemiological studies for the identified highly hazardous area have been delineated and merged with the programme of environmental epidemiological studies initiated for the critically polluted area as per the decision of the steering committee. Such studies have been initiated through the National Institute of Occupational Health, Ahmedabad.

Pollution control status of the identified 17 categories of industries in all the States and UTs have been collected and defaulting units have been identified. The SPCBs and the State Governments have been asked to take action against the defaulting units. Actions taken by the polluting industries to comply with the prescribed standards, are being reviewed by the State level Task Forces and the Review Committees of the CPCB.

Development of Standards

A notification consolidating all the environmental standards including general effluent, emission and noise standards has been issued under the Environment (Protection) Act, 1986. This notification includes standards for waste water generation in respect of the following 11 categories of industries:

1. Integrated Iron & Steel
2. Sugar
3. Pulp & Paper Industries
 - (a) Large pulp and paper

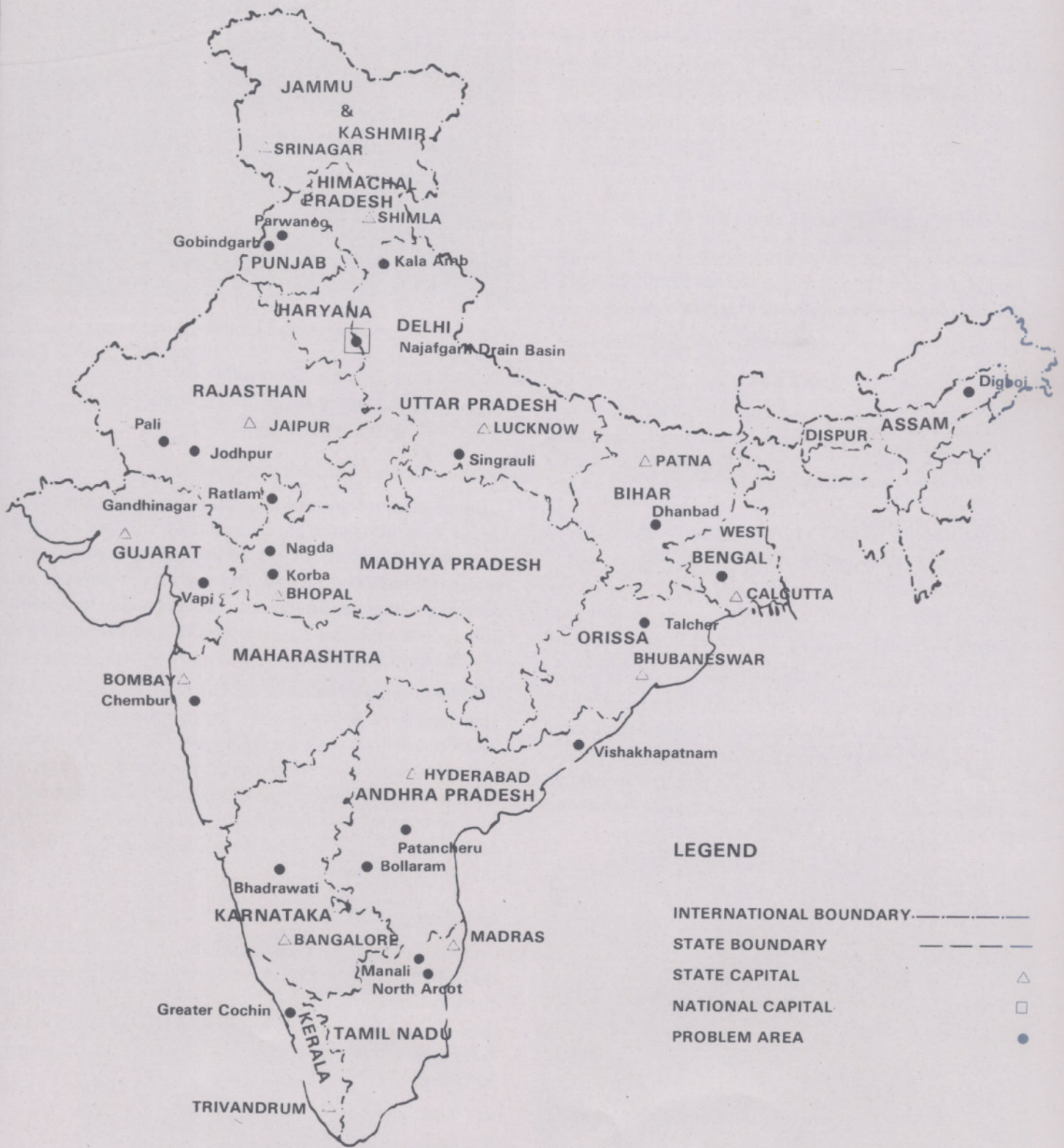


Fig.40 Problem areas in India

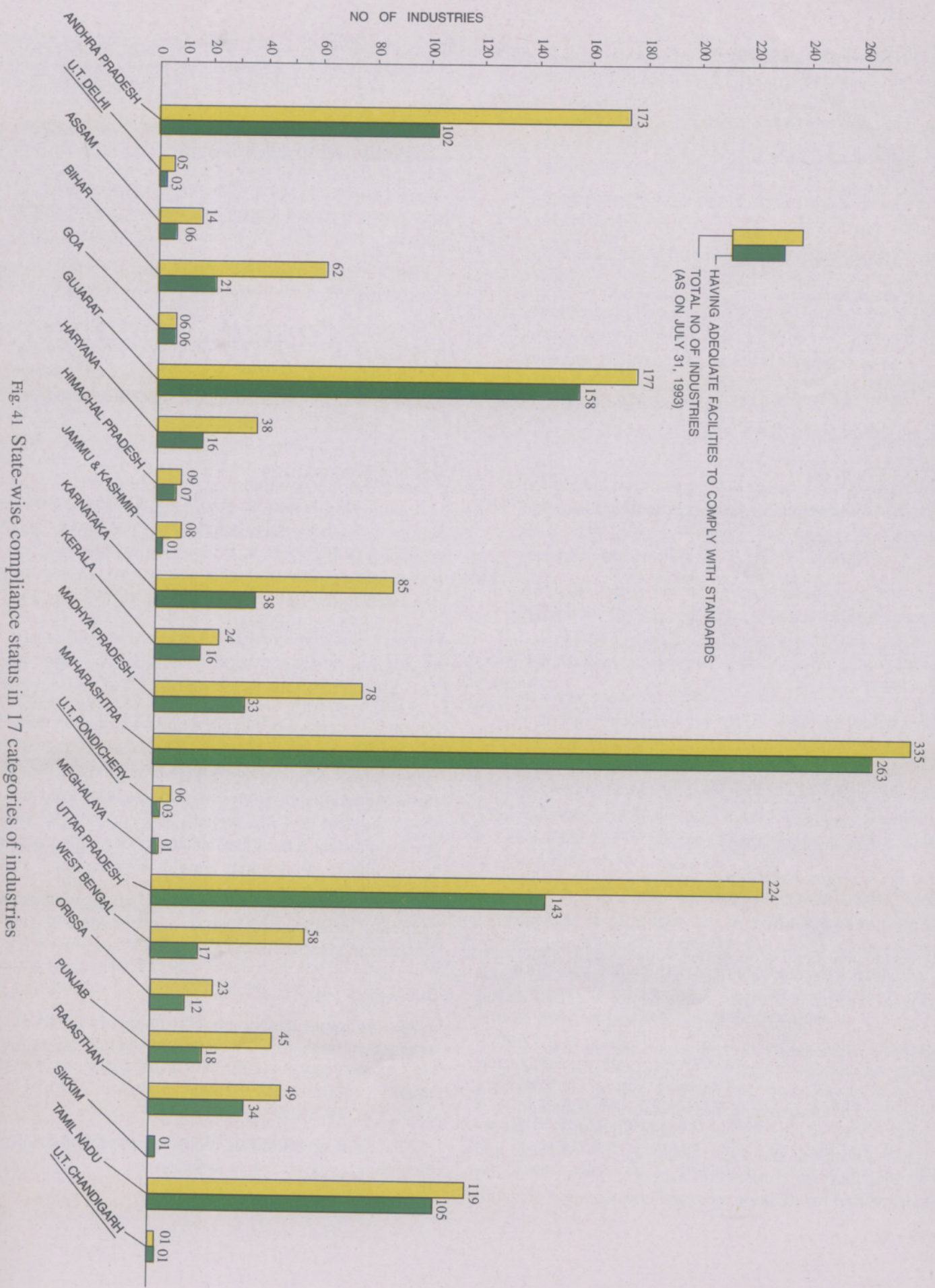


Fig. 41 State-wise compliance status in 17 categories of industries

- (b) Small pulp and paper
 - i. Agro-residue based
 - ii. Waste paper based
- 4. Fermentation Industries
 - (a) Maltry
 - (b) Brewery
 - (c) Distillery
- 5. Canstic Soda
 - (a) Membrane cell process
 - (b) Mercury cell process
- 6. Textile Industries
 - (a) Man-made fibre
 - Nylon & Polyester
 - (b) Man-made fibre (semi-synthetic)
 - i. Viscose staple fibre
 - ii. Viscose filament yarn
- 7. Tanneries
- 8. Starch, Glucose and related products
- 9. Dairy
- 10. Natural rubber processing industry
- 11. Fertilizer
 - (a) Straight nitrogenous fertilizer
 - (b) Straight phosphatic fertilizer (SSP&TSP), excluding manufacture of any acid.
 - (c) Complex fertilizer

Automobile Pollution

Future mass emission norms which would come into effect from 1.4.1996, have been issued for petrol and diesel driven vehicles under the Central Motor Vehicles Rules, 1989 by the Ministry of Surface Transport. The norms include emission standards for Type Approval and Conformity of Production tests for Vehicles in the manufacturing stage. The various State Transport Authorities have been requested to take suitable measures for implementation of these norms. A pilot project is being implemented by the Gas Authority of India Ltd. (Ministry of Petroleum and Natural Gas) in conjunction with the Delhi Transport Corporation for studying technical and economical viabil-

ity of substituting petrol and diesel with Compressed Natural Gals (CNG). Depending upon the success of this project, large scale use of CNG by the transport sector would be undertaken.

Comprehensive Environmental Legislation

Studies on integration of the major environmental laws have been conducted through the Indian Law Institute and a report submitted by the institute is being examined.

The Water (Prevention and Control of Pollution) Cess Act, 1977

The Water (Prevention and Control of Pollution) Cess Amendment Act, 1991 was brought into effect from January 26, 1992 where by the cess charges on water consumption have been increased to encourage conservation. Additionally, rebate is given to those industries which comply not only with the prescribed standards but also with the consumptions norms.

A proposal to increase the Water Cess rate structure further by 2-3 fold is also being formulated to augment the resources of the PCBs and also to maximise the use of water. Some powers under the Act are also proposed to be delegated to the SPCBs for effective recovery of Water Cess from the consumers.

The National Environment Tribunal Bill, 1992

A Bill to provide for strict liability for damages arising out of any accident occurring while handling any hazardous substance and for the establishment of a National Environment Tribunal for effective and expeditious disposal of cases arising from such accident was introduced in the Parliament on 18th August, 1992 and was referred to the Department related Parliamentary Standing Committee on Science, Technology and Environment and Forests.

The Committee has recommended certain amendments to the Bill based on which a note has been submitted to the Cabinet Secretariat for consideration.

Eco Labelling

The scheme of labelling of Environment Friendly Products was initiated for household and other consumer products to meet certain environment criteria along with the quality requirements of Indian Standards. The label is known as 'Ecomark'.

The status of criteria developed in respect of the identified product categories is as follows:

- Final notifications have been issued for the Criteria on Toilet Soap, Detergents, Paper, Architectural Paints and Laundry Soaps.

Draft notifications have been issued for Plastic, Lubricating Oil, Aerosols Food items (Edible oil, Tea, Coffee Baby food, Processed Fruit & Vegetables and Beverages). Packaging materials, Wood substitute, Textiles, Cosmetics, Electrical and Electronic goods, Food Additives, Batteries and Pesticides.

Simplification of Consent Procedure for Small Scale Units

The procedure for granting consent to small scale industries has been simplified. For small scale industries other than the 17 categories of heavily polluting industries, the application form itself would serve the purpose of consent and the industry is not required to obtain periodic renewal of consent till such time that a unit modifies/changes its process (processes). The State Pollution Control Board or the Committee specified by the Central Government (for Union Territories) may conduct random checks or call for information from any small scale unit and make formal consent orders prescribing conditions etc., as and when required.

Amendments to the Rules under the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981

After the amendment of the Rules of the Water and Air Acts, the following procedure shall be followed by the SPCBs with regard to issue of consents to industries:

- SPCBs shall issue consent to industries only after the industry has installed all the required pollution control equipment
- No conditional consents would be issued without the installation of the same.
- The consent orders issued by the SPCBs shall be valid for a period of 15 years or till such time there is some significant change in the process, whichever is earliest.

Details of various pollution control projects executed with financial and assistance from bilateral and multi-lateral agencies, including the World Bank, are given in Chapter 10.

Hazardous Substances Management

The Environment (Protection) Act, 1986 places on the

Central Government, the responsibility of laying down the procedures and safeguards for handling of hazardous substances and prevention of accidents. Three sets of rules regulate the handling of hazardous chemicals and hazardous micro-organisms/genetically engineered organisms and hazardous waste. These are :

- Manufacture, Storage and Import of Hazardous Chemical Rules, 1989.
- Hazardous Waste (Management and Handling) Rules, 1989.
- Manufacture, Use, Import, Export and Storage of Hazardous Micro-organisms/Genetically Engineered Organisms or Cells, Rules 1989.

Management of Hazardous Chemicals

- A Centrally Sponsored Scheme being implemented with the objective of creating infrastructure in the State Pollution Control Boards to regulate the management of hazardous substances handled by hazardous industries, was continued during the year and financial assistance has been provided to 18 States/UTs.
- Amendments to Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 have been finalised. Safety Audit in major Accident Hazard Units will now become mandatory with the Notification of these Rules.
- In order to reduce risk and prevent off-site consequences of accidents on-site, hazard analysis and off-site Emergency Plans for four industrial pockets in West Bengal, viz., Midnapur, Howrah, Hooghly and Rishra are under preparation. Off-site plans for eight districts viz. Durgapur, Cuddalore and Tutricon, Mangalore, Muradabad, Visakhapatnam, Thane, Kota and Raigarh have been completed.
- The Redbook entitled 'Central Crisis Group Alert System' incorporating the details of the Central Crisis Group set up by the Ministry with names, addresses and telephone numbers of the Central and State Authorities and experts to be contacted in case of emergency, was updated and distributed to all concerned.
- A guide entitled 'Introduction to Vulnerability Analysis of Eight Extremely Hazardous Chemicals' and a guide to 'Safe Road Transport of Hazardous Chemicals' have been prepared. Two studies on 'Development of PC Software for Hazard Analysis sponsored to IIT, Kanpur and Delhi Productivity Council are nearing

completion.

- Funds have been released for the establishment of Emergency Response Centres at Bhopal (MP), Baroda (Gujarat) and Manali (Tamil Nadu). These Centres are likely to be operational by June, 1994.
- Under the Five Year Scheme to conduct district-wise hazard analysis of major industrial pockets, hazard analysis for Alwar (Rajasthan) and Dhanbad (Bihar) have been completed, while the same for Chembur (Maharashtra) is in progress. During the year, hazard analysis of eight more industrial pockets viz. Delhi, Vapi, Ankleshwar, Mettur, Manali, Udyog Mandal, Patalganga and Raigarh have been initiated.
- Guidelines for siting of hazardous industry and a set of Rules on classification, labelling and packaging of hazardous chemicals are being finalised.
- The Training Programme for various categories of personnel for enhancement of safety in industry and management of chemical accidents started in 1992-93 at two institutions, is being continued with more institutions conducting such programmes.
- Based on the recommendations of the Workshop on National Register for Potentially Toxic Chemicals (NRPTC) convened in collaboration with UNEP and UNITAR during February, 1993, the following activities have been undertaken to establish the NRPTC in the Ministry :
 - Basic infrastructure (hardware and software) for setting up of NRPTC has been installed. Linkages with districts have been established through NICNET in order to access to the Universities/Research Institutions. Nodes of SURNET and ERNET networks are also being procured to facilitate the linkage for on-line access to relevant data bases.
 - To decide the most appropriate methodology to establish the National Inventory of Existing Chemicals, an Approach Paper has been prepared and circulated to relevant agencies for comments. Proposals for establishment of Regional Register for Potentially Toxic Chemicals (RRPTC) at the six regional offices have been received and some of them are under consideration.
 - A Training Programme on Data Base is proposed

to be held with the help of UNITAR for which experts from IRPTC, IPCL and ILO have been contacted.

- H-acid and other naphthol based dye intermediates have been identified as one of the Priority Chemicals for assessment of environment and health risk. A study on the national scenario and socio-economic aspects of appropriate regulatory actions has been initiated.
- The Ministry participated in consultations arranged by the UNEP to provide a legal backing to the London Guidelines for Exchange of information on Chemicals in International Trade. India has been elected as Vice-Chairman of the Task Force appointed for the purpose with powers to conduct the meeting in the absence of the Chairperson. The proposal is to be discussed in an Inter-ministerial meeting.

A proposal for setting up a network of Poison Control Centres throughout the country and enhancement of capacity for management of hazardous and solid wastes has been prepared and posed to the concerned agency for funding under the programme capacity 21 of the UNDP which is the outcome of the 'Agenda 21' adopted at the UNCED held in Rio in June 1992.

Crisis Management

Management of Crisis due to Oil Slick

Efforts of various Government Departments were coordinated by an Inter-departmental Coordination Group on Oil Slick under the Chairmanship of Secretary (E&F) for the following accidents involving oil spillage:

- Collision between a Danish Tanker and Japanese ship on 21.1.1993 resulting in an oil spill which drifted to Indian waters near Andaman Island : Surveys of the affected areas have been completed and environmental damages are being assessed for filing claims for compensation.
- Rupture of an ONGC pipeline in Bombay High on 17.5.1993: A detailed study on the effects of oil slick on the marine life of the affected area has been completed.
- Sinking of a ship near Mangalore carrying oil and other items on 2-8-1993.
- Leakage of oil near Cochin during pumping of oil from a Tanker to a Refinery on 1.10.1993.

Other Accidents

During the year, an Industrial Accident at Century Rayon in Maharashtra was dealt with and the emergence arising out of leakage of phenol due to overturning of a tanker near Trichur into a rivulet leading to drinking water Reservoir at Peechi (Kerala) on 24-6-1993 was also attended.

A meeting of the Central Crisis Group was held to discuss the questionnaire circulated by the UN Centre for Urgent Environmental Assistance (UNCUEA) set up by UNEP. The questionnaire was duly filled up and sent to UNCUEA. The Ministry also participated in the Governmental Advisory Meeting on UNCUEA at Geneva.

Hazardous Waste Management

- Amendments to Hazardous Waste (Management and Handling) Rules, 1989, have been finalized incorporating the views of the industries, implementing agencies and provisions of the Basel Convention, and are being processed for Notification.

Financial assistance had been provided to five States viz. Tamil Nadu, Punjab, West Bengal, Uttar Pradesh and Delhi for the year 1992-93 for identification, environmental impact assessment and design for development of secured landfills for the disposal of hazardous waste in specific regions. The assistance has been extended in the year 1993-94 to five more States, namely, Karnataka, Andhra Pradesh, Rajasthan,, Haryana and Gujarat.

- R & D projects on "Application of Clay Soils and Indigenously available Synthetic Membranes for lining Landfill for Hazardous Waste Disposal" has been assigned to NEERI, Nagpur which also include the demonstration of use of such liners in five identified areas.

Draft Rules for the Handling and Management of Bio-

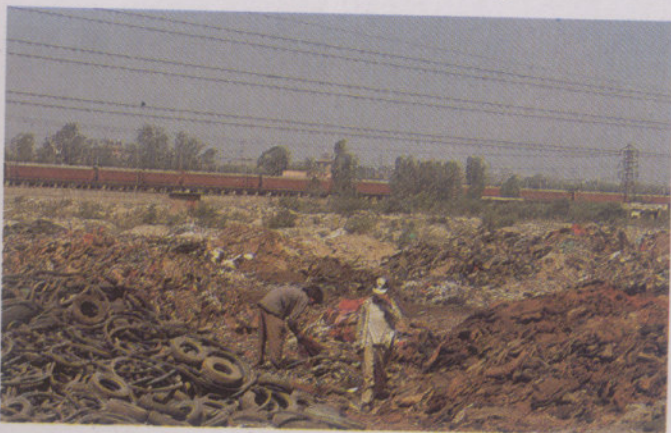


Fig.42 Solid waste disposal and management-an urban environmental problem

medical Wastes have been prepared under the Environment (Protection) Act, 1986 and circulated to the concerned Departments for comments. Draft Guidelines have also been prepared for the Management of Bio-medical Wastes.

- During the year, the Government of India had consultations with the Basel Convention Secretariat regarding finalisation of the Guidelines on Hazardous Wastes and a draft protocol on liability and compensation to deal with transboundary movement of hazardous wastes. India also participated in the Bureau meeting and the meeting of an open-ended ad-hoc Committee for Implementation of the Basel Convention.

Solid Waste Management

The National Waste Management Council, reconstituted in October, 1992 held two meetings under the Chairmanship of the Minister of Environment and Forests. With a view to increasing awareness on proper waste management practices and undertake programmes at the municipal level, "Waste Management" has been included as one of the themes for the National Environmental Awareness Campaign 1993-94.

- Financial assistance of Rs. 70,000/- each has been released to seventeen cities, namely, Delhi, Bombay, Calcutta, Madras, Bangalore, Jaipur, Panipat, Faridabad, Ahmedabad, Hyderabad, Nagpur, Trivandrum, Cuttack, Bhubaneswar, Kanpur, Banaras and Agra for conducting surveys on urban municipal solid waste.
- A pilot project on the use of Municipal Solid Waste in road construction has been assigned to Central Road Research Institute, New Delhi.
- Special emphasis has been laid on promoting the use of flyash in various fields and the State Governments have been asked to prepare a Perspective Action Plan for 50% utilization of flyash by the turn of the century. A project on the Application of Flyash Utilisation in Agriculture has been assigned to Madhya Pradesh Pollution Control Board, Bhopal.

Implementation of the Public Liability Insurance Act, 1991

Two meetings of the Advisory Committee on the Public Liability Insurance were organised to discuss the relevant issue. Rules for owners seeking exemptions under the Act have been amended. A Notification regarding authorisation of various agencies under Section 13 and 18 of the PLI Act, 1991 and a corrigendum for the list of chemicals have been issued. Draft guidelines on the Act have also been prepared. Preliminary discussions have been held with various agencies for establishing an Environment Relief Fund.

