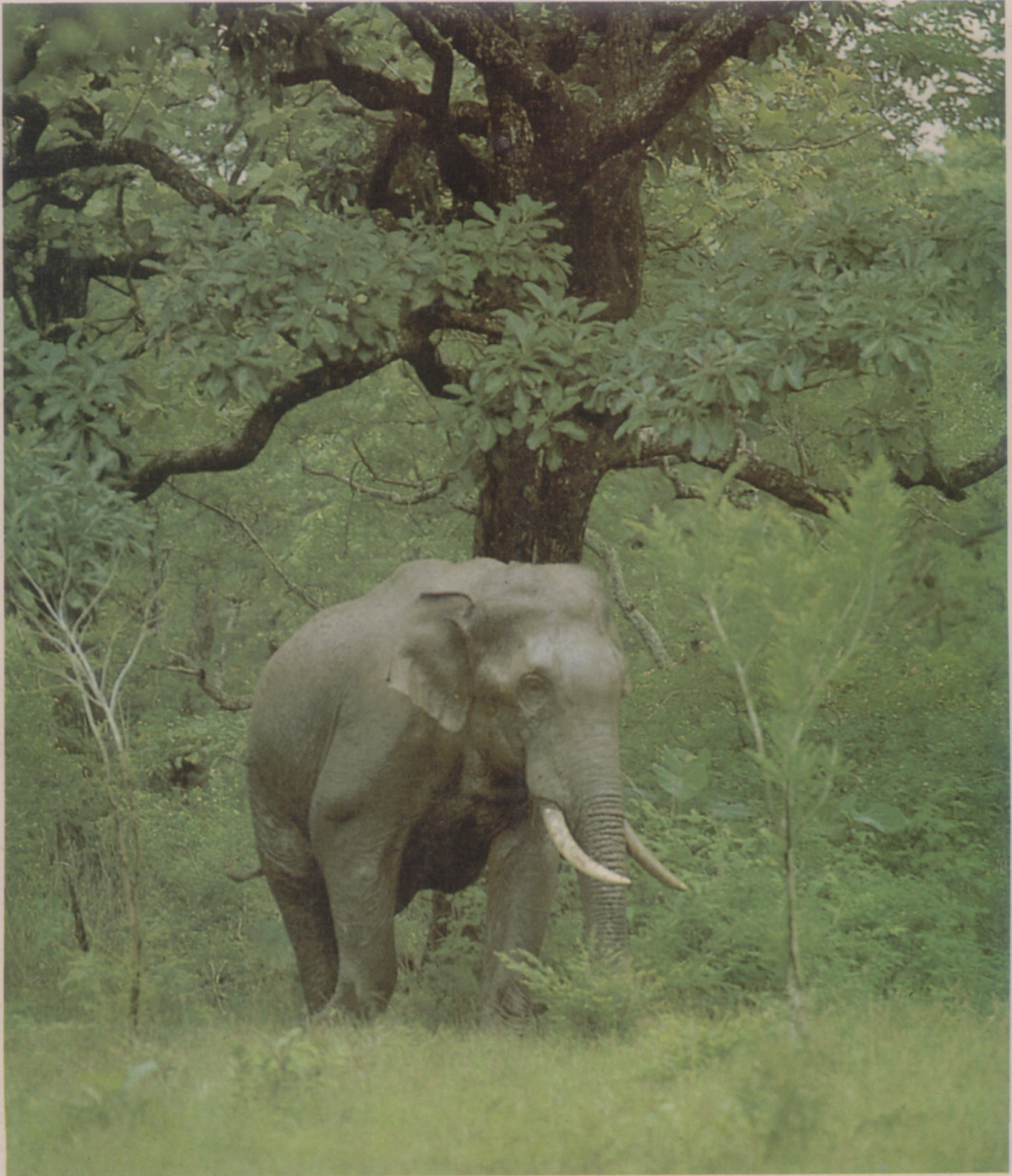


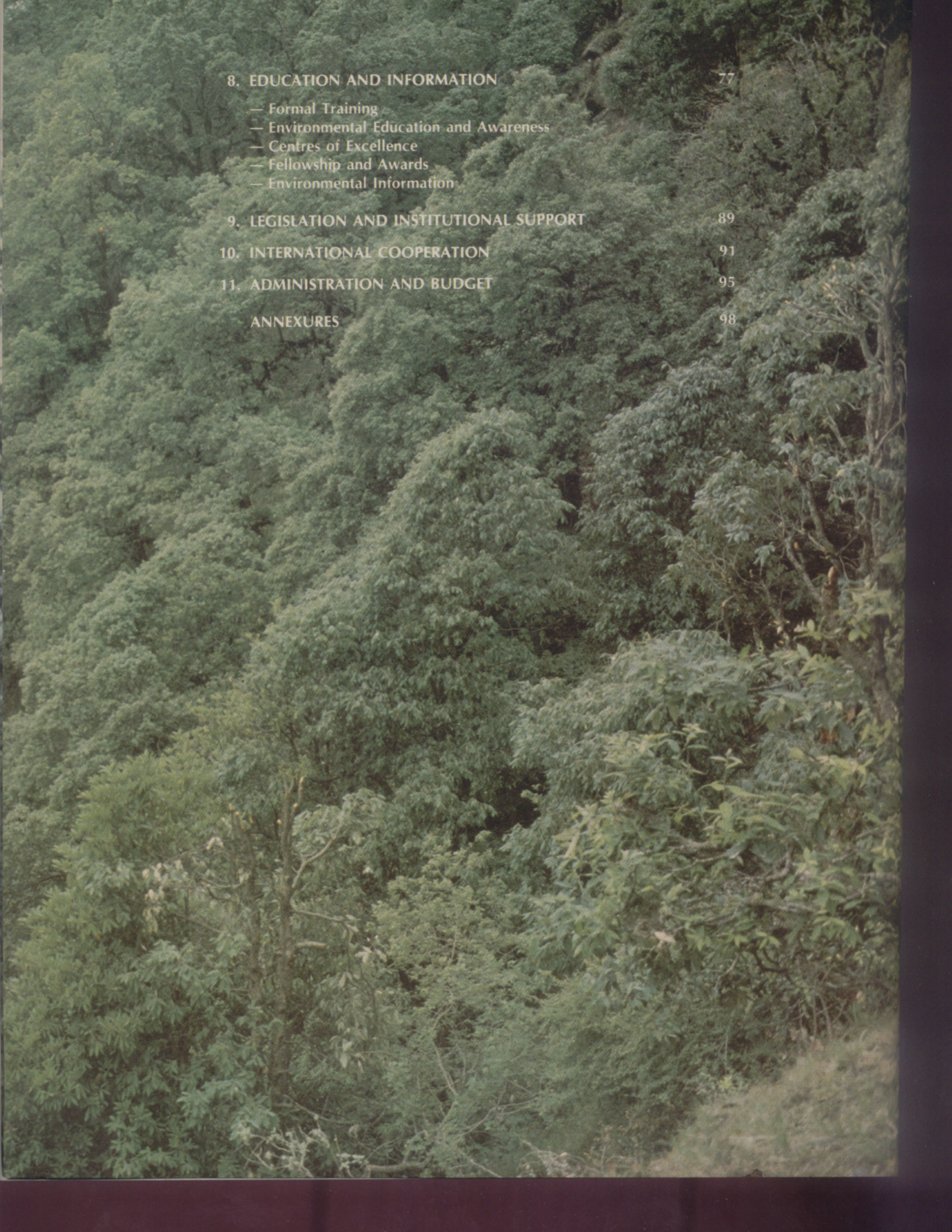
Annual Report 1990-91



MINISTRY OF ENVIRONMENT AND FORESTS
GOVERNMENT OF INDIA

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1. INTRODUCTION

1.1 ROLE AND ORGANISATION

In the administrative structure of the Central Government, the Ministry of Environment and Forests plans, promotes and co-ordinates environmental and forestry programmes. The Ministry's main activities include conservation and survey of flora, fauna, forests and wildlife; prevention and control of pollution; afforestation and re-generation of degraded areas, protection of the environment and research related to these topics. These tasks are being fulfilled through environmental impact assessment; eco-regeneration; assistance to organisations implementing environmental and forestry programmes; promotion of environmental and forestry research; extension; education and training to augment the requisite manpower; collection, collation, storage and dissemination of environmental information, and creation of environmental awareness at the national level.

1.1.1 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, mangroves and coral reefs, but excluding marine environment on the high seas;
- Botanical Survey of India;
- Zoological Survey in India;
- National Museum of Natural History;
- The Water (Prevention & Control of Pollution) Act, 1974;
- The Water (Prevention & Control of Pollution) Cess Act, 1977;
- The Air (Prevention & Control of Pollution) Act, 1981;
- The Environment (Protection) Act, 1986;
- Biosphere Reserve Programme;
- National Forest Policy and Forestry Development in the country, including Social Forestry;
- Forest Policy and all matters relating to forest 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;
- Fundamental research including coordination thereof and higher education of Forestry;
- Padmaja Naidu Himalayan Zoological Park;
- National Land Use and Wastelands Development Council;

- National Wastelands Development Board;
- National Assistance to Forestry Development Schemes;
- Central Ganga Authority;
- Prevention of cruelty to animals; and
- Indian Plywood Industries Research Institute, Bangalore.

1.1.2 Organisation

The organisational structure of the Ministry showing various Divisions and Agencies is given in Annexure I.

1.2 AN OVERVIEW OF ACTIVITIES DURING THE YEAR

1.2.1 Survey of Natural Resources

Flora

- Intensive floral survey in the priority areas of Andaman and Nicobar Islands, Jammu & Kashmir, Mizoram, Pondicherry, Sikkim, South Western Ghats, Nilgiri Biosphere Reserve and Uttar Pradesh were taken up by the Botanical Survey of India and more than 3650 plant specimens have been collected during the surveys. A critical study and description of about 3500 species collected from the states of Himachal Pradesh, Jammu & Kashmir, Mizoram, Nagaland, Manipur and Assam was completed.
- Volum IV of the Red Data Book of the Indian plants is being published
- The 'Fascicle 20' of the Flora of India consisting of the families Barclayaceae, Nelumbonaceae, Nymphaeaceae, Sabiaceae, Rhamnaceae, Stachyuraceae, Tetracentraceae and Zygophyllaceae has been published.
- State Flora of Rajasthan Volume II and Madhya Pradesh Volume I are being published.
- Study on Mangroves of Goa and identification of plant specimens in the Indravati Tiger Reserve, M.P. have been completed.
- Geo-Botanical Study in Singhbhum and in the Khetri Copper Belts has been undertaken in collaboration with Geological Survey of India.

Fauna

- A total of 64 surveys were conducted in 60 districts covering diverse eco-systems all over the country by the Zoological Survey of India (ZSI);
- Faunal Study of West Bengal, Chilka Lagoon, Andaman and Nicobar Islands, the West Coast; Meghalaya and Tripura, Uttar Pradesh and Western Himalayan eco-systems, were continued;

- Taxonomic studies were conducted on different orders of insects of Arunachal Pradesh, Aves of Nagaland, Scorpions of Orissa, Mites of West Bengal and Mollusca and Arachnida of Madhya Pradesh;
- The national zoological collections were enriched by the addition of 15,994 identified specimens pertaining to 2761 species; and
- During the year, 700 zoological specimens pertaining to 200 species were identified.

Forest Survey

- The third assessment of the forest cover in India has been completed by the Forest Survey of India;
- An inventory of forest resources in Nagaland, Manipur, Meghalaya, Assam and Mizoram has been completed during the year;

1.2.2 Conservation of Natural Resources

Forest Conservation

- An Advisory Committee constituted under section 3 of the Forest (Conservation) Act, 1980, has been reconstituted in accordance with the amended Forest (Conservation) Rules.
- Diversion of forest land for non-forest purposes during the year has come down considerably. Out of 4257 proposals received under the Forest (Conservation) Act, 1980, 2205 proposals were approved.
- In order to reduce pressure on forests for extraction of fuelwood, townships of more than 5000 population which are in the vicinity of forests have been identified in various States with a view to supply them LPG.
- Regional Offices of the Ministry have been delegated powers to process proposals for diversion of forest land for non-forest purposes upto one hectare.
- The Ministry has issued guidelines to the State Governments for dealing with specific problems related to tribals.
- A beneficiary oriented scheme for tribal development has also been launched during 1989-90 with the objective of rehabilitation of tribals and other families affected under plans of the Project Tiger areas, National Parks and Wildlife Sanctuaries. Under the scheme financial assistance is provided for construction of houses, development of land for agriculture, approach road, drinking water facilities, fuelwood lots and pasture at the new site.
- Guidelines have been issued in June, 1990 to the State

Governments for involving village communities and voluntary agencies for regeneration of degraded forest lands on usufruct sharing basis.

- The Modern Forest Fire Control Project to devise, test and demonstrate the principles and techniques of forest fire prevention, detection and suppression of forest fire was continued. With the introduction of modern methods and technologies, the area burnt by forest fires has been reduced significantly.
- Under the scheme of 'development of infrastructure for protection of forests from biotic interference' Central assistance has been provided to various State Governments for taking effective protection measures against illegal felling, encroachment and grazing.

Wildlife Conservation

- A Bill to amend the Wildlife (Protection) Act, 1972 has been introduced in the Parliament to make its provisions more stringent in regard to control of poaching and illegal trade and for better management of zoos, wildlife sanctuaries and national parks.
 - Under the Centrally Sponsored Scheme, assistance was provided to 36 National Parks and 150 sanctuaries for conservation.
 - There are now 18 Tiger Reserves in 13 States all over the country covering an area of over 28,000 sq. kms. During the year, an amount of Rs. 6.5 crores has been provided as Central assistance for maintenance and conservation of the existing 18 Tiger Reserves.
 - The Nature Interpretation Centre in Kanha Tiger Reserve under Indo-US Cooperation Programme has been completed.
 - A Project Elephant is being formulated with the objective of restoring the lost and degraded habitats of elephants, including creation of migration corridors, mitigating man-elephant conflicts etc. and it's habitat for the conservation of the elephant.
 - The National Zoological Park, New Delhi continued its programme of captive breeding of rare and endangered species of wild animals like the Manipur brown antelope deer, swamp deer, and lion-tailed macaque and other rare species.
- #### Biosphere Reserves
- Seven biosphere reserves out of the 14 potential identified sites have been set up so far. These are: Nilgiris, Nanda Devi, Nokrek, Great Nicobar, Gulf of Mannar, Manas and the Sunderbans.

- During the year, the action plans of all the existing biosphere reserves except Manas, were further extended and strengthened through survey, protection, eco-restoration, education and awareness activities.

Wetlands, Mangroves and Coral Reefs

- Sixteen wetlands have been identified by the National Wetlands Management Committee on priority basis for conservation and management of wetlands.
- During the year, management action plans have been sanctioned for Harike and Kanjali (Punjab) and Renuka (Himachal Pradesh) wetlands.
- A Directory of Wetlands of India containing information on location, area and ecological categorisation of wetlands in different parts of the country, has been published.
- Based on the recommendations of the National Mangrove Committee, 15 mangrove areas have so far been identified for the purpose of conservation and research.
- During the year, management action plan for the Sunderbans Mangroves covering regeneration, has been sanctioned.
- Four Coral Reefs have been identified for conservation in Tamil Nadu, Andaman & Nicobar, Lakshdweep Islands and Gujarat. A project has been sanctioned for undertaking studies and preparing a status report on the corals of Andamans and Nicobar Islands and Gulf of Kutch in Gujarat.

National Strategy for Conservation and Sustainable Development

- A draft paper on "National Conservation Strategy and Policy Statement on Environment and Development" has been prepared.

1.2.3 Environmental Impact Assessment

- Guidelines and questionnaires/check-lists for appraisal of projects in different sectors have been developed and published by the Ministry.
- Various Environmental Appraisal Committees like River Valley, Multipurpose Irrigation and Hydro-electric Projects, Mining Projects, Industrial Projects, Thermal Power Projects and Atomic Power and Nuclear Fuel Projects, have been constituted for environmental appraisal.
- Out of the 290 development projects appraised in various sectors during the year for environmental clearance, 108 projects were cleared and 97 were rejected. Additional information has been sought for the remaining 85 projects.

- An Environment Development Centre for preparing an integrated development plan for the Narmada Basin on the basis of carrying capacity, is being set up.
- A case study on environmental management of iron ore mine at Noamundi has been completed.
- In order to facilitate costal zone management, the Environmental Management Plans commissioned by the Ministry for three coastal stretches viz., Puri-Konark in Orissa, Dwarka-Jodia in Gujarat and Digha in West Bengal have been completed.
- Chembur and central areas in Bombay have been selected as Indian Human Exposure Assessment Location Sites (HEAL) because of the concentration of industries and heavy traffic density and air pollution.
- Under the Indo-Dutch Programme, five workshops in sectors such as industrial siting, land use planning, ports and harbours and water resource management, were held during the year.

1.2.4 Control of Pollution

Control of Water, Air and Noise Pollution

- Draft statement policy for abatement of pollution has been prepared.
- Government are implementing a scheme for promoting combined facilities for treatment of effluents and solid waste generated in clusters of small scale industries.
- The State-of-the-Art Report on Status of Vehicular Pollution is being prepared. Efforts are being made to examine the suitability of fixing catalytic convertor to the existing and new vehicles.
- Standards have been notified for ambient noise and noise from various sources.
- An Action Plan has been evolved for controlling pollution from 17 heavily polluting industries, 17 critical areas and 6 critical pollutants.
- Reports on the River Basin Studies on the Ganga, Yamuna, Subarnarekha, Brahmini, Baitarni, Krishna and Sabarmati have been published. Studies on the Godavari, Kaveri, Indus, Mahanadi, Mahi, Brahmaputra and Tapti have been completed.
- The Public Liability Insurance Act, 1991 has been enacted to provide immediate relief to the persons affected by accident occurring while handling hazardous substances.
- National awards have been instituted for public recognition of outstanding activities for prevention and control of pollution.

- Norms are being revised to lay down mass based standards.
- The Central Pollution Control Board has launched an intensive programme, "Operation Pollution Control in Delhi" to curb pollution caused by industrial units in the Union Territory.

Management of hazardous substances

- A set of rules has been prepared in 1989 to regulate the handling of hazardous chemicals, hazardous micro-organisms/genetically engineered organisms and hazardous wastes. Amendments to these rules are under consideration to make them more comprehensive.
- A notification restricting the use of benzidine and benzidine based dyes in the country has been issued. Steps were initiated to restrict the use of other harmful substances like pesticides, Penta Chloro Phenol (PCP) etc.
- Financial assistances to States/UTs for creation of infrastructure in State Pollution Control Boards for regulating the use of hazardous substances was continued.
- A detailed off-site emergency plan for Baroda District has been prepared. Action has been initiated to get reports prepared for 7 more districts.
- During the year, studies were carried out on preventing and averting accidents and improving safety in respect of handling of hazardous substances and wastes.
- The Red Book on Central Crisis Group Alert System is being updated and revised.
- A National Waste Management Council has been constituted to suggest ways and means for effective utilisation of industrial/urban/agricultural wastes.
- A scheme on "Environment Friendly" labelling of products with the objective of creating awareness among consumers regarding safety and pollution, has been formulated by the Ministry.

1.2.5 Regeneration and Development

Ganga Action Plan

- The main objective of the Ganga Action Plan is to improve the water quality of the river Ganga by reducing the pollution load on the river and by establishing self-sustaining sewage treatment plant systems. To that end, in the first phase, of the nearly 1400 million litres per day (mld) of sewage generated in 25 Class I towns along the river, 870 mld is proposed to be intercepted, diverted and treated. By March, 1991, 370 mld of waste water has been diverted out of which 55 mld has been diverted in the year 89-90.

- Out of the 261 schemes sanctioned at a total cost of Rs. 327.21 crores covering the States of Uttar Pradesh, Bihar and West Bengal, 172 schemes have been completed, out of which 25 were completed during the year.
- Out of the sanctioned 35 STPs, seven STPs have been commissioned so far and during the year two STPs were commissioned.
- Out of the 88 sanctioned Interception and Diversion Schemes, 52 have been completed by March, 1991, out of these six were completed this year.
- Under the low cost sanitation programme, out of the sanctioned schemes, 39 schemes involving construction of 2732 public toilet complexes and 41228 individual pour flush latrines have been completed. Out of the 2732 community toilets and 407 individual toilets were completed during this year.
- Out of 28 sanctioned schemes of electric crematoria, 22 schemes involving construction of 22 electric crematoria have been completed. Of these, six schemes involving electric crematoria were completed this year.
- Out of 35 River Front Development Schemes, involving 122 ghats, 30 schemes involving 92 ghats have been completed, out of which 7 schemes involving 34 ghats were completed in the year.
- As a result of administrative action initiated, 43 industries have set up ETPs out of 68 gross polluting industries identified along the main stream of river Ganga.
- Bilateral, technical and financial assistance from ODA and Dutch Government was continued during the year. Multilateral assistance from the World Bank was continued.
- Many innovative ideas/ schemes have been taken up under Ganga Action Plan e.g. Upflow Anaerobic Sludge Blanket Sewage Treatment, Chrome Recovery from Tannery waste, use of sewage water for agro forestry, improved wood crematoria.
- On the request of GAP, Central Water Commission carried out studies in Minimum Water flows in Ganga and the Yamuna rivers.
- Diverse public participation programmes, especially involving the youth, students, pilgrims and school children have been organised under the Ganga Action Plan.

Wastelands Development

- Wastelands Development Programme reoriented towards meeting the concerns of checking land degradation and putting wastelands to sustainable use, increasing fuelwood

and fodder availability and helping restore the ecological balance.

- National Wastelands Development Board's role and functions redefined on 11th June, 1990, with mandate to adopt a mission approach for enlisting people's participation, harnessing the inputs of science and technology and ensuring the requisite inter-disciplinary coordination in the planning and implementation of the Wastelands Development Programme.
- The six Centrally Sponsored Schemes and two Central Sector Schemes of the NWDB reoriented in the light of the mission approach.
- Five high level inter-Ministerial Policy Advisory Groups set up on fuelwood conservation, wood substitution, grazing and livestock management, benefit distribution from common lands, and institutional finance for farm forestry.
- Preparation and implementation through people's participation of village Action Plans (Micro Plans) continued in 16 districts. The attempt is to integrate resources financial, technical and manpower in order to execute programmes to upgrade land quality, and provide requisite eco-services through coordinated inter-departmental and multipronged efforts.
- Initiatives for fostering people's participation continued through tree growers/farm forestry cooperatives, NWDB Schemes etc. National Fund for Afforestation and Wastelands Development established with a view to encourage people to participate in Wastelands Development Programmes.
- Special greening programmes started in Haryana, Delhi and Rajasthan to demonstrate what can be done through coordinated inter-departmental effort with pooling of financial, manpower and technical resources.
- New projects for financial assistance from donor agencies like World Bank, SIDA, and OECF identified and ongoing projects monitored.
- Monitoring system under Point No. 16 (afforestation/tree planting) of the 20-Point Programme revised in line with the new mandate for the Wastelands Programme.
- Seven Regional Centres of NWDB provided financial assistance in order to equip them to assist the State Governments in project formulation, appraisal, monitoring, evaluation, training, etc.

Other activities for regeneration

Field Demonstration Projects

- During the year, one field demonstration project aimed

at ecological improvement of Gopeshwar area of Chamoli District, Uttar Pradesh was completed.

- Other demonstration projects at Almora (UP), Pathanjapur (Tamil Nadu), and Parbhani (Maharashtra) continued.

Task Forces

- Eco-task forces of ex-servicemen deployed in Rajasthan, Jammu & Kashmir and Uttar Pradesh continued their activities of afforestation, pasture development, soil and water conservation and other restorative works.

1.2.6 Research

Environmental Research

- Under the Environmental Research Programme and the Biosphere Programme, 18 new projects were sanctioned while 52 projects sanctioned earlier were completed.
- All India Coordinated Research project for studies on sea level rise at 10 different institutions of the country has been initiated.
- All India Coordinated Research Project on Conservation of Endangered Species—Tissue Culture Programme continued during the year.
- Four projects for the Himalayan Region and three for the Western Ghats and five for Eastern Ghat Region were sanctioned, while 12 projects on the Himalayan region, 10 on the Western Ghat region and 8 on the Eastern Ghat region sanctioned earlier were completed during the year.
- Thirty-nine research projects under the Environment Research (ERC) and Man and Biosphere Programme (MAB) were reviewed at the monitoring workshop and MAB Committee meeting respectively, during the year.
- The G.B. Pant Institute of Himalayan Environment and Development, an autonomous organisation of the Ministry, undertook various research and developmental projects on conservation and sustainable development of natural resources of the Himalayan region.
- The other units of the institute located at Srinagar (Garhwal Himalaya), Gangtok (Eastern Himalaya) and Mokochung (North-Eastern Himalaya) executed their programmes through infrastructural support from governmental and non-governmental organisations.

Research on Wetlands

- Research on various aspects of wetlands conservation was promoted through universities and other research institutions. In addition to the 19 on-going research projects, one new project was sanctioned during the year.

Research on Mangroves Conservation

- Research on various aspects of mangrove conservation was promoted through universities and other research institutions. In addition to the 12 on-going research programmes, one more project was sanctioned during the year.

Research on Biosphere Reserves

- Ten research projects covering hydrological studies, human ecology, eco-restoration, long-term monitoring of biological processes and atmospheric chemistry were sanctioned under the aegis of the Nilgiri and Nanda Devi Biosphere Reserves. During the year, three research projects sanctioned earlier were completed.

Forestry Research

- The Indian Council of Forestry Research and Education (ICFRE) was registered as a Society under the Societies Act, 1860 on 12 th March, 1991.
- The six Institutes of ICFRE viz. Forest Research Institute, Dehra Dun, Institute of Deciduous Forests Jabalpur, Institute of Forest Genetics and Tree Breeding, Coimbatore, Institute of Wood Science and Technology, Bangalore, Institute of Arid Zone Forestry Research, Jodhpur and Institute of Rain and Moist Deciduous Forests, Jorhat continued their research activities on different aspects of Forestry.
- In three institutes viz., FRI, Institute of Forest Genetics and Tree Breeding and Institute of Wood Science and Technology, studies were conducted on habitat management and growth of social forestry species and shrubs for wastelands reclamation. Biomass productivity trials were carried out in diversified plantations. Tissue culture techniques were standardised for *Eucalyptus* Hybrid. Eco-restoration techniques was developed and worked out on mined area reclamation on phosphate mines in Doon Valley. It has also been extended to limestone mines in the Valley. Studies were undertaken on large scale mortality of Sal and Teak tree species in M.P. and Orissa. Ethnobotanic studies were conducted in tribal areas. Techniques for vegetative restoration of *Eucalyptus*, *Acacia*, *Albesia* were standardised.
- The other two Institutes under the ICFRE viz. the Institute of Arid Zone Forestry Research, Jodhpur and Institute of Rain and Moist Deciduous Forests, Jorhat are in the process of developing infrastructural facilities for carrying out research activities.

Wildlife Research

- The Wildlife Institute of India was strengthened to carry

out research activities on ecology and wildlife management problems. During the year, eighteen on-going research projects were continued and five new ones were launched, which covered subjects like the ecology and genetics of the *Ibex*, impact of management practices on the wildlife of the Gir forests and a study of the dependency of local people on the Ranthambhore Tiger Reserve for natural resources. The Institute also brought out several publications, including a manual on census techniques, and important research findings related to the management of the Rajaji National Park and the Gir Conservation Area.

- Research projects sponsored by the Ministry under the Indo-US Rupee Fund Programme and implemented by the Bombay Natural History Society were also continued.

National Natural Resources Management System (NNRMS)

- Out of 11 project sanctioned earlier under NNRMS programme, two projects were completed during the year.

Research in Ganga Action Plan

- 48 University Research Projects have been completed between 1985-86 and 1989-90.
- 10 Research projects in the thrust areas of pollution monitoring, water quality monitoring, resource recovery, impact assessment and ecological conservation are under implementation.

1.2.7 Education and Information

Formal Training

- Sixty-two IFS Probationers and two foreign trainees are being trained at the Indira Gandhi National Forest Academy, Dehra Dun.
- Three State Forest Service Colleges located at Dehra Dun (Uttar Pradesh), Burnihat (Assam) and Coimbatore (Tamil Nadu) continued to train officers of the State Forest Services.
- 154 trainees are being trained at the Forest Rangers College, Kurseong (West Bengal) during the year.
- The Indian Plywood Research Institute, Bangalore, organised 19 short-term courses in the area of saw doctoring, saw milling, plywood manufacturing, log grading etc. during the year and 97 persons were trained.
- Indian Council of Forestry Research and Education continued its support for under-graduate courses in Forestry in 14 State Agricultural Universities and post-graduate courses in two Universities.

- The Institute of Forest Management, Bhopal, continued Post-graduate Diploma Programme for graduates from various disciplines. During the year, 27 candidates are being trained under this course. The Institute also conducted management development programmes and one week refresher course and orientation course for IFS Officers.
- Eighteen officer trainees and 19 Range Officers completed the nine month post-graduate diploma course and the three months certificate course respectively in Wildlife Management at the Wildlife Institute of India, Dehra Dun.

Environmental Education and Awareness

- The National Environment Awareness Campaign (NEAC) 1990 was organised with the major theme "Save the Environment Save Yourself". More than 480 organisations comprising NGOs, schools, colleges, universities, research organisations, professional bodies, women and youth organisations, government departments, etc. from various States and Union Territories were involved in organising several programmes such as seminars, workshops, training camps, public meetings, padyatras, audio visual/film shows, folk dances, street theatres/essay/debate/painting competitions for school children etc. Various groups such as students/youth, teachers, women, professionals, industrial workers, legislators, armed forces and the general public were covered under the Campaign.
- The Centre for Environment Education (CEE), Ahmedabad organised about 90 one-day cluster level NGO-teacher meetings for planning school programmes during the awareness campaign.
- The C.P.R. Environmental Education Centre, Madras, organised a communication training programme during NEAC-90, highlighting various environmental issues for the participants of southern region.
- The Ecological Research and Training Centre at the Indian Institute of Science, Bangalore, and the Centre for Mining Environment, Dhanbad continued their programmes under the Centres of Excellence scheme to strengthen research and training in priority areas of environmental sciences and management.
- A new Centre of Excellence viz., the Salim Ali Centre for Ornithology and Natural History was inaugurated during the year with the objective of conducting research in the field of ornithology and natural history.
- The National Museum of Natural History (NMNH), New Delhi, organised a large number of programmes during the National Environmental Awareness Campaign, for the school children, teenagers, teachers and residents of housing colonies and army camps to promote environmental awareness.
- During the campaign, Doordarshan telecast fortnightly programmes on environment and related areas in the National Hook-up and a variety of programmes were broadcast by All India Radio.
- Two documentary films on 'noise pollution' and 'waste water management' were commissioned during the year.
- A national painting competition for school children was organised on the theme "Technology and Environment". A total of 1000 schools from all over the country participated in the competition. The paintings of three national winners were entered in the regional painting competition in Bangkok organised by ESCAP and one of them was awarded the second prize of US \$ 300.
- During the year, 65 universities, non-governmental organisations, research institutions, professional bodies, etc. were provided financial assistance for organising seminars, symposia, work-shops on various environmental topics of current interest.
- The interpretive programme at Kanha National Park was completed by the Centre for Environment Education (CEE) Ahmedabad. The CEE also started an eight months training programme on environment education during the year. A publication entitled "Essential Learnings in Environmental Education" consisting of 600 basic concepts to understand the environment was published by CEE under the Indo-US Children Environmental Education Television Project.
- Workshops, rural training programmes, communication training programmes, experience sharing programmes for wastelands development, etc. were organised by CPR Environment Education Centre, Madras.
- A six weeks' programme on Environment Education for children of the age group of 5 to 15 was also organised by CPR Environment Education, Madras in addition to the two exhibitions on "Mangroves" and "Trees of Madras".
- The CPR Environmental Education Centre developed a water testing kit and a soil testing kit for non-technical persons.
- Galleries on introduction to natural history, ecology and conservation as well as the discovery room for children at the NMNH were renovated and updated with new exhibits, photographs, translights and labels during the year.
- The museum organised two national exhibitions and one international exhibition in Japan during the year.

- NMNH continued its regular educational activities, special programmes on quiz, declamation contests for teenagers, painting competitions for children, etc. during the year.
- Gallery designs for exhibit areas at the Regional Museum of Natural History, Mysore, were completed during the year.

Environmental Information

- The Environmental Information system (ENVIS) Network with its Focal Point in the Ministry and 10 other ENVIS Centres on diverse areas of environment continued their activities on collection, collation, storage, retrieval and dissemination of environmental information to all concerned.
- 10 more priority areas have been identified for which new ENVIS Centres would be set up in phases.
- The Focal Point of ENVIS enriched the existing information base by acquiring various documents on environment and related areas for storage, retrieval and dissemination of information.
- Over 3900 queries on diverse aspects of environment were responded to by the ENVIS Focal Point and its Centres during the year and out of the total queries, more than 1400 queries were responded to by the Focal Point alone.
- The quarterly abstracting journal 'Paryavaran Abstracts' reporting Indian research on environment and related areas continued to be published by the ENVIS Focal Point. During the year four such issues containing about 600 abstracts were published.
- The Focal Point of ENVIS also continued its liaison with other National Information systems for exchanging environmental information and to avoid duplication of efforts.
- ENVIS Focal Point in the Ministry continued its activities as the National Focal Point (NFP) and as the Regional Service Centre (RSC) for South Asia Sub-Region of INFOTERRA of UNEP. As NFP, more than 500 Indian sources engaged in environment related activities were registered for inclusion in 'International INFOTERRA Directory of Environmental Sources' published by UNEP. During the year, the Focal Point as NFP and RSC of INFOTERRA processed 3484 National and 469 International queries and provided substantive information to the users.

1.2.8 Legislation and Institutional Support

- Rules under the Environment (Protection) Act, 1986 (EPA)

were notified for regulating hazardous chemicals at all stages of manufacture, import, storage, transport, use and disposal.

- Amendment of the EPA to make it more effective, is under consideration.
- Public Liability Insurance Bill has been enacted to provide immediate relief to the victims of accidents caused by hazardous chemical industries.
- A Legislation on Civil Liability and setting up of Environmental Courts at national and state level for dealing with payment of compensation for injury/damage suffered as a result of industrial activities is being considered.
- Necessary instructions/guidelines have been issued by the Cabinet Secretariat, at the instance of the Ministry, for a ban on smoking in selected public places.
- As on 31.12.90, 4429 cases were filed under the Water and Air Acts, out of which 1408 cases have been decided.
- Action against more than 110 polluting industries identified under Ganga Action Plan has been initiated under Environment (Protection) Act, 1986. —An amount of Rs. 79.45 lakhs was disbursed to the State Pollution Control Boards during the year for equipment, and scientific and technical staff for laboratories and field.

1.2.9 International Cooperation

- The year was marked by the beginning of international preparations for the 1992 Conference on Environment and Development to be held in Brazil. The United Nations General Assembly has established an Intergovernmental Preparatory Committee for this purpose and India is playing an important role among developing countries in putting forth their views and concerns in the preparatory process. The Ministry has established an Inter-Ministerial Group chaired by Secretary (E&F) which consists of representatives from the concerned Ministries, to coordinate the preparations for the 1992 Conference acting in concert with Ministry of External Affairs.
- The Ministry is also the nodal agency for the Intergovernmental Panel on Climate Change (IPCC) which has been jointly established by UNEP and WMO to study the causes and impacts of climate change and response strategies required to deal with them. The IPCC work is of great importance in supporting for the intergovernmental negotiations on a global convention on climate change which have begun during the year. These negotiations will have very long term and wide-ranging implications on global industry and economies.