6

REGENERATION AND DEVELOPMENT

Ganga Action Plan Phase I (GAP-1)

The Central Ganga Authority established in 1985 under the Chairmanship of the Prime Minister, lays down the policies for works to be taken up under the Ganga Action Plan. The Authority is assisted by a Steering Committee and a Monitoring Committee. The Ganga Project Directorate of the Ministry services these Committees and coordinates the implementation of the schemes under the Ganga Action Plan.

During the year, the Monitoring Committee met twice and the Steering Committee thrice, to review the progress of the Ganga Action Plan, which was launched in 1986 for improving the quality of the river Ganga, by reducing the pollution load and establishing self-sustaining sewage treatment plant systems. The schemes under this plan are being implemented by various agencies of the respective State Governments of Uttar Pradesh, Bihar and West Bengal.

Schemes sanctioned and their progress

A total of 261 schemes have been sanctioned under the Ganga Action Plan. These schemes can be broadly divided into six categories and the State-wise distribution of these schemes is given in Table 3.

Table 3

Category	U.P.	Bihar	West Bengal	Total
Interception & Diversion schemes	40	17	31	88
Sewage treatment plants (STPs)	13	7	15	35
Low Cost Sanitation (LCS)	14	7	22	43
Electric crematoria	3	8	17	2
River front facilities	8	3	24	35
Other schemes for biological regeneration of the river etc.	28	3	1	32
Total	106	45	110	261

Out of these 261 schemes 211 schemes have been, completed so far. The remaining schemes are at various stages of implementation. The State-wise break-up of the completed schemes is given in the Table 4.

Table 4

Category	U.P.	Bihar	West Bengal	Total
Interception & Diversion schemes	32	17	18	67
Sewage Treatment Plants (STPs)	7	-	8	15
Low Cost Sanitation (LCS)	12	7	22	41
Electric Crematoria	3	8	15	26
River front facilities	8	3	24	35
Other schemes for biological regeneration of the river etc.	23	3	1	27
Total	85	38	88	211

Automatic Water Quality Monitoring Station of River Ganga (AWQMS)

Nine locations have been identified along the stretches of the river Ganga from Kannouj to Calcutta for installing Automatic Water Quality Monitoring Stations to monitor the quality of the river water continuously. Six stations, one

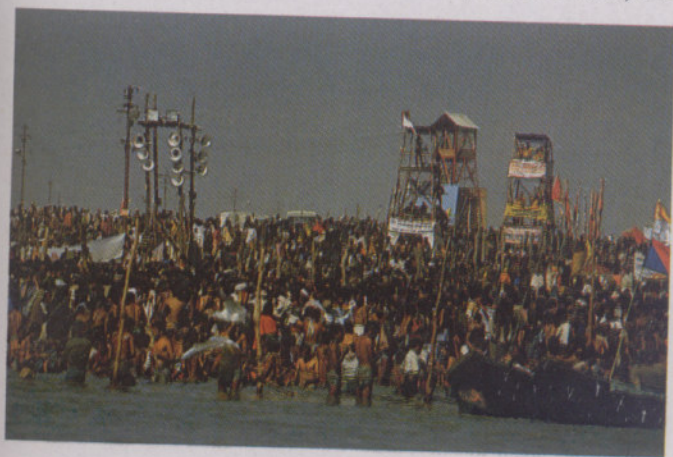


Fig. 43 Holy dip in the Ganges

in Kannouj, two in Kanpur, one in Patna, one in Varanasi and one in Allahabad have been installed so far and made operational.

Status of Control of Industrial Pollution along the River Ganga

The pollution control status in the 68 major polluting industries along the river Ganga is given in Table 5.

Table 5

Status	No. of industries			Total
	U.P.	Bihar	W.B.	
ETP installed	27	4	18	49
ETP under installation	-	-	01	01
No ETP at site	01	-	05	06*
Unit closed/lock-out	06	1	05	12
Total	34	5	29	68

* Prosecution has been launched against these 6 units.

Impact of the Ganga Action Scheme

Against the target set under Phase 1 of the GAP to create infrastructure capable of intercepting and diverting 873 mld of domestic sewage and capacity to treat 893 mld of domestic sewage, infrastructure capable of intercepting and diverting 543 mld and treating 297 mld of municipal sewage has been created. Besides this, completion of most of the low cost sanitation schemes and electric crematoria, has helped in reducing the pollution load of the river Ganga.

The efficiency of the GAP schemes with respect to people's health, is being evaluated and results available so far indicate that there is a decreasing trend in the incidence of water-borne diseases such as diarrhoea, helminthic infection, skin diseases, respiratory tract infection etc.

Public Participation

Initiatives have been taken to enlist people's participation in cleaning and maintaining the purity of the river Ganga through public awareness and education programmes involving non-governmental organisations, youth, pilgrims and school students.

Supreme Court direction to industries for setting-up Effluent Treatment Plants

In a public Interest Litigation (Civil) No. 3727 of 1985 - M.C. Mehta versus Union of India and others, the Hon'ble Supreme Court has directed that industries must set-up

effluent treatment plants to the satisfaction of the concerned State Pollution Control Boards. The case is being heard every week and the cases of individual mills are being reviewed regularly. Industries have already started taking concrete steps for setting up of the effluent treatment plants conforming to prescribed standards. On the directives of the Hon'ble Supreme Court, Ganga Project Directorate has sanctioned Rs. 8 lakhs each to the State Pollution Control Boards of Bihar and West Bengal to compensate for the additional expenditure incurred by them to ensure that the directives of the Supreme Court are carried out by the industries.

Ganga Action Plan-Phase II

Unlike GAP Phase I which is fully funded by the Central Government, the Second Phase of the GAP would be taken up as a Centrally Sponsored Scheme with equal contribution from the Centre and the State Governments Concerned. The Government has approved a Scheme of Pollution Abatement of Yamuna and Gomti rivers at an estimated cost of Rs. 421 crores. The estimated cost of Yamuna component is Rs. 357 crores for which external assistance from the Government of Japan is available. Pollution abatement works are to be taken up in 15 towns,

of which 8 are in Uttar Pradesh and 6 are in Haryana, besides Delhi. The estimated cost of the Gomti component is Rs. 64 crores and pollution abatement works are to be taken up in 3 towns namely Lucknow, Sultanpur and Jaunpur. The implementation period of both Yamuna and Gomti Action Plans is about 6 years.

To formulate an Action Plan for Pollution Abatement of the River Damodar, surveys and studies have been initiated to collect data. The Second Phase of GAP would also cover the following works :

- Works required but not included in the First Phase of GAP in 25 Class I Towns;
- Pollution Abatement works in Class II and Class III towns identified on the main river Ganga.

National River Action Plan (NRAP)

An Approach Paper on the National River Action Plan, (NRAP) has been approved by the Government at an estimated outlay of Rs. 1000 crores spread over a period of 10 years of which the share of the Central Government would be Rs. 500 crores. The NRAP will include grossly polluted stretches of those rivers of the country, not covered under the Ganga Action Plan Phase I and II. For this



Fig. 45 Earthen bunds built under Technology Mission and Yojna Mandal-a multi-purpose project

purpose, 14 grossly polluted stretches in 9 rivers and 14 less polluted stretches in another 8 rivers of the country have been identified and are under consideration for inclusion under the National River Action Plan. The stretches have been Classified based on pollution load surveys carried out by the Central Pollution Control Board. Some more stretches in these or other rivers may also be taken up, if required. Proposals from the State Governments of Gujarat, Punjab, Madhya Pradesh and Orissa have been received so far and action has been initiated to obtain approval of the Expenditure Finance Committee (EFC) for these proposals. Actual execution of work on smaller schemes like Low Cost Sanitation, Electric/Improved Wood Crematoria, River Front Development and Afforestation is likely to commence shortly.

National Afforestation and Eco-Development Board

The National Afforestation and Eco-Development Board (NAEB) is responsible for promoting afforestation, tree planting, ecological restoration and eco-development activities in the country. Apart from assisting in a massive afforestation effort, the Board encourages participation of the community at grass root level in the protection and

management of forests on the basis of 'care and share' through a systematic planning, implementation and monitoring approach.



Fig. 44 Greening of hill slopes

Objectives and Functions

The objectives and functions of NAEB are:

- To evolve mechanisms for ecological restoration of degraded forests areas and adjoining lands through systematic planning and implementation, in a cost effective manner;



- To restore through natural regeneration or appropriate intervention, the forest cover in the country for ecological security and to meet the fuelwood, fodder and other needs of the rural communities;
- To undertake all other measures necessary for promoting afforestation, tree planting, ecological restoration and eco-development activities in the country;
- To restore fuelwood, fodder, timber and other forest produce on the degraded forest and adjoining lands in order to meet the demands for these items;
- To sponsor research and extension of research findings to disseminate new and proper technologies for the regeneration and development of degraded forest areas and adjoining lands;
- To create general awareness and help foster peoples' movements for promoting afforestation and eco-development with the assistance of voluntary agencies, non-government organisations, Panchayati Raj institutions and others and promote participatory and sustainable management of degraded forest areas and adjoining lands;
- To coordinate and monitor the Action Plans for afforestation, tree planting, ecological restoration and eco-development.

Schemes

Various schemes under the NAEB are as follows :

- Integrated Afforestation and Eco-development Projects Scheme (IAEPS)
- Fuelwood and Fodder Projects Scheme (FFPS)
- Raising of Minor Forest Produce including medicinal plants (MFP)
- Grants-in-aid
- Seeds Development Scheme
- Aerial Seeding
- External aided projects
- Communication

Afforestation under the 20 Point Programme

The targets under 20-Point Programme for afforestation and eco-development activities from 1990-91 are set in two mutually exclusive items viz. 'seedling distribution' for planting on private lands and 'area coverage' in respect of

public lands, including forest lands. The targets and achievements for the year 1992-93 and 1993-94 are given in Table 6.

Table 6

	1992-93		1993-94	
	Target	Achievement	Target	Achievement
i. Area coverage (public lands, including forestslands) (area in lakh ha.)	10.64	10.62	11.65	6.76 (upto 30th November, 1993)
ii. Seedling distribution (for planting on private lands) (seedlings in crores)	145.00	124.00	135.09	54.89

Integrated Afforestation and Eco-Development Projects Scheme (IAEPS) (100% Centrally Sponsored):

This scheme is intended to promote afforestation and wastelands development by adopting an integrated approach to the management of land and other related natural resources on water-shed basis. The thrust is in favour of micro-level planning in selected micro-watersheds of identified districts in the States with the active participation of the local people at all stages of planning and implementation. Projects under the scheme are being implemented in all the States.

Fuelwood and Fodder Projects Scheme (50% Centrally Sponsored)

This scheme aims at augmentation of production of fuelwood and fodder to meet the community needs, conservation of bio-mass through promotion of energy saving devices and technologies and regenerations of degraded lands by village communities, and is being implemented in identified fuel and fodder deficient districts of the country. Projects under this scheme are being implemented in 23 States.

Centrally Sponsored Scheme for Raising Minor Forest Produce including Medicinal Plants

The minor forest produce scheme aims at conservation and improvement of the minor forest produce, including medicinal plants, by adopting effective production and appropriate silvicultural practices. It is specially meant to benefit the tribal and rural poor who depend upon the minor forest produce for their subsistence. The scheme is being

implemented in 23 states.

Centrally Sponsored Scheme of Seed Development (100% Centrally Sponsored)

The Scheme was initiated during 1988-89 with the objective of providing assistance to the State Forest Departments for developing proper facilities and infrastructure for collection, testing, certification, storage and distribution of quality seeds including the seeds of grasses and legumes. The scheme is under implementation in 23 States.



Fig. 46 Nursery at Cherapunjee

Centrally Sponsored Scheme - Aerial Seeding (100% Centrally Sponsored)

The main objective of this scheme is to regenerate inaccessible areas like mountains/hills, ravines, deserts etc. through aerial seeding which is expected to provide large area coverage at a reasonable cost. An area of 10,000 ha. has been aerially seeded in Tamil Nadu during 1993-94.



Fig. 47 *Pinus khasya* plantation under social forestry programme



Fig. 48 Roadside plantation, Cherapunjee

Eco-Task Force

Eco-Task Forces of Ex-servicemen is a joint venture of the Ministry of Environment and Forests, Ministry of Defence and the concerned State Governments to undertake ecological restoration work in selected environmentally degraded areas, particularly in unapproachable and inhospitable terrains. Besides providing re-employment to the ex-servicemen, this scheme also serves the cause of ecological improvement. Activities under the scheme include afforestation, pasture development, soil and water conservation and other restorative works. Achievements of the three Eco-Task Forces presently deployed in the States of Uttar Pradesh, Rajasthan and Jammu and Kashmir are given below :

Achievement of Eco-Task Forces during 1993-94 is given in Table 7.

Table 7

	127 Bn. (U.P.)	128 Bn. (Rajasthan)	129 Bn. (J&K)
Plantation (No. of seedlings)	4,34,525	5,44,194	1,35,000
Area covered (in ha.)	-	510	143

Grants-in-aid Scheme

Under this scheme, financial assistance is provided to Non-Governmental Organisations (NGOs) and Voluntary Agencies (VAs) to encourage their involvement in afforestation and wastelands development activities.

Technology Extension

Technology extension activities are undertaken as a component of the Integrated Afforestation and Eco-devel-

opment Project Schemes in collaboration with various technical institutions, Universities and Voluntary Agencies. Significant progress has been achieved in the production of quality seeds of grasses and legumes under this scheme.

Inter-Departmental Coordination

An Expert Group has been constituted to consider the various issues of Joint Forestry Management. The NAEB is also engaged in formulating an integrated grazing policy in coordination with the Department of Animal Husbandry.

The draft reports of the Policy Advisory Groups (PAG) on Grazing and Livestock Management as well as on Benefit Distribution from common lands were considered in the 1st Meeting of the National Afforestation and Eco-development Board held on 24.5.1993 and the report on Benefit Distribution from common land has been accepted and it has been decided to forward the report to NWDB for taking further necessary action. Regarding the report on Integrated Grazing Policy it has been decided to consult the Department of Animal Husbandry and Dairying before finalising the same. An inter-departmental committee has



Fig. 49 Village Protection Committee in discussion-an example of joint forest management

been constituted to consider amendments, if any, to the recommendations of the PAG report.

National Fund for Afforestation

The National Fund for Afforestation and Wastelands Developments, set up earlier, is being re-designated as the National Fund for Afforestation and Eco-development. Donations from individuals as well as corporate/non-corporate bodies to regenerate degraded areas/wastelands are eligible for 100% tax deduction under the relevant



Before



After

Fig. 50 Afforestation activities in Jhabua



Fig. 51 Two tier vegetation, Barapani

provisions of the Income Tax Act. The fund is managed by a Committee headed by the Minister of Environment and Forests.

Regional Centres

Seven Regional Centres have been set up under the World Bank assisted National Social Forestry Project (NSFP) in different universities and national level institutions like the IIM, Ahmedabad, Jadhavpur University, IIFM, Bhopal, etc. The Regional Centres provide support to the State Governments in preparing projects for afforestation and wastelands development people's participation. They also act as a forum for exchange of ideas and experiences amongst the States concerned as well as the Non-Government Organisations, and carry out evaluations, problem specific studies and training. The list of these centres is given in Annexure IV.

Mapping of Wastelands

The National Wastelands Identification Project (NWIP)



Fig. 52 Village Protection Committee members carrying grass for their use

was initiated in 1986 in collaboration with the National Remote Sensing Agency and the Survey of India to prepare district-wise wastelands maps on 1:50,000 scale by using satellite data under this project.

During 1992, processing of satellite data, ground-truthing and preparation of master copies of the maps for 84 districts was completed. The master sheets are under scrutiny in the Ministry of Defence for according security clearance before the maps are printed for distribution. In addition, preparation of wastelands maps for the 9 remaining districts of Madhya Pradesh has been commenced in order to ensure complete coverage of all the districts of this State under the project.

Geographical Information System (GIS)

Ten GIS projects were taken up in different agro-climatic zones in collaboration with some of the leading scientific/technical institutions in the country. The aim of these projects is to study the possible utilisation of the GIS technology for land use management, decentralised planning, and the programme for developing degraded lands. The pilot phase of these projects has since been completed and the results obtained are being evaluated with a view to enhance the scope of these projects to larger areas.



Fig. 53 Urban forestry nursery

Monitoring and Evaluation

Besides, the regular monitoring by the State Governments monitoring of progress of tree plantation/afforestation activities were undertaken at the Central Government level through various independent agencies like the Indian Institute of Public Opinion (IIPO), National Council of Applied Economic Research (NCAER), Institute for Research, Management and Economic Development, Agricultural Finance Corporation (AFC), and non-government



Fig. 54 Growth of bamboo culms at Jhabua Forest Division, Madhya Pradesh

organisations like PRADAN and individual forestry experts. Survival rate studies have also been entrusted to the Regional Centres.

The detailed district/taluk-wise information in respect of afforestation/tree planting activities are being compiled and computerised. These reports will be placed in the libraries of the Parliament and the Ministry of Environment and Forests so that such information is accessible to the people's representatives and to the general public. Samples checking in respect of the actual work done during the year 1992-93 in selected districts is being done through inde-



Fig. 55 Biomass production through social forestry in the North-East

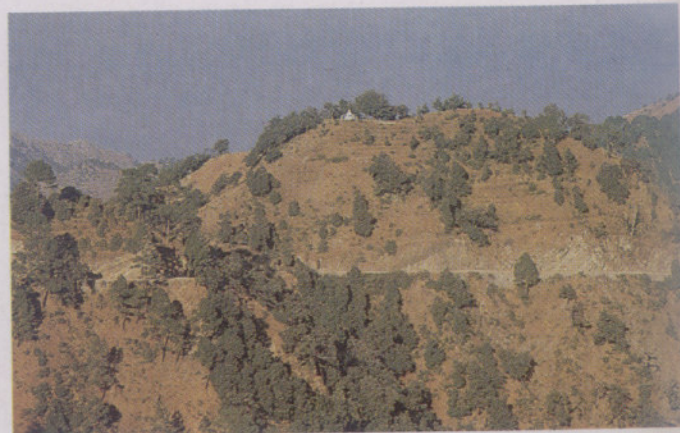


Fig. 56 An example of environmental degradation due to human activities

pendent agencies like educational institutions, retired forest officers, NGOs etc.

New Initiatives

Realising the need to evolve new strategies for wider involvement of stakeholders in the management of natural resources and care for the environment, an Expert Committee has been constituted to facilitate people's participation in Joint Forest Management.



Fig. 57 Bamboo plantation under Silvi-Pasture Scheme

It is proposed to implement a new scheme titled 'Rajiv Paryavaran Pariyojana' in selected districts of the country which have the following criteria;

- Acute environmental degradation problems (due to industries, deforestation, shifting cultivation, soil erosion, mining, etc.)
- Less than 40% crown density forests;
- Presence of unique eco-systems, which are threatened and required urgent protection.

7

RESEARCH

Environmental Research

The main objective of the environmental research programme is to develop strategies, technologies and methodologies for better environment management. It also seeks to develop infrastructure and trained manpower for undertaking environmental research in the country. The programme particularly aims at attempting solutions to the practical problems of resource management and provides vital inputs for development and formulation of action plans for conservation and restoration of environmental quality.

Research projects are funded in the multi-disciplinary aspects of environment protection, conservation and management at various universities, research and development institutions and non-governmental organisations in the country.

Research projects are supported under 3 main schemes, namely, (1) Man and the Biosphere (MAB) Programme; (2) Environment Research Programme (ERP); and (3) Action-oriented Research Programme for Eastern and Western Ghats. The MAB Programme mainly deals with ecological studies in various ecosystems, conservation of biodiversity and inter-relationships between man and his environment. The ERP covers chemical, biochemical and engineering studies. The Action-oriented Research Programme addresses itself to location-specific practical problems of resource management in the eastern and western ghat regions of the country.

During the year, 24 new projects were sanctioned, 20 projects were completed and 122 projects were on-going under the above mentioned schemes. The list of sanctioned and completed projects are given in Annexure - II and Annexure - III respectively.

Highlights of some of the completed projects

- A technology for integration of Artemia (prine shrimp, highly useful in prawn farming as food) in solar salt works has been developed at small field scale. The technology offers benefits of improving the quality and quantity of salt and yields valuable by-products of Artemia cysts and Artemia biomass.
- Cytology of 110 plant species of rare, endangered and endemic forest flora has been studied in the Andaman and Nicobar Islands. In a project on "Conservation of freshwater fishes of peninsular India," survey of critical habitats in Kerala, Tamil Nadu and Karnataka was



Fig. 58 Seed collection from plus trees for increasing productivity

carried out and a checklist containing 440 species has been prepared with other details. Studies on "Ecology and management of mammalian resources of Andhra Pradesh" revealed 46 species of which 6 are endangered and 18 are vulnerable.

- Floristic survey of Kolli hills in Tamil Nadu revealed occurrence of 910 species, out of which 41 species are endemic and 4 are rare. The endangered species are *Gnetum ula* and *Psilotum nudum*. Factors leading to rarity of the species were identified.
- Impact of thermal power plant on environment and agricultural productivity was studied in the vicinity of the Handuaganj Thermal Power Plant. Most of the water and soil parameters were within the permissible limits. Adverse effects on certain crops were noticed within a radius of 2 kilometers.

The 2nd volume of the publication "Environmental Research: Executive Summaries of Completed Projects",



Fig. 59 *Agaricus sp.*-a common mushroom

containing summaries of 138 research projects was published during the year in order to disseminate the results of research efforts to scientists, research students and other such agencies.

National Methane Campaign

The second phase of the project on "National Methane Campaign" was launched during the year involving the following organisations:

- Regional Research Laboratory, Bhubaneswar
- Central Salt and Marine Chemicals Research Laboratory, Bhavnagar.
- National Institute of Oceanography, Goa.
- Indian Agricultural Research Institute, New Delhi

The objective of the project is to understand the role of methane in global climate change and to evolve possible solutions for reducing its generation.

Integrated Action-oriented Programme on River Kaveri

The first phase of the project, coordinated by the Madras Science Foundation, has been completed. Information on biota has been collected and compiled. Twenty three locations have been identified as 'highly polluted'.



Fig. 60 A view of Garhwal Himalayas

Coordinated Research Project on Ethno-biology

It is an integrated inter-disciplinary multi-institutional project to study, evaluate and analyse multi-dimensional aspects of tribal life, culture, traditions and to understand the use of various plant and animal materials for medication, family planning, food and shelter by the aboriginals. The objective is to document the wisdom of the traditional knowledge system relating to conservation and use of



Fig. 61 Glacier between Gangotri and Gaumukh

natural resources. The following institutions are participating in this project :

- Central Drug Research Institute, Lucknow.
- Tropical Botanical Garden and Research Institute, Trivandrum.
- Nagpur University, Nagpur.

It is proposed to extend the second phase of the project to cover the remaining 20% of the tribal areas of the country.

G.B. Pant Institute of Himalayan Environment and Development

The Institute was established in August, 1988 as an autonomous organisation of the Ministry for developing strategies, technologies and knowledge for ecologically sound development of the Himalayan region.