- Another international initiative is the move towards a global convention on the conservation of bio-diversity. As the nodal agency for this subject, this Ministry has, with wide scale consultation with Government agencies and experts begun to formulate Government of India's position about various aspects of the Convention.
- One of the most significant achievements during the year was the London Conference of the Parties to the Montreal Protocol, held in June, 1990. Far reaching amendments were adopted during this Conference as a result of the moves by India and other developing countries, so that we are assured of financial and technical assistance to cooperate in the global programme.
- The Ministry continued to play an important role in the UNEP and participated in the second special session of the Governing Council held in August, 1990.
- The Netherlands Government has made a substantive commitment of support the second phase of the Ganga Action Plan.
- The World Bank through International Development Agency (IDA) continued its assistance in Social Forestry Projects in collaboration with other bilateral channels in five States of the country.
- Research studies on Wildlife Conservation and Ecology of endangered species and their habitat have been taken up under Indo-US Rupee Fund.
- The German assistance for strengthening of laboratories for Central and State Pollution Control Boards continued during the year.
- A National Forestry Action Programme is being prepared with assistance from UNDP/FAO for re-orienting the forestry practices in the country in accordance with the National Forest Policy of 1988.

1.2.10 Administration and Budget

- In accordance with the revised Recruitment Rules for Group 'A' Scientific posts in the Department, direct

recruitment to several categories of Group 'A' Scientific posts was made in the Ministry and its various associated offices.

- Under the Flexible Complementing Scheme, 39 Group 'A' Scientific Officers were promoted to the next higher grade.
- A special drive to fill up back-log of SC/ST vacancies for Group 'A' 'B' 'C' and 'D' posts in the Ministry and its associated offices was taken up and selections were made for 116 posts.
- The Hindi Salahakar Samiti, an Advisory Body for the Ministry on Language policy met thrice during the year and reviewed the progress in the use of Hindi.
- During the year special arrangements for training in Hindi/Hindi shorthand were made for employees of this Ministry.
- Hindi week was organised during 10th to 14th September, 1990 in which various competitions were held and prizes distributed to the winners.
- The quarterly journal namely 'Paryavaran' continued to be published by the Ministry in order to encourage creative writing in Hindi among its officers and staff.
- The Civil Construction Unit (CCU) of the Ministry undertook 15 major construction projects.
- The field work load of the Unit during the year is about Rs. 60 crores.
- An officer has been designated to attend to matters relating to staff welfare.
- The recreation club set up in the Ministry, played active role in promoting sports, cultural and other activities during the year.
- The Budget Estimate (Plan) and Revised Estimate (Plan) of the Ministry during 1990-91 was Rs. 237 crores and Rs. 209 crores respectively.

2. SURVEY OF NATURAL RESOURCES

2.1 SURVEY OF FLORA

2.1.1 The Botanical Survey of India (B.S.I.) was established in 1890 with objectives of surveying and identifying the plant resources of the country. The Survey has its Headquarters at Calcutta and 9 Circles located in different phyto-geographical regions of the country. The Primary and Secondary objectives of B.S.I. after its restructuring are as follows:

2.1.2 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 their 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.

2.1.3 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 ethnobotanical studies and evaluate plants of economic utility in specified areas; and,
- To carry out geobotanical studies in specified areas.

2.1.4 The activities of BSI during the year are as follows:

2.1.4.1 Survey and Taxonomic Studies

Intensive survey work was taken up in priority areas in order to collect, identify and document the plant resources. During the year the following areas were surveyed:

- **Andamans and Nicobar Islands:** North Andaman Biosphere area covering Interview Island, Saddle Peak, Ariel Bay; Long Island (Middle Andaman) and Great Nicobar Island. In addition, Little Andaman and Middle Andaman Mangrove vegetation were also surveyed.

- **Jammu & Kashmir:** Exploration work is in progress.
- **Mizoram:** Areas of Blue Mountain, Darzo, Sairep, Thitlang, Khawruhlian, Pheilang and Tapaimuch. were surveyed.
- **Pondicherry:** Survey work was completed.
- **Sikkim:** Donkiala, Sengalela Range, Muguthang (N. Sikkim) and parts of E. Sikkim surveyed.
- **South Western Ghats:** Moozhiar, Goodrical Reserve Forests, Erviculam, Pathanamthilla and Poojamkutty areas.
- **Nilgiri Biosphere Reserve:** Survey work, completed and interim report compiled. Final Report with approximately 3,300 species is under preparation.
- **Uttar Pradesh:** Survey work in Nanda Devi Biosphere Reserve has been completed and taxonomic account of 600 species has been prepared. Identification and writing of description of the remaining species is in progress.

Surveys of the higher fungi in the hills of Uttar Pradesh has been initiated.

During the year, eight major exploratory tours and six short duration tours have been undertaken in the priority areas. More than 3650 plant specimens have been collected during these surveys and the process of mounting and identification of these specimens is in progress. Quite a good number of live plants, seeds and other propagules of plants including some rare plants, particularly, orchids have been collected and introduced in the gardens and National Orchidaria of the Botanical Survey of India.

A critical study and description of about 3500 species collected from the States of Himachal Pradesh, Jammu & Kashmir, Mizoram, Nagaland, Manipur and Assam was completed.

2.1.4.2 Rare and Endangered Species

Publication of Vol. 4 of the Red Data Book of Indian Plants is under progress.

2.1.4.3 National Flora and State Flora

National Flora

The Fascicle 20 of the Flora of India consisting of the families *Barclayaceae*, *Nelumbonaceae*, *Nymphaeaceae*, *Sabiaceae*, *Rhamnaceae*, *Stachyuraceae*, *Tetracentraceae* and *Zygophyllaceae* has been published. Manuscripts of the families viz., *Tamaricaceae*, *Hypericaceae*, *Sonneratiaceae*, *Gooderiaceae* have been processed for publication. Compilation work on the *Florae Indicae Enumeratio* Vol. 2 (Dicotyledons) is under progress.



Fig 1: A wild Poppy—an attribute of the Flora of J&K

State Flora

Publication of the State Flora of Rajasthan Vol. 2 and Madhya Pradesh Vol. 1 is under process. Compilation of State Floras of Arunachal Pradesh, Assam, Nagaland, Manipur, Mizoram, Sikkim, Andaman & Nicobar Islands has been initiated. The manuscript of the Flora of Pondicherry has been completed.

2.1.4.4 National Data Base

- List of type collections represented in Central National Herbarium is being published.
- 325 species growing in B.S.I. and other gardens of India were listed.
- Distribution data and nomenclature of 570 species (Dicotyledons) have been compiled and checked.



Fig 2: *Cassia* in full bloom.



Fig 3: A wild banana in flower.

2.1.4.5 Studies on selected fragile ecosystems

- Study on mangroves of Goa was completed and that of Godavari, Krishna estuaries, and Gujarat areas is under progress.
- Lyngdohs the sacred forest of Meghalaya have been thoroughly explored.
- Identification of specimens from Indravati Tiger Reserve has been completed and writing work on the Flora is in progress.

2.1.4.6 Ethnobotanical studies

Phase I of the All India Coordinated Project on Ethnobiology (AICRPE) has been initiated with the recruitment of necessary staff. Ethnobotanical surveys in Bihar, Sikkim and some parts of Western Himalayas have been undertaken.

2.1.4.7 Geobotanical studies

Geobotanical studies in Singhbhum (Bihar) and Khetri (Rajasthan) copper belt areas were undertaken in collaboration with Geological Survey of India. During exploratory field trips, interesting plant specimens were collected along with soil samples from different habitats/sites for critical chemical analysis. About 850 plants and soil samples were analysed for copper, nickel, lead, zinc, manganese and chromium. The behaviour of some plants with respect to mineralisation is noticeable indicating specificity of certain plant species in the mineralised zones. A detailed report in respect of the above studies in Singhbhum area is being finalised.

2.1.4.8 Other activities

Apart from maintaining the National collection of herbarium specimens, identification services, data of distribution and cultivation of plant species, living and preserved materials for scientific research, Vanamahotsav and flower shows BSI has also organised a Sit and Draw Competition in order to create environmental awareness among the general public and school children.

- Palynology Unit of Central National Herbarium continued its work on pollen morphology of Caesalpiniaceae.
- Ecology Section has undertaken work on mangroves of Godavari and Krishna estuarine areas. Compilation work on Coastal Ecosystem is in progress.
- Cryptogamic Section has taken up the work on the Pteridophytic flora of N.E. India, mosses of Western Himalayas and higher fungi of the hilly region of Uttar Pradesh.
- Work on Karyotype studies on Palms of Indian Botanic Garden has been undertaken by cytology section and so far 40 species have been studied. Chromosome numbers of 177 flowering plants have been determined for chromosome survey of Indian Flora.
- Economic botany Section compiled data of 35 species of less known plants of economic importance with particular reference to Sunderban areas. 10% work on ethnobotany of Darjeeling, Nagaland and Sikkim areas has been completed.
- Industrial Section of BSI continued its work of maintaining the exhibits in the galleries of Indian Museum.
- Indian Botanic Garden undertook multiplication of rare, endangered species of palms, orchids and other groups. It has also organised Vanamahotsava, flower shows, conducted tours and the garden and drawing and painting competition for children. On the occasion of

Vanamahotsava, a number of saplings were distributed to the public free of cost. The seed collections of the Indian Botanic Garden were enriched by receiving seeds on exchange from different parts of the gardens of the world.

2.1.5 The following publications were brought out by the Botanical Survey of India during the year:

- Bulletin of the Botanical Survey of India, Vol. 30
- Fascicles of Flora of India, Vol. 20.
- Flora of Nallamalais Vol. 2.
- Vanaspati Vani (in Hindi) Vol. 1 No. 1.
- A Manual of Herbarium Collections.
- Conservation through Plant Survey and Research.

2.2 SURVEY OF FAUNA

2.2.1 The Zoological Survey of India (ZSI) was established in 1916 with the main objective of carrying out faunistic studies. The Survey with its headquarters at Calcutta has 15 regional/ecological/field stations located in different parts of the country.

2.2.2 The objectives of (ZSI) after its restructuring in 1987 have been classified into primary and secondary objectives. These include:

- Exploration and survey of faunal resources,
- Status survey of endangered species,
- Publication of Fauna of India,
- Maintenance and development of National Zoological collections,
- Maintenance of Museums at Headquarters and Regional Stations,
- Central referral, information, advisory and library services.

2.2.3 The activities of ZSI during the year are as follows:

2.2.3.1 Exploration and Survey of Faunal Resources

A total of 64 surveys were conducted covering 60 districts falling under various ecosystems spread all over the country.

- Tropical rain forest ecosystems: surveys were conducted in Arunachal Pradesh, Meghalaya and portions of Western Ghats falling under Tamil Nadu and Kerala.
- Himalayan Ecosystems: Surveys were conducted in the districts, viz., Chamoli, Almora, Nainital and Pithoragarh of U.P., Chamba in Himachal Pradesh; Sikkim, Lohit and Tirap in Arunachal Pradesh.
- Desert and Semi arid ecosystem: Surveys were undertaken



Fig 4: *Calotis* on a stone heap—a common reptile.

in certain parts of Rajasthan (Jaisalmer District) and Gujarat (Junagadh, Jamnagar, Rajkot, and Surat District.)

- Indo Gangetic Plains: Surveys were conducted in the districts of Bahraich, Gonda, Lakhimpur-kheri, Sitapur and Barabanki of Uttar Pradesh. Further surveys were also undertaken in Bihar (Monghyr, Bhagalpur, Santhal Paragana, Hazaribagh and Ranchi districts); Orissa (Mahanadi Estuary); West Bengal (Sunderban Estuary); M.P. (Mandsor, Ratlam and Ujjain districts); Nagaland, Tamil Nadu (Salem, Kanyakumari districts); Kerala (Palghat) and Pondicherry.
- Wetlands: Two surveys were conducted in Kabar Lake, Bihar and one survey in Ujni Wetland, Maharashtra.
- National Parks: Three surveys were conducted in Rajaji National Park (U.P.), two surveys in Nagerhojhoje National Park (Karnataka) one survey each in Nanda Devi and Nilgiri Biosphere Reserves and Sunderban and Periyar

Tiger Reserves and Marine National Park (Andaman)

Surveys were also conducted in Andaman and Nicobar group of Islands covering Bay, Nancowry, Great Nicobar and Little Andaman.

2.2.4 Faunistic Studies

2.2.4.1 Fauna of West Bengal

Studies were continued on the fauna of the state and as a result 27 more papers dealing with Free Living Protozoa, Cnidaria, Freshwater Bryozoa; Freshwater sponges; Land, Freshwater, Estuarine, and Marine Mollusca; Crustacea (Isopoda, Decapoda, Stoamatopoda and Copepoda); Arachnida and Insecta (Ephoemeroptera, Odonata, Plecoptera Orthopetera, Psocopetera, Thysanoptera, Coleoptera, Meloidea), Diptera (Asilidae and Simulidas), Lepidoptera (Arctidae) and Trichoptera were finalised. In these papers besides all the known species several new ones

are also described. Further studies on other groups are in progress. The first part of the State Fauna of West Bengal is being published.

2.2.4.2 Fauna of Chilka Lagoon

Studies on Mollusca of Chilka Lagoon are in progress. Results of most other groups have already been compiled and are in final form for publication.

2.2.4.3 Fauna collected during cruises of 'Sagar Sampada'

Plankton, Chaetognatha and Protochordata specimens were collected during cruises of 'Sagar Sampada'

2.2.4.4 Meiofauna of Andaman

Studies on Meiofauna, Freshwater Cladocera (Crustacea) and Fishes of Andaman are in progress.

2.2.4.5 Fauna of West Coast

Sipuncula, Marine and Estuarine fishes of Karnataka, Magharashtra and Gujarat coast were studied.

2.2.4.6 Fauna of Meghalaya and Tripura

Studies were conducted on Freshwater Oligochaeta, Earthworms, Leeches, Freshwater, sponges, Bryozoa, Parasitic Protozoa, Mollusca and Insects belonging to orders Dictyoptera, Isoptera and Hymenoptera and phylum Reptilia. Identification of the species is in progress.

2.2.4.7 Fauna of Uttar Pradesh

Material of various groups of animals collected by several survey parties is being studied.

2.2.4.8 Fauna of Western Himalayan Ecosystem

Protozoa, Chilopoda, Insects belonging to orders Odonata, Coleoptera and Lepidoptera and Fishes were studied.

2.2.4.9 Fauna of Biosphere Reserves, National Parks, Wildlife Sanctuaries

Studies were conducted on Fishes of Nanda Devi Biosphere Reserve; Insects (Aquatic Homoptera, Lepidoptera), Mites, Fishes and Amphibia of Nilgiri biosphere Reserve; Fishes and Amphibia of Dudwa National Park and Amphibia of Mudumalai Wildlife Sanctuary.

2.2.4.10 Fauna of other States

Taxonomic studies were conducted on different Orders of insects of Arunachal Pradesh; Aves of Nagaland; Scorpions of Orissa, Mites of West Bengal and Mollusca and Arachnida of Madhya Pradesh.

2.2.5 Development of National Zoological collections

The National Zoological collections were further enriched by the addition of 15,994 identified specimens pertaining to 2761 species. These include 100 type specimens belonging to 20 new species.



Fig 5: An Egret on its nest.



Fig 6: Common Butterfly—an active Pollinator.

2.2.6 Identification and Advisory Services

Zoological Survey of India continued to render identification and advisory services to various research and teaching institutions in India and abroad. During the year, 700 Zoological specimen pertaining to 200 species were identified. In addition, 167 other enquiries of scientific and technical nature requiring information and advice on various zoological and allied problems were also attended to.

2.2.7 Other activities

- A training course on 'Snakes and Human Welfare' was organised at Jodhpur from 5-9 March, 1990 by the Desert Regional Station, Zoological Survey of India. About 25 participants attended the training programme.
- A function to mark the beginning of year, year-long Platinum Jubilee Celebration of Z.S.I. was organised on the 2nd July, 1990 at Calcutta, on this occasion the Hon'ble Governor of West Bengal released a book entitled "Zoological Survey of India-History and Progress". An exhibition of rare books and animals preserved in the Survey was also arranged.

In this connection, a national symposium 'Taxonomy in Environmental Management and Modern Biology' was also organised on 19th November, 1990 alongwith an exhibition. Two books entitled Taxonomy in Environmental Biology; Collection and Preservation of Animals and a multicoloured Brochure on the Zoological Survey of India were also released.



Fig 7: A common Indian beetle.



Fig 8: A dense Sal Forest.

- A training programme on 'Earthworm Resources and Vermiculture' was organised from 10-14 September, 1990 at High Altitude Zoology Field Station, Zoological Survey of India, Solan.
- Hindi Day was celebrated by ZSI at Calcutta on 7th December, 1990. In this connection a Hindi debate competition was organised.

2.2.8 Publications of the Zoological Survey of India

- Fauna of India-2 volumes viz., Aphidoidea, Pt. 5 and Coleoptera Eremninae
- Occ. Pap., Rec. Zool. Surv. India, No. 113, 120 and 127
- Zoological Survey of India (1916-1990) History & Progress
- Taxonomy in Environment and Biology
- Collection and Preservation of Animals
- Zoologiana, No. 5
- Zoological Survey of India-A brochure

2.3 FOREST SURVEY

The FSI has completed the third assessment of Forest Cover in India. The state of Forest Report 1991 is under compilation and will be brought out soon.

2.3.1 Inventory of Forest Resources in North Eastern Region

The Forest Survey of India is making detailed forest inventory in North Eastern Region since 1976. The inventory of Forest Resources in Nagaland, Manipur, Meghalaya, Assam and Mizoram has been completed by March 1990. Currently the inventory in Arunachal Pradesh is going on and during 1990-91 till December an area of 7,257 Sq. Kms has been covered. The total forest area of North Eastern states is about 1,60,000 and 1,15,257 Sq. Kms. of areas has already been covered till December 1990.

2.3.2 Thematic Mapping

The FSI is preparing maps on 1:50,000 scale by interpreting details of aerial photographs for various forest types composition and other land uses. The crown density of the forest cover is also determined. These thematic maps are being prepared for the entire country on 10 year scale. The first cycle of mapping began in 1986-87 which will be over in 1996-97. Every year about 5000 aerial photographs corresponding to 260 topographic sheets are interpreted. During the year 1990-91, 199 sheets have already been covered till December, 1990.

2.3.3 Vegetation Mapping

The Forest Survey of India is preparing forest vegetation map 1:250,000 scale for the entire country on two year cycle. The maps of third cycle on 1:250,000 are under preparation and will be released in 1990-91. Currently the imageries used for interpretation are Landsat Imageries. In future the imageries of IRS-IA will be used. The target for 1990-91 is 180 sheets of 1:250,000 scale. Till December 1990, 148 sheets have already been completed.