During the year, the foundation stone for the building complex of the Himachal Pradesh unit of the Institute at Kullu was laid by the Hon'ble Minister for Environment and Forests.

Twelve action-oriented research projects launched earlier in different parts of the Himalayan region focusing on location-specific problems continued to be supported. Networking with other relevant organisations in the Himalayan region, elsewhere in the country and at the international level was also strengthened.

The Research Projects executed by the Institute during the year are:

- Improvement of the ecology and economy of selected watersheds in Sikkim:

- Development of agro-forestry models in Garhwal;
- Assessment of the existing agricultural practices for the purpose of improving and maintaining soil fertility in Kumaon hills.
- Assessment of the suitability of cultivation of several valuable medicinal and cash crops in Kumaon and Nagaland;
- Exploration of lesser-known wild food resources in Garhwal and Kumaon regions;
- Establishment and strengthening of a functional arboretum at Kosi-Katarmal, Almora;
- Impact of domestic sewage disposal on natural water quality of Almora.
- Evaluation, propagation and multiplication of selected multi-purpose tree species;
- Development of low-cost wastewater harvesting technology.



Fig. 62 A view of the Himalayan range

International cooperation was strengthened with International Centre for Integrated Mountain Development (ICIMOD) and two programmes namely Mountain Environment Resource Information System (MENRIS) and Eco-system Rehabilitation Project were initiated. The Institute continued to receive its support for Tropical Soil Biology and Fertility Programme from NORAD. A

UNESCO-sponsored regional seminar-cum-workshop on 'Conservation of biodiversity was also organised by the Institute during this year. The scientists of the Institute participated in the Nandadevi Expedition and the 10th Anniversary Celebrations of ICIMOD, Kathmandu (Nepal).

The procurement and installation of an Earth Station for enabling quick flow of information among its units located in remote areas have been finalised. Three Weather Monitoring Stations (WMS) for collecting and analysing climatic data for the Himalayan region have been installed by the institute.

Publications

The following publications were brought out by the Institute during the year:

- Himaparyavaran - a bi-annual newsletter.
- Agricultural Economy of Garhwal Himalaya.
- ENVIS Bulletin and Himalayan Bio-diversity.
- Conservation Strategies.

Research on Wetlands, Mangroves and Biosphere Reserves

Wetlands

In order to provide scientific and technical inputs for implementation of the management action plans, and encouraging research in the field of wetlands conservations, 25 research projects have been supported. During the year, the following three projects have also been sanctioned:

- Keoladeo National Park eco-system - Modeling and Simulation Studies
- Survey of wetlands and their associated flora and fauna in W.B. Districts from ecological perspectives
- A comprehensive investigation on wetlands in Amethi and Rae Bareilly (second phase)

Mangroves

In order to provide technical and scientific inputs for the effective management of mangroves in the country, 25 research projects have so far been sanctioned by the Ministry to selected nodal institutions/universities. During the year, the following three research projects have been supported under this scheme:

- Impact of mass collection of prawn seeds in mangrove ecosystem of Sunderbans Biosphere Reserve



Fig. 63 A hill stream in Western Ghats

- Survey, identification and screening of potential foliar fungi of mangrove ecosystem of Sunderbans
- Regeneration of mangroves in some degraded areas of Sunderbans

Biosphere Reserves

A scientific Advisory Committee has been constituted to oversee the research activities under the Biosphere Reserves. As per the recommendations of the Committee, seven research projects have been sanctioned by the Ministry during the year. The list of these projects along with the implementing institutions is given at Annexure - III.

Forestry Research

Indian Council of Forestry Research and Education (ICFRE), Dehra Dun

The ICFRE, an autonomous body of the Ministry of Environment and Forests holds the mandate to organise, direct and manage research and education in the field of forestry. It is also responsible for framing the overall Forestry Research Policy of the country and ensure the best method of application of all sources of scientific knowledge to the solution of Problems facing the forestry sector. Various research institutes and centres under the Council are as follows:

- Forestry Research Institute (FRI), Dehra Dun
- Tropical Forest Research Institute (TFRI), Jabalpur
- Institute of Wood Science & Technology (IWST), Bangalore
- Institute of Forest Genetics & Tree Breeding (IFGTB), Coimbatore

- Institute of Rain and Moist Deciduous Forests, (IRMDF), Jorhat
- Centre for Forest Productivity (CFP), Ranchi
- Temperate Forest Research Centre (TFRC), Simla
- Centre for Social Forestry and Environment (CSFE), Allahabad

All the above institutes of ICFRE continued various research activities in different eco-climatic zones in which they are located. Some of the major research activities undertaken and research findings made during the year by the Council and its institutes are as follows :

- It has been observed that the mortality of Sal forests is more severe in those areas where dead and drying trees have been removed and the area is prone to fire and grazing.
- Silvicultural operations such as thinning, canopy opening, controlled burning, etc. have been suggested in non-observance of silvicultural operations areas for revitalizing the regeneration process.



Fig. 64 Demonstration of agro-forestry model under UNDP sponsored project at the ICFRE, Dehradun

Studies conducted at the Arid Forest Research Institute (AFRI), Jodhpur with various species reveal that *Prosopis juliflora* attain the best growth in the desert region and should be preferred for sand dune stabilisation.

- Studies on various methods of rain water harvesting and its conservation conducted by AFRI show that among the different methods, the method of inter rowridges having 20% slopes is best effective for harvesting and storing maximum water producing best growth in *Azadirachta indica*, *Tecomella undulata* and *Prosopis cineraria*. In terms of total biomass production (on dry weight basis), this treatment provided four fold increase (16.93 q/ha to 63.94 q/ha) in *Azadirachta indica*, seven fold in *Prosopis cineraria* (4.49 cm/ha to 39.6 cm/ha) and about five and half folds in *Tecomella undulata* (3.81 q/ha to 21.21 q/ha). The practice of weeding alone produced more than two-fold biomass increase in all these species.
- Studies conducted to determine the optimum time of seed collection in silver fir have shown that the cones collected during second and third fortnight of September give as good germination as mature cones collected during first fortnight of October, provided, the cones collected in September are allowed to mature under cool and dry conditions.
- Experiments conducted to find out the effect of kinetin on seed germination in spruce (*Picea smithiana*) have shown that the seeds treated with 1.5 ppm solution after 72 hours of water soaking give germination of 52.5 per cent which is considered quite high in the species.
- Studies conducted in cold desert areas of Spiti Valley in Himachal Pradesh have revealed that the seeds of *Rosa webbiana* gives 92 percent germination when treated with concentrated sulphuric acid for 20 minutes as against 8 percent in untreated seeds.
- *Ephedra gerardiana*, an important indigenous multi-purpose shrub having its medicinal value, fondly used as fuel by local people, was identified for afforestation studies.
- On the basis of preliminary results of the studies conducted on possibilities of biological control of weeds of Deodar forests have revealed that *Rumex nepalensis* and *Polygonum alatum* can be controlled biologically by the insect *Colasposoma semicostatum*.
- Scientific investigations on mycorrhizae reveal that Verbuscular Arbuscular Mycorrhizae (VAM) not only helps in making available insoluble phosphates and potassium to the plant by solubilising them but the Mycorrhizae hyphae also serve as an effective extension of the plant root system, providing it access to

larger quantity of nutrients and water. VAM also improves production by enhancing diseases and pests resistance.

- Research on developing biopesticides from plant products has been initiated at the ICFRE institutes for controlling pests affecting forests and agricultural crops. Various extractives of *Dalbergia stipulacea*, *Melia azedarach*, *Hopea parviflora*, *Mangifera indica* and *Hevea brasiliensis* have been found to have insecticidal and fungicidal properties and are being investigated for practical application.
- The FRI, Dehra Dun and AFRI, Jodhpur have conducted successful research trials on rejuvenating saline sodic soils which include investigating critical limits of salt tolerance to identify stress tolerant species-provenances, soil amelioration, optimal planting season, application of mycorrhizae and in leguminous trees rhizobium.
- Research work on rehabilitating lateritic soils ravinous and gullied area has been initiated by the Council's institutes at Jabalpur and Jodhpur.
- Research attempts at ecologically rehabilitating mined areas in the Himalaya with ecologically compatible plant species of economic value have provided fruitful results. Findings indicate that mined areas can be rehabilitated and biorejuvenated within 8 to 9 years for sustained production of economic goods for locals.
- During the year, ICFRE coordinated with State Forest Departments of West Bengal, Orissa, Andhra, Tamil Nadu, Karnataka, Goa, Kerala, Maharashtra, Gujarat and Union Territories of Andaman & Nicobar, Lakshadweep, Pondicherry, Daman & Diu in initiating scientific management of mangroves.
- A field experiment with various Nitrogen Fixing Tree (NFTs) and others was conducted on eroded skeletal soils with poor moisture and nutrient availability in the Sambalpur region of Orissa to evaluate their potential for biomass production. It was found that biomass was highest (2.67 kg/plant) for the species *Brocera* and lowest (0.198 kg/plant) for *Cquisetifolia*. The species *Dulce* failed totally at the site in biomass production.

In order to study and monitor the ecological characteristics and changes in representative habitats, preservation plots and sample plots have been laid out by the Forest Research Institute in collaboration with the State Forest

Departments, in respective locations. Of 309 preservation plots (covering around 8500 hectares) - laid out since 1905, 187 are in natural forest, and 122 in plantations. Of 207 forest types, only about 60 are represented so far, and efforts are on to establish more new preservation plots so as to have a complete coverage of all forest types.

- The Institute of Forest Genetics and Tree Breeding (IFGTB), Coimbatore conducts national level research in the field of forest genetics and tree improvement while the short term projects include identification and maintenance of seed stands and seed production areas, selection of plus trees and establishment of first generation clonal seed orchards and provenance testing, the long term projects include studies on reproductive biology and breeding systems, progeny testing, studies on genetics of tree characteristics, hybridization, isozyme studies and genetic conservation. In addition, ICFRE coordinates tree improvement programmes of different State Forest Departments and provides technical assistance in developing, maintaining seed orchards, and seed production areas and the conduct of provenance trial.
- The TFRI, Jabalpur has identified about 3000 ha. of new seed stands of teak, bamboo and casuarina in M.P., Maharashtra and Orisa and the IFGTB, Coimbatore one seed production area at Valparai (T.N.) and to near Trivandrum (Kerala) for *Eucalyptus grandis*. ICFRE has targeted at establishing 60,000 ha. of seed stands for important species.
- The Institute of Forest Genetics and Tree Breeding, Coimbatore has undertaken extensive surveys in seven districts of Tamil Nadu and selected 50 candidate plus trees of *Azadirachta indica* and twenty five candidate plus trees of *Casuarina equisetifolia* which are being vegetatively cloned. Another 20 plus trees of *Tectona grandis* selected from Tamil Nadu, Kerala and Andhra Pradesh for their resistance to defoliator and skeletoniser attack and superior role and crown characters have been assembled in a clonal seed orchard. AFRI, Jodhpur has marked 15 candidate plus trees of *Tecomella undulata*, 4 of *Acaia senegal*, 8 of *Acacia tortilis*, 4 of *Acacia nilotica*, and 6 of *Prosopis cineraria*.
- The Institute of Forest Genetics and Tree Breeding is conducting provenance trials on many important tree species like *Acacia nilotica*, *Albizia lebbek*, *Casuarina equisetifolia*, *Eucalyptus canldulensis*, *E. grandis*, *E.*

- nicrotheca*, *E. tereticornis* after extensive study of their population structures. Studies on six provenances each of *Albizia lebbek* and *Acacia nilotica* from southern state revealed that Nathampatti and Mannarkovil provenance of *A. lebbek* and Ghat Road and Local provenances of *A. nilotica* were superior in performance.
- A parent progeny trial of teak has been established at Nilambur (Kerala) using open pollinated seeds (half sibs) collected from twenty clones assembled in a clonal seed orchard at Walayar (Kerala). Analysis of variance on data of six month old seedlings revealed significant differences among clones for mean values.
 - With the objective of establishing clonal seed orchard for different multipurpose trees species like *Acacia nilotica*, *Albizia lebbek*, *Azadirachta indica*, *Casuarina equisetifolia* and *Eucalyptus grandis*, extensive surveys were conducted and phenotypically superior trees were selected and marked.
 - Germplasm banks aim at conserving a broad spectrum of genetic variability to act as a reservoir for present and future needs.
 - The Institute of Forest Genetics and Tree Breeding has a germplasm bank of elite teak trees with 20 clones representing the southern states of the country. Twenty six clones of *Eucalyptus tereticornis* and *E. camaldulensis* have been screened using high intensity selection procedures and 40 superior performers in *Casuarina equisetifolia* identified and rooted using cladodes, the developed plants assembled in clonal multiplication gardens.
 - Large polythene bags of the size of 75 cm X 45 cm with hard bottom have been standardised successfully for rooting of green tender/ cuttings of Eucalyptus, Casuarina and Gliricidia when water and electricity are scarce. The polythene globule has trapped air and high humidity and cutting material kept inside does not require watering or care for 21 days.
 - A mist chamber was designed and developed with specific purpose of maintaining high humidity, reduced ambient temperature and adequate air circulation by relatively reduced vapour pressure gradients.
 - Macropropagation rooting protocols for *Acacia nilotica*, *Albizia lebbek*, *Gliricidia sepium*, *Pinus roxburghii*, *Dalbergia sissoo*, etc. under ambient conditions has been successfully standardized. Hundred percent success in rooting of juvenile cuttings of *Eucalyptus camaldulensis* in mist chamber and 70 percent in polytent conditions were achieved and successfully transferred to field.
 - Extensive studies have been made on *Eucalyptus hybrid* with respect to variation in strength from pith to periphery, top to bottom, age of the tree and locality of plantation. It has been found that there is no significant difference in the strength of *E. hybrid* from Punjab, Haryana and Uttar Pradesh. The strength has been found to vary with the age and increases significantly upto the age of 14-15 years and thereafter no appreciable change has been observed.
- Poles of *Casuarina* and *Eucalyptus hybrid* treated with toxic Copper Chrome Arsenic (CCA), Acid Cupric Chromate (ACC) and Copper chrome Boric (CCB) compositions remain in good conditions whereas, untreated ones decay within two years. Durability tests on *Acacia tortilis*, *Prosopis chilensis* and two bamboo species are being conducted besides *E. hybrid*, which seems to be moderately durable on the basis of field test carried out at Dehra Dun.
- Researches have been conducted at TFRI, Jabalpur on various aspects like nursery techniques including time and method of sowing, planting techniques with varied spacing and pit size, coppicing, pollarding, collection, drying, storage and grading of Tendu leaves.
 - A survey was carried out by TRPI, Jabalpur to assess the variability in oil content in the seeds of *Jatropha curcas*. The results indicated that the best season for planting branch cuttings for sprouting and rooting was March-April. Heavy mortality was observed in cuttings planted during rainy season (June-September). Cuttings planted in the month of October took longer time for sprouting and rooting and cuttings planted in the month of November to February did not sprout till March.
 - Studies for the species like Eucalyptus, Chir, Sal, Teak and Poplar have been carried out in relation to different edaphic and climatic zones.
- So far 30 case studies on cost-benefit analysis of forest plantations in the country have been conducted. Economic models have been developed for a wood producing fire, growing trees for commercial purposes in a competitive market. Cultivation of Eucalyptus on a wider spacing in combination with agricultural crops at

8 year rotation was found to yield high economic returns.

Indian Plywood Industries Research and Training Institute (IPIRTI)

The IPIRTI, an autonomous organisation of the Ministry, undertakes research aimed at enlonging service life of wood and wood products, economising wood volume in end use and reducing wastage in conversion as well as application, with the ultimate objective of reducing pressure on natural forests. The Institute has established close linkages with the mechanical wood industries, particularly plywood industry.

Besides, continuing with its 35 on-going research projects, the IPIRTI also initiated work on four new projects during the year. Some highlights of these research projects are as follows:

- The appropriate technology developed under the project "Development of Bamboo Mat Board" has resulted in the revival of Bamboo mat weaving for rural and tribal women in backward and remote areas.
- Under the project "Demonstration and Training in Primary Processing of Small Diameter Logs", a breakdown saw for tiny units has been designed, installed and demonstrated. Research works to develop a similar system for small to medium units are also being undertaken.

Indian Institute of Forest Management (IIFM) Bhopal

The IIFM, an autonomous organisation of the Ministry and a management institute in the forestry sector, mainly focuses on economic and social aspects of forest management though it also undertakes ecological and silvicultural research. The projects undertaken are location-specific and problem oriented. Action research is also given due emphasis to involve the people in the participatory forestry management.

At the initiatives of the Ministry, the Institute has taken up a project preparation for eco-development under Global Environmental Facility (GEF) for Pench National Park. The field work for survey of nearly 40 villages around the Park has been completed. Field exercises for Participatory Rural Appraisal (PRA) groups of 6 villages have been completed.



Fig. 65 Pressure on land-Terraced agriculture

Wildlife Research

Wildlife Institute of India (WII)

One of the major activities of the Wildlife Institute of India (WII) is to conduct research in selected priority areas pertaining to wildlife. WII's research encompasses a wide range of ecological and biological management and socio-economic aspects of wildlife conservation. The WII emphasise on applied research to help and enhance protected area management in this country. Another important function of WII's research activities is to develop the professional capabilities of WII faculty and keep the abreast of current field situations, management needs and research trends at all times.

During the year, seven research projects and two studies on "snow leopard" and "giant squirrel" have been completed. Three other studies on: (1) Socio-economic study in the wild ass project; (2) Gir lion and (3) study of



Fig. 66 A crocodile-the species needs protection



Fig. 67 The Indian roller-also known as Blue jay

crocodiles, have also been initiated.

A survey report of the Turtle and Tortoise Conservation Project has been published in collaboration with WWF-India and Traffic-India, which contains vital information on distribution and conservation status of the different species of inland turtles and tortoises of value to support field programmes as well as adjust statutory to improve protection.

Other important studies initiated earlier on Montane grasslands in Himalayas, Ecology of Indian Wolf, Integrated Forest Management in Satpura are in progress.

A survey project on identifying and suggesting alternate habitat for the Asiatic Lion has been undertaken by the Institute. Preliminary reconnaissance work has been completed. Another detailed remote sensing and GIS based study has also been initiated to develop strategies for revitalisation of crucial corridors for genetic interlinking. A project on release of captive Musk Deer in Kedarnath Wildlife Sanctuary is being initiated.

Realising the mandatory need for reliable Environmental Impact Studies for development Projects and in view of its experience in carrying out such studies WII has been now established an Environmental Impact Assessment (EIA) Cell under the directives of the Governing Body.

The EIA Cell has completed the following two major

consultancy projects :

- Study on the EIA of the HBJ Gas Pipeline upgradation Project
- Study on the EIA of the Vishakapatnam -- Vijayawada pipeline on Wildlife and their habitats.

The Wildlife Institute of India has coordinated between Ministry of Agriculture, Government of India and the International Crane Foundation, USA to facilitate the quarantine procedures and requirement of health certificate to enable the release of the young birds reared in captivity in USA and in Russia at Keoladeo Ghana National Park at Bharatpur. The WII will be involved in the health check and the proposed release of two captive bred young siberian cranes at Bharatpur during this season.

Salim Ali Centre for Ornithology and Natural History (SACON), Coimbatore

Research on issues related to conservation of bio-diversity is the major objective of SACON, which is an autonomous organisation of the Ministry. Work on the following research projects was continued by SACON during the year :

- A study on the biology, status and conservation per-



Fig. 68 A Flamingo



Fig. 69 A flock of Pelicans fishing together

spectives of certain rare endemic avifauna of the Andaman and Nicobar Islands.

- Monitoring of the Keoladeo National Park Eco-System.
- Status and Distribution of Western Tragopan.
- Survey of Wetland of Etawah and Mainpuri districts of U.P.
- Impact of Development Projects on the Fish Diversity of the Western Ghats.
- Status of Feral elephants in Andamans.
- Long-term monitoring of elephant habitat interaction in Mundumali Wildlife Sanctuary, Tamil Nadu.
- A rapid assessment of Bio-diversity in Mehao Sanctuary (Muhmi Hills, Arunachal Pradesh) through Remote Sensing and GIS.



Fig. 70 Painted storks nesting on a tree top

- Keoladeo National Park Eco-System — Modelling and simulation studies.
- Breeding strategies of Birds in a Tropical Moist Dicluous Forest at Sravani, Coimbatore.
- Impact of Human Interference on the Bird Communities in the Nilgiri Bio-Sphere Reserve.
- Indian Avifauna -- A National Database.
- Pesticide Contamination in Nilgiri District with special reference to selected Avifauna.

The Management of fragmented Rain Forests of the Western Ghats for the conservation of fauna with emphasis on small mammals.

- Ethno-ecology of medicinal plants in the Nilgiri Biosphere Reserve.



Fig. 71 Pangolin-the Indian scaly ant-eater

- Survey of Information Resources and Services in Ornithology and Natural History.

Other Activities

- As a participant in the "Expedition Nandadevi" undertaken during May-July 1993, SACON conducted an assessment of the impact of 12 years of closure of the core area of the Nanda Devi National Park on the avifauna which indicates that rare avifauna population has increased due to the ban. A Workshop on 'Avian Conservation' in India was conducted at SACON premises, during 3-5th August, 1993 in collaboration with Birdlife International-Asia.
- A project to map eight Project Tiger areas in the country, using remote sensing data and ground verification has been undertaken. The maps will depict physical



Fig. 72 A Butterfly-several species of which are endangered and need protection

features, management zones, forest cover and land use pattern in the area.

A handbook on Keol-adeo National Park is being produced in collaboration with the WWF-India.

Details of Research Activities Under Ganga Action Plan

A Research Committee, under Ganga Action Plan, has identified the thrust areas of R&D work to meet the specific requirements of the Ganga Action Plan particularly on low cost technology options for sewage treatment using non-conventional technologies. More emphasis has been laid on scheme specific and site specific activities which have a direct bearing on the objectives and mandate of the Ganga Action Plan.

Water Quality Monitoring

The water quality monitoring of river Ganga has been revamped and involvement of Research Organisations and Universities situated along the river Ganga has been sought. Under the revised monitoring schedule, the number of parameters have been reduced from 42 to 21 (14 Physio-chemical and 7 heavy metals (pesticides). The scope of monitoring has been enlarged to include sediment analysis and pollution source identification. The number of monitoring stations (27) and frequency of sampling (thrice a month on three transectional width) remain unaltered.

The Water Quality Monitoring of other rivers taken up under Ganga Action Plan phase II, i.e. river Yamuna including W.J.C. Hindon and Gomti has also been initiated to collect the base-line data on water quality and evaluate

the efficacy of the works being undertaken.

Water quality has been observed to improve discernibly in towns where pollution abatement schemes have been commissioned wholly or in part. It has also been observed that both the Dissolved Oxygen and Bio-chemical Oxygen Demand are meeting the permissible limits for bathing in all the main towns except Kanpur.