2.3.4 Digital Cartography

The FSI is already in possession of Digital Image Processing System configured around VAX-11/780. The FSI has also floated global tenders to acquire Digital Cartography System and map production facilities during the current financial year.

3. CONSERVATION OF NATURAL RESOURCES

3.1 FOREST CONSERVATION

3.1.1. The Forest (Conservation) Act, 1980 and its Implementation

Deforestation, which causes ecological imbalance and leads to environmental deterioration is taking place on a large scale in the country, especially in the Himalayas and other hilly areas. The continued process of ruthless destruction of forests not only leads to heavy soil erosion, erratic rainfall and frequent floods, but also causes acute shortage of fodder, industrial wood, firewood etc., and more significantly the loss or productivity due to degraded and eroded lands.

Prior to the enactment of the Forest (Conservation) Act 1980, the Central Government issued guidelines to all State Governments/Union Territories, that all proposals involving use of forest land of and above 10 ha. should be referred to the Central Ministry of Agriculture for prior concurrence. Obviously, the intention was to have some check on the indiscriminate felling of trees and loss of forest wealth.

Unfortunately, it had little impact. In this perspective, the Forest (Conservation) Act, 1980, was enacted to check indiscriminate deforestation/diversion of forest land for non-forest use.

3.1.1.1. Amendment of the Forest (Conservation) Act, 1980.

To check the violation of the provisions of the Forest (Conservation) Act 1980, the Act has since been amended to make the existing provisions more stringent, which include the following:

- No State Government or other authority may issue orders directing that any forest land or any portion thereof may be assigned by way of lease or otherwise to any private person or to any authority, Corporation, agency or any other organisation not owned, managed or controlled by Government, without prior approval of the Central Government.
- The scope of the existing definition of 'non-forest



Fig 9: A denuded hill slope—a testimony of extensive soil erosion and frequent flood.

purposes' has been extended to include therein cultivation of tea, coffee, spices, rubber, palms, oil bearing plants, horticultural crops and medicinal plants. A paragraph under the "Explanation" has been added to include such operations which are ancillary to forest conservation, development and management as part of forest purposes as this was not mentioned in the original Act; and

- Who so ever contravenes or abates the contravention of any of the provisions of Section 2 of the Act, shall be punishable with simple imprisonment for a period which may extend to 15 days including public servants who are directly incharge at the time the offence is committed.

3.1.1.2. Advisory Committee

The Advisory Committee, constituted under Section 3 of the Forest (Conservation) Act, 1980, has been reconstituted in accordance with the amended Forest (Conservation) Rules. Three eminent personalities in the field of environment and afforestation are nominated in the Advisory Committee as Non-Official Members.

3.1.1.3. Meeting of the Advisory Committee

A specific provision has been made in the Forest (Conservation) Rules laying down the periodicity of holding the meeting of the Committee. The Chairman shall call the meeting of the Committee as often as necessary but not less frequently than once in a month.

3.1.1.4. Diversion of Forest Land for non-forest purposes

The Forest (Conservation) Act stipulates prior approval of the Central Government for de-reservation of reserved forest and for use of forest land for non forest purposes. Prior to the enactment of Forest (Conservation) Act, 1980, the average rate of diversion of forest land for non forest purposes used to be in the range of 1.41 lakh ha. per year. But after the enactment of the Act, this rate has come down considerably.

3.1.1.5. Present status of the proposals received under the Forest (Conservation) Act, 1980

The present status of the 4257 proposals received under the Forest (Conservation) Act, 1980, till 31st December, 1990 is given below:

— Approved	—	2205
— Not approved	—	635
— Rejected	—	1127
— Proposals withdrawn by the States/UTs.	—	109
— Proposals pending for final decision.	—	181
		(including pendency of Regional Offices.

The Central Government has decided that if no information is furnished by the States/UTs within a month from the date of seeking requisite information, the proposals will be rejected for non-furnishing of information.

3.1.2. Use of Alternative Sources of Fuel

In order to reduce pressure on forests for fuelwood, townships of more than 5,000 population which are in the vicinity of forests have been identified with a view to supplying them with LPG. The list of such townships from the States/UTs of Bihar, Maharashtra, Rajasthan, Arunachal Pradesh, Haryana, Tamil Nadu, Sikkim, Goa, Dadra & Nagar Haveli, Daman and Diu, Tripura Gujarat, Kerala, Nagaland and Himachal Pradesh have been forwarded to the Ministry of Petroleum and Natural Gas for taking further necessary action. The State Governments have been advised to ensure adequate supply of kerosene oil in these towns and to take preventive action to check unauthorised felling and smuggling of timber from the forest area.

3.1.3. 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 use and also to evaluate ongoing forest development projects and schemes.

Regional Offices have been delegated powers to process proposals for diversion of forest land for non-forest use upto 1 ha. The State Governments are requested to submit such proposals to the concerned Regional Offices.

3.1.4. Forest Act

The Indian Forest Act, 1927 is proposed to be amended



Fig 10: Largescale firewood collection—a causitive factor for forest degradation.

so as to bring it in conformity with the new National Forest Policy announced in December, 1988. A Drafting Committee, set up to draft a suitable legislation has completed its work and the draft Act prepared by the Committee has been circulated to all the State Governments/UTs for seeking their views. The new provisions/amendments proposed fall into the following three categories:

- Amendments to the existing provisions with a view to make them more effective
- Incorporation of provisions which already exist in some of the States either by way of amendment to the Indian Forest Act, 1927 or by virtue of new Acts enacted by the States.
- New provisions which are required to give effect to the pronouncements made in the National Forest Policy, 1988.

3.1.5. Involvement of village communities and voluntary Agencies for Regeneration of Degraded Forest Lands.

The recorded forest area in the country is 75.18 mha. while the satellite imagery estimates the figure of actual forest cover at 64.01m ha. Out of this only 37.84 ha. of forest is of adequate density. Thus, large tracts of degraded forest lands are available which need to be treated to bring them under tree cover. The National Forest Policy, 1988, envisages people's involvement in the development and protection of forests. Consequently, it has been recognised that committed voluntary agencies/NGOs may be well suited for motivating and organising village communities for protection, afforestation and development of degraded forest lands. The beneficiaries are to be given usufructs like grass, minor forest produce and if they successfully protect the forests, a portion of the proceedings from the sale of mature trees.



Fig 11: A closed canopy of Shola Forest.

In this context, guidelines have been issued in June 1990 to the State Governments for involvement of village communities and voluntary agencies for regeneration of degraded forest lands on usufruct sharing basis.

3.1.6. Forest-Tribal Interface

The Tribal communities have a close relationship with forests. It has been estimated that nearly 25 million tribals live in and around forests and depend to a great extent on forests for their sustenance.

After an in depth study of specific problems related to tribals, the Ministry has issued guidelines to the State Governments on the following issues with a condition that compensatory afforestation is done wherever forest land is regularised:

- Review of settlement: wherever areas have been notified as deemed reserved forests, without observing the process of settlement as provided in the forest Acts, the claims of aggrieved tribals and other rural poor should be enquired into and settled, provided the claimant is still in possession of the disputed land.
- Pattas and leases granted: The pattas and leases granted by the State Government Departments to scheduled Tribes and rural poor, either individually or collectively, should be honoured by resolving inter-departmental disputes about the status of the land.
- Regularisation of encroachment cases: The possession of forest land by tribals prior to enactment of the Forest (Conservation) Act, in 1980 should be regularised in cases where the State Governments had already taken a decision to do so and had evolved eligibility criteria prior to enactment of the Forest (Conservation) Act, 1980 but could not implement the decision due to intervention of this Act subject to the condition that possession continues to subsist on ground.
- Forest villages: Forest villages should be converted into revenue villages to enable the villagers to have the benefits of various development schemes and access to credit.
- Protection of tribals from exploitation: In order to protect tribals from exploitation by intermediaries and for ensuring adequate wages to them, guidelines have been issued to State Forest Departments.
- Payment of compensation for loss of life and property due to predation/depredation: Compensation should be paid on uniform basis with a minimum of Rs. 20,000/- for death or permanent incapacitation and one third of this amount for grievous injury. Compensation for loss of property should be given according to the assessment and should be revised to bring it on par with the amount admissible to riot victims.
- The Government of India has constituted the Central

Board of Forestry vide their notification No.3-2/89-FP dated 5.10.1990. The Hon'ble Prime Minister of India is the Chairman of the Board.

3.1.7. National Forestry Action Programme

The Forestry practices in the country are being reviewed and re-oriented according to the National Forest Policy of 1988. For this purpose, a National Forestry Action Programme is being prepared with assistance from UNDP.

3.1.8. Beneficiary Oriented Scheme for Tribal Development.

This scheme was launched during the year 1989-90 with the objective of rehabilitation of tribal and other families affected under relocation plans of the Project Tiger areas, National Parks and Wildlife Sanctuaries. The activities envisaged under this centrally sponsored scheme include:

- Financial incentives for Development of Agricultural lands and re-construction of houses.
- Providing the displaced persons with necessary infrastructure such as approach roads, drinking water, cattle ponds, cattle, fuel and fodder etc.

The scope of this scheme is proposed to be broadened to include rehabilitation of people practicing shifting cultivation as well as to bring the land so released under proper land use, preferably under tree cover, and rehabilitation of tribals living inside forest areas by providing them with necessary amenities. During 1990-91 an amount of Rs. 47.25 lakh was spent under this scheme.

3.1.9. Modern Forest Fire Control Project

3.1.9.1. Modern Forest Fire Control Project in India was introduced in April, 1984 as a demonstration project to devise, test and demonstrate the principles and techniques of forest fire prevention, detection and suppression in selected areas of Uttar Pradesh and Maharashtra. The Project was launched with an idea of extending the activities of introducing modern methods and technology to other States of the country on the basis of the results of the project. The achievements of the project during the year are as follows:

- With the introduction of modern methods and technology in combating forest fires, the burnt area has been reduced by about 90 percent in the project area demonstration. In Maharashtra, the area burnt in 1990 was 1618 hectares against 24132 ha in 1985 (base year) and average size of fire was 9.52 ha against 190 ha in 1985. Similarly, in Uttar Pradesh the area burnt in 1990 was 630 ha against 15789 ha in 1984 (base year) and average size of fire was reduced from 45.100 ha in 1984 to 3.92 ha in 1990.
- Hand tools and water handling equipment, manufacture

- indigenously were introduced from 1985 and used to the optimum capacity and they proved quite useful.
- Detection equipment like Osborne fire finders and watch towers were used for fire detection in early stages.
 - The radio communication link established in 1987-88 was in full operation during 1990 fire season. The facility proved quite effective in reducing the fires by quick communication and fast attack.
 - Demonstrations/ seminars on modern forest fire fighting techniques and methods were conducted in project areas and officers/workers from other States were also trained.
 - Forest fire weeks were observed in different forest divisions in U.P. to educate and ensure the involvement and cooperation of the rural population in fighting fires.
 - Forest fire danger rating system and Statistical reporting system were fully operational and fires were reported in prescribed format.
 - Fire prevention/suppression programmes were held in different forest divisions for training officers/staff.
 - Ten officers from various States successfully completed the 22 week programme on "Implementation of Forest Fire Planning" organised by the Colorado University.
 - Research programme initiated on work study of determining the cost of fire line building with different combination of hand tools, water handling equipment and power equipment was completed.
 - Research on effect of fire on humus/organic matter, soil nutrients, litter composition, natural regeneration and growth of trees etc., was completed and report is being compiled.
 - Assessment of fire damage with the help of satellite imagery is being completed.

Based on the encouraging results achieved in the project areas it has been decided to introduce a scheme during VIII Five Year Plan "Introduction of Modern Forest Fire Control Methods" in all States of the Country in a phased manner. The Government of India will assist States on one time basis on the approved items like hand tools, water handling equipment, detection equipment and transport cabs.

3.1.9.2. Centrally sponsored scheme-development of infrastructure for protection of forests from Biotic interference.

The scheme for "Development of Infrastructure for protection of forests from Biotic Interference" was introduced in 1986-87. Under this scheme 50% Central assistance is provided to State Governments for taking effective protection measures against illegal felling, encroachment and grazing. Forest areas comparatively more susceptible to biotic pressures have been identified in different States where the Scheme is being implemented. The Central assistance released from the inception of the scheme is as follow:

1986-87	—	48.94 Lakhs
1987-88	—	115.75 Lakhs
1988-89	—	196.94 Lakhs
1989-90	—	184.00 Lakhs
1990-91	—	185.20 Lakhs.

3.2. WILDLIFE CONSERVATION

3.2.1 The activities to implement the National Wildlife Action Plan were continued during the year. These included:

- Expanding and strengthening the protected area network which comprises of 412 Wildlife Sancturaries and 70 National Parks
- Organising training for wildlife managers; and of research on problems related to wildlife including survey of endangered species;
- Enforcement of the Wild Life (Protection) Act, 1972 and initiation of action to amend the Act to make it more stringent;
- Control of domestic and international trade in wildlife and its products and better management of zoos.

3.2.2. Indian Board of Wildlife

Action has been initiated to reconstitute the Indian Board of Wildlife.

3.2.3. Enforcement of Wild Life (Protection) Act, 1972 and Amendment of the Act.

- The Regional Deputy Directors of Wildlife Preservation at Delhi, Calcutta, Bombay and Madras continued to enforce the Wild Life (Protection) Act and the provisions of the Convention on International Trade in Endangered Species (CITES) and Export and Import Policy of India. Several cases of illegal trade were detected and handed over to State Wildlife Wings and the Customs Department for follow-up.
- A bill to amend the Act to make its provisions more stringent with regard to control of poaching and illegal trade and for better management of zoos, wildlife sanctuaries, and national parks, has been introduced in the Winter Session of the Rajya Sabha.

3.2.4. Conservation Programme

- Under the Centrally Sponsored Scheme 'Assistance for Development of National Parks'. financial assistance has been provided for supporting 36 National Parks, including those located in the high altitudes and covered under the "Snow Leopard" Project;
- Central assistance was also made available to 150 sanctuaries for development activities like construction of buildings, creation of infrastructure for protection etc;

- Under the Centrally Sponsored Scheme “Control of Poaching and Illegal Trade in Wildlife” financial assistance has been made available to the State Governments, on a 50 percent cost sharing basis, for strengthening anti-poaching and enforcement activities outside protected areas;
- Under the Scheme “Nature Education and Interpretation” Central assistance was made available to States, on a 50% cost sharing basis, for setting up wildlife interpretation centres and for conducting conservation education campaigns:
- Centrally funded schemes on a 50% cost sharing basis for captive breeding programmes for a number of highly endangered species like the Musk deer, etc. continued in four States under the scheme “Captive Breeding and Rehabilitation of Endangered species.
- Financial assistance was provided to the Government of Assam for strengthening the management of the habitats of rhinos in Assam as well as upgradation of anti-poaching measures under the scheme “Conservation of Rhinos in Assam.



Fig 12: Nilgiri Tahr—needs immediate protection.



Fig 13: Star tortoise—a threatened species.

3.2.5 Project Tiger

3.2.5.1. The Centrally Sponsored Plan 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 time areas of such biological importance as a national heritage for the benefit, education and enjoyment of the people.

3.2.5.2. To achieve these objectives, 18 Tiger Reserves have so far been established in 13 States covering over 28,000 sq. kms. forest area. The following table gives the distribution of areas of Tiger Reserves in the country:

Table 1

S. No.	Name of the Tiger Reserve	Area (in sq. kms)		
		Core	Buffer	Total
1.	Bandipur (Karnataka)	523	343	866
2.	Corbett (Uttar Pradesh)	338	183	521
3.	Kanha (Madhya Pradesh)	940	1005	1945
4.	Manas (Assam)	470	2370	2840
5.	Melghat (Maharashtra)	448	1170	1618
6.	Palamau (Bihar)	213	715	928
7.	Ranthambhore (Rajasthan)	392	433	825
8.	Similipal (Orissa)	845	1905	2750
9.	Sunderbans (West Bengal)	1330	1255	2585
10.	Periyar (Kerala)	501	276	777
11.	Sariska (Rajasthan)	498	302	800
12.	Buxa (West Bengal)	315	444	759
13.	Indravati (Madhya Pradesh)	1258	1541	2799
14.	Nagarjunasagar (Andhra Pradesh)	1200	2368	3568
15.	Namdapha (Arunachal Pradesh)	1808	177	1985
16.	Dudhwa (Uttar Pradesh)	648	163	811
17.	Kalakad Mundanthurai (Tamil Nadu)	571	229	800
18.	Valmiki (Bihar)	336	504	840
Total		12634	15383	28017

3.2.5.3 A Steering Committee under the chairmanship of the Prime Minister provides guidelines for the management of the Tiger Reserves. The non-official members of the Steering Committee (Project Tiger) and four scientific institutions nominated by the Steering Committee (Project Tiger) review the Project Tiger bi-annually.

3.2.5.4 To boost up research activities in the Tiger Reserves on the recommendations of the Steering Committee, the Department has agreed to provide 100% financial assistance for establishing Tiger Reserve. The department has also decided to provide 100% financial assistance for establishment of Nature Interpretation Centres in each Tiger Reserve to meet the growing demand for educational and

scientific information by the visitors including a large number of students.

3.2.5.5 During the year an amount of Rs. 6.5 crores has been provided as central assistance for the maintenance and development of the existing 18 Tiger Reserves. The funding pattern requires the State Government to contribute 50% of the expenditure on recurring items whereas Government of India provides 100% expenditure on non-recurring items. The total expenditure during 1990-91 including both central and state share on the Project Tiger Scheme was about Rs. 9.7 crores.

3.2.5.6 An eco-development programme launched during 1989-90 in the buffer area of the Ranthambore Tiger Reserve to overcome the problems of the local people in and around the Tiger Reserve, continued during the year. It is proposed to implement in future similar eco-development programmes in the buffer areas of all the 18 Tiger Reserves. The programmes will aim at increasing the biomass productivity of the buffer areas so that there is enough firewood and fodder available to meet the legitimate requirement of the people who had been adversely affected due to the ban on removal of firewood and fodder from the core areas. The programme will also provide veterinary care to the domestic cattle of the people and encourage stall feeding by improving their breed.

3.2.5.7 During the year, the following important developmental activities were undertaken in various Tiger Reserves:

- Ex-gratia payment has been made to the dependents of the five field staff of Sariska Tiger Reserve who were killed in an accident while chasing poachers.
- Rs. 11.59 lakhs have been provided to the State Government of Orissa for relocation of four villages from the core area of the Similipal Tiger Reserve.
- Ecodevelopment plan of Kanha Tiger Reserve is being finalised for implementation.
- Nature Interpretation centre in Kanha Tiger Reserve under Indo-US Cooperation programme has been completed.
- With the financial assistance provided by the Government of India, 15 jeeps, 8 motor-cycles, 5 boats, 93 wireless sets and 82 buildings for the field staff living in the remote areas have been purchased and constructed. In addition Interpretation Centres have been renovated at Palamau, Sarska and Melghat Tiger Reserves.
- The management plan of Valmiki Tiger Reserve has been finalised.
- An eco-development plan for solving the problems of tribals of Kanha Tiger Reserve has been prepared by the State Govt. and is under consideration of the Ministry for Financial Assistance.
- The Assam State Govt. has been provided special financial

assistance under Project Tiger Scheme for equipping the field staff to deal with the anti social elements in the Manas Tiger Reserve.

3.2.5.8 Publication

— Project Tiger, 1990

3.2.6 Project Elephant

A project has been formulated for the conservation of elephant population of the country. The project provides for restoring the lost and degraded habitats of elephants, including creation of migration corridors, mitigating man-elephant conflicts and establishment of a data base on the migration and population dynamics of elephants. The project is being taken up under the VIII Plan and will become operational in 1991-92.

3.2.7 Zoological Parks

3.2.7.1 The National Zoological Park, New Delhi, at present displays 1,713 animals comprising 71 species of mammals, 97 species of birds and 5 species of reptiles. On an average about 15 to 16 lakh people visit the zoo every year. Construction work of the Nocturnal House has been completed. Renovation and improvement of Monkey enclosures, construction of Reptile House and an underground water tank to augment water supply are under progress.

The zoo continued to contribute incaptive breeding of rare and endangered species of wild animals like Thamin deer, Swamp deer and Sloth bear, through successful breeding. The zoo has acquired a pair of Cheetahs from the London Zoological Society, London, (United Kingdom.)



Fig 14: A wild Tusker—Threatened habitats.

3.2.7.2 Padmaja Naidu Himalayan Park

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 wildlife. The park also conducts research on the behaviour and breeding biology of the fauna of the East Himalayan Region and provides visitors an opportunity to learn about the high altitude fauna and flora.

3.2.8 Animal Welfare

3.2.8.1 Animal Welfare Board of India

The Board—an autonomous grant-in-aid institution under the Ministry continued to pursue the cause of animal welfare. It provided financial assistance to the voluntary animal welfare organisations for running rescue homes, animal shelters and veterinary hospitals for treatment of stray animals. An amount of Rs. 50.50 lakhs was released to the Board during the year for carrying out these activities. Special preference was given to measures for controlling the population of stray dogs and conducting anti-rabies operation.

3.2.8.2 Welfare of Bears held by "Madaris"

Consequent upon receiving the report regarding cruelty to animals particularly the bears held by Madaris, the Ministry persuaded the State Governments to check the ownership documents for these bears with the Madaris and to seize any bears that are illegally held by them. Several bears in West Bengal and one in Delhi were seized and rehabilitated.

3.3 BIOSPHERE RESERVES

3.3.1 Biosphere Reserves are multipurpose protected areas to preserve the genetic diversity in representative ecosystems. The major objectives of Biosphere Reserves are:

- To conserve diversity and integrity of plants, animals and micro-organisms;
- to promote research on ecological conservation and other environmental aspects; and
- to provide facilities for education, awareness and training.

3.3.2. As per the recommendations of a core advisory group set up by the Government of India in 1979, 14 potential sites were identified for setting up of Biosphere Reserves in the country. So far the following seven Biosphere Reserves have been set up:

- i) Nilgiri
- ii) Nanda Devi
- iii) Nokrek
- iv) Great Nicobar
- v) Gulf of Mannar
- vi) Manas
- vii) Sunderbans

3.3.3 Action plans have so far been prepared for six Biosphere Reserves. These are: Niligiri, Nanda Devi, Nokrek Great Nicobar, Gulf of Mannar and Sundarban. Financial assistance has been provided to the concerned State Governments for implementation of the action plans. Research studies have also been initiated to provide scientific inputs as required for management of these areas.

3.3.4 Project documents for setting up of Bio-sphere Reserves in other areas have been prepared. These include Namdapha (Arunachal Pradesh), Kanha (Madhya Pradesh), Uttarakhand (Uttar Pradesh), The Thar Desert (Rajasthan), Kaziranga (Assam), the Little Rann of Kutch (Gujarat) and North Andaman (Andaman & Nicobar Islands). These are under consideration in consultation with the respective State Governments and Union Territory Administration.

3.3.5 Comprehensive guidelines have been proposed for implementation of the Biosphere Reserve Programme in the VIII Five Year Plan with emphasis on the following:

- Gearing up of the research activities;
- Monitoring of performance in the fields;
- Building up of massive public awareness by involving NGOs;
- Regular manpower training programmes;
- Bilateral programmes between India and USSR, USA, Mexico, UK and Canada;
- Use of latest technologies like remote sensing in carrying out the studies in the Biosphere Reserves.

3.4 WETLANDS, MANGROVES AND CORAL REEFS

3.4.1 Wetlands

3.4.1.1 India has a wealth of wetland ecosystems distributed in different geographical regions ranging from cold arid zone of Ladakh to wet humid climate of Imphal; warm arid zone of Rajasthan to tropical monsoonic Central India; and wet and humid zone of southern peninsula. Most of the wetlands in India are directly or indirectly linked with major river systems like the Ganga, Brahmaputra, Narmada, Tapti, Godavari, Krishna, Cauveri, etc.

Millions of people in India depend directly or indirectly on wetland resources for food (fishing, hunting, shrimp harvest etc., and fringe grazing by cattle and fodder. Wetlands also harbour a vast array of birds, reptiles, fishes and other fauna, all of great economic and bioaesthetic importance. These Wetlands also play an important role in flood control, recharging of aquifers, regulating water quality, pollution abatement as potential sites for aquaculture and breeding grounds for waterfowls etc.

3.4.1.2 Several significant steps have been initiated for conservation and management of wetlands. A National Wetland Management Committee has been constituted for



Fig 15: A flock of large Egrets—regular visitors to Wetlands.

advising the Government on appropriate policies and measures to be taken for conservation and management. The National Wetland Management Committee has identified 16 wetlands on priority basis for conservation and management. Steering Committees have been set up by the concerned State Governments in which representatives of State Government Departments, universities and research institutions are represented. Nodal research/academic institutions have been identified for each of the selected wetland.

3.4.1.3 During the year, management action plans have been sanctioned for three more wetlands viz., Harike and Kanjli (Punjab) and Renuka (Himachal Pradesh.) These management action plans broadly cover activities such as survey and mapping, soil conservation measures, weed control, pollution monitoring, catchment area development and environmental education and awareness.

3.4.1.4 India is a signatory to the Ramsar Convention on Wetlands. At the time of accession, India had designated two of its wetlands viz. Keoladeo National Park and Chilka Lake for inclusion in the list of Wetlands of International

Importance. During the year, necessary action has been taken for inclusion of the following wetlands.

- Loktak
- Wular
- Harike
- Sambhar

3.4.1.5 A Directory of Wetlands of India has been published which gives information on location, area and ecological categorisation of wetlands in different parts of the country.

3.4.2 Mangroves

3.4.2.1 Mangroves are very specialised forest ecosystems of tropical and sub-tropical regions of the world, bordering the sheltered sea coasts and estuaries. They stabilise the shoreline and act as bulwark against encroachments by the sea. Mangrove forests are dominated by salt tolerant inter tidal halophytic sea plants of diverse structures.

3.4.2.2 Mangroves occur all along the Indian coastline in



Fig 16: Rhizophora—the main constituent of Mangrove Flora.

sheltered estuary, tidal creeks, backwaters, salt marshes and mudflats covering a total area of 6,740 sq. kms which is about 7% of the world's total mangrove area. The mangroves in India have been subjected to immense biotic pressures and ruthless exploitation.

3.4.2.3 Realising the importance of mangroves, a scheme for conservation and management of mangroves was initiated by the Ministry. A National Mangrove Committee was constituted to advise the Government on appropriate policies and implementation of the programme for conservation of mangroves. Based on the recommendations of the Committee, the following 15 mangrove areas have been identified.

- Northern Andaman and Nicobar (Andaman & Nicobar Islands):
- Sunderbans (West Bengal), Bhitarkanika (Orissa). Coringa, Godavari Delta and Krishna Estuary (Andhra Pradesh), Mahanadi Delta (Orissa), Pichavaram and Point Calimere (Tamil Nadu), Goa (Goa), Gulf of Kutch (Gujarat.) Coondapur (Karnataka), Achra-Ratnagiri (Maharashtra) and Vembanad (Kerala).

It has been decided to extend the scheme to all remaining mangrove areas in the country. Steering Committees have been set up by the concerned State Governments in which State Government Departments, universities and research institutions are represented. Nodal research-cum-academic institutions have been identified for each of the identified mangrove area.

3.4.2.4 During the year management action plan for Sunderban, covering regeneration has been sanctioned.

3.4.2.5. Publications

During the year, the following have been published:

- A Directory of Wetlands of India, 1990
- Conservation of Mangroves in India, 1990.

3.4.3 Corals and Coral Reefs

Four coral areas have been identified viz, Gulf of Mannar in Tamil Nadu, Andaman & Nicobar Islands in Andaman and Nicobar, Lakshadweep Islands in Lakshadweep and Gulf of Kutch in Gujarat. Concerned State Governments have been asked to prepare management action plans and to set up Steering Committees for initiating the management of corals in the respective areas. The mangrove committee, existing at State level, will also help in conservation programmes of coral reefs of the concerned State.

A project has been sanctioned to the National Institute of Oceanography, Goa for undertaking studies and preparing a status report on corals of Andaman & Nicobar Islands and Gulf of Kutch in Gujarat.

3.5 NATIONAL STRATEGY FOR CONSERVATION AND SUSTAINABLE DEVELOPMENT

3.5.1. The Core Committee, set up by the Ministry to recommend the framework for formulating a National Conservation Strategy has submitted its report during the year. The report includes a policy statement on Environment and Development and a conservation strategy which highlights the following priority issues:

- Stabilisation of population growth:
- Integrated land use and water management:
- Conservation of Biological Diversity, Sustainable Energy and Resource Utilisation; and
- Pollution Control and Improvement of Human Habitats.

3.5.2 The report was examined by an In-house Group of the Ministry and Comments were sought from Central and state government departments, educational Institutions and non Government organisations. The draft paper on 'National Conservation Strategy and Policy Statement on Environment and Development has been prepared.

4. ENVIRONMENTAL IMPACT ASSESSMENT

4.1 INTRODUCTION

The basic objective of Environmental Impact Assessment is to identify, predict and evaluate the likely impacts of a given developmental activity and then prepare necessary Action Plans to prevent, eliminate or mitigate the adverse impacts as a part of the overall Environmental Management Plan (EMP). Each development project has the following related and inter-dependent impact categories:

- Economic Impact;
- Environmental Impact, and
- Social Impact

4.2 ENVIRONMENTAL IMPACT STATEMENT (EIS)

Since the objective of every development project is to contribute to the welfare of the society, it is essential that the diverse impacts of the project must be stated in detail

to ascertain whether it will achieve the stated objectives or not. The following components are considered in preparation of an Environmental Impact Statement;

- Land degradation and subsistence,
- Air pollution,
- Surface and ground water pollution,
- Deforestation and compensatory afforestation,
- Human displacement and cultural loss,
- Socio-economic impacts,
- Noise pollution and vibrations,
- Flora and fauna and loss of Biological diversity,
- Health aspects; and
- Risk analysis and disaster management



Fig 17: Tea garden in the midst of dense Shola Forest—human interference in forest eco-systems.

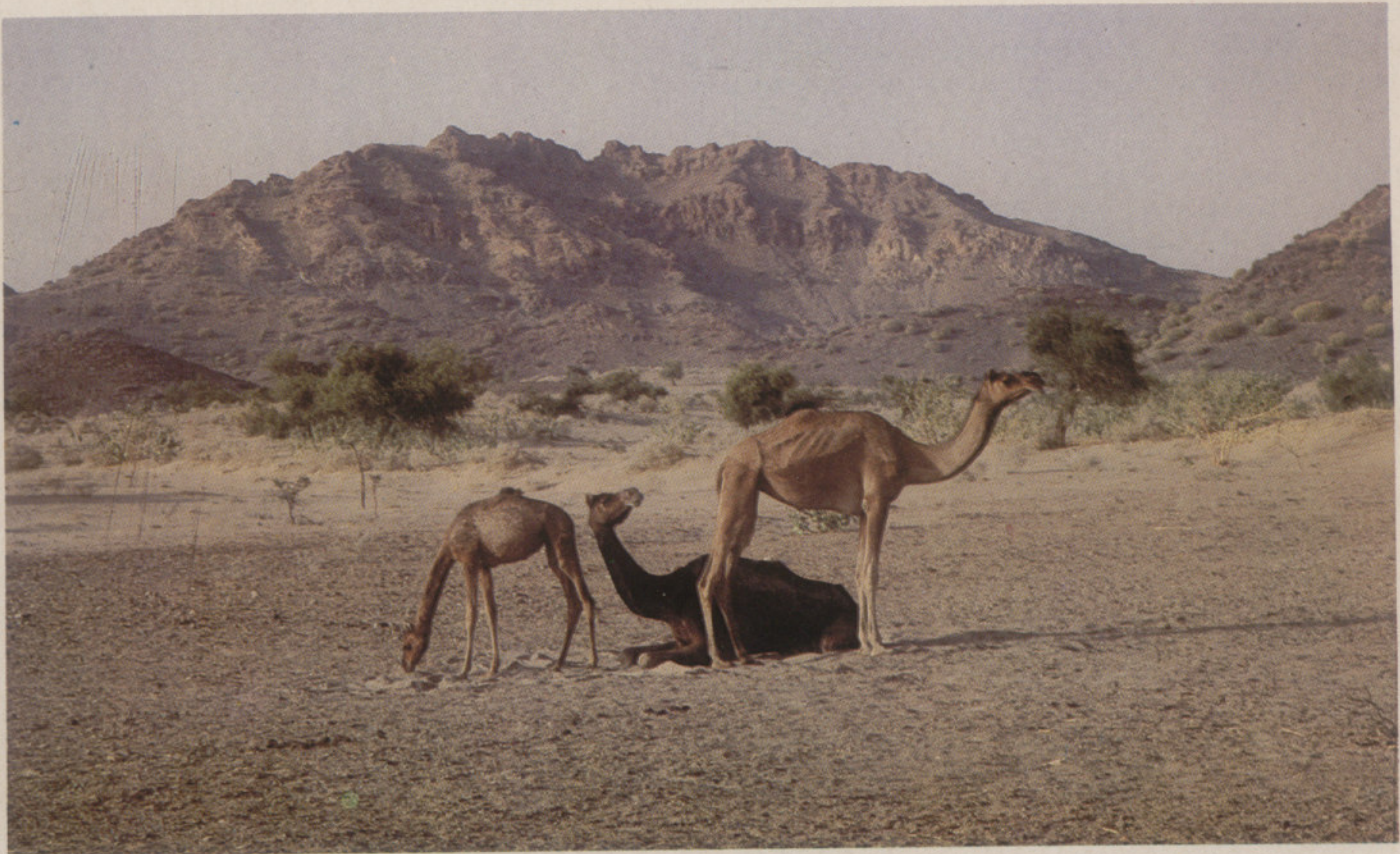


Fig 18: Extensive grazing of marginal lands accentuates desertification.

4.3 COVERAGE OF PROJECTS

In order to ensure the integration of the environmental considerations with development projects right at the planning stage, procedures have been instituted for environmental (including forestry) clearance of projects before approval for investment. At present the following categories of projects are assessed by the Ministry:

- Thermal Power Projects.
- Atomic Power Projects.
- Mining Projects of Public Sector Undertakings.
- Industrial Projects-(a) requiring the clearance of the Expenditure Finance Committee or the Public Investment Board of (b) requiring international funding, or (c) those projects referred specifically to Ministry of Environment and Forests by the State Governments or the respective administrative Ministries or (d) those taken up for scrutiny by the Ministry of Environment and Forests due to public complaints.

- All projects being put up before Cabinet Committee on Economic Affairs (CCEA) or Public Investment Board (PIB) such as Ports and Harbours, Communication Projects, etc.
- Projects in certain areas such as Doon Valley and the islands taken up for scrutiny because of the ecologically fragile nature of the areas.
- Tourism projects including beach resorts, which violate the guidelines regarding prohibition of any activity within 500 metres of the high tide line of the sea.
- Other projects such as constructions in violation of the existing rules brought to the notice of the Ministry of Environment and Forests.

4.4 PROCEDURE FOR ENVIRONMENTAL IMPACT ASSESSMENT

4.4.1 The Ministry has developed guidelines and questionnaires/check-lists for appraisal of projects in different sectors. The project authorities are required to provide

the relevant information as per prescribed questionnaire/check-list along with the Feasibility/Detailed Project Reports and Environmental Impact Statement/Environmental Management Plans. A multi-disciplinary staff complement in the Ministry, responsible for environmental appraisal of development projects carries out the preliminary scrutiny of the project proposals. Project proposals contain the essential environmental data, are placed before the Environmental Appraisal Committees in respective areas. During the meetings of the Environmental Appraisal Committees, the project authorities are also invited for discussion and wherever necessary, site visits are made for on-the-spot assessment of environmental aspects. Based on their examination, the Appraisal Committees make their recommendations for approval or rejection of a particular project.

While recommending approval of a project, the Committees also suggest certain safeguards in specific cases. In cases where the Appraisal Committees are not satisfied about the environmental action plans incorporated in the ESI/EMPs, the project authorities are advised to revise the reports and resubmit them for consideration of the Ministry/Appraisal Committees. The recommendations of the Appraisal Committees are processed for approval or rejection of the proposals by the Ministry.