Twenty two research projects and studies on scheme specific and site specific thrust areas such as Pollution Monitoring, Resource Recovery, Bio-monitoring and Bio-conservation and Impact Assessment of Ganga Action Plan on health have been initiated during year. Low cost and



Fig. 73 Golden Oriole-found throughout the country

unconventional technologies for sewage treatment through plantation and aquaculture are being studied with a view to finding alternatives for sewage treatment. Possibilities of initiating available technological options for disinfection of sewage through ultra-violet and gamma radiation are being explored. Under the directions of the Planning Commission, the works completed under the Ganga Action Plan Phase I were evaluated by four experts from reputed Universities who have submitted their evaluation reports. Recommendations, wherever feasible, are being incorporated in the schemes being formulated under Ganga Action Plan Phase II and the National River Action Plan.

The technology of Afforestation with Raw Sewage' developed by the Central Soil Salinity Research Institute, Karnal, has been applied under the Action Plan Phase I at Buxur and Varanasi. It is proposed to popularise the technology through deliberations by the experts in various towns where the schemes under Ganga Action Plan are under implementation.



Fig. 74 Rehabilitation of Turtles under Ganga Action Plan

National Natural Resources Management System (NNRMS)

The main objective of the scheme is the utilisation of remote sensing technology with conventional methods in monitoring of natural resources such as land, water, forests, minerals, oceans etc. for attaining sustainable development by addressing the following aspects :

- Optimal utilisation of the country's natural resources by a proper and systematic inventory of the resource

availability.

- Reducing regional imbalances by effective planning and in tune with the environmental efforts.
- Maintain the ecological balance with a view to evolve and implement the environmental guidelines.

To achieve the above objectives, a Standing Committee on Bio-resources and Environment has been constituted. The Committee has identified 37 priority areas for undertaking research projects involving Remote Sensing Technology. Committee has also identified the key issues which can be grouped as follows :

- General information and needs in the field of bio-resources and environment. This covers mainly forests, grasslands, plant and faunal resources, wetlands, pollution aspects, wetland development wildlife habitat, forestry etc.

Out of 17 Research Projects sanctioned so far under the Scheme, nine projects have already been completed and remaining are at different stages of completion. Two more new research projects have been sanctioned during the year. The list of the projects sanctioned during the year are given at Annexure II.

8

EDUCATION, TRAINING AND INFORMATION

Forestry Education, Training and Extension

The Indian Council of Forestry Research and Education (ICFRE), an autonomous institution of the Ministry is the focal point for forestry research, education and extension development in the country. Transfer of technology, creation of public awareness, extension of technical support to State Forest Departments, NGOs, etc., coordination and collaboration between users and scientific groups are the major areas of ICFRE's forestry extension programmes and the council achieves these through publication of brochures and books, organisation of short courses and seminars, production of film and other audio-visuals and adoption of villages for developing social forestry models.

During the year, ICFRE published about 15 brochures on various tree species and about 6 books on various aspects of forests. The following activities were also undertaken by the Council.

- Capsule courses of one week duration on seed technology and bio-fertilizers were conducted.
- Forestry programmes for alleviation of poverty have been launched in 100 villages by ICFRE institutes covering over 100 NGOs and 50,000 farmers. Socio-economic and soil surveys have been conducted in these villages for planning agro-forestry packages compatible with edaphic and local social and economic requirements. Tree and forest awareness programmes have also commenced in the adopted villages.
- A National seminar on 'Forest Products' was organised at Coimbatore.
- A Seminar on 'Forest Productivity' was organised at Jodhpur.
- A Seminar on 'Forestry Education' has been organised at Jabalpur.

Forest Research Institute (FRI), Dehradun

The highlights of the activities of the FRI, a deemed university, during the year are as follows:

- The FRI has received requests from Jordan, Cambodia, Vietnam, Nepal, Myanmar and Bhutan to assist them in the education of their forestry professionals.
- About 102 candidates are registered for Ph.D. in various disciplines of forestry.
- The AIFC Diploma has been assessed and equated to

M.Sc. (Forestry) to encourage academic pursuit among serving foresters.

Indian Plywood Industries Research and Training Institute, Bangalore

The IPIRI, an autonomous body of the Ministry also conducted the following training courses/seminars etc.

- Six vocational training courses for 43 candidates.
- The 1-year certificate course in 'Mechanical Wood Industries Technology' was completed by 22 candidates in August, 1993.
- A one day brain-storming session on bamboomat board was organised in August, 1993 at Bangalore.
- An international training workshop on "Bamboo Mat Board Production" was held in January, 1994 at Bangalore, attended by participants from 10 Asian countries.

Indian Institute of Forest Management (IIFM), Bhopal

The Indian Institute of Forest Management, an autonomous body of the Ministry, imparts education and training in forest management aimed at inculcating professionalism in forestry management.

The following courses/workshops were conducted by the IIFM during the year :

- The regular 2-year Post-Graduate Diploma in Forestry Management.
- Management Development Programme on participatory forest management during May, 1993.
- National Workshop on Farm Forestry Management, June, 1993.
- Management Development Programme on Integrated Watershed Management, July, 1993.
- Workshop on Joint Forestry Management Networks July, 1993.
- Management Development Programme on Sustainable Management of Forest Resources, September, 1993.
- Management Development Programme on Forest Management-New Challenges, November, 1993.

'A fifteen month's Masters' level course by IIFM on "Resource Management" for inservice foresters, administrators and all practicing resource managers etc., has been approved in principle and the first course is scheduled to start from June, 1994.



Fig. 75 A field training programme at the Pichavaram mangrove ecosystem

Indira Gandhi National Forest Academy (IGNFA), Dehradun

The Indira Gandhi National Forest Academy is a premier forestry training institution of the country imparting inservice training to IFS probationers. This Academy has so far trained 1613 IFS probationers and 226 foreign trainees from neighbouring countries of South East Asia.

Sixty-four IFS probationers including 10 lady officers and 2 trainees from Bhutan passed out during the year and another 64 are in the second year of their training.

During the year, the Academy also organised two refresher courses in the field of computer application, project formulation and evaluation, in which forest officers from various States participated.

A proposal to strengthen the infrastructural set up of this Academy to bring it to the level of a Staff College at par with the Administrative Staff College of India, Hyderabad is under consideration.

State Forest Service Colleges

The Directorate of Forest Education, Dehradun coordinates the training of the officers of the State Forest Services and Forest Rangers, provided by the following colleges:

- State Forest Service College, Dehradun
- State Forest Service College, Coimbatore
- State Forest Service College, Burnihat
- Eastern Forest Rangers College, Kurseong

The three SFS colleges continued with their 2-year Diploma course in Forestry for SFS Officers and a total of

about 114 officers from various States are attending these courses.

Fifty-four forest rangers are being trained under the two-year Rangers Course being conducted by the Eastern Forest Rangers College at Kurseong.

The Committee constituted by the Ministry to look into the revision of rules/syllabii for the SFS/Rangers Training Courses as well as the training courses for subordinate levels in Forest Departments of the various States, has submitted its report during the year.

The report of the pilot study on "Manpower Planning in Forestry Sector in Uttar Pradesh" carried out by the Directorate in collaboration with the Institute of Applied Manpower Research, New Delhi, has been forwarded to the Principal Chief Conservator of Forests, Lucknow for comments and finalisation.

Wildlife Education and Training

The Wildlife Institute of India (WII) continued its activities to provide inservice training in Wildlife Management to forest officers, wildlife ecologists and various other professionals.

During the year, the following regular courses were conducted by the WII:

- 9 months Diploma and Certificate Courses for Protected Area Managers at the professional and field technician levels, attended by 17 Indian participants and 2 participants from China and Nepal.
- A three and half month "Eco-development Planning Course" during April-July attended by 15 participants including 2 representatives from NGOs.
- A three and half month "Management Planning Course" for Park Area Managers during October-January, 1994. Both these courses were organised under the UNDP-FAO collaborative project on "Strengthening the Wildlife Management and Eco-Development Planning Capabilities".
- A one-week capsule course for IFS officers.
- A one-week course on Environment and Nature Conservation in November, 1993, in collaboration with the Military Training Directorate of the Indian Army for senior army officers.
- A 10-day course for zoo technicians.

- A 10-day course on Interpretation and Conservation Education for NGOs and forest officers.

The following courses are scheduled to be held shortly in collaboration with the British Council :

- An one-week course for all India Services and Central Service Officers on "Conservation and Care of Physical Environment".
- A 3-week course for wildlife managers on "Wildlife Management".
- A 10-day course on "Monitoring for Conservation".
- A 6-week "International Wildlife Conservation and Management Training Programme" is also scheduled to be held in March, 1994, in collaboration with the Smithsonian Institution, USA and is intended for forest officers, university researchers and NGO personnel from India and other South and South-East Asian countries.

The Institute also organised the following workshops during the year :

- The XII Annual Research Seminar on the WII's ongoing and completed research projects.
- A seminar on the "Training Needs in Wildlife Sector".
- A workshop on "Animal Damage Control" at Madhav National Park, Shivpuri, M.P.

Besides this, the WII also published a poster and a survey report on India's turtles and tortoises and a primer on "Biodiversity Conservation" for school children. Nature education activities including nature excursions were organised for school children during wildlife Week and World Environment Day. The Institute helped the Corbett National Park in designing their guide training programmes and also participated in several exhibitions including the one organised by the Ministry during the International Trade Fair-93 at New Delhi.

The Institute's computerised data base which carries information on the biogeographically correlated network of protected areas, status of different species and bibliography on wildlife literature has been updated with the inclusion of information received from various protected areas. One PC based GIS package ArcInfo version 3 4D has been procured from Environmental Systems Research Institute (ESRI), Redlands, USA and efforts are underway to link up the information in the Database with ARCINFO

GIS package so that PA maps, species distribution maps and habitat types maps may also be produced. The GIS team of WII consisting of faculty and computer personnel are presently undergoing a specialised training on the Institute's GIS set up, being imparted by the US counterpart working under the WII-USFWS collaborative project. WII has also commenced one to two week formal training on the use of computers and software packages to the participants in its various training courses.

Formal Environmental Education

The Ministry is continuing its interaction with University Grants Commission (UGC), National Council of Education, Research & Training (NCERT), Department of Education, Ministry of Human Resource Development (MHRD) etc. for implementing programmes related to environmental education. The Ministry has also constituted a Committee to review the facilities available for training in management of resources & environmental management at school & college level educational programmes. Regular inputs to UGC & MHRD is provided by the Ministry for implementation of several environmental educational programmes at various levels. UGC in consultation with the Ministry is formulating a common Course on environmental education for students at graduate levels for different colleges & universities.

Non-formal Environmental Education and Awareness

Environmental education, awareness and training plays a vital role in promoting people's participation in activities aimed at conservation, protection and management of environment. The Ministry, therefore, accord priority for the promotion of non-formal environmental education and



Fig. 76 Students' participation in tree plantation



Fig. 77 Students' participation in an awareness camp on Animal Welfare under NEAC-93

creation of awareness among all sections of the society through diverse activities using traditional and modern media of communication.

National Environment Awareness Campaign (NEAC), 1993

The Ministry has been organising the National Environment Awareness Campaign (NEAC) every year since 1986, with the aim of creating environmental awareness at all levels of the society. While the main themes for this year's NEAC were "Animal Welfare and Waste Management", the campaign also addressed other environmental issues such as management of hazardous chemicals and non biodegradable wastes, recycling of wastes/waste utilisation, women's role in waste utilisation, eutrophication of water bodies, fuel and fodder, wildlife protection etc. Around 1500 organisations comprising of NGOs, schools and colleges, universities, research institutions, women and youth organisations, including NSS and NCC, Government Departments etc. from various States and Union Territories were provided financial assistance for organising various awareness activities like seminars, workshops, training courses, camps, padyatras, rallies, public meetings, exhibitions, essay/debate/painting/poster competitions for school children, folk dances, street theatres etc. and for preparation and distribution of environmental education resource material. The target groups covered under the campaign are students/youth, teachers, women, NGOs, farmers/rural population, general public, professionals, voluntary workers etc.

Seventeen organisations located in different part of the country were designated as Regional Resource Agencies (RRAs) for assisting the Ministry in planning, implement-

ing, monitoring and evaluating the activities of NEAC in their respective areas. These RRAs played a key role not only in selecting participating agencies for the Campaign programmes but also in implementing the Campaign in their respective areas of jurisdiction.

Other projects

The Ministry continued to support various other proposals on non-formal environment education and awareness such as setting up of eco-clubs, preparation of films/audio-visuals on environmental themes etc. A new set of guidelines have been formulated for the Eco-clubs scheme and circulated to State Governments, NGOs, Educational Institutions etc. The scheme envisages participation of school children in various activities related to ecological conservation and preservation of the environment. The Eco-Clubs shall be established in Government recognised schools and each club will have 20-50 members taken from among the students of class VI to X. A group of 20-50 Eco-Clubs in one or more geographically contiguous districts shall be serviced by a Coordinating Agency which may be a well established Educational Institution, a Non-Governmental Organisation or a professional body. About 200 Eco-Clubs have been set up so far.

Realising the potential of films/audio-visuals in spreading environmental messages among the masses, the Ministry has been supporting the production of documentary films on various aspects of environment. Besides being telecast by Doordarshan, these films are also made available to various governmental and non-governmental organisations, educational institutes etc. for screening. During the year, 26 such films have been commissioned by the Ministry. The list of these films is given in Annexure V.

In addition, at the initiative of the Ministry Panels with environmental messages were displayed on State Transport buses in three States for creating environmental awareness among the public.

Paryavaran Vahinis

The Paryavaran Vahini scheme, launched during last year with the basic objectives of creation of environmental awareness through people's participation and reporting on violations of environmental legislation and environmental degradation was continued during the year. So far, 110 districts spread over 25 States and 4 Union Territories, and showing high incidence of pollution and density of forest

and tribal population have been identified for constitution of such Vahinis. The Vahinis are functioning under the charge of District Collectors, who take follow-up action on the complaints received from various members by pursuing the matter with the respective authorities. Water testing kits have been provided to the members of Paryavaran Vahinis in 20 selected districts.

Communication/Awareness Programme of NAEB

Films

During the year, two films on the following themes have been commissioned for production.

- Joint Forest Management in Harda Division
- Adoption of appropriate moisture and soil conservation measures in Kharaiya Nalah catchment in Jhansi Distt.

Three films on the theme of 'People's participation in forest management' were completed and VHS copies of these films have been distributed to the Forest Department of all States/UTs and to Training Institutes. One of the films titled 'Harmony in Arabari' was also telecast by Doordarshan.

Print Media

The following documents were prepared and distributed during the year:

- Greening of Sand Dunes and interdunal plains
- Greening of Forest Grasslands in Nasik Districts
- A Brochure on National Afforestation and Eco-development Board
- During the Conference of the Forestry Forum of Developing Countries organised by the Ministry a brochure titled 'National Afforestation and Eco-development Board' was brought out specifically for distribution. Besides this 250 copies of some selected publications were also distributed during the conference.

Communication Strategy

The communication strategy has been formulated in view of the changed mandate of the NAEB. The Action Plan component of the strategy is being finalised.

Exhibition

- The NAEB participated in the special display on 'Envi-

ronment and Forest' at the International Trade Fair during the year. The Ministry was awarded a gold medal for the special display.

Centres of Excellence

The following five Centres of Excellence which have a linkage with an institution, have been assisted or set up by the Ministry with a view to strengthening awareness, research and training in priority areas of Environmental Science and Management :

- Centre for Environment Education, Ahmedabad (linked with Nehru Foundation for Development, Ahmedabad).
- CPR Environmental Education Centre, Madras (linked with Sir C.P. Ramaswamy Aiyar Foundation, Madras).
- Centre for Ecological Science (linked with the Indian Institute of Science, Bangalore).
- Centre for Mining Environment, Dhanbad (linked with the Indian School of Mines, Dhanbad).
- Salim Ali Centre for Ornithology and Natural History, Coimbatore (linked with the Bombay Natural History Society).

Centre for Environmental Education (CEE), Ahmedabad

The CEE, Ahmedabad, set up in 1984 continued to develop and carry out nation-wide environmental education programmes and activities. The activities of the Centre during the year 1993-94 are as under:

- The fourth batch of trainees of the 8-month intensive training programme in Environment Education (TEE) being regularly conducted by CEE, passed out during the year. The fifth batch commenced in December, 1993 with 14 participants, including 2 from abroad.
- TALEEM (Teach and Learn Environmental Education Modules), a programmes of short, theme-specific training programme has been started during the year. These programmes are intended as an on-going activity tailored to the needs of distinctly defined audiences. Programmes held during the year included environmental education for museum staff, bio-diversity, energy efficiency and environmental standards for industries.
- A permanent exhibition on the life of Gandhiji in

Ahmedabad has been installed at the Gandhi Ashram at Sabarmati, Ahmedabad.

- An interpretive plan was developed for the Madras Crocodile Bank during the year.
- The field offices set up Sawai Madhopur, Rajasthan and Jasdan, Gujarat, continued eco-development programmes in villages around the protected areas of Ranthambore and Hingolghadh respectively.
- CEE-NFS, the News and Features Service of CEE, carried out a Newspaper campaign on the denotification of the Narayansarovar Wildlife Sanctuary in Kachchh, Gujarat, which resulted in the decision given by the Gujarat High Court reversing the denotification and restoring the status quo ante.
- Sundarvan continued to attract thousands of visitors including organised school groups.
- Under the Urban Programme, a consultation was organised by CEE in partnership with Vastushilpa Foundation, in which the Municipal Corporation of Ahmedabad presented its new development plan for discussion.
- The South and South-East Asia Network on Environmental Education (SASEANEE), established at an international workshop held at CEE in February, 1993, spans 16 countries of the region. Two issues of the SASEANEE newsletters were brought out during the year.
- Four issues of 'Sampark', the Hindi edition of the UNESCO-UNEP EE newsletter were brought out.
- Training programmes and workshops on industry and environment were held at Ahmedabad and Guwahati.
- The Centre put up an exhibition on the theme 'Act Now' as part of the pavilion on Environment and Development at the Trade Fair in Pragati Maidan in New Delhi, aimed at motivating people to act in an environmentally friendly way.
- The Southern Regional Cell in Bangalore has completed five years. Its area of coverage includes Karnataka, Kerala, Tamil Nadu, Andhra Pradesh, Goa, Pondicherry and Lakshadweep. The Cell is involved in a wide variety of activities in these States, as well as in the city of Bangalore. In the school programme area, the Cell has integrated the development of locale specific environmental education through the Ministry of Human

Resources Scheme and the Environmental Education Bank Project with the teacher training programme under the National Environmental Awareness Campaign. It has also launched a programme of environmental quality monitoring involving students of high schools and colleges, in the districts of Dakshina Kannada, Hassan and Tumkur. CEE-South has initiated several community based action programmes such as a solid waste management programme for Bangalore city which involves segregation of garbage and production of compost through vermicomposting; a programme for production of fuel from human solid waste in slums; a campaign to clear the District of Coorg of non-biodegradable waste involving local schools. A number of CEE's publications were brought out in Kannada through the interaction of CEE-South with various government and non-government agencies.

- The North-Eastern Regional Cell of CEE was inaugurated in Guwahati, through a workshop 'Environment and Education: Initiatives for the North-East', attended by over 70 participants from the region. A number of workshops on various topics including Solid Waste Management, Environmental Issues of Paper and Pulp industries, Environmental Education in Schools have been organised by the Cell.
- EDUTECH, the educational products division continued to produce and disseminate environmental education material.

C.P.R. Environmental Education Centre (CPREEC) Madras

The Centre was set up in 1988 with the objective of creating and increasing consciousness and knowledge about the environment and to generate resource material and educational packages on environmental conservation. Highlights of the various activities undertaken by the Centre during the year are as follows:

- Training Programmes were conducted for NGOs, rural workers and teachers in Andhra Pradesh, Tamil Nadu, Karnataka, Kerala and Gujarat.
- The Centre has set up an Environment Law Cell which conducted several training programmes on environment, wildlife, people and the law, to familiarise NGOs with environmental legislation. The Centre has also been providing free consultancy services to NGOs on the utilisation of the existing environmental laws to

fight cases of environmental degradation.

- Awareness-through-action programmes were conducted to educate rural communities on the role of sacred groves in ecological conservation, besides taking up six sites for restoration of sacred groves.
- Environmental education programmes such as nature camps, eco-clubs, essay, quiz, painting and oratory competitions were conducted for children throughout the year.
- Several teacher's training programmes on integrating environmental education into the school curriculum have been organised in Tamil Nadu and Andhra Pradesh.
- Besides a major exhibition on Habitats of the World at the Vandalur Zoo, smaller exhibitions on "Animal Welfare" and "Waste Management" were organised. The Centre also participated in the exhibitions held at the Global Forum for Environmental Education at New Delhi and the Congress on Traditional Sciences and Technologies of India at the Indian Institute of Technology (IIT) Bombay.
- Regular awareness-raising programmes for NGOs, teachers and children were organised in the Nilgiri Biosphere Reserve. Bokkapuram, adjoining Mudumalai, is being developed as an eco-model village with ecologically sustainable development programmes for the tribals.
- The project on Women in Wasteland Development undertaken by the Centre in the districts of Trichy, Salem, Periyar, Dindigul, Madurai, Dharmapuri and North Arcot has been extended to Thirunelveli and Pasumpon Muthuramalinga Thevar districts in Tamil Nadu and Chittoor district in Andhra Pradesh. Plantation programmes by the participating women have commenced in Trichy and Dindigul districts.
- Soil samples from various wasteland sites were analysed by the Centre to check the suitability of tree species to be planted and a comprehensive report has been published. This facility is extended to private farmers and individuals also.
- Under the project "Sthala Vrikshas of Tamil Nadu", the association of trees with religious sites, the origin of their association and their development is being documented and analysed.
- The Centre is functioning as a nodal agency for the

Ministry of Human Resource Development on innovative programmes for environmental education in schools in Tamil Nadu and Andhra Pradesh. 13 NGOs have been selected for this project and the Centre has been conducting trainer's training programmes, besides monitoring the implementation of the project.

- Another project titled "Environmental Education for Eco-Restoration of Coastal Areas in Tamil Nadu", has also been taken up through the Ministry of Human Resource Development, in which connection school teachers and students along the east coast are exposed to the coastal environmental problems. Publications, posters and pamphlets have been brought out on the subject for distribution.
- Several publications such as "Priya - The Parrot", in English and Tamil (on urban waste management and clean environment), Water Resources Management (in English and Tamil), Wasteland Development (in Telugu), the Nilgiri Biosphere Reserve and Animal Welfare (in English and Tamil) were brought out.
- A Teacher's Environmental Education Kit (in English and Tamil) has been developed for use in schools and in the projects on Eco-restoration of the Coastal Areas of Tamil Nadu and Andhra Pradesh, and innovative programmes on Environmental Education. Pamphlets on Save Water, Save Energy, Think Green, Eco Clubs, Sacred Groves and Waste Management, Stickers on environment, posters on Sacred Groves, Animal Welfare and Waste Management, were also brought out by the Centre.

Centre for Ecological Sciences, Bangalore

This Centre was established in 1983 with the mandate of focussing on the ecology and environment of the Western Ghats. During the year the Centre has initiated work on the following basic research projects :

- Monitoring ecological changes at the scale of individual communities/landscape.
- Monitoring ecological change on a sub-regional scale.
- Monitoring ecological change on a national scale.
- Solid access to biological resources.
- Multipurpose indigenous plant resources.

Three projects under Action Research have been initiated as follows :

- Ecologically sustainable development.
- Community based resource management systems.
- Reviving traditions of nature conservation.

Two more projects on networking have also been undertaken :

- Interaction with State Science and Technology Councils.
- Networking with voluntary agencies involved in eco-development efforts.

Centre for Mining Environment, Dhanbad

The Centre of Mining Environment was established at the Indian School of Mines, Dhanbad, with the following objectives:

- To impart training to inservice field personnel in environmental science and technology with particular reference to environmental management in mining areas.
- To carry out research in the field of mining environment.
- To initiate regular academic programmes leading to M.Tech. degree in Environmental Science and Engineering.
- To undertake consultancy and testing work to help mining and mineral industries and the neighbouring areas in solving environmental pollution problems.

The financial liability of the permanent establishment of this Centre has been taken over by the U.G.C. with effect from 1.4.93. However, as several administrative adjustments are still being sorted out between UGC and ISM, the Centre continued to receive financial assistance from this Ministry during 1993-94. A Monitoring Committee has been constituted under the Chairmanship of Secretary (E&F) to oversee the work of the Centre.

This Centre runs a 3-semester integrated M.Tech. programme in Environmental Science and Engineering in which the students are assigned research work on specific mining environmental problems during the 3rd semester, which involves lab and field work. Some of the research works undertaken are as follows:

- Applicability of BEES functional curves for preparation of EIA of Mining Projects.
- Distribution and cycling of trace elements in a coal

mining environment.

- Augmentation of pumped out under ground mine water for potable purposes.
- Noise pollution in cement plants and potential noise control measures.
- Human vibration problem in open cast mining-its assessment and control measures.
- Study of some environmental impacts of opencast mining in a part of the Godavari valley coalfield using remotely sensed data.
- Study of nutrient status of mine spoils.

Salim Ali Centre for Ornithology and Natural History (SACON)

This Centre was established in 1990 with the major objectives of conducting research and Post-Graduate level courses on all aspects of Ornithology and Natural History of other life forms.

Details of the activities of the Centre are given in Chapter 7.

National Museum of Natural History

The National Museum of Natural History (NMNH) was established in 1978 to promote non-formal environmental education and to create conservation awareness among the people. The museum has several exhibit galleries that deal with biological diversity, ecology and conservation, a Discovery Room for Children, an Activity Room for preschoolers, a Bio-science Computer room for high school students and a Mobile Museum for outreach activities, all aimed at promoting environmental awareness among various target groups. The museum conducts a number of educational activities all the year round including the organisation of temporary exhibitions on themes relevant to Environment, Ecology and Conservation.

A brief report of the activities of the NMNH during the year is given below :

New Exhibits

A number of new exhibits have been added to the existing galleries under the on going programme of renovation and updation of the exhibit galleries. These include an enlarged molecular model of DNA, an electron microscope gifted by the Indian Agricultural Research Institute, exhibits on

extinct animals etc.

Temporary Exhibitions

The Museum organised a number of temporary exhibitions aimed at promoting public awareness on environment and conservation. Significant among these are an exhibition entitled, 'Forests and Ecosystems of India' representing the variety and diversity of India's flora, fauna and ecosystems, organised to coincide with the first Ministerial conference of the Forestry Forum for Developing Countries in the month of September, 1993; an exhibition on 'Environment & Development' as the theme pavilion for the India International Trade Fair-1993 at Pragati Maidan during the month of November, 1993, which involved exhibit presentation related to the rich biological diversity of India, environmental issues and concerns and the Indian tradition of nature conservation apart from coordinating the participation of 16 different Government Institutions/organisations. The exhibition was awarded a Gold Medal by the Indian Trade Promotion Organisation for its contents and quality of presentation.



Fig. 78 An exhibit in an exhibition on 'Environment and Development' organised by the Ministry

The museum also organised inhouse exhibitions during the year including a display of prize winning entries of slogans, symbols, posters, comic strips etc. received under the nation wide 'Care for the Environment Contest' organised by the Museum on behalf of the Ministry of Environment and Forests.

Educational Activities

The educational activities of the NMNH during the year included a number of special programmes apart from the regular activities such as public lectures, film shows and pedagogical activities for the benefit of school children.

These included :

- A month long summer Programme for teenagers on 'Exploring the Environment' consisting of museum activities, outdoor environmental exploration and assessment of environmental problems, nature camps etc.
- A month long Summer Programme of creative activity for children on nature painting and animal/plant modelling.

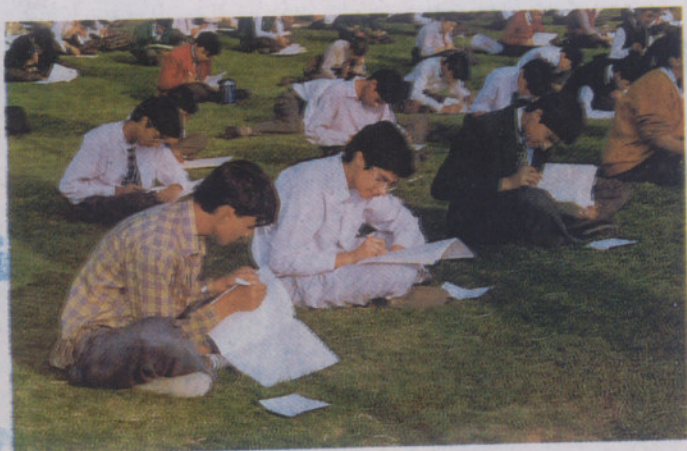


Fig. 79 Students' participation in an essay competition organised by NMNH

- Poster, painting and modelling contests organised on the occasion of the World Environment Day, Wildlife Week, Earth Day, Conservation Day etc.
- Audio-visual extension programmes and film shows organised at schools, colleges, resettlement colonies in Delhi and rural areas.
- Special museum programmes for handicapped children.
- Environmental education programmes and activities for different target groups under the National Environmental Awareness Campaign.
- Teacher Orientation Workshops.
- Publication of popular environment education resource materials.

The museum organised a number of outreach and extension activities through its Mobile Museum in and around Delhi and also for special programmes at Jaipur, Dehradun and Jammu. Film shows on Environment and Conservation were conducted in several housing colonies, schools and colleges in Delhi as well as selected locations in U.P., Haryana and Rajasthan.



Fig. 80 Painting Competition at NMNH

Care for the Environment Contest

The nation-wide 'Care for the Environment Contest' conducted by the NMNH on behalf of the Ministry during the year 1992-93 concluded with a Prize Distribution Function on 5th June, 1993, the World Environment Day. 344 prizes were awarded by the Minister of Environment and Forests to the winners from various categories of the contests such as slogans, symbols, poems, comic strips, posters and films selected from among over 2 lakhs of entries in 15 languages.

Collaboration with Universities

The NMNH continued its academic collaboration with the Delhi University by conducting a month-long course on 'Environmental Education' for the final year students of B.Sc. (Environmental Science). The Museum also assisted the Department of Environmental Biology, Delhi University (South Campus) by conducting lectures and practical classes on 'Systematics and Evolutionary Biology' and by organising slide presentations, film shows, field study visits and guidance in project work for the students of M.Sc. (Environmental Biology).

The NMNH also extended its cooperation to the National Museum, New Delhi (a deemed University) in the teaching of Museology and in conducting courses on 'Museum

Communication', 'Computerization in Museums' and 'Exhibition Planning and Designing'.

Indo-US Museum Partnership Programme

Under the auspices of the Indo-US Sub-commission on Education and Culture a new programme of Indo-US Natural History Museum Partnership has been initiated during the year, and partnership has been established with the Cincinnati Museum of Natural History, Cincinnati, USA. Two officers of the Regional Museum of Natural History, Mysore and two museum experts from the Cincinnati Museum of Natural History participated in project-based exchange visits. One officer each from the NMNH, New Delhi and RMNH, Mysore visited museums of the USA for professional enrichment in the areas of exhibition techniques and education programmes.

Regional Museums

Considerable progress has been made in the development of exhibit galleries at the newly constructed Regional Museum of Natural History, Mysore. Building plans and estimates have been finalised for the Regional Museums at Bhopal and Bhubhaneswar and the foundation stone has been laid to initiate the construction of the Museum at Bhopal.

Fellowships and Awards

Indira Gandhi Paryavaran Puraskar (IGPP)

This annual award, instituted in 1987, is awarded to an individual or to an organisation for significant contribution in the field of environment. Since 1991, this award is being presented both to an individual as well as an organisation. Each award carries a cash component of Rs one lakh, a silver trophy, a scroll and a citation.

More than 300 nominations from various organisations and individuals have been received for consideration of the award for the year 1993 and are being considered.

Indira Priyadarshini Vrikshamitra Award (IPVM)

The annual Indira Priyadarshini Vrikshamitra (IPVM) Awards were instituted in 1986 to recognise pioneering and exceptional contribution of Individuals and Organisations in the field of afforestation and wastelands development. Since 1988, ten Awards of Rs 50,000/- each in cash with medallions and citations are given annually under five categories viz. (a) Individuals, (b) Panchayats/

Gram Sabhas/Village Level Institutions, (c) Educational Institutions, (d) Voluntary/agencies including Mahila Mandals, Yuvak Mandals etc. and (e) Government Agencies (district level and below). IPVM Awards upto 1990 have already been presented. While Awards for 1991 have been finalised, those for 1992 are being processed and nominations for 1993 have been invited.

Maha Vriksha Puraskar

A new annual award titled "Maha Vriksha Puraskar" has also been instituted by the NAEB during the year, which will be given every year to individuals/organisations for trees of the notified species, having the largest girth and height and also in good health and vigour. A roster of notified tree species, valid for 5 years has been prepared. The award would consist of a cash prize of Rs 25,000/-, a plaque and a citation.

National Awards for Prevention and Control of Pollution

Since 1991, a scheme of National Awards has been initiated to encourage industries and operations to take steps for prevention and control of pollution and awards have been given to the following four units so far : M/s Bhopal Pesticides Pvt. Ltd., Bhopal, Madhya Pradesh; M/s Gujarat Ambuja Cements Ltd., Kodinar, Gujarat; M/s Shriram Fertilizer & Chemicals, Kota, Rajasthan and M/s Sree Rayalaseema Alkalies and Allied Chemicals Ltd., Kurnool, Andhra Pradesh.

Paryavaran Evam Van Mantralaya Vishisht Vaigyanik Puraskar

With the objective of encouraging original and applied research among Group 'A' Scientists in the Ministry of Environment and Forest and its associated offices and Autonomous Bodies, "Paryavaran Evam Van Mantralaya Vishisht Vaigyanik Puraskar" has been instituted since 1992-93. The scheme provides for two awards of monetary value of Rs 20,000/- each to be awarded to Scientists in recognition of their outstanding contributions towards the objectives of the Ministry in the following areas :

- Silviculture
- Forest Protection
- Conservation of Natural Resources
- Wood Substitution

- Wasteland Development
- Afforestation and Social Forestry
- Prevention and Control of Pollution
- Environmental Education
- Eco-regeneration
- Environmental Planning and Management
- Waste Disposal and Recycling.

During 1992-93, the award was given to Dr A.R.K. Sastry of Botanical Survey of India for his outstanding contributions in the area of conservation of Natural Resources. This year two awards have been given to Dr S.M. Nair, Director, National Museum of Natural History, New Delhi, for Environmental Education and Dr S. Karthikeyan of Botanical Survey of India, Pune, for conservation of Natural Resources.

Pitambar Pant National Environment Fellowship Award

This fellowship, instituted in 1978 is awarded annually to recognise, encourage and support excellence in any branch of research related to environmental sciences. The fellowship for the year 1993 has been awarded to Dr. S. Sriramachari in recognition of his valuable contribution in the field of Environmental Sciences. During the period of the fellowship, Dr. Sriramachari will undertake research on "Trace Element Analysis on Human Tissue Samples for Bio-Environmental Monitoring".

Desert Ecology Fellowship

In recognition of the Bishnoi Community's contribution to nature conservation and to encourage studies on Desert Ecology, the Ministry has instituted a Desert Ecology fellowship at the University of Jodhpur. A Selection Committee in the University has been constituted and a suitable candidate is being considered for awarding the fellowship.

B.P. Pal National Environment Fellowship Award

The Advisory Committee for Pitambar Pant National Environment Fellowship Award recommended the institution of "B.P. Pal National Environment Fellowship award for Bio-diversity".

The Institution of the award is under consideration of the Ministry.

Environmental Information

Environmental Information System (ENVIS)

The ENVIS Network with the Focal Point in the Ministry and 17 Subject Specific ENVIS Centres located in different parts of the country continued its activities in information collection, storage, retrieval and dissemination. A list of total ENVIS Centres is given at Annexure IV. The focal point and their ENVIS Centres continued to pay special attention to developing the information base by creating the relevant databases in their concerned subject areas. The highlights of the activities of the ENVIS Focal Point and its various centres during the year are given below :

Focal Point

- The focal point of ENVIS located in the Ministry continued to strengthen its information based through the acquisition of relevant publications, reports, bibliographies, journals, monographs, state-of-art reports etc. on various aspects of environment. The information base was also enriched by the documentation support provided by the Network Partners in the subject areas allotted to them.
- The Library of the Ministry which functions under ENVIS, acts as a potential documentary repository of information in the field of environment, forest, wildlife and other related areas. During the year, the Library enriched its collection through the procurement of substantive information resources in the relevant fields. Presently, it has a collection of over 19,000 books, scientific and technical reports, and receives over 200 national/international scientific journals. The Library thus provides back up support to the ENVIS in providing exhaustive information to its clients. Personalised information/reference service is also provided to the users/scholars visiting the Library. During the year, over 250 scholars from various institution institution/universities made use of the Library. Reprographic facilities as and when required continued to be provided by the Library. Apart from the technical books and journals a wide range of general books, magazines and newspapers both in English and Hindi have also been procured by the Library for use of the officials of the Ministry.
- As the National Focal Point (NFP) and Regional Service Centre (RSC) of the UNEP's INFOTERRA, ENVIS responded to several queries from the users of

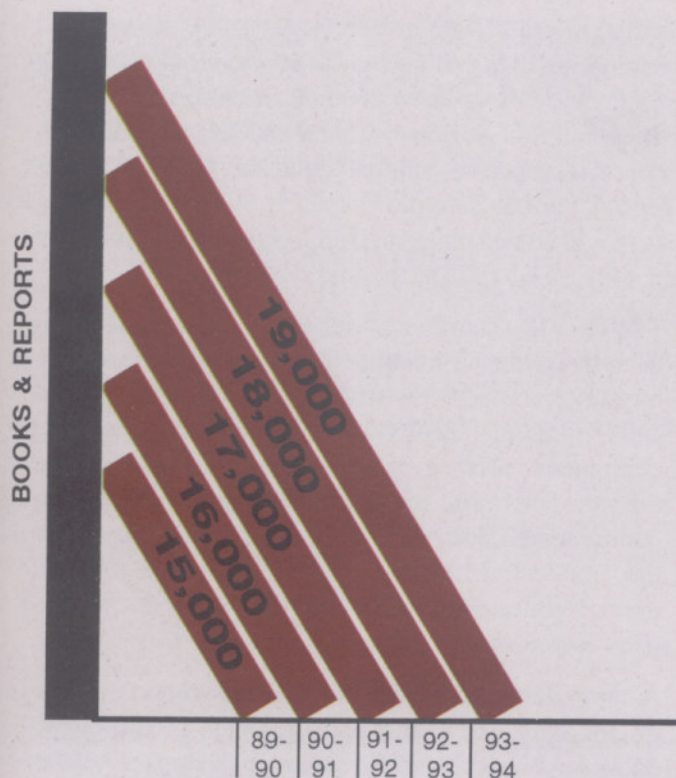


Fig. 81 Enrichment of Documentary Base by ENVIS

INFOTERRA from different countries especially from countries of the South-Asian Sub-Region.

During the year it responded to 5662 queries out of which 847 were international and the remaining were national. The ENVIS Focal Point alone responded to more than 1307 queries out of which 1200 were national and about 107 were international. The major areas on which queries were received pertained to subjects such as pollution control, renewable energy, biodegradation of wastes, soil conservation, mining environment, environmental management etc.

A detailed break up of the number of queries processed by the ENVIS Network during the last five years is given in figure 82. In some cases where substantive information was not readily available, referral service was provided to the users.

The Focal Point continued its publication of the quarterly abstracting journal 'Paryavaran Abstracts' containing information about environmental research in the Indian context. About 600 environment related journals are referred to in the compilation of the various

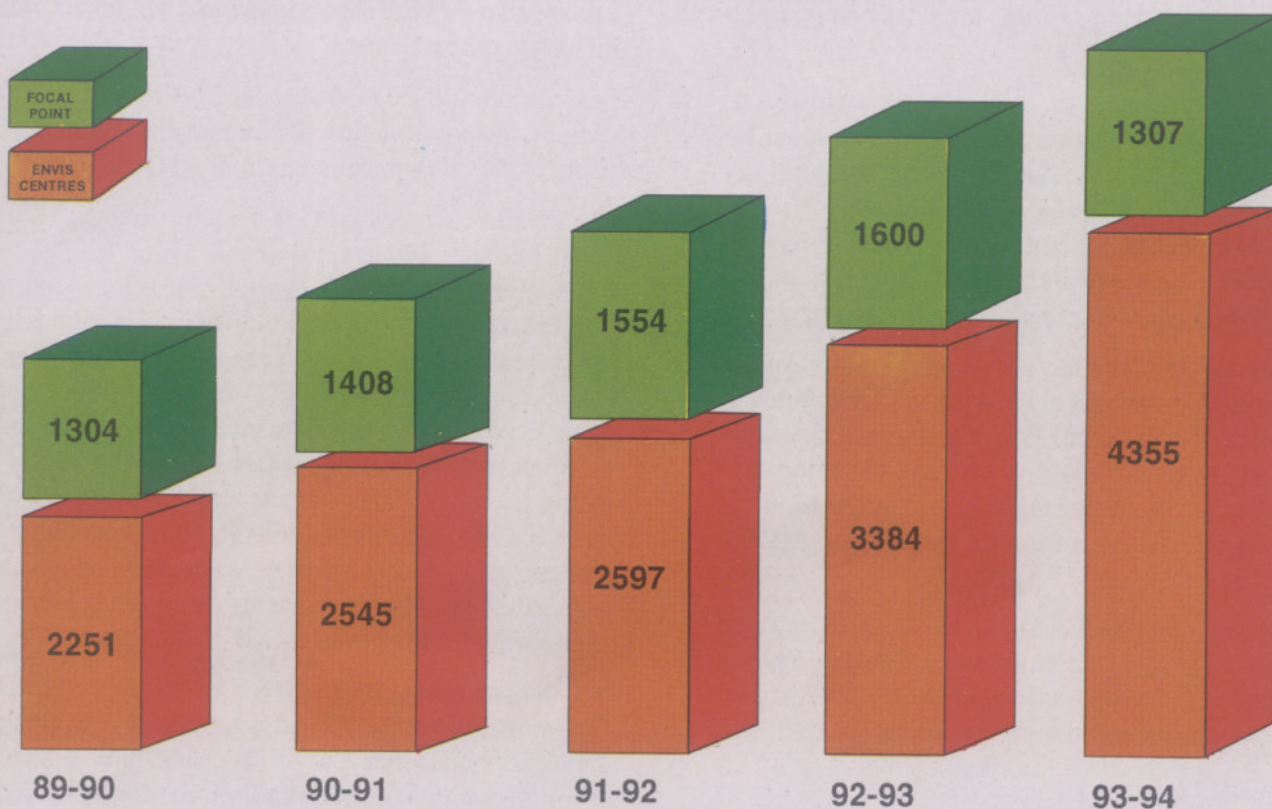


Fig. 82 No. of Queries Responded by ENVIS

abstracts for inclusion in the publication and these abstracts are arranged under 12 major categories like Air Pollution, Water Pollution, Noise Pollution, Ecology, Environmental Management, Nature and Natural Resources Conservation, Health and Toxicology, Wastes, Forestry, Wildlife, Energy etc. A subject and keyword index have also been appended to the journal for precise retrieval of information. During the year, 4 issues of the journal containing about 1200 abstracts were published.

- The Focal Point continued its activities relating to setting up of new ENVIS Centres on subject areas not covered so far in order to make the ENVIS network comprehensive. A few such subject areas and potential institutes for setting up ENVIS Centres have been identified during the year and other details are being worked out.
- With a view to enhancing the scope of ENVIS by accessing the information available at various scientific and research institution, CSIR laboratories, educational and other academic institutions of the country and abroad, and to link up all the ENVIS Centres with the focal point and with each other, a computer network interconnecting all these institutions is being developed.
- ENVIS also continued its close liaison with various other National Information Systems like National Information System for Science and Technology (NISSAT), Bio-Technological Information System (BTIS), National Oceanographic Information System (NOIS) for exchange of environmental information and to avoid duplication of efforts in the concerned fields.
- ENVIS in the Ministry has also been designated as the focal point for the global Sustainable Development Network (SDN) Project of UNDP, in India. A task force of local as well as UNDP experts and the Ministry's official etc. has since been constituted by the Ministry to prepare a feasibility report for establishing SDN in India.
- Information on more than 250 Indian sources engaged in the environmental activities was updated by ENVIS for inclusion in the International INFOTERRA Directory of environmental sources published by UNEP.

Activities of the ENVIS Centres

All the ENVIS Centres continued their activities in

information collection, collation, retrieval, storage and dissemination in the subject areas allotted to them during the year. Apart from strengthening the information base and responding to various national and international queries in their respective subject areas, the ENVIS Centres undertook various activities aimed at providing information to a wide range of users. Highlights of the activities of some of the ENVIS Centres are given below :

- The ENVIS Centre at Development Alternatives has been instrumental in collecting and disseminating information related to Environmentally Sound Appropriate Technology and Environmental Management and continued to offer several information services such as reference, referral, reprographic, query/response, literature search, current awareness, press clipping, scientific and technical data search etc. to a wide range of users. It continued to publish the Development alternatives Newsletter.
- A computerised database on the books, reports, monographs and thesis available in the fields of 'Bio-degradation of Wastes' and 'Environmental Impact Assessment' has been created by the ENVIS Centre at Anna University, Madras and is updated regularly. It includes a listing of over 3400 papers under the two subject areas mentioned above.