4.4.2 The Ministry has constituted the following Environmental Appraisal Committees so far:

- River Valley, Multipurpose, Irrigation and Hydro-electric projects;
- Mining Projects;
- Industrial Projects;
- Thermal Power Projects; and
- Atomic Power and Nuclear Fuel Projects.

In addition to the above-mentioned Committees, specific Groups/Committees and Task Forces are constituted from time to time for appraisal of other major projects referred to the Ministry.

4.5 STAGES OF ENVIRONMENTAL CLEARANCE

A two-stage clearance has been adopted considering the site specific nature of a large number of projects. This clearance is essential for the following types of projects:

- Mining;
- Pit Head Thermal Power Stations;
- Multi-purpose River Valley Projects;

All other projects which require environmental clearance on the basis of detailed project reports are required to obtain environmental clearance by submitting complete environmental action plans clearly indicating time-schedule and financial investments.

4.6 STATUS OF APPRAISAL OF DEVELOPMENT PROJECTS

During the year, 164 projects were received for environmental appraisal. Required information was also received in respect of most of the 152 projects pending at the beginning of the year. Two hundred and ninety projects were appraised during the year out of which 108 projects were granted environmental clearance while 97 projects were rejected either due to environmental incompatibility or due to non-furnishing of required information by the project authorities. A detailed break-up on the status of environmental appraisal of various projects received during the year is given in the Table 2.

Table 2

Sector	Projects pending at the beginning of the year	Projects Received	Projects Total	Projects Appraised	Projects Cleared	Projects Rejected	Additional Information sought
River Valley and Hydel Project	4	41	45	45	15	26	4
Mining	58	18	76	75	20	20	35
Thermal	24	16	40	40	17	11	12
Industries	23	46	69	59	22	10	27
Atomic Power & Nuclear Fuel	6	4	10	10	4	1	5
Other Sectors (including Transport, tourism ports, harbours Airports, highways etc.	37	39	76	61	30	29	2
	152	164	316	290	108	97	85

4.6.1 River Valley Projects

During the year, 41 River Valley Projects were received for environmental appraisal. Required information was also received in respect of four projects pending at the beginning of the year. All the 45 projects were appraised, out of which 15 projects have been granted environmental clearance while 26 projects were rejected either due to environmental incompatibility or due to non-furnishing of information.

4.6.1.1 Narmada Sagar & Sardar Sarovar Project

Narmada Sagar and Sardar Sarovar are the the major reservoir schemes proposed in Narmada Basin, which had been accorded conditional environmental approval in 1987 with the provision that the Environmental Action Plans will be formulated and implemented *pari-passu* with the engineering works. To ensure effective implementation of environmental safeguard measures, the scope of the Narmada Control Authority had been enlarged by creating two additional sub-Groups to deal with the problems of rehabilitation of oustees and the environmental issues. Various studies and surveys on environmental aspects have been initiated by the concerned States with the help of universities and research institutes. These studies are at various stages of progress and are likely to be completed in another two years. Keeping in view the necessity of implementation of environmental mitigative measures with the construction work, the Narmada Control Authority has been requested to synchronize the construction activities with the implementation of environmental mitigative measures. This is being pursued in the sub group on environment in so far as it relates to environmental issues.

In the meantime, for the integrated development of Narmada Basin, it is proposed to set up Development Centre which aims at the following:

- Assess the carrying capacity of Narmada Basin;
- Assess the present status of natural resources and prepare a detailed inventory;
- Identify and demarcate critically degraded areas in the Basin for priority treatment; and,
- Assess the present development mix along with the formulation of Environmental Management Plans.

The Centre will come up with an Integrated Development Plan for Narmada Basin on the basis of carrying capacity. An Advisory Body is also being constituted to oversee the activities of the centre.

4.6.1.2 Tehri Dam Project

The Tehri Dam Project envisages construction of a 260.5

metre high dam across the river Bhagirathi near Tehri town down-stream of the confluence of Bhagirathi and Bhilangana rivers. The project was initially approved in 1972 for an installed capacity of 600 MW. The scope of the project has subsequently been modified to have an installed capacity of 2000 MW (1000 MW in Stage-I and 1000 MW in Stage-II at Tehri) and 400 MW at Koteshwar. The project also envisages irrigation over an additional area of 2.7 lakh ha.

A Working Group was constituted in May, 1980 to study the environmental aspects of the project. Considering that the project is located in the highly seismic Himalayan Zone, and that it will have adverse environmental impact, the Working Group had recommended that a series of small run-of-the river schemes be considered and that a Ganga Management Authority be created for planning various projects in this Basin.

On the basis of the revised Environmental Management Plans submitted by the Tehri Hydro Development Corporation in November, 1989, the project was examined by the Standing Environmental Appraisal Committee of the Experts. Since the environmental action plans submitted were still not complete and satisfactory, the scheme was given conditional approval in July, 1990 stipulating that the project authorities must get the safety aspects and design of the dam approved by the High Level Expert Committee, which was examining this issue and that Environmental Management Plans on Catchment Area Treatment, Rehabilitation, Command Area Development and Disaster Management etc. shall be submitted by December, 1990 and March, 1991. These plans are now under preparation by the Tehri Hydro Development Corporation and will be assessed by the Ministry when submitted.

4.6.2 Thermal Power Projects

During the year, 40 thermal power projects were appraised from environmental angle. Seventeen projects were accorded environmental clearance subject to certain conditions and environmental safeguards. Fifteen projects were rejected and additional information has been sought in respect of 12 projects.

While according clearance, stipulations were made to provide pollution control measures such as electrostatic precipitators (ESPs), tall stack and ambient air quality monitoring system, dust suppression and control equipments, raising of green belts around the power plants etc. Installation of fuel gas desulphurisation plant was also prescribed, wherever necessary. Further, emphasis has been laid on utilisation of fly-ash for constructive purposes such as in cement, building materials, bricks, building blocks etc.

4.6.3 Mining Projects

4.6.3.1 During the year, 75 mining projects have been appraised. Out of these, 20 projects have been cleared while 20 projects have been rejected either due to environmental incompatibility or due to non-furnishing of information. While giving clearance, conditions for regular monitoring of implementation of various environmental safeguards like reclamation of quarried land and overburden dumps, rehabilitation of affected population, air and water pollution control measures have been imposed. Clarifications were sought in the remaining 35 cases.

4.6.3.2 A Case Study on Environmental Management of Iron ore mine at Noamundi of Tata Iron and Steel Company Ltd has been completed and final report has been received. Another Case Study on Environmental Management Plan of Dhanpuri coal Mine is under progress.

4.6.3.3 The work on the Indo-US Project entitled "Conceptual Environmental Management Plan for Coal Mines in India" with special reference to Singrauli coalfield is under progress.

4.6.4 Industrial Projects

4.6.4.1 A total of 59 industrial projects were appraised during the year. Out of these, 22 projects were cleared while 10 projects were rejected. Additional information has been sought on the remaining 27 projects.

4.6.4.2 During the year, the studies undertaken with regard to the carrying capacities for kawas-Hazira area in Gujarat and Thane-Belapur area in Maharashtra were reviewed. These studies being carried out by the Governments of Maharashtra and Gujarat are expected to throw light on the overall capacity of the area with regard to further development, present and anticipated pollution levels and their impact on environment. The interim report submitted by the project authorities has provided basic data regarding availability of water, effluent disposal and air quality of the area for the first six months of the year.

4.6.5 Atomic Power and Nuclear Fuel Projects

During the year, 10 projects were appraised, out of which four projects were cleared from environmental angle. One project has been rejected while additional information has been sought in remaining five projects. While granting clearance, conditions of radiation safety, risk and hazards associated with the operations and storage of hazardous materials, raising of green belts, contamination of air and water etc., have been considered.

4.6.6 Other Development Projects

Thirty nine projects related to different sectors like ports

and harbours, transport, communication, tourism and beach resorts etc., have been received for environmental appraisal during the year. Thirty seven projects which pending at the beginning of the year were also taken up for appraisal. During the year, 61 projects were appraised out of which 30 projects were granted environmental clearance and 20 projects were rejected. Additional information has been sought in the remaining two projects.

4.7 OTHER PROGRAMMES

4.7.1 Coastal Area Management

In order to protect the cultural, aesthetic and ecological values of coastal areas and to ensure that the use and activities in the coastal areas are consistent with the principles of environmental conservation, the Ministry has issued a notification under Environment (Protection) Act, 1986 to ban certain activities and to categorise the coastal areas into certain regulation zones. The notification identifies prohibited activities within the 500 m of the high tide line and those that are to be permitted in accordance with the guidelines given in the notification. To help the State Government in preparation of Coastal Zone Management Plans, the Ministry has completed Environmental Management Plans for three coastal stretches, namely, Puri-Konark in Orissa, Dwarka-Jodia in Gujarat and Digha in West Bengal. The fourth study for Madras-Mahabalipuram area in Tamil Nadu is in progress.

4.7.2 Doon Valley

As directed by the Doon Valley Board, the Committee constituted to examine the environmental implications of lime kilns in the Doon Valley, has suggested shifting of these kilns. The Ministry constituted a Finance Committee to suggest incentive package for shifting the lime kilns from Dehra Dun to Beharigarh in Saharanpur District.

A study for determining the carrying capacity of the Doon Valley is also being taken up by the National Environmental Engineering Research Institute, Nagpur.

4.7.3 Human Exposure Assessment Location

4.7.3.1 The Human Exposure Assessment Location (HEAL) project is the first international attempt to make an integrated assessment of environmental pollution. The project is being implemented by the World Health Organisation (WHO), and the United Nations Environment Programme (UNEP) in close cooperation with national agencies and institutions.

4.7.3.2 The long term global objectives adopted for the HEAL project are as follows:

— to provide comparable and Valid assessment of human

- exposure to selected environmental pollutants;
- to improve, field tests, harmonize and demonstrate methods for this integrated monitoring and assessment of human exposure to environmental pollutants;
 - to promote the assessment of human exposure to pollutants as a basis for development of environmental control strategies for the protection of public health;
 - to provide an overview of existing exposure of selected population to pollutants on a regional and global basis and, if possible, observe trends in this regard, and
 - to improve national capabilities for environmental monitoring and human exposure assessment.

4.7.3.3 The project is being implemented in three phases as given below:

- Training phase
- Pilot monitoring phase, and
- Definite monitoring phase.

In the present study, Pb/Cd, DDT/PCB and No₂ have been selected.

4.7.3.4 Chembur and central area of Bombay city have been selected as Indian HEAL sites due to concentration of industries and heavy traffic density. Both the sites have been sub-divided into two regions viz., low polluted area and high polluted area. The institutions associated with the programmes are as follows:

- National Institute of Occupational Health (NIOH), Ahmedabad
- Maharashtra Pollution Control Board (MPCB), Bombay;
- Air Quality Monitoring and Research Laboratory, KEM Hospital, Bombay; and
- Municipal Corporation, Bombay (BMC).

4.8 WORKSHOP/TRAINING

During the year, five workshops were held under the Indo-Dutch Programme. The sectors covered in these Workshops were:

- Industrial siting and land use planning;
- Ports and harbours; and,
- Water Resources Management.

Three more Regional workshops on Water Resources Development Projects were organised in collaboration with Central Board for Irrigation and Power (CBIP). These workshops were attended by senior managers, engineers and participants from Public Sector Undertakings, Centre and State Government Departments.

4.9 PUBLICATION

During the year, the following has been published.

- Parameters for determining ecological fragility, 1990.

5. CONTROL OF POLLUTION

5.1 CONTROL OF WATER, AIR AND NOISE POLLUTION

5.1.1 Draft policy statement for abatement of pollution has been prepared in consultation with the Sectoral Ministries, State Governments, major industrial associations and some non-governmental organisations. The consensus is that the focus should be on prevention of pollution through the adoption of low or no waste technology. Small scale industries have been identified as priority areas. Steps have been taken to integrate the environmental and economic aspects in development planning; stress preventive aspects in pollution abatement; promote technological inputs for reducing industrial pollutants; and rely upon public cooperation in securing a clean environment.

5.1.2 Assistance for Adoption of Clean Technology by Small Scale Industries

5.1.2.1 Environmental policy for industry has focussed mainly on pollution control through "end-of-the-pipe" treatment technologies which allow the wasteful use of resources and then consume further resources to deal with environmental problems in a particular medium. The future raw material and energy scenarios, the impact of the industry and its products have on the natural resources base and environmental quality, and the necessary thrust being given to industrial growth in the country, warrants a comprehensive strategy to deal with environmental and economic problems in the country. Steps have been taken to improve manufacturing methods that require less raw material and energy to obtain equitable levels of output or better quality.

5.1.2.2 Small Scale Industries (SSIs) are a special feature of our economy. Government are implementing a scheme for providing assistance for promoting combined facilities for treatment of effluent and solid waste generated in clusters



Fig 19: Irrational use of water bodies causing water pollution.



Fig 20: Monitoring of Vehicular Pollution.

of SSIs. A subsidy of Rs. 25 lakhs or 25% whichever is less is being given to clusters of SSIs for setting up Common Effluent Treatment Plants (CETPs), subject to the State Government put in a matching contribution. For 1990-91, a total amount of Rs. 4.91 crores was disbursed as the GOI share.

5.1.3 Vehicular Pollution

5.1.3.1 The Ministry of Environment & Forests has asked the Ministry of Industry to issue instructions to all the vehicle manufacturers for making necessary changes in the design of vehicles for compliance of prescribed standards. It has also been suggested that a policy decision will have to be taken for regulating the number of vehicles using two-stroke engines (scooters, motor-cycles, etc.) in areas of heavy traffic density.

5.1.3.2 A project has been initiated with the Indian Institute of Petroleum, Dehra Dun for preparing a State of the Art Report on the status of vehicular pollution in the country. The report will deal with emission characteristics, standards, control technology and strategy for reducing emission from vehicles in use.

5.1.3.3 The suitability of fixing catalytic convertors to the existing and new vehicles to reduce pollution is also being examined by the Government. The Ministry is in close touch with the National Environmental Engineering Research Institute (NEERI), Nagpur, and it has been indicated by them that such devices have been found to be promising in initial trials with petrol driven vehicles are proposed to be initiated in the laboratory and in field by middle of 1991. The Ministry has also sought the opinion of the Automotive Research Association of India (ARAI) and Indian Institute of Petroleum, Dehra Dun regarding suitability of fixing catalytic convertors.

5.1.4 Noise Pollution and Smoking in Public Places

5.1.4.1 The Central Board has conducted ambient noise monitoring studies for assessment of noise pollution in industrial areas of Delhi. Ambient noise levels have also been measured at other cities like Calcutta, Hyderabad, Madras, Bangalore, Kanpur and Jaipur. Transportation noise was found to be the main cause for high ambient noise levels.

5.1.4.2 During the year, standards have been notified for ambient noise, industrial noise, vehicular noise and noise generated by domestic appliances.

5.1.4.3 Necessary instructions/guidelines have been issued by the Cabinet Secretariat for ban on smoking in selected public places.

5.1.5 Surveillance of Pollution Sources

5.1.5.1 The Central Government in consultation with the States have evolved an action plan for controlling pollution from the heavily polluting industries, critical areas and control of critical pollutants.

The critical areas have been identified as follows:—

- Vapi, Gujarat.
- Chembur, Maharashtra.
- Vishakhapatnam, Andhra Pradesh.
- Talchar, Orissa.
- Manali & North Arcot, Tamil Nadu.
- Udyogmandal, Kerala.
- Pali, Rajasthan.
- Dhanbad, Bihar.
- Gobindgarh, Punjab.
- Korba, Madhya Praesh.
- Singrauli, Uttra Pradesh.
- Digboi, Assam.
- Mangalore, Karnataka.
- Durgapur & Howrah, West Bengal.

5.1.5.2 During the year, the identified problem areas have been surveyed and time targetted action plans are being framed out in consultation with the respective State Boards.

The heavily polluting industries that have been identified in the action plan are as follows:—

Air Pollution Control:

Cement
Thermal Power Plants
Iron & Steel
Fertilizer
Zinc Smelter
Copper Smelter
Aluminium Smelter and
Oil Refinery

Water Pollution Control:

Distillery (i.e. Fermentation)
Fertilizer

Pulp & Paper (Large & Small)
Basic Drugs
Dyes & Dye Intermediates
Pesticide Manufacturing
Oil Refinery
Petro-chemicals
Clusters of Tanneries
Sugar and Pharmaceuticals

The critical pollutants which have been identified are:

Lead
Mercury
Pesticide
Carbon Monoxide
Sulphur dioxide and
Asbestos (Air pollutant)

The critical river stretches which had been identified in the Action Plan, are the polluted areas of Sabarmati, Subernarekha, Godavari, Krishna, Indus (Tributaries), Satluj, Ganga (Tributaries), Yamuna, Hindon, Chambal, Damodar, Gomati and Kali.

5.1.6 River Basin Studies

The Central Pollution Control Board is conducting studies on major river basins to assess the impact of pollution related activities in these basins. These studies provide necessary information for national planning of pollution control programme of the rivers. Reports of such studies on Ganga, Yamuna, Subarnarekha, Brahamani & Baitarni, Krishna and Sabarmati have been published. Studies on Godavari, Caurvery, Indus, Mahanadi, Mahi and Brahmaputra and Tapti have been completed and the reports are under preparation.