The Centre continued to publish the ENVIS Newsletters, a listing of current literature, journal abstracts and thesis abstracts in the two subject areas allotted to it.

The ENVIS Centre at the G.B. Pant Institute for Himalayan Ecology and Development, which has started functioning from this year, is in the process of setting up an information archival and retrieval system employing optical disc based storage. During the year, the Centre brought out 2 issues of an ENVIS Bulletin on Himalayan Ecology and Development. The Centre is also in the process of building up a database of work completed by the scientists of the Institute and 600 maps, continued to cater to the information requirements of a large number of students, research workers, teachers etc. during the year. The centre has also acquired a computer exclusively for the use of the ENVIS Centre.

- Besides publishing the ENVIS Newsletter, the ENVIS Centre at the Centre of Advanced Study in Marine Biology, Annamalai University, published a monograph on "Marine Animals for Culture" during the year. The Centre has collected about 10,000 titles of informa-

tion on estuaries, mangroves, coral reefs and lagoons and is also preparing a faunal list of various groups of marine and estuarine animals. This centre also participated in an exhibition on "Shrimp Farming" at Madras which highlighted the environmental aspects of Coastal Aquaculture.

The ENVIS Centre at the Central Pollution Control Board (CPCB) continued to publish its ENVIS Newsletter, the CPCB Newsletter and the CPCB Annual Report. Besides participating in exhibitions, the Centre also extended help to Schools and NGOs in organising lectures, audio visual programmes, exhibitions etc.

during the year.

- Since inception, the ENVIS Centre at CEE, Ahmedabad, has been collecting Environmental Education (EE) material from around the world and the same has been computerised. Nodes of the EE bank are proposed to be set up in various places of the country to make them accessible to a large number of users.
- The ENVIS Centre on Environmental Problems in Mining set up at the Centre for Mining Environment brought out its first newsletter on the subject and circulated it to various organisations, institutions and individuals throughout the country.

9

LEGISLATION AND INSTITUTIONAL SUPPORT

Legislation

Since the enactment of the Environment (Protection) Act, 1986, several steps have been taken by the Ministry of Environment and Forests to provide the legal and institutional basis which include framing of rules, notification of standards, delegation of powers, identification of agencies for hazardous chemicals management and setting up of Environmental Protection Councils in the States.

- Under the provisions of the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981 additional responsibilities have been placed on the Central and State Pollution Control Boards. Legal Action under these two acts are taken by the respective State Pollution Control Boards.
- The Rules under the Water and Air Act have been amended and as per these amendments, the consent order issued by the respective State Pollution Control Boards (SPCB) to the industries would be valid for a period of 15 years or till such time there is some significant change in the process- whichever is earliest. No conditional consent would be issued by the SPCB without complete installation of the required pollution control equipment.
- The Gazette Notification on environmental audit-issued on 12th March, 1992 has been amended vide Notification GSR 386 (E) dated the 22nd April, 1993. The Notification applies to all the units seeking consent under the Water Act, 1974, or Air Act 1981 or authorisation under the Hazardous Wastes (Management and Handling) Rules, 1989. Beginning from 1993, all units are required to submit environmental statements for the period ending 31st March on or before 30th September every year to the concerned State Pollution Control Boards.
- A Notification consolidating all the environmental standards including general effluent, emission and noise standards has been issued under the EPA 1986. This Notification also includes standards for waste water generation in respect of 11 categories of industries.
- A Bill to provide assistance for the setting up of National Environment Tribunals and expeditious disposal of cases regarding compensation to the victims of accidents occurring while handling hazardous substances was introduced in the Parliament in August,

1992.

- During this year, the Bill was referred to the Department related Parliamentary Standing Committee on Science and Technology, who have recommended certain amendments. A Cabinet Note on the proposed amendments has been prepared and submitted for consideration to the Cabinet Secretariat.
- Amendments to manufacture, storage and import of Hazardous Chemicals Rules have been finalised. Safety Audit in major accident hazard units will now become mandatory with the Notification of these Rules.
- Rules for classification, labelling and packaging of hazardous chemicals are being finalised.
- Amendments to Hazardous Waste (Management and Handling) Rules, 1989 have been finalised and are being notified.
- Draft Rules for the Handling and Management of Bio-medical Wastes have been prepared under the EPA and have been circulated to the concerned departments for comments.
- Rules for owners seeking exemption under the Public Liability Insurance Act (PLI) 1991 have been amended.
- A Notification regarding authorisation of various agencies under Sections 13 and 18 of the PLI Act and a corrigendum for the list of chemicals have been issued during the year.
- The Forest (Conservation) Rules, 1981 have been amended to further decentralise and streamline the examination of proposals received under the forest Conservation Act, 1980.
- The Indian Forest Act, 1927 is proposed to be revised and a draft of the revised legislation has been circulated among the State Governments for comments.
- An Expert Committee constituted by the Ministry to examine issues relating to tourism and hotel facilities in coastal areas of the country, has suggested certain modifications to the existing Coastal Zone Regulation Notification. A fresh Notification containing the draft amendments has been issued on 11th November, 1993 for inviting suggestions from the public.
- The notification making Environmental Impact Assessment statutory for 29 different activities in Industries, Mining, Irrigation, Power, Transport, Tourism

etc. was issued on 27th January, 1994 by the Ministry. The notification deals with the details of procedures for obtaining environmental clearance, constitution of Expert Committee, procedure for public hearing and a time schedule for taking a decision.

Legal action against polluting industries

The Central and State Pollution Control Boards are responsible for carrying out the functions entrusted to them under the provisions of the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981 respectively. Legal action under these two Acts is taken by the respective State Boards. The statewise information regarding the number of cases filed by the Central and State Pollution Control Boards is compiled and analyses on a quarterly basis.

As on 30th September, 1993, 5896 cases have been filed by the State Pollution Control Boards under the Water and Air Acts. Out of these 2323 have been decided, 3573 are pending in various courts. In 486 cases convictions were obtained and in 322 cases court has passed restraint orders.

Institutional Support

The Central Government provides financial assistance to the State Pollution Control Boards for strengthening their technical man-power and procurement of scientific equipment ; financial support is also provided to the State/UTs Department of Environment for additional technical man-power. This scheme was continued during the year and an amount of Rs 2.0 crores has been disbursed to the State Pollution Control Boards and the State/UT Departments of Environment.

10

INTERNATIONAL CO-OPERATION

Introduction

The Ministry of Environment and Forests is the nodal agency in the country for United Nations Environment Programme (UNEP), South Asia Cooperative Environment Programme (SACEP), International Centre for Integrated Mountain Development (ICIMOD) and the International Union for Conservation of Nature and Natural Resources (IUCN). Annual financial contributions are made to these organisations. The Ministry also functions as the nodal agency for participation in international agreements such as the Convention on International Trade in Endangered Species on Wetlands and the Basel Convention on Transboundary Movement of Hazardous Substances. These international conventions/agreements are being looked after by respective specialized Divisions. The International Cooperation (IC) Division looks after Vienna Convention and the Montreal Protocol on Substances that deplete the ozone layer as well as the international negotiations on environmental issues. The Ministry is responsible for 12 out of 33 agreements/conventions etc. to which India is a party.

Follow-up on UNCED

The principles enshrined in the 'Rio Declaration' and Agenda 21' provide a framework for future action on environmental issues in a global perspective. India is actively participating in the global debate on the implementation of Agenda 21, especially the need for the transfer of resources, both technological and financial from the countries of the North to the countries of the South. The Commission on Sustainable Development (CSD) has undertaken the responsibility of overseeing and reviewing the implementation of Agenda 21. India signed the Convention on Biological Diversity and the United Nations Framework on Climate Change in June, 1992. The convention on Climate Change has been subsequently ratified and that on Biological Diversity is in the process of being ratified.

- India is committed to the non-legally binding forest Principles signed at Rio. India had hosted the First Ministerial Conference of the Forestry Forum for Developing Countries in September, 1993. The Delhi Declaration on Forests issued at the end of this conference highlights the priorities in the forestry sector as perceived by the developing countries. India and the United Kingdom have entered into a Memorandum of Understanding on Forestry issues which also seeks to promote constructive discussions between developed

and developing countries on the nature, use and management of forest resources.

Ozone Layer Protection

Ozone (O₃) is a form of oxygen in the atmosphere about 20 km. above the earth's surface that efficiently screens out almost all the harmful ultraviolet rays of the sun. This radiation has the potential to cause skin cancer, eye damage, suppress the body's immune system, decrease crop yield, cause damage to forests and affect ocean life. Global efforts to protect the ozone layer started in early seventies leading to the adoption of the Vienna Convention in 1985 and the Montreal Protocol in 1987. To strengthen the global efforts India acceded to the Montreal Protocol alongwith its London Amendment. Its provisions became effective for India with effect from 17.9.1992. However, scientific assessment has confirmed that Ozone levels continue to decrease in all latitudes except over the tropics and such decreases have become greater in the 1980s than in 1970s, as Ozone Depleting Substances (ODS) continue to be used in refrigeration and air-conditioning, preparation of foam products, spray products, fire extinguishing and as solvents in electronics and other industries.

A series of sectoral workshops, followed by Country Programme Workshops were organised during June-August, 1993, to finalise India's Country Programme on the phasing out of ODS which has since been approved by the Montreal Protocol Executive Committee in November, 1993 ; action is being initiated for formulating individual proposals, particularly in the small-scale sector. India chaired the Preparatory Meeting to the Fifth Meeting of Parties to the Montreal Protocol held in Bangkok in November, 1993 and has been elected to the Montreal Protocol Executive Committee. India has access to the multilateral fund set up under the Montreal Protocol and fifteen projects have already been approved. Various other projects to phase out ODS in the country are being undertaken.

Functioning of the Global Environmental Facility (GEF)

Limited progress was made during the pilot phase of the GEF towards generating a steady pipeline of projects that meet the criteria stipulated by GEF. For GEF-2, an Inter-Ministerial Cell has been constituted under the Chairmanship of Secretary (E & F). A Workshop was held in December in which experts of UNDP and the World Bank participated. A large number of proposals were discussed

at this Workshop and a few have been indentified for further refinement and presentation to GEF.

Follow-up Action on Convention

India has ratified the 'Framework Convention on Climate Change' on 1st November, 1993. The Convention on Conservation of Biological Diversity is also being ratified. While the Convention on Bio-diversity has come into force from 29.12.93, the climate change convention will be coming into force from 21.3.94.

Proposals for funding under the terms of convention are being taken up under GEF at present.

Environment Action Programme

An Environment Action Programme, which is the first document of its kind, has been drawn up and it attempts to integrate the concerns for conservation, sustainable development and human welfare with a quest for a dynamic economy exemplified in the ongoing process of economic reforms.

Bilateral and Multilateral Programmes

The Ministry and its agencies received assistance from various countries like Germany, Netherlands, Norway, U.K. and the USA on bilateral basis and from several U.N. and Multilateral agencies like UNDP, the World Bank, the Asian development Bank and the Nordic Fund. Various bilateral and multilateral programmes in environment and forestry sectors are as follows :

Bilateral Programmes

- Swedish Government has extended financial assistance of 15 Million SEK (Rs 9 Crores) under Indo-Swedish Bilateral Cooperation for upgradation of the Environmental Protection, Training and Research Institute, Hyderabad, A.P.
- Norway has earmarked NOK about 42 Million for assistance to projects on "Training of Indian Scientists from selected Pollution Control Boards on modelling and surveillance of dispersion and movement of pollution" and on " Orissa Environmental Programme" involving human resource development, institutional strengthening, environmental awareness, pollution abatement and waste management technologies.
- Denmark has earmarked Rs 12 crores for assistance to

project "Environmental Master Plan Study" in South Karnataka District.

- The Netherlands have provided an assistance of DFL 2.6 lakhs for the project "Bio-monitoring of the river Yamuna, Phase-II", river 'Cheliyar' in Kerala and river Tungabhadra in Karnataka.
- Japan Government is presently evaluating the following projects being assisted by them :
 - Setting up of National Environmental Training and Management Centre and
- Industrial Pollution Control Project in West Bengal.
- The major projects in pipeline with NORDIC lines of credit is "Industrial Pollution Control Project" to be implemented in Madhya Pradesh with financial assistance of US \$ 41.6 million.
- The major project in pipeline for assistance of A\$ 7.0 million from Australia is "Waste Management Technology at Hussain Sagar in Hyderabad".
- The major project in pipeline for assistance of D.M. 5.5 million from Germany is phase-III of the project viz., "Strengthening of Pollution Control Laboratories in CPCB, Delhi and certain Laboratories of State Boards of Punjab, Rajasthan, Madhya Pradesh, Karnataka, Assam, Haryana, Gujarat and Bihar."
- The meeting of the Sub-commission of Science & Technology to strengthen cooperation in environment and ecology under the Integrated Long-Term Programme with Russia was held in November, 1993.
- Forestry Projects from Rajasthan and Karnataka and those from Orissa and Tamil Nadu have been posed to OECF and SIDA, respectively for financial assistance.
- The Kerala Forestry Project and two Himachal Pradesh Forestry Projects have been posed to World Bank and ECF and ODA and OECF, Japan.
- At present an external aid of Rs 547 crores is available for various schemes of river cleaning programme under Indo-Dutch bilateral Co-operation Programme, World Bank and OECF, Japan.

Out of the above amount, a provision of Rs 42 crores and Rs 50 crores have been made for the year 1993-94 and 1994-95 respectively for externally aided schemes.

Multilateral Programmes

- In the Forestry sector, nine externally-aided afforestation and wastelands development projects were implemented during the year in seven States and financial assistance was provided by the donor agencies like the World Bank, Swedish International Development Agency (SIDA), EEC, OECF (Japan), etc.
- The A.P. Forestry Project has been successfully negotiated with the World Bank during the years and the Eco-development Project from Changer Valley, Himachal Pradesh is in the final stage of negotiations with the assistance from the German Government.
- In order to keep the pipeline of projects for external assistance, forestry projects for the States, viz., Bihar, Uttar Pradesh, Gujarat, have been posed to the World Bank.
- The UNDP sponsored project on 'Strengthening and developing ICFRE', and a World Bank funded project on forestry, research, education and extension is also being implemented by ICFRE.
- World Bank supported project on the 'Industrial Pollution Control' to prevent and alleviate environmental degradation caused by industrial operations continued during the year. The project involves a line of credit of US \$ 155.8 million and counterpart fund of US \$ 108 million to be provided by the Government of India, State Governments and Financial Institutions (IDBI and ICICI) and by Industrial Units availing the loan. The project with three major components, viz., 'Investment Component', 'Institutional Development Component' and 'Technical Assistance Component' is scheduled to be completed by the end of VIII Five Year Plan period.
- The Major project being assisted by UNIDO are :
 - Training of trainers in Environmental Auditing
 - Area-wise Master Plan for Environmental Quality Management, Dhanbad.
 - Clean Technology for identified small-scale industries.
 - Environmental Audit Approach for industrial pollution control in the clusters of small-scale industrial units and critically polluted areas in India.

- Applications of Biotechnologies for treatment and disposal of wastes, especially and toxic and hazardous wastes in India.
- Establishment and Upgrading of Industrial Units for manufacture of equipment and instruments for pollution control environmental monitoring.
- Environmental Decision Support System for Atmospheric air pollution simulation and control.

Other Activities

The Minister of Environment and Forests had paid an official visit to Austria during the year to discuss possibilities of cooperation between the two countries. A Memorandum of Understanding has been signed with Austria on exchange of experiences in designing national policies aiming at the implementation of the process of sustainable development and technological cooperation.

11

Advisory Inputs, Administration, Plan Co-ordination and Budget

Advisory Inputs

National Environmental Council

The National Environmental Advisory Committee has been reconstituted as the National Environmental Council under the Chairmanship of the Prime Minister. The Council will act as a think-tank on important environment policy matters and also provide planning and other inputs in an advisory capacity on issues and matters which may be placed by the Ministry before it. The recommendations of the Council shall be advisory in nature and will be made to the Ministry of Environment and Forests. Secretaries of various key Ministries, Heads of various Research Institutes, eminent Environmentalists, Scientists, Journalists/Media Persons, Industrialists and Persons who have been awarded prizes/fellowships by Ministry of Environment and Forests and Environment Ministers of all States/UTs have been associated in the Council which will be serviced by the Ministry.

Administration

The strength of the Ministry including National Afforestation and Eco-Development Board (NAEB) and Ganga Project Directorate (GPD) at the Head Quarters is 1191 (Group 'A' 236; Group 'B' 347; Group 'C' 352; Group 'D' 256).

Personnel Policies

In accordance with the revised recruitment rules for Group 'A' Scientific posts in the Ministry, direct recruitment to the post of Director, Botanical Survey of India, Director, National Zoological Park and Scientist 'SD' in Zoological Survey of India were made. Under the Flexible Complementing Scheme 89 Group 'A' Scientific Officers were reviewed and 76 were graded fit for promotion to the respective higher grades.

In accordance with the Government guidelines, representatives of minorities/Scheduled Castes/Scheduled Tribes were associated with the Departmental Recruitment/Review Committee constituted by the Ministry for direct recruitment/promotion to Group 'A' Scientific posts.

The Recruitment Rules for Group 'A' Scientific posts in the Ministry and subordinate offices are under review.

Reservation in Service

A statement showing the reservation of Scheduled Castes/Scheduled Tribes in the Ministry as on 31.12.1993 is given

in the Table 8.

Table 8

Sl. Group No.	Sanc- tioned strength	No. in posi- tion	Sche- duled caste	% of total em- plo- yees	Sche- duled tribes	% of total em- plo- yees
1. Group 'A'	236	208	14	6.73	10	4.81
2. Group 'B'	347	296	26	8.78	6	2.03
3. Group 'C'	352	328	42	12.80	11	3.35
4. Group 'D'	228	216	57	26.39	20	9.26
(Excluding Safaiwala)						
5. Group 'D'	28	28	28	100		
(Safaiwala)						
Total	1191	1076	167	15.52	47	4.37

IFS Cadre Management

Actions are being taken to recruit 100 Probationers on the basis of the results of Indian Forest Service (IFS) Examinations held in 1992 and 1993. During the year 28 officers of the State Forest Service have been promoted to the Indian Forest Service. The strength and composition of Kerala and Madhya Pradesh Cadres of the IFS have been reviewed and revised.

Grievance Cell

Grievance Cell was set up in October, 1991 to attend to complaints regarding environmental problems. The main function of the Cell is to take up these matters with the concerned authorities like, District Magistrates, Municipal Corporations, Pollution Control Boards and various Development Authorities for their redressal. Most of the complaints relate to :

- unauthorised industries functioning in residential areas, discharging harmful gases and hazardous effluents in the immediate neighbourhood.
- environmental degradation due to mismanagement of civic amenities like location of waste dumps and water logging.
- maintenance of open areas and ornamental parks.

- commercial establishments operating illegally in residential buildings causing nuisance to people living in the immediate vicinity.

During the year more than 300 complaints have been received and attended to.

NGO Cell

Public participation is imperative for the success of all environmental programmes. The overall strategy and direction of the Government of India is outlined in the Eighth Plan document which emphasises strengthening of people's institutions. NGO Cell was set up in this context in May, 1992 mainly to enhance the environmental movement at grassroot level so that even the poorest people are able to protect their surrounding environment, even while using the natural resources. The main functions of the NGO Cell are:

- to act as a single window/reception counter of the Ministry for all NGO related activities;
- to obtain information about the activities, membership and financial conditions of NGOs involved in environmental activities;
- to coordinate the various NGO oriented programmes being handled by different divisions of the Ministry of Environment and Forests.

During the year, 240 references have been received and attended to. Most of this correspondence relates to queries about pending project with the Ministry of Environment and Forests; request for various publications of the Ministry and seeking information about grants-in-aid programme, wherein NGOs can play an active role.

Joint Consultative Machinery

The Departmental Council of the Ministry of Environment and Forests set up under the Joint Consultative Machinery and Compulsory Arbitration of Central Government Employees continued its activities. During the year, 4 meetings were held to sort out the issues raised by the employees. Similarly, Office Council of the Ministry, associated offices of the Ministry as well as the Regional Councils set up in BSI and ZSI continued to function regularly.

CGO Complex Coordination Committee

The Ministry continued to play an active role in maintenance, upkeep and security of Ministries/Departments/Offices located in the CGO Complex. The Complex has

been cleaned up with the hawkers who were encroaching valuable space being evicted from the Complex. Traffic within the complex has been regulated considerably and the construction of Cow-catchers has been completed. Work relating to plantation of trees and shrubs were continued. At the Ministry's initiative, Ministry of Urban Development is proposing to allot a plot measuring about 3.5 acres to DTC in CGO Complex for construction of a multi-storeyed building where the ground floor will be utilised for DTC terminal and upper floors for Office accommodation. With active support from the Ministry, Border Security Force has opened a canteen facility 'Prahari' for the benefit of the occupants of the CGO Complex.

Training programme for Scientific and Technical Officers/Officials

In order to familiarise the scientific and technical officers of the Ministry with office procedures, including Parliamentary procedure, a training programme on office procedure was organised during 27th-31st December, 1993 through the faculty members of the ISTM, which was attended by about 20-25 officers.

O&M Inspection

The O&M Inspection of Sections/Desks of the Ministry was carried out in accordance with the programme of Annual O&M inspection drawn by IWSU for the year 1993-94 as per provision contained in the Central Secretariat Manual of Office Procedure. The Inspecting Officers were requested to pay special attention towards record management.

Study Team

As per the instructions issued by the Ministry of Finance, Secretary (E&F) had constituted a study team in 1991 for undertaking a work measurement study in respect of scientific and non-scientific posts in the Ministry. Chaired by the then J.S. (Admn.), the study team consisted of an associated scientific/technical officer of each division and a core member from the Staff Inspection Unit (SIU). The core member was entrusted with the responsibility of assessing the manpower requirement of each division through the application of various work study techniques. During the year under report, the SIU submitted their report/comments indicating tentative assessment of manpower of all the divisions of the Ministry, which was discussed in a series of meetings. It has been decided that those divisions, who have expressed disagreement with the SIU assessment may be requested to furnish detailed

justification for their demand for more staff, so that the same may be finalised with the SIU. A similar review of all the scientific and non-scientific posts of the NAEB and other associated offices of the Ministry is proposed to be undertaken shortly.

Environment and Parliament

During the year, 579 Parliament Questions pertaining to various aspects were dealt with by the Ministry and 336 questions in the Lok Sabha and 243 in the Rajya Sabha were answered. Industrial and vehicular pollution, deforestation, progress of afforestation, wildlife preservation, conservation and early clearance of developmental projects from environmental and forest angles were among the areas in which the Members of Parliament evinced keen interest.

Use of Hindi

Hindi as Official Language is being progressively used in the Ministry and its attached and subordinate Offices. The Hindi Salahakar Samiti, an advisory body for the Ministry on language policy could not meet during the year as it is being reconstituted. However, the Official Language Implementation Committee of the Ministry met regularly during the year.

Inspection of Offices

In order to ensure effective implementation of the Annual programmes and instructions on the use of Hindi, 16 offices under the Ministry were inspected during the year.

Training in Hindi

During the year, three employees passed Hindi Type-writing, one Hindi Stenography and one each in Hindi Prabodh, Praveen and Pragya examination under the Hindi Teaching Scheme.

Hindi Week

Hindi week was organised from 6th-9th September, 1993 during which various competitions were held and prizes were distributed to the winners.

Incentives for Hindi Books on Environment

The prize scheme, introduced in 1987 to encourage creative and original writing on topics relating to Environment, etc. in Hindi also continued during the year. Out of 10 entries received under this scheme, the following were awarded prizes:

- Khanan Paryavaran Aur Prabandh Rs.20,000 (First)
By Dr. P.K. Gandhi
- Adhunik Jeevan Aur Paryavaran Rs. 15,000 (Second)
By Sh. Damodar Sharma &
Sh. Harish Chandra Vyas
- Garhwal Ki Van Sampada Aur Rs. 10,000 (Third)
Paryavaran
By Dr. Shivanand Nautiyal
- Paryavaran Pradoosshan Aur Rs. 5,000
Ekkisaween Sadi (Consolation)
By Dr. Sujata Bisht

Publication of Journal

The quarterly Hindi Journal 'Paryavaran' continued to be published by the Ministry with a view to encouraging creative writing in Hindi among its officers and employees. In addition, a book entitled 'Sanskriti Evam Paryavaran' writing by Sh. Harish Chandra Vyas was published in Hindi and five training books pertaining to training Institutes were also translated into Hindi during the year.

Civil Construction Unit

A Civil Construction Unit (CCU) (Civil) was set up in the Ministry in August, 1987 for taking up important works for the Ministry on priority basis, in pursuance of the Government's decision that major scientific departments with substantial annual civil works budget should have a Civil Engineering Unit. The technical posts are manned by officers drawn from the C.P.W.D. These works relate to various units of the Ministry, viz., Botanical Survey of India, Zoological Survey of India, National Museum of Natural History, Indian Council of Forestry Research, Education and Training (ICFRE), G.B. Pant Institute of Himalayan Environment and Development, Indira Gandhi National Forest Academy, Forest Survey of India and National Zoological Park.

The Civil Construction Unit has taken up 70 major schemes so far with a total estimated cost of Rs. 83 crores. The works mostly consist of construction of office-cum-laboratory buildings, Herbariums, National Museum of Natural History, Forest Research Institutes, National Forest Academy, National Zoological Parks and residential quarters for staff located all over India. Out of these, 36

works costing Rs. 55.89 crores are being directly executed by CCU, which has 3 field divisions with Sub-Divisions at Delhi, Dehra Dun, Almora, Bangalore, Mysore, Coimbatore, Jodhpur and Jabalpur. Works in Eastern, North Eastern and Western Zones have been entrusted to C.P.W.D. or to the State PWDs and their progress is monitored by the CCU. However, Planning of all the works including those executed by C.P.W.D./ Andaman P.W.D. is undertaken by CCU.

In tune with the Ministry's policy of substituting wood wherever possible, the CCU has adopted the use of a number of alternatives for timber in the buildings being constructed by them. Use of wood in doors, windows, cupboards, has been dispensed with completely and Steel sections/pressed steel frames/Aluminum sections are being used for doors and window frames depending on the importance of the buildings. Conventional wooden panel/flush door shutters, have been replaced with Agro-based MDF boards/PVC panelled shutters. Use of photo voltaic cells is being introduced at selected areas in place of conventional electric lights, with a view to popularising use of alternate sources of energy. Solar water heating system is also being introduced for hostel buildings for heating water. In Tropical Arid Forest Research Institute, Jodhpur where water is scarce, recycling sewage water for horticultural purposes after treatment is being introduced. In G.B. Pant Institute of Himalayan Environment and Development, a bio-gas plant is being set up to generate electricity from the sewage. It is also proposed to utilize the concept of solar passive architecture for important buildings to be taken up by CCU in future.

At present, there are 18 major works amounting to Rs.



Fig. 83 Office of the Forest Survey of India, Dehradun

27.92 crores which have been awarded and are under execution by CCU. Details regarding works completed during 1993-94, works in progress, works for which sanctions have been awarded recently and are likely to be started, new works for which sanctions are awaited, and works in planning stage, are as follows :

A. Works completed during 1993-94

Name of Work	Cost (Rs. in lakhs)	Remarks
1. Regional Museum of Natural History	196	a) Main building work completed. b) Work of inner galleries nearing completion. c) Horticultural works entrusted to K.S.F.I.C. are in progress.
2. Construction of 24 Nos. qrs. (Phase I) in IFGTE, Coimbatore	97	
3. Approach road to existing Nursery, TFRI, Jabalpur	7	
4. Providing drainage system to IFGTB Campus, Coimbatore	33	
5. 34 Nos. staff qrs. for B.S.I., Dehra Dun	81	
6. 108 Nos. staff qrs. for TFRI, Jabalpur	151	
7. Construction of Office -Cum Laboratory building for TFRI, Jabalpur.	277	Work is complete, except for obtaining service connection from MPSEB.



Fig. 84 The laboratory building of TFRI, Jabalpur

B. Works in progress

Name of Work	% Progress	Sanctioned Cost (Rs. in lakhs)
1. ICFRE Works:		
(i) Arid Zone Forestry Research Institute, Jodhpur:		
a) Office & Laboratory Bldg.	60%	277
b) Residential Qrs.- 40 Nos Phase I	96%	154
c) Residential Qrs.- 32 Nos. Phase II.	55%	75
2. IFGTB, Coimbatore:		
a) Construction of 41 Nos. Qrs. (Phase II)	80%	72
b) Construction of 72 Nos. Qrs. (Phase III)	27%	194
c) Extension to Guest House and provision of Dormitory accommodation for Drivers and Garages.	80%	15
3. Institute of Wood Science & Technology, Bangalore:		
a) Construction of laboratories and Workshops	Work started on 21.11.1993	424
4. F.R.I. Dehra Dun:		
a) Construction of Scientists Hostel	5%	159
5. Construction of G.B. Pant Institute of Himalayan Environment & Development, Almora. :		
a) Construction of 46 nos. residential quarters	45%	150
b) Construction of Faculty Building & Guest House	10%	434
c) Construction of Library building and Hostel	Work recently awarded	
d) Development of site	95%	100

C. Works which are likely to be started, for which sanctions have been accorded recently

1. F.R.I., Dehra Dun:		
a) Construction of Library-Cum-Information Centre		354
2. Arid Zone Forestry Research Institute, Jodhpur:		
a) Construction of 27 Nos. staff quarters Phase III.		115
b) Construction of Scientists Hostel		90

3. F.R.I., Jabalpur:

- a) Construction of 78 Nos. staff quarters Phase II 219

D. New works for which sanctions are awaited

- | | | |
|--|---------------------------------|---|
| | Estimated cost
Rs. in lakhs) | |
| a) Construction of Regional Museum of Natural History, Bhopal | 346 | Estimated cost phase I
Rs. 183 lakhs |
| b) Construction of Regional Museum of Natural History, Bhubaneswar | 393 | |
| c) Construction of G.B. Pant Institute of Himalayan Environment and Development at Kulu. | 204 | |
| d) Construction of 40 Nos. staff quarters for TFRI, Jodhpur (Under World Bank Plan) | 118 | |
| e) Construction of Administration Building for F.R.I., Dehra Dun. | 443 | |

E. Works in Planning Stage

- G.B. Pant Institute of Himalayan Environment & Development, Gangtok.
- Construction of Scholars hostel and Scientists hostel for TFRI, Jabalpur.
- Construction of Library-cum-Information Centre for TFRI, Jabalpur.
- Construction of 40 Nos. staff quarters for TFRI, Jabalpur (Phase III)
- Construction of Scientists-cum-Scholars Hostel for IFGTB at R.S. Puram, Coimbatore.
- Construction of Guest House for I.W.S.T., Bangalore.
- Construction of office building for Z.S.I., Pune.
- Visitors Centre for National Zoological Park, New Delhi.

Plan Co-ordination and Budget

The Plan Coordination Division is responsible for the coordination of all plan schemes and programmes of the Ministry in close association with the Planning Commission. The Division is also responsible for monitoring the progress of the plan schemes, preparation of Annual Action Plans, periodical progress reports and reports under the 20-Point Programme (Points 16 and 17).

An amount of 1200.00 crores has been allocated to the Ministry for the Eighth Five Year Plan (1992-97), which constitutes about 0.5 percent of the total Central Sector Plan outlay of Rs. 247,865 crores. The allocation in the Annual Plan 1993-94 is Rs. 318 crores as against Rs. 280 crores for 1992-93.

The sector-wise break-up is given in Table 9.

Table 9

(Rs. in crores)

Sl. No.	Sector Outlay	VII Plan	VIII Plan	Annual Plan	
		Outlay	Outlay	1992-93	1993-94
1.	Environment	110	325	48	70
2.	Ganga Action Plan	240	350	55	65
3.	Forests & Wildlife	155	250	62	85
4.	National Wetlands Development Board/ National Afforestation and Eco-Development Board	292	275	115*	98
TOTAL:		797	1200	280	318

* Rs. 26.19 crores transferred to NWDB.

The total Public Sector Plan Outlay for the year 1993-94 is as follows:

Table 10

(Rs. in crores)

	Annual Plan 1992-93		Annual Plan 1993-94
	B.E.	R.E.	B.E.
Central Plan	48407	49719	63936
State & UT Plan	32365	27408	36184
TOTAL:	80772	77127	100120

The corresponding allocation in the Environment and Forestry sectors alongwith this Sector's share in total plan outlays are given at Table 11.

Table 11

Outlays in Environment and Forestry Sector

(Rs. in crores)

	Annual Plan 1992-93		Annual Plan 1993-94
	B.E.	R.E.	B.E.
1. Central Sector Plan (Ministry of Environment & Forests)	280	279	318
2. States and UTs Plan	664	569	706
3. Total Outlay in Central and State Plans	944	848	1074
4. Total outlay in Env. and Forestry Sector as % of total Public Sector Outlay	1.2	1.1	1.1
5. Plan outlay of Ministry of Environment & Forests as a % of total Central Plan Outlay	0.6	0.6	0.5
6. States Plan Outlays under Environment & Forestry as a % of total States Plan	2.1	2.1	2.0

The progress of plan schemes of the Ministry was reviewed regularly at the level of Secretary (E&F) every month.

The Ministry has been allocated an outlay of Rs. 360 crores as per the following sectoral break-up for the Annual Plan 1994-95, which is the mid-year of the Eighth Plan.

Table 12

	(Rs. in crores)
1. Environment	79
2. Ganga Action Plan	78
3. Forests & Wildlife	100
4. National Afforestation and Eco-Development Board	103
Total	360

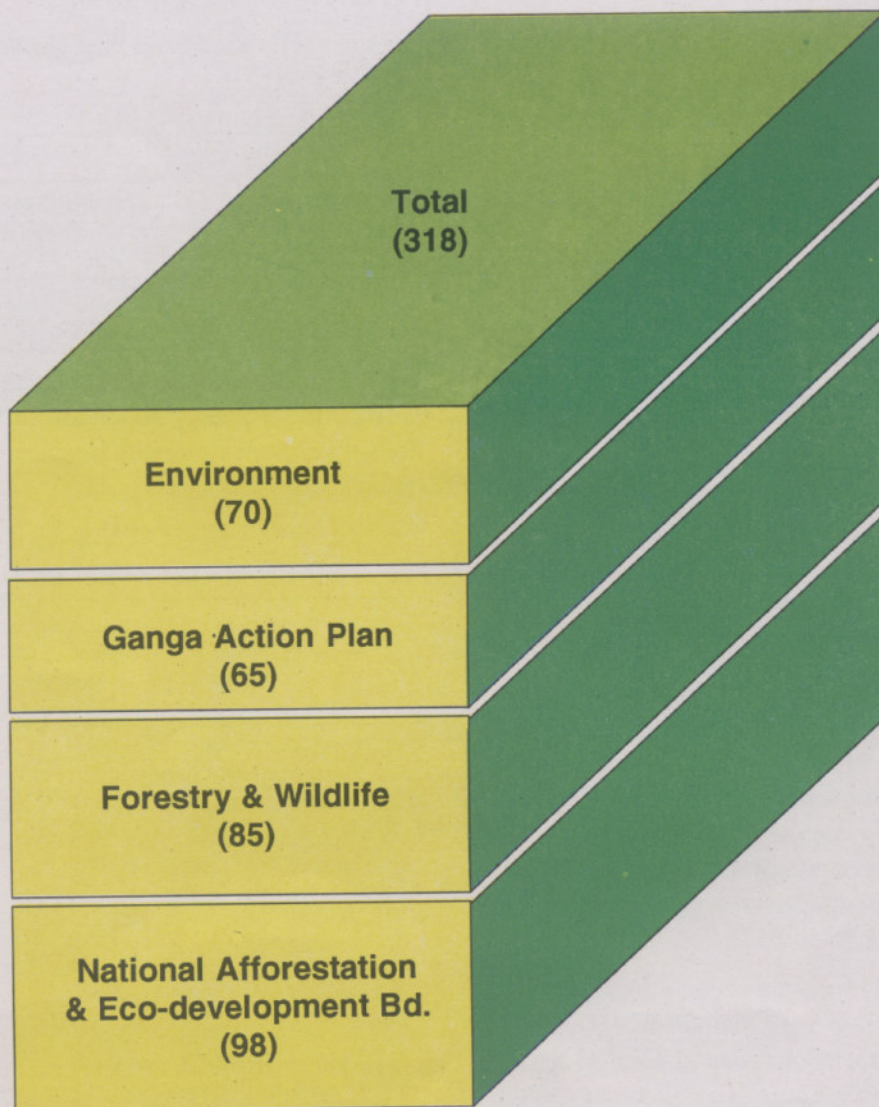
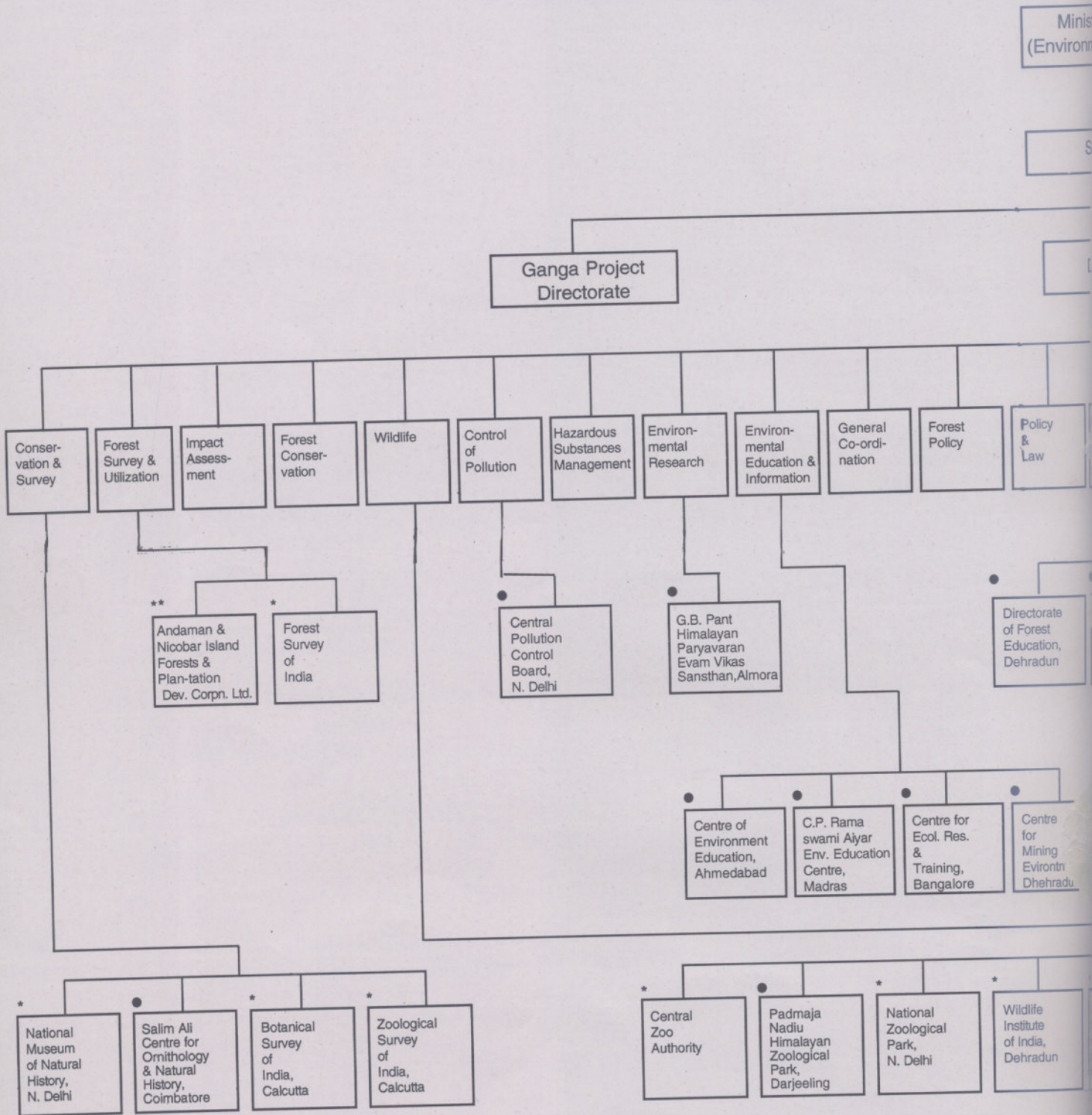


Fig. 85 Areawise Distribution of Funds for the Year 1993-94 (In Rs. Crores)

Annexures

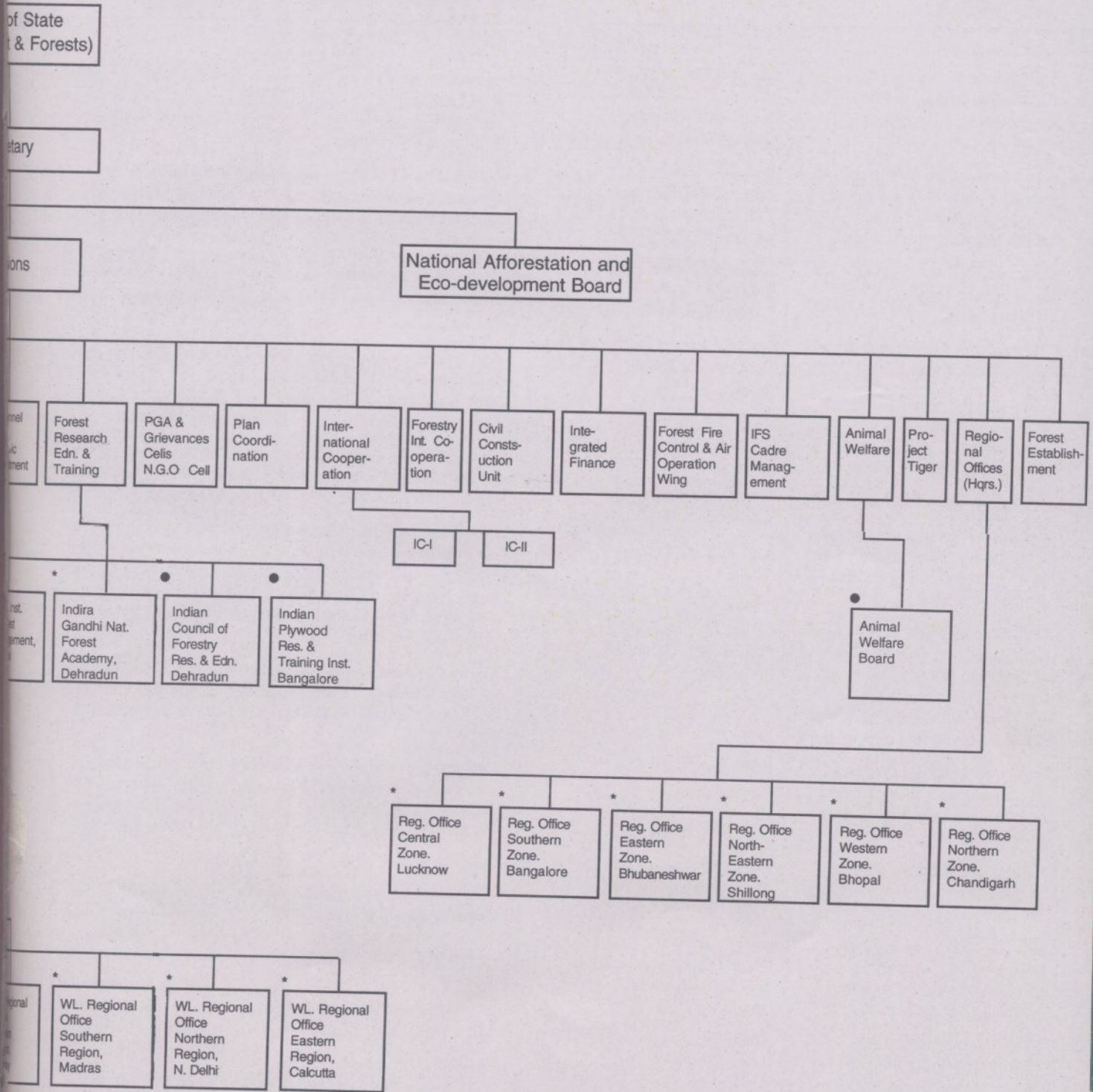
ORGANISATION CHART OF THE MINISTRY OF ENVIRONMENT AND FORESTS



- Autonomous Agencies assisted by the Ministry
- * Associated Units under the administrative control of the Ministry
- ** Public Sector undertaking

MINISTRY OF ENVIRONMENT & FORESTS

Annexure - I



Annexure-II

LIST OF PROJECTS SANCTIONED DURING 1993-94

Sl. No.	Title of the Project	Institution	Sl. No.	Title of the Project	Institution
Man and Biosphere					
1.	Studies on insect plant inter-relations in natural scrub-jungle forest eco-systems.	G.S. Gill Research Institute, Guru Nanak College, Madras-600 032.		select stretch of rivers canals and connected lakes system of Telengana region of river Krishna.	
2.	Assessment of the impact of industrial air pollution on tree species growing in and around Baroda Industrial area.	Prof. S.J. Bedi, Deptt. of Botany M.S. University Baroda-390 002.	7.	Manipulation of catabolic genes for the detoxification of Xenobiotic.	Deptt. of Zoology University of Delhi.
3.	Survey of the conservation status of Monitor Lizard (<i>Varanus sps.</i>)	School of Studies in Zoology, Jiwaji University Gwalior.	8.	Reclamation of Marble monuments affected by air pollutants through chemical and biological means.	Birla Institute of Scientific Research, Malakpet, Hyderabad.
4.	Tree Watching: A Handbook for the trees of Delhi.	Deptt. of Botany University of Delhi Delhi.	Integrated Action-Oriented Research, Demonstration and Extension Programme		
5.	Impact of Irrigation on Environment: A study of Srirama Sagar Command area.	Deptt. of Geography, Osmania University Hyderabad.	Eastern Ghats		
Environmental Research Programme			1.	Avifauna of Eastern Ghats with special reference to status of the Jerdous course <i>Cursorius bitorguatus</i> .	Bombay Natural History Society, Shaheed Bhagat Singh Road, Bombay.
1.	A study on the role of cadmium in the environment as causative factor in hypertension and renal damage	Deptt. of Pharmacology, AIIMS, New Delhi.	2.	Ecology and biology of crustacean and Molluscs of Eastern Ghats.	Deptt. of Zoology, Andhra University, Visakhapatnam.
2.	The future of endangered human populations and environment of Andaman Islands: A strategic study on the conservation and development with reference to endangered human Populations.	Centre for Future Studies Pondicherry University, Pondicherry.	3.	Ecological analysis of vegetation floristic study, reproductive biology, conservation and regeneration of endemic and indigenous species at Burgur Hills in Periyar District.	Deptt. of Botany Vellalar College for Women, Erode.
3.	Impact of industrial effluents on Shivanth and Kharun rivers from the industrial belt between Durg and Bilaspur.	Govt. P.G. College Chhindwara.	4.	Eco-climatology, water balance ecological balance & ecorestoration of Nallamallai Hills in Eastern Ghats.	Deptt. of Geography, Sri Krishnadevaraya University.
4.	Carbon and Nitrogen fixation by blue green algae cyanobacteria and its role for development of waste land.	Indian Institute of Technology, New Delhi.	5.	Development and management of ecohamlets for conservation of Eastern Ghats forests in Northern Andhra Pradesh.	Deptt. of Environmental sciences, Andhra University Visakhapatnam.
5.	Sediments as sink for heavy metals case studies from the Yamuna river sediments	School of Environmental Sciences, JNU New Delhi.	Western Ghats		
6.	Study of sediments, their transport, distribution and transformation of significance to biological magnification and ecological regeneration in a	Deptt. of Zoology, Osmania University, Hyderabad.	6.	A study on the management of fragmented rain forests of the Western Ghats for the conservation of fauna with special emphasis on small mammals.	Salim Ali Centre for Ornithology and Natural History, Kalayampalayam (P.O.) Coimbatore-641 010.
			7.	An eco-system analysis of Kodyar Forests in Western Ghat.	Madurai Kamaraj University, Palkalai Nagar, Madurai.
			8.	Survey of edible mushroom in the Western Ghats of Uttar Kannada District (Karnataka).	University of Agricultural Sciences, Dharwad-580 005.