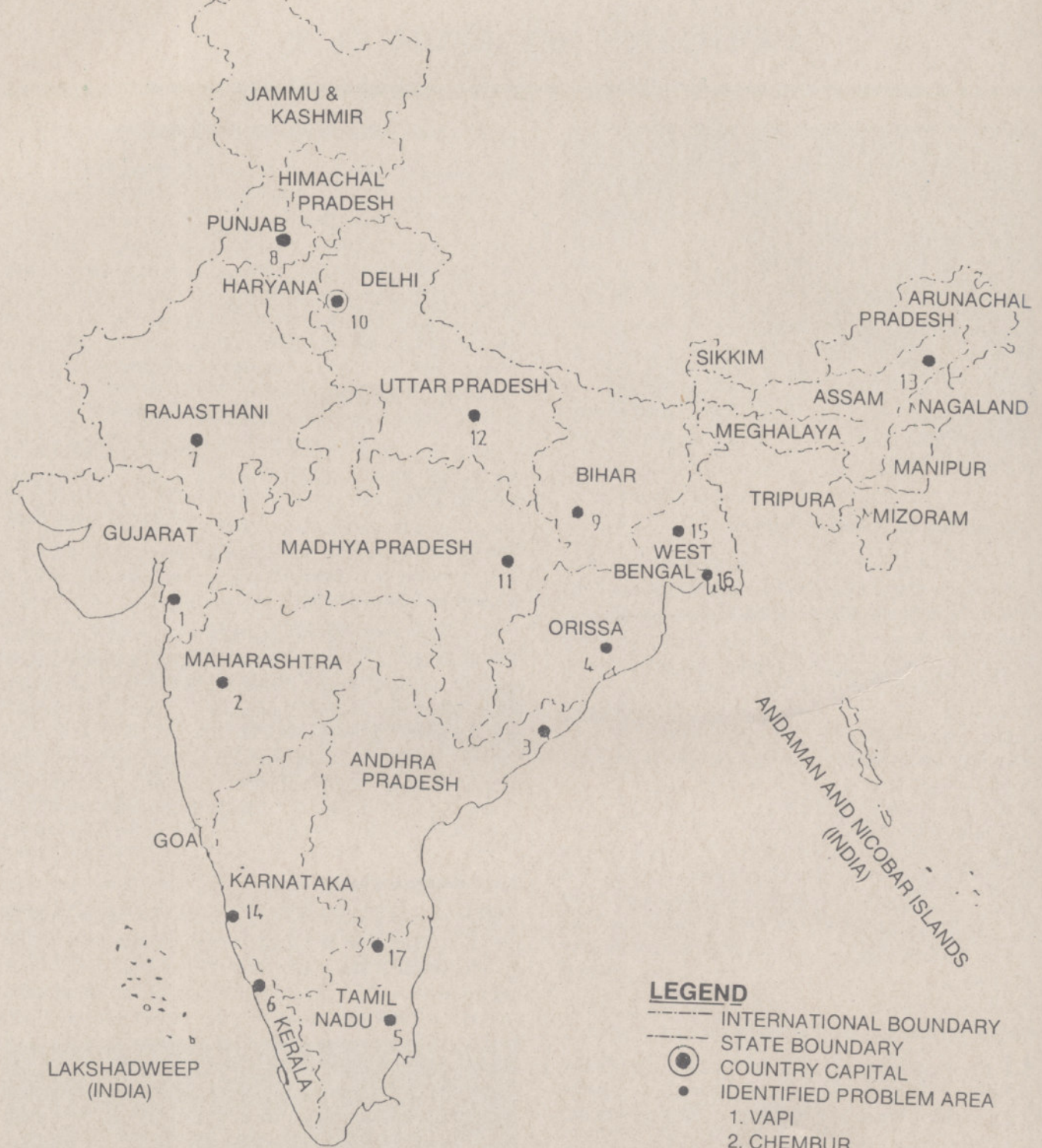
5.1.7 Waste Exchange

Effort is being made by this Ministry for the control of pollution arising out of disposal of the waste by conversion of this unwarranted waste into raw material for various industrial uses. The major generation of industrial solid wastes per year are from thermal power plants which produce 30 million tonnes of coal ash; integrated iron and steel mills producing blast furnace slag and steel milling slag (35 million tonnes); non-ferrus industries like aluminium, zinc and copper producing Red Mud entailing (3 million tonnes); sugar industries generating Press Mud (3 million tonnes); fertilizers and allied industries producing gypsum (4.5 million tonnes).

The Ministry is trying to link the suppliers and uses of these waste.

5.1.8 Legislation

5.1.8.1 As the present system of jurisprendence does not provide for compensation to individuals for environmental damage, including damage caused by pollution, it is proposed to set up special legal institutions to redress this



LEGEND

- INTERNATIONAL BOUNDARY
- STATE BOUNDARY
- (in circle) COUNTRY CAPITAL
- IDENTIFIED PROBLEM AREA

- 1. VAPI
- 2. CHEMBUR
- 3. VISHAKHAPATNAM
- 4. TALCHER
- 5. MANALI
- 6. GREATER COCHIN
- 7. PALI
- 8. GOBINDGARH
- 9. DHANBAD
- 10. NAJAFGARH DRAIN BASIN
- 11. KORBA
- 12. SINGAULI
- 13. DIGBOI
- 14. MANGALORE
- 15. DURGAPUR
- 16. HOWRAH
- 17. NORTH ARCOT

Fig. 21: Problem Areas in India

deficiency and also make adequate arrangements for interim relief.

5.1.8.2 The Public Liability Insurance Act, 1991 has been enacted to provide for mandatory insurance for the purpose of providing immediate relief to the persons affected by accident occurring while handling any hazardous substance. The Act has come into operation w.e.f. 1.4.1991.

5.1.8.3 An exercise has been undertaken to codify the principles of civil liability in regard to the handling of hazardous substances and setting up of Environmental Tribunal at the National Level with Benches in the States. It is also proposed to set up an Environment Commission from time to time.

5.1.8.4 Amendments to the Environment (Protection) Act, 1986 are under process with a view to rationalise the scope, coverage and penal provisions of the Act, and to meet the merging concerns.

5.1.8.5 Amendments to the water (Prevention & Control of Pollution) Cess Act have been finalised with a view to augment the resources of Pollution Control Boards.

5.1.8.6 Public interest litigation has successfully demonstrated that responsible non-governmental organisations and public spirited individuals can bring about significant pressure on polluting units for adopting abatement measures. This commitment and expertise is being encouraged and their practical work supported.

5.1.9 Enforcement

5.1.9.1 The Ministry is pursuing with Supreme Court to expedite the hearing to transfer of 30 writ petitions pending in various High Courts in which certain provisions of EP Act, 1986 have been challenged.

5.1.9.2 In order to argue the cases related to pollution matters effectively, particularly public interest cases, it is proposed to set up a separate panel of lawyers.

5.1.9.3 The Central and the State Pollution Control boards (SPCBs) are responsible for carrying out the functions entrusted to them under the provisions of the Water (Prevention & Control of Pollution) Act, 1974 and Air (Prevention & 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 & State Boards is compiled on quarterly basis and analysed. As on 30th June, 1990, 3189 cases were filed under the water Act and 365 cases under the Air Act. Out of 1040 cases decided under the Water Act, 720 cases were in favour of the Board and 320 against. Under the Air Act, out of 286 cases decided, 235 were in favour of the Board and 51 against.

5.1.10 Delegation of Powers of Central Pollution Control Board

5.1.10.1 The Central Pollution Control Board (CPCB) exercise powers and functions of State Boards in the Union Territories. According to Section 4(4) of the Water Act and Section 6 of the Air Act, the CPCB can delegate its powers and functions in a UT to the local body as the Central Government may specify. The powers for control of pollution exercised by the CPCB have been delegated to the Admn. of Chandigarh and Delhi w.e.f. April 1, 1991 and June 1, 1991 respectively.

5.1.10.2 The Central Government has delegated the powers to CPCB with respect to grant of recognition to laboratories or institutes (except private laboratories) as environmental laboratories and to appoint or recognise analysts as Government Analysts.

5.1.11 Environment Friendly Products

House holders, as consumers, make large number of relatively small individual contributions, whose cumulative effect is considerable. A system of certification of goods that are "environmentally friendly" has been initiated to make available information to encourage the environmental conscious behaviour of consumers.

5.1.12 State Environment Protection Councils

All State Governments have been advised to set up State Environment Protection Courts.

5.1.13 Awards for Prevention and Control of Pollution

National Awards have been instituted for Public Recognition of Outstanding Activity for Prevention and Control of Pollution.

5.1.14 Development and Enforcement of Standards

5.1.14.1 The present standards are based on the concentration of pollutants in effluent and in emissions. The norms are being revised to lay down mass based standards which will set specific limits to encourage the minimisation of waste, promote recycling and reuse of materials as well as conservation of natural resources particularly water.

5.1.14.2 Minimal National Standards and air emission standards are evolved by the Central Pollution Control Board for major categories of water and air polluting industries. These standards refer to the maximum limit of effluents and emission that an Industry may discharge into any water body or in the atmosphere. The State Pollution Control Boards while issuing their consent to the Industries, can stipulate the same or more stringent standards for effluent and air

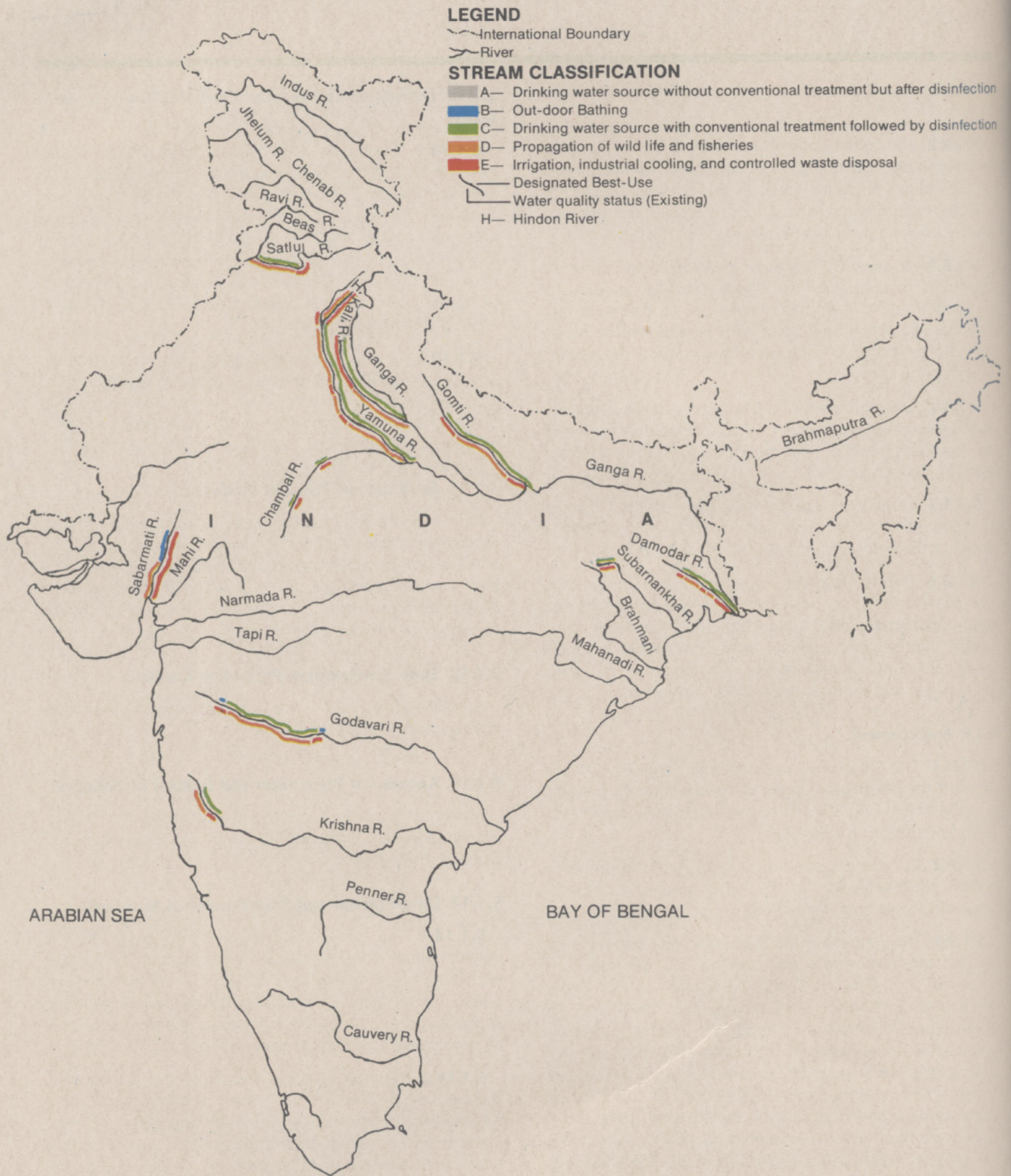


Fig. 22 Grossly Polluted River Stretches

emission discharges. The Ministry has notified the standards for following categories of industries.

Table 3

Standards for liquid effluent	Standards for Gaseous Emission
Bullion refining Industry	Aluminium Industry
Caustic Soda Industry	Asbestos Product Industry
Dye & Dye Intermediate Industry	Boiler (Small)
Fermentation Industry	Calcium Carbide Industry
Fertilizer Industry	Carbon Black Industry
Integrated Iron & Steel Industry	Caustic Soda Industry
Inorganic Chemical Industry	Cement Industry
Man made fibre industry	Copper, Lead mix and zinc melting Industry
	Fertiliser Industry
Oil refinery	Foundries
Paint	Furnaces
Pesticides	Integrated Iron & Steel
Petrochemical	Nitric acid plant
Pharmaceuticals	Oil refineries
Pulp and paper	Pulp & Paper
Small scale Industry	Stone crushing units
Sugar Industry	Sulphuric Acid Plants
Cotton textile	Thermal power plants
Composite woolen	Glass Industry
Large Pulp & Paper	Lime kiln
Thermal Power Plant	
Glass Industry	
Slaughter houses	
Jute processing	
Food and fruit processing	

5.1.15 Implementation of Standards

National and Zonal Task Forces have been constituted for the implementation of standards in the industries like fertilizer, iron and steel, thermal power plants, cement, pulp and paper and oil refineries. These Task Forces interact with the concerned industry representatives and SPCBs and also take up inspection of pollution control systems installed at sources and monitor the progress of implementation of standards. During the year, Task Forces have been constituted for distilleries, producers of non-ferrous metals and petrochemicals, caustic soda and man-made fibres. The status of implementation of standards in respect of some major industries are given in Table 4.

Table 4
Implementation of Standards in Industry

	Cement	Thermal Power	Pulp & Paper	Fertilizer	Oil Refineries	Sugar	Distil
— No. of units complying with emission standards	62	23	—	44	6	—	—
— No. of units complying with effluent standards	—	—	118	62	6	180	74
— No. of units committed to a time-bound programme/have partial treatment	21	42	99	—	—	95	70
— No. of desulphing units	5	—	100	14	—	88	63
— No. of units closed	6	3	—	3	—	03	04

5.1.16 Monitoring

5.1.16.1 National Water Quality Monitoring Programme

Under the United Nations Global Environmental Monitoring Systems (GEMS) and the Monitoring of Indian National Aquatic Resources (MINARS), 50 new stations have been added during the year raising the total number of water quality monitoring stations to 450 all over the country. The present network comprises 372 stations under MINARS Programme, 51 stations under GEMS and 27 stations under Ganga Action Plan (GAP), covering all the 14 major, 7 medium and 11 minor rivers. Polluted river stretches of six major rivers identified on the basis of high extent of water quality deviations from the desired class of water have been described in Table 5. These stretches require immediate action for restoring the water quality.

5.1.16.2 Coastal Monitoring

The ongoing project on coastal monitoring has a network of 173 stations spread all along the coastal waters of the country. Of these 173 stations, 107 stations are monitored by the State Pollution Control Boards of Gujarat, Maharashtra, Kerala and Tamil Nadu. The Eastern Zonal Office of the Central Board, Calcutta is involved in the monitoring of Orissa and West Bengal coastal waters. The Central Pollution Control Board is co-ordinating the work of these five agencies. A report on "Criteria for classification and Zoning of Coastal & Marine Waters" has been prepared.

5.1.16.3 Air quality monitoring

5.1.16.3.1 The National Ambient Air Quality Monitoring Programme (NAAQMP) was initiated in 1984 with 28 monitoring stations covering 7 important cities. A total of 260 stations have been established in 75 cities/ towns out of which 200 stations are operational. Ambient air quality monitoring in the country is being carried out by State Pollution Control Boards (SPCB)

5.1.16.3.2 Under Indo-EEC bilateral programme, Central Board has established three continuous ambient air quality monitoring stations and these stations, are being operated in Delhi. Besides these stationary stations, two mobile vans

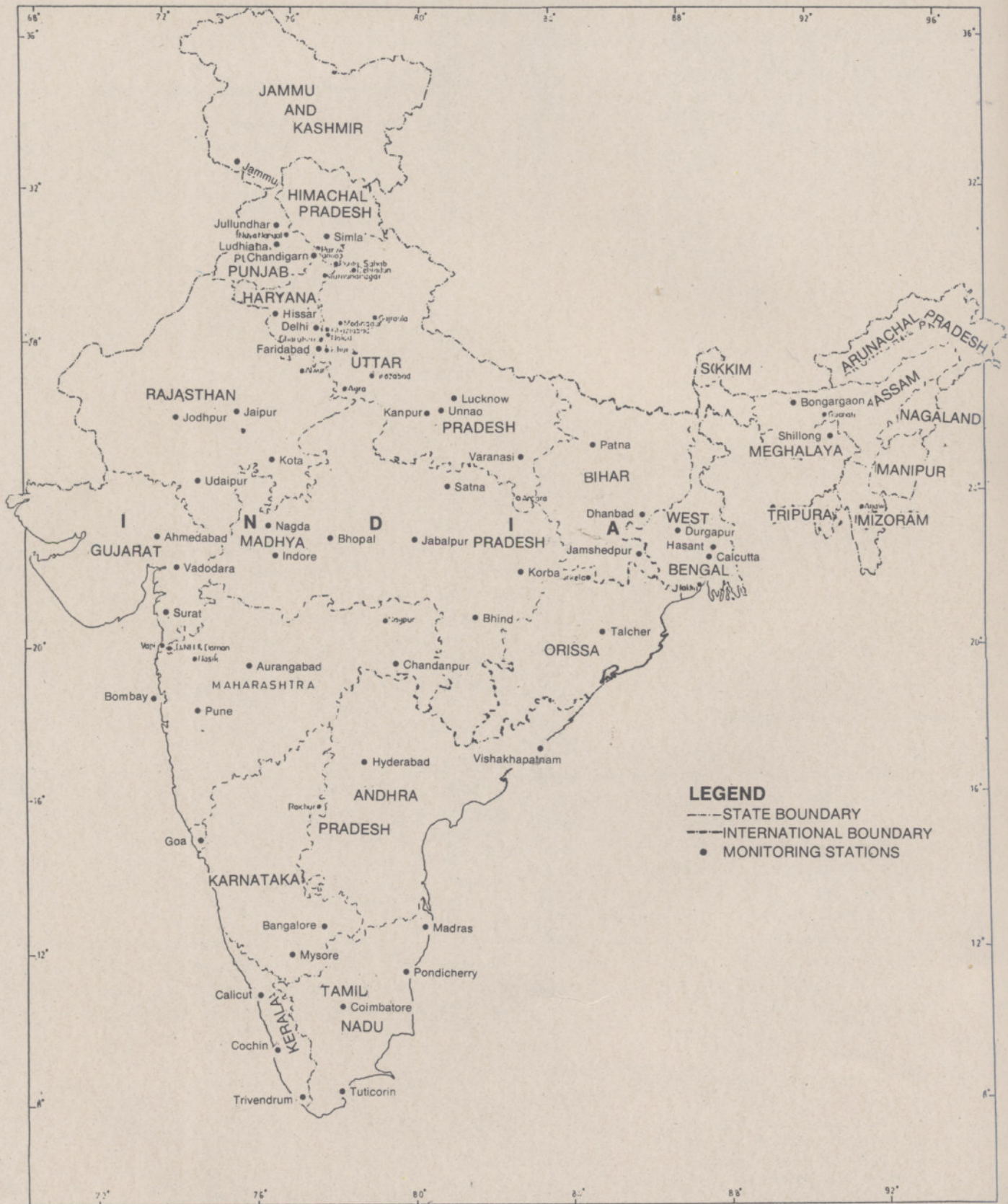


Fig. 23 Air quality Monitoring Stations in India.