Sl. No.	Title of the Project	Institution
9.	Tourism: Economic Boon or Environment Bane?	Organisation for Applied Socio-Economic System (OASES), B-10 Ansal Chambers, Bhikaji Cama-Place, New Delhi.
10.	Recycling and re-use of raw coir pith to promote plant growth.	Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore 641 043.
11.	Water relation and rooting depth of selected Eucalyptus species.	Kerala Forest Research Institute, Peechi, Kerala 680 653.

Biosphere Reserves

1.	Eco-systems Dynamics and Plant Animal interactions in Great Nicobar Biosphere Reserves.	Department of Botany, University of Delhi, Delhi- 110 007.
2.	Bio-diversity of Cetaceans off Tuticorin.	Fisheries College and Research Institute, Tuticorin- 628 008.
3.	Breeding strategies of Birds in Tropical moist Deciduous Forest in Siruvani.	Salim Ali Centre for Ornithology and Natural History, Kalayampalayam, Coimbatore- 641 010.
4.	In-situ observation on under water Ecology of Coral reefs and associated Fauna in the Gulf of Mannar Biosphere Reserves.	School of Energy, Environment and Natural Resources, Madurai Kamaraj University, Madurai- 625 021.
5.	Enumerative survey and study of Dugong in the Gulf of Mannar Biosphere Reserves.	Marine Biological Station, Zoological Survey of India, Madras- 600 028.
6.	Studies on the Biology and Sea Ranching of the Sacred Chank, <i>Xancus pyrum</i> with special ref. to the protection of species in the marine National Park of the Gulf of Mannar.	Mandapam Regional Centre of CMFRI (ICAR) Marine Fishers, P.O. Mandapam, Ramnad Dist. Tamil Nadu
7.	Impact of Human interference on the plant and bird communities in the Nilgiri Biosphere Reserves.	Salim Ali Centre for Ornithology and Natural History, Kalayampalayam PO Coimbatore- 641 010.

NNRMS

1.	Monitoring of Daira Lands of Eastern India with respect to vegetation, wasteland, soil-erosion, inundation through Remote Sensing Techniques.	Division of Agricultural Physics, Indian Agricultural Research, Institute, New Delhi-110012.
----	---	--

Sl. No.	Title of the Project	Institution
2.	A rapid assessment of Bio-diversity in Mehao Sanctuary, Arunachal Pradesh through Remote Sensing Techniques and GIS.	Salim Ali Centre for Ornithology and Natural History, Coimbatore- 641 010.

Annexure-III

LIST OF PROJECTS COMPLETED DURING 1993-94

Sl. Title of the Project No.	Institute	Sl. Title of the Project No.	Institution
Man and Biosphere			
1. Effects of recurring droughts and human interference on the vanishing flora and conservation of rare and endangered and endemic.	Prof. M.M. Bhandari, Deptt. of Botany, University of Jodhpur, Jodhpur-342 001.	6. Status of metal speciations in the environment.	University College of Art and Science, Srivenkateswara University Tirupati-517 502 Bareilly College Bareilly.
2. Animals and Environment	Prof. N.S. Ramaswamy, 870, 17th Main Moramangale VI Block, Bangalore- 34.	7. Studies on the ecology of the effluent channel flowing from synthetics and chemicals Ltd. Bareilly and its irrigational impact on some Rabi crops.	Berhampur University Berhampur, Orissa.
3. Conservation of fresh water Fishes of India	Zoological Survey of India, Southern Regional Station, 100, Santhome High Road Madras.	8. Studies on the algal vegetation in the inland waters of Berhampur with emphasis to the pollution species.	
4. Ecology and cytogenetical studies of rare, endangered and endemic forest flora of Andaman and Nicobar Islands.	PG Deptt. of Botany, Govt. College, Port Blair- 744 104.	Integrated Action-oriented Research Demonstration and Extension Programme	
5. Integrated Artemia in solar salt work, benefits for salt production or ralgash by products (Artemia cysts and Artemia Biomass).	Deptt. of Zoology, AVVM Sri Pushpam College, Poondi, Thanjavur (T.N.)	Eastern Ghats	
6. Analysis of structure and function of degraded eco-systems (Grasslands) of Meghalaya.	Deptt. of Botany, North-Eastern Hill University, Shillong-793014.	1. Studies on the flora and vegetation of Kolli Hills, Tamil Nadu.	Vellalar College for women, Erode.
Environment Research Programme		2. Ecology & Management of mammalian resources of the Eastern Ghats	Andhra University, Visakhapatnam.
1. Impact of a thermal power plant on environment and agricultural production.	A.M. University, Aligarh- 202 001.	Western Ghats	
2. Studies on aerobic composting of spent wash and its environmental impact assessment.	Environmental Research Foudation, Sangali Maharashtra-416 415.	3. Studies on sediment flux of river estuary and adjoining coastal waters of Goa, West Coast of India.	Deptt. of Marine Science, Goa University, Bambolim-Goa-403 005.
3. Studies on Chemistry of dry, wet and bulk deposition at Agra	Deptt. of Chemistry, Agra University, Agra.	4. Studies on water use, assimilation and growth of Eculayptus.	Kerala Forest Research Institute, Peechi, Kerala.
4. Microbial degradation of polycyclic aromatic hydrocarbons in soil and sus-surface environment in vicinity of Mathura oil refinery.	Interdisciplinary Unit of Biotechnology, A.M. University, Aligarh-202 001.	5. Exploitation of microbial systems associated with forest tree species for the eco-development of the Vivekanandapuram of Karamadai Block-I.	Avinashilingam Instt. for Home Science and Higher Education for Women, Coimbatore-43.
5. Biochemical and biological evaluation of Algae inhabiting wild water in North Bihar.	Bihar University Muzaffarpur (Bihar).	6. Ecological studies in Agastyamalai rain forests, Western Ghats.	Salim Ali School of Ecology, Pondicherry University, Pondicherry- 605 001.

Annexure-IV

LIST OF REGIONAL OFFICE/ASSOCIATED/AUTONOMOUS AGENCIES/ENVIS CENTRES/CENTRES OF EXCELLENCE ETC. OF THE MINISTRY OF ENVIRONMENT AND FORESTS

Regional Offices

1. Regional Office
North East Zone
Ministry of Environment and Forests
Upland Road
Leitumkhra
Shillong - 793 003
2. Regional Office
Central Region
Ministry of Environment & Forests
B-1/72 Sector Aliganj
Lucknow-226 020
3. Regional Office
Northern Region
Ministry of Environment and Forests
1812, Sector 33-D
Chandigarh.
4. Regional Office
Western Region
Ministry of Environment and Forests
E-3/24, Arera Colony
Bhopal-664 016
5. Regional Office
Southern Region
Ministry of Environment and Forests
493, 1st Main
III Block, III Stage
Basaveswar Nagar
Bangalore - 560 079
6. Eastern Region
Ministry of Environment and Forests
194, Kharavel Nagar
Bhubaneshwar-751 001

Centres of Excellence

1. Centre for Environment Education
Nehru Foundation for Development
Thaltej Tekra
Ahmedabad - 380 054
2. C. P. R. Environmental Education Centre
1A, Eldams Road
Madras-600 018
3. Ecological Research & Training Centre
Indian Institute of Science
Bangalore-560 012
4. Centre For Mining Environment
Indian School of Mines

Dhanbad-826 004

5. Salim Ali Centre for Ornithology
and Natural History (SACON)
Kalayampalayam
Coimbatore-641010

Regional Offices of NAEB

1. Coordinator
(SFSSO: Regional Unit)
University of Agricultural
Sciences, Department of
Economics, GKVK Campus
(P.B. No. 2477)
Bangalore-560 065
(Karnataka)

Andhra Pradesh,
Tamil Nadu and Kerala
Karnataka,
2. Coordinator
(SFSSO: Regional Unit)
Dr. Y. S. Parmar University of
Horticulture and Forestry
College of Forestry Nauni,
Solan-173 230
(Himachal Pradesh)

Jammu & Kashmir,
Himachal Pradesh.
Punjab
3. Coordinator
(SFSSO: Regional Unit)
Agricultural Finance Consultants
Limited. Chhatrapati Shivaji
Maharaj Marg., Bombay-400 039
(Maharashtra)

Rajasthan, Uttar Pradesh,
Haryana & Delhi.
4. Coordinator
(SFSSO: Regional Unit)
Indian Institute of Forests
Management, Nehru Nagar
Bhopal-462 003.
(Madhya Pradesh).

Madhya Pradesh and
Orissa
5. Coordinator
(SFSSO: Regional Unit)
Indian Institute
of Management, Sastrapur
Ahmedabad-380 015
(Gujarat)

Gujrat Maharastra,
and Goa
6. Coordinator
(SFSSO: Regional Unit)
North- Eastern Hill University
Lower Lachumjane
Shillong 793 001
(Meghalaya)

Assam, Arunachal
Pradesh.
Meghalaya
Mizoram
Manipur, Nagaland
and Tripura

7. Coordinator
(SFSSO: Regional Unit)
Jadavpur University
Post Box 17026
Calcutta-700 032
(West Bengal)
- Bihar, West Bengal
and Sikkim

2. Zoological Survey of India
M-Block, New Alipur
Calcutta-700 053
3. National Museum of Natural History
FICCI Building
Barakhamba Road
New Delhi 110 001

Autonomous Agencies

a) Environment Wing

1. Central Pollution Control Board
Parivesh Bhawan
CBD- cum-Office Complex
East Arjun Nagar
Delhi 110 032
2. Gobind Ballabh Pant Institute
of Himalayan Environment and
Development, Kosi, Katarmal
Almora- 263 643 (U.P.)

b) Forest Wing

1. Andaman and Nicobar Islands
Forests and Plantation Development
Corporation Ltd., Van Vikas Bhawan
Port Blair,
Andaman And Nicobar Islands.
2. Indian Institute of Forest Management
Tumkur Road
Bangalore-560 022
3. Indian Plywood Research Institute
Tumkur Road
Bangalore-560 002
4. Indian Council of Forestry Research Education
P.O. New Forests
Dehra Dun-248006

c) Wildlife Wing

1. Wildlife Institute of India
P.O. New Forests
Dehra Dun 248006
2. Animal Welfare Board of India
4th Street, Abhiramapuram
Madras 600 018 (Tamil Nadu)

Associated Units

a) Environment Wing

1. Botanical Survey of India
P-8 Brabourne Road
Calcutta-700 001

b) Forest Wing

1. Forest Survey of India
25, Subhash Marg.
Dehra Dun-248 006
2. Indira Gandhi National Forest Academy
P.O. New Forests
Dehra Dun 248 006 (U.P.)
3. Forest Research Institute
P.O. New Forest
Dehra Dun-248 006
(U.P.)
4. Institute of Forests Genetics and Tree
Breeding, Forest College Campus
P.B. No. 1031, R. S. Puram,
H. P. O. Coimbatore-641 002
(Tamil Nadu)
5. Institute of Wood Science and
Technology, 18th Cross, Malleswaram
Bangalore-560 022
(Karnataka)
6. Institute of Arid Zone Forestry Research
12/10, Chopasani Housing
Scheme, Jodhpur 342 008
(Rajasthan)
7. Institute of Deciduous Forests
P.O. RFRC, Mandla Road
Jabalpur 482 021 (Madhya Pradesh)
8. Institute of Rain and Moist Deciduous
Forest Research, Jorhat (Assam)

c) Wildlife Wing

1. National Zoological Park
Mathura Road,
New Delhi-110003

Regional Offices

1. Wildlife Preservation
Western Region

- 11 Air Cargo Complex
Sahar, Bombay-400 099
2. Wildlife Preservation
Eastern Region
Nizam Palace
6th Floor, MS Building
234/4, A. J. C. Bose Road
Calcutta 700 020
3. Wildlife Preservation
Northern Region
Bikaner House, Shahjahan Road
New Delhi - 110 011
4. Wildlife Preservation
Southern Region
2C/5, Brownstone Apartments
Mahaligapuram
Madras-600 034

ENVIS CENTRES

Institution	Area	
1. Dr. K. R. Khan Member Secretary Central Pollution Control Board Parivesh Bhawan CBD-Cum Office Complex, East Arjuni Nagar, Delhi-110 092	Control of Pollution (Water & Air)	Tel (011) 2217013, 2217079 2204948, 2217078 Grams : CLEANENVIRON Telex : 0.31-66440 PCO-IN
2. Dr. P. N. Vishwanathan Sr. Assistant Director Industrial Toxicology Research Centre Mahatma Gandhi Road Lucknow-226001 (U.P.)	Toxic Chemicals	Tel:(0522)248227, 248228 247586,240106 Telex: .535-456 ITRC IN Grams : INTOXI, LUCKNOW
3. Dr. Ashok Khosla President Development Alternatives B-32 Institutional Area Tara Crescent, New Mehrauli Road, Hauz Khas, New Delhi -110016	Environmentally Sound & Appropriate Technologies	Tel:(011)665370, 65793 Telex: 031-7316 DALT IN Delhi Fax : 91-11-686-6031
4. Dr. G. B. Jaiprakash Narain Director Centre for Environment Studies College of Engineering Anna University Madras-600025 (T.N.)	Biodegradation of Wastes and Environmental Impact Assessment	Tel: (044)2351723/Extn. 3 Grams: ANNATECH MADRAS Telex: 041-21077 ANNU IN
5. Dr. R. K. Pachauri, Director Tata Energy Research Institute (TERI) 102, Jor Bagh New Delhi-110003	Renewable Energy and Environment	Tel: (011) 4625296 Grams: TERINST Telex: 31-61593 TERI IN Fax:91-11-4621770
6. Prof. Raghvendra Gadagkar Chairman Centre for Ecological Sciences Indian Institute of Science Bangalore-560012 (Karnataka)	Western Ghats and Biological Diversity	Tel. (91-812) 340985 344411/2506 Grams "Science" Malleswaram Bangalore Telex: 0875-8349 Fax: 91-812-341683 E-Mail: Cesgre- @ ces iscemet in
7. Secretary General World Wide Fund for Nature-India 172 B, Lodi Estate, Max Mueller Marg New Delhi-110003	Non-Government Organisations, Media and Parliament Matters related to Environment	Tel:(011) 616532, 693744 4627586 Grams: PANDAFUND Delhi Fax: 91-11-4626837

8. Shri Swadeep Singh
Executive Director
Environmental Planning and Coordination Organisation
E5 Sector Arera Colony
Bhopal-462 016
Madhya Pradesh
Environmental Management related to the State of Madhya Pradesh
Tel:(0755) 565868, 566970
564501
9. Dr. S.K. Bhattacharya
Deputy Director
National Institute of Occupational Health (NIOH)
Meghani Nagar
Ahmedabad-380-016, Gujarat
Occupational Health
Tel: (0272) 67351 67352
67359, 67361, 67371
Grams: NIOHEALTH
Grams: (81) 121-6471
Fax (91) 272 866630
Gram:SUSKHSHETRA
10. Shri D.C. Ojha
Senior Librarian
Central Arid Zone Research Institute (CAZRI)
Jodhpur-342 003
Rajasthan
Desertification
Gram:SUSKHSHETRA
11. Dr. K. Krishnamurthy
Director
Centre for Advanced Studies in Marine Biology
Annamalai University Parangipettai-608 502
Tamil Nadu
Mangroves, Estuaries, Lagoons and Coral Reefs.
Tel:23
12. Shri Karthikeya V. Sarabhai
Director
Centre for Environment Education (CEE)
Nehru Foundation for Development
Thaltej Tekra
Ahmedabad-380-054 Gujarat
Environmental Education
Tel: (0272) 442642, 442651
Telex: 81-121-6779 CEE IN
Fax: 91-272-467342
91-272-468201
13. Dr. A.K. Ghosh
Director
Zoological Survey of India
Prani Vigyan Bhawan
M-Block, New Alipore
Calcutta-700 053
Animal Ecology
Tel: (033) 494893, 493383
Grams: Zoology, Calcutta
14. Dr S.P. Banerjee
Prof. and Head
Indian School of Mines
Dhanbad-826 004
Bihar
Environmental Problems of Mining
Tel: (0326)32040
822187, 822176
Grams: SCOLOMIN
Telex: 0629-214
Fax:(0326) 832040
15. Dr. T Chakraborty
Head, RIHW Division
National Environmental Engineering Research Institute ((NEERI), Nehru Marg
Nagpur-440-020 Maharashtra
Solid Wastes including Hazardous Wastes
Tel(0712)526071 526075
Grams: NEERI
Telex: 0715-233
Fax: 523893
16. Dr. A. N. Purohit
Director
G.B. Pant Instt. of Himalayan Environment and Development
Kosi-Katarmal-263 643
U.P.
Himalayan Ecology
Tel: (05962) 3314, 3311
Grams : HIMVIKAS
Telex: 05802-201 IHED IN
Fax: (05962) 2100
17. Prof. A. R. Maitra
Head, ENVIS Centre
School of Planning and Architecture
Indraprastha Estate
New Delhi - 110002
Human Settlement
Tel: 3318353

Annexure-V

LIST OF FILMS PRODUCED BY THE MINISTRY DURING 1993-94

Sl. No.	Title	Language, Duration and Format	Subject
1.	Mudialy Alternatives	English 30 mts. U-matic	A film on ecological restoration and environmental upgradation in big cities.
2.	Ecology that Sustains the Tiger	English 20 mts. U-matic	A film on the status of the forests Tiger population in project areas and other related aspects.
3.	Wapsi	Hindi 37 mts. U-matic	A film on environmental conservation.
4.	Ek Zaroori Baat	Hindi 15 mts. U-matic	An animated film on environmental problems and solutions.
5.	Maila Pani	Hindi 35 mts. U-matic	A film on ground water pollution in rural areas due to chemical industry.
6.	Chhindwara Adivasi - Naya Swarup	Hindi 30 mts. U-matic	A film on Chhindwara tribals in Madhya Pradesh covering various environmental, ethno-botanical and ethno-zoological issues.
7.	Gauri Tal	Hindi 30 mts. U-matic	A film based on a small lake in Kumaon Hills.
8.	Dhak Ki Rajkumari	Hindi 30 mts. U-matic	A fiction film on environmental awareness.
9.	Udyog Lagane Se Pahle	Hindi 2 mts. U-matic	A quicky on location of industry.
10.	A Goal for All	Bengali 30 mts. U-matic	A documentary film on pollution in Calcutta.
11.	Hame Bhi Jeene Do	Hindi 17 mts. U-matic	A film on the prevention of cruelty to animals.
12.	2nd All India Forest Sports and Games Meet,	English 20 mts. U-matic	A film on 2nd All India Forest Sports and Games Meet held at Dehradun in December, 1993.

13. Smriti Van	Hindi 30 mts. U-matic	A film highlighting the importance of forests in maintaining the ecological balance.
14. Bhoomi	Hindi 32 mts. U-matic	A film on various stories related to environment.
15. White Lies	English 19 mts. U-matic	A film on 'Plastics' and detergents.
16. Cold Deserts of Himachal Pradesh	Hindi 30 mts. U-matic	A film on life of nomade tribes of Lahul Spiti.
17. Sare Jahan Se Achha	Hindi 3 mts. U-matic	A film on various aspects of environment, indended to create awareness.
18. Noise Pollution	Hindi 26 mts. U-matic	A film on noise pollution.
19. Swachh Pani	Hindi 4 mts. U-matic	A film on different aspects of water pollution.
20. Kale Pahar	Hindi 27 mts. U-matic	A fiction film on environmental awareness.
21. Meri Vasiyat	Hindi 14 mts. U-matic	A film on use of electric cremetoria to save fuel wood.
22. Samajhdari	Hindi 14 mts. U-matic	A film on environmental education.
23. Overloading of Horses	Hindi 2 mts. U-matic	A film aimed at creation of awareness regarding prevention of cruelty to animals.
24. Kya Yeh Theek Hai	Hindi 2 mts. U-matic	A quickly aimed at creation of awareness regarding prevention of cruelty to animals.
25. Jaan Inki Bhi Hai	Hindi 2 mts. U-matic	A short film aimed at creation of awareness regarding prevention of cruelty to animals.
26. Kanton Bhari Dagar	Hindi 2 mts. U-matic	A film on storage and transport of chickens.



Fig. 86 Blue Poppy of North Sikkim