Table 5
LIST OF POLLUTED RIVER STRETCHES

Sl. No.	River	Polluted stretch	Desired Class	Existing Class	Critical Parameters	Possible Sources of Pollution
1.	Sabarmati	(i) Immediate upstream of Ahmedabad city upto Sabarmati Ashram	B	E	DO, BOD, Coliforms	Domestic and Industrial waste from Ahmedabad
2.	Subernarekha	(ii) Sabatamati Ashram to Vautha Hata Dam to Bahargoa	D C	E Partly C and Partly E	—do— DO, Coliforms, BOD	—do— Domestic and Industrial waste from Ranchi and Jamshedpur
3.	Godavari	(i) D/S of Nasik to Naded	C	Partly D and Partly E	BOD	Waste from Sugar, Distillery and Food processing Industries
		(ii) City limit of Nasik and Nanded	B	—do—	—do—	—do—
4.	Krishna	Karad to Sangli	C	Partly D and Partly E	BOD	Waste from Sugar and Distillery Industries
5.	Indus (Inbutanes Sutie)	D/S of Ludhiana to Hrike	C	Partly D and Partly E	DC BOD	Industrial waste from Hosieries, Tanneries Electroplating and Engg industries and domestic waste from Ludhiana and Jullundur
		D/S of Nangal to Anandpur	C	E	Ammonia	Waste of Fertiliser, Chior Ajkali and paper mills from Nangal
6.	Ganga (Tributaries)					
	(i) Yamuna	(i) Delhi to Confluence with Chambal	C	Partly D and Partly E	DO BOD Coliforms	Domestic and Industrial wste from Delhi, Mathura and Agra
		(ii) In the city limits of Delhi, Maathura & Agra	B	—do—	—do—	—do—
	Hindon	Sabaranpur to Confluence with Yamuna	D	E	DO BOD Toxic	Industrial and domestic wste from Saharanpur and Ghaziabad
	Chambal	D/S of Nagda and D/S Kota (app. 45 kms at both phases)	C	Partly D and Partly E	BOD Do	Domestic and Industrial waste from Nagota and Kota respectively
	Damodar	D/S of Dhanbad of Haldia	C	Partly D and Partly E	BOD Toxic	Industrial waste from Dhanbad Durgapur, Asansol, Haldia and Burnpur
	(iii) Gomti	Lucknow to Confluence with Ganga	C	Partly D and Partly E	DO BOD Coliforms	Industrial waste from Distilliers and domestic waste from Lucknow
	(iv) Kali	D/S Modragar to Confluence with Ganga	C	Partly D and Partly E	BOD Coliforms	Industrial and domestic waste from Modinagar

for continuous air quality monitoring have also been procured under Indo-FRG bilateral programme. One mobile van is working at Eastern Zonal Office, Calcutta and the other is in Delhi. Oxides of Nitrogen (NO)_x, Nitrogen Oxide (NC) and Carabonmonoxide (CO) are being monitored by these automatic monitoring stations regularly on 24 hours basis.

5.1.17 Computerisation

5.1.17.1 Necessary software compatible with various computer terminals has been developed by the Central Pollution Control Board for quick and easy transfer of data between Ministry and Central and State Boards. Thirteen State Boards have developed necessary computer infrastructure facilities. State Boards of Assam, Rajasthan, Madhya Pradesh,

Punjab, Orissa, Kerala, Bihar and Andhra Pradesh have now started sending the ambient air and water quality data on floppies.

5.1.17.2 During the year, various existing data bases have been updated, for analysis and interpretation. Water and Air quality data upto December, 1989 have been analysed, interpreted, and published.

5.1.18 Training and Awareness

5.1.18.1 A two week WHO sponsored training programme on Environmental Impact Assessment was organised at the Management Development Institute, Gurgaon during 21 January, to 3 February, 1990. 20 participants from Central and State Pollution Control Boards attended the course.

5.1.18.2 During the year, Central Board organised the following mass awareness activities.

- Pollution control camp at Silvasa (Dadra Nagar and Haveli) during February, 1990.
- Pollution control Camp at Anand Parbat (Delhi) during March, 1990.
- A Hindi Drama "Chimni Choga" at the Shriram Centre (Delhi) on the "World Environment Day".
- Publication of nine coloured posters.

5.1.19 Pollution Control in Delhi

The Central Pollution Control Board operates as the State Board for the Union Territories including Delhi. During the year, the Board has launched an intensive programme 'Operation Pollution Control in Delhi' to curb pollution caused by industrial units in the Union Territory of Delhi. Under this programme, Scientists/Engineers of the Central Board have identified polluting industries discharging effluents and/or emitting air pollutants without valid consent of the Board and are taking steps to ensure that such defaulting industries take pollution control measures.

In the initial investigations, it has been found that most of the small-scale units operate without a consent and discharge their effluent without any pre-treatment into the city sewers. Notices under the amended Water & Air Acts are being issued to those industries which do not comply with the standards.

5.1.20 Publications

The Central Board brought out the following publications during the year.

- Comprehensive Document on Integrated Iron & Steel Plants COINDS/27/1988-89.
- Comprehensive Document on Integrated Aluminium Industry (Emission Control) COINDS/28/1988-89.
- Comprehensive Document on Minimal National Standards Pesticide Industries; COINDS/30/1988.
- Comprehensive Industry Document Series: Revised Minimal National Standards (Pesticide specific) COINDS/33/1989-90.
- Comprehensive Industry Document Series: Minimal National Standards for Liquid Effluents-Paint Industry. COINDS/33/1990-91.
- Status of Water supply and Wastewater collection Treatment and Disposal in Class II Towns - 1988. CUPS/31/1989-90.

- Maha Nagaron me Bahan Pradushan Ka Adhyan (Hindi) CUPS/32/1989-90.
- Specifications for sophisticated analytical instruments/system. LATA/8/1989-90.
- National Ambient Air Quality Statistics of India 1987-88. NAAQAMS/1/1990-91.
- Monitoring of Indian National Aquatic Resource: Water Quality Statistic of India. MINARS/3/1989-90.
- Water Quality Status of Indian Aquatic Resources (River and Wells). MINARS/4/1989-90.
- Pollution Control Acts & Rules with Amendments.
- Hindi Terminology.
- Annual Report 1989-90.

5.2 MANAGEMENT OF HAZARDOUS SUBSTANCES

5.2.1 The Environment (Protection) Act, 1986, places on the Central Government the responsibility of laying down procedures and safeguards for handling of hazardous substances and prevention of accidents. A set of rules have been prepared to regulate the handling of hazardous chemicals, hazardous micro-organisms/genetically engineered organisms and wastes. These are as follows:—

- Manufacture, Storage and Import of Hazardous Chemicals 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.

The rules are being amended to make them more comprehensive.

5.2.2 A set of rules on the transportation of hazardous chemicals by road have also been notified under the Motor Vehicles Rules, 1989 by the Ministry of Surface Transport. A few amendments clearly indicating the responsibilities of the occupier/transporter/driver are being included in the proposed amendments to the Motor Vehicles Rules, 1989.

5.2.3 The State Governments have been instructed to identify hazardous installations and operations in their states and implement the notified rules.

5.2.4 Twelve States have so far identified units generating hazardous wastes in their States as required under the Hazardous Waste (Management & Handling) Rules, 1989. Other States are being approached to identify such units.

5.2.5 A notification restricting the use of Benzidine and

Benzidine based dyes in the country has been issued, suggesting a three year time span for phasing out these dyes. Necessary steps were initiated to restrict the use of other harmful substances like pesticides, PCP etc. A number of inter-departmental meetings were held on the initiative of the Ministry.

5.2.6 Efforts are being made to create and maintain a data bank for hazardous chemicals and accidents. Data bases like CCINFO (a Canadian data base), ETEC5 and POISINDEX in Microfische have been procured in this regard.

5.2.7 A centrally sponsored scheme is being implemented with the aim of creating infrastructure in the State Pollution Control Boards to regulate the management of hazardous substances handled by hazardous industries. Eighteen States/Union Territories have been assisted so far. Financial assistances for creation of such structures was continued during the year.

5.2.8 A detailed emergency plan highlighting the hazardous installations, lacunae in the existing machinery and infrastructure for Baroda District has been prepared. Similarly, reports are to be prepared in respect of 7 more districts - viz. Midnapore, Tuticorin, Manali, Moradabad, Visakhapatnam, Thane-Belapur and Mangalore.

5.2.9 During the year, a number of studies were carried out towards preventing and averting accidents and improving safety in respect of handling of hazardous substances and wastes. These are as follows:

- Vulnerability analysis of some extremely hazardous chemicals like Hydrogen cyanide, Carbon disulphide, thionyl chloride, Phosgene, Ammonia and Chloride by IIT; Delhi.
- Guidelines on siting of hazardous waste treatment disposal facilities and identification and assesment of abandoned hazardous waste sites—by National Environmental Engineering Research Institute, Nagpur (NEERI).
- Guidelines for Management of Hazardous Wastes by National Productivity Council (NPC).
- Guide book for the preparation of off-site plan—by Microcon Ltd.

The following detailed reports have also been prepared:—

- Asbestos.

— Pentachloro Phenol (PCP).

— A Guide of the Manufacture, Storage and import of Hazardous chemicals rules, 1989.

5.2.10 The Ministry took over the residual work of the "Scientific Commission on Continuing Studies on the Effects of Bhopal Gas Leakage of Life-system and Environment" from the Cabinet Secretariat. Executive Summaries of the various completed projects have been compiled.

5.2.11 The Red Book on "Central Crisis Group Alert System" is being updated and revised. The Red Book aims at providing guidance for mangement of crisis pertaining to chemical accidents in the country.

5.2.12 The Ministry is actively associated with the Department of Atomic Energy and the Atomic Energy Regulatory Board in prescribing procedures and safeguards for nuclear installations. The Ministry is also a member of the Advisory Committee on Project Safety Review of the Atomic Energy Regulatory Board and the National Emergency Response Committee of the Department of Atomic Energy constituted to review safety of nuclear projects and emergency preparedness. The following nuclear power corporation projects referred to this Ministry were reviewed for environmental clearance from the safety angle.

- Nuclear Power Project of Narora (NAPP 1 & 2) at various stages of commissioning.
- Nuclear Power Project at Kaiga.
- Nuclear Power Project at Rajasthan (RAPP 3 & 4).
- Nuclear fuel complex at Hyderabad.

5.2.13 The Ministry constituted a National Waste Management Council to suggest ways and means of effective utilisation of industrial/urban/agricultural wastes. Three sub-groups were set up for these sectors. Their reports have been discussed in the Council meeting and follow up action initiated.

5.2.14 Ministry of Environment and Forests is taking up with concerned Departments to maximise utilisation of flyash to minimise environmental hazards/degradation.

5.2.15 The Ministry formulated a schme on "Environment friendly Labelling" of products with the objective of creating awareness among consumers regarding safety and pollution. The scheme also encourages the manufacture and use of such products.

6. REGENERATION AND DEVELOPMENT

6.1 GANGA ACTION PLAN

6.1.1 The Central Ganga Authority (CGA) was constituted in February, 1985 to guide and oversee the implementation of a programme for restoring the quality of the river Ganga. During the year, the overall progress of the Ganga Action Plan was reviewed and the Monitoring Committee monitored the progress of engineering and scientific aspects of Ganga Action Plan. The Steering Committee met several times during the year to review the progress of sanctions and executions of various schemes and utilisation of funds under the Ganga Action Plan. The Ganga Project Directorate (GPD) of the Ministry continued to coordinate the implementation

6.1.2 The three State Governments of Uttar Pradesh, Bihar and West Bengal have designated an officer in their nodal Departments to coordinate the Action Plan work. In addition, committees comprising of implementing agencies and non-officials have been set up for each of the major towns to oversee the programme. State Steering Committees have also been set up in each State to oversee the implementation of the Ganga Action Plan.

6.1.3 Objectives of Ganga Action Plan

The main objectives of the Ganga Action Plan is to improve the river water quality of the river Ganga by reducing the pollution load on the river and by establishing self-sustaining sewage treatment plant systems. To that end, in the first phase, out of the nearly 1400 million litres per day (mld) of sewage generated in 25 Class-I towns along the river, 870 mld is proposed to be intercepted, diverted and treated. By March, 1991, 370 mld of waste water has been diverted. The achievements of the Ganga Action Plan would be taken into account while formulating the National River Action Plan wherein some of the major rivers of the country are proposed to be taken up to make them pollution free. Details of the National River Action Plan are being worked out.

6.1.4 Schemes sanctioned

6.1.4.1 A total of 261 schemes necessary for completion of the plan have been sanctioned and the State-wise position

of the schemes is as follows:

Table 6

State	(Rs. in Crores)	
	Schemes No.	Sanctioned No.
Uttar Pradesh	106	144.30
Bihar	45	40.41
West Bengal	110	142.49
Total	261	327.20

6.1.4.2 Schemes sanctioned under the Ganga Action Plan can be broadly divided into 6 categories as shown in Table 7.

6.1.5 Progress of schemes

6.1.5.1 One hundred and seventy two schemes have been completed so far out of which 25 were completed during the year. The remaining schemes are at various stages of completion. The Statewise physical progress of these schemes is shown in the following table.

Table 8

Physical progress %	Uttar Pradesh	Bihar	West Bengal	Total
Schemes sanctioned	106	45	110	261
Less than 10%	3	0	3	6
10-50%	18	6	13	37
Over 50%	9	8	29	46
Schemes completed	76	31	65	172

6.1.5.2 Seven sewage treatment plants (STP) out of the total 35 sewage treatment plants (STP) to be established, have become operational. Of these, 2 have been commissioned in this year. The STPs at Banaras and the Treatment Plant at Kanpur have been completed. The BHU Plant generates methane to supply about five hours of its energy requirements during the peak hours. The sewage treatment works at Lakkar Ghat, Rishikesh have been renovated and expanded. In West Bengal, one existing STP at Howrah has been renovated and recommissioned. Two STPs in Bihar (Beur and Saidpur) and two STPs in West Bengal (Bhatpara and Titagarh) have been renovated and commissioned and further augmentation of these plants is in progress.

Table 7

	(Rs. in lakhs)								
	Uttar Pradesh		Bihar		West Bengal		Total		Cost
	No.	Cost	No.	Cost	No.	Cost	No.		
1. Interception & diversion	40	3610.87	17	1857.92	31	6685.01	88	12153.80	
2. Sewage Treatment Plants	13	8048.78	7	1019.98	15	3470.25	35	14534.01	
3. Low Cost Sanitation	14	1000.50	7	550.34	22	647.22	43	2198.06	
4. Electric crematorium	3	148.92	8	362.92	17	740.19	28	1252.03	
5. River Front Facilities	8	613.26	3	87.52	24	676.16	35	1376.94	
6. Other schemes	28	1012.65	3	162.71	1	30.47	32	1205.83	



Fig. 24: Sewage Treatment Plant at Banaras Hindu University established under Ganga Action Plan.

6.1.5.3 The schemes for sewage interception and diversion have been accorded priority under the Ganga Action Plan. In all, 88 schemes have been sanctioned in the three States which involve laying of 340kms of sewers (including forcemains) and installation/renovation of 130 sewage pumping stations. Out of the 52 completed schemes, 6 schemes were completed during the year. As a result, 370 mld of waste water flowing into the river has been diverted out of which 116 mld is being taken to the sewage treatment plants for treatment. The Plan when completed, will intercept, divert and treat 873 mld of waste water.

6.1.5.4 Under the low cost sanitation programme, 43 schemes have been taken up in the 3 States. 39 schemes involving construction of 2732 public toilet complexes and 41,228 individual pour flush latrines have been completed. Out of this eight community toilets and 407 individual toilets have been completed this year. As a result of the execution of Low Cost Sanitation Programme, the tourists and the people living near the river bank are now able to use these toilets instead of defecating on the river bank.

6.1.5.5 Out of the 28 schemes of electric crematoria, 19 schemes involving construction of 22 electric crematoria have been completed so far and six schemes involving eight electric crematoria have been completed this year. As a result of construction of these electric crematoria, the pollution of the river on account of dumping of unburnt and half burnt bodies has reduced.

6.1.5.6 A programme for construction and redevelopment of ghats, renovation of kunds/talabs, improvement of lanes/bye-lanes leading to the ghats, traffic regulation of road segments and re-allocation of dhobi ghats have been taken up under Ganga Action Plan. Out of 35 river front development schemes involving 122 ghats, 30 schemes involving 92 ghats have been completed. Of these, 7

schemes involving 34 ghats have been completed this year. This will help to keep the river front clean.

6.1.5.7 Industrial Pollution

Based on the Expert Committee report, 68 gross polluting industrial units have been identified and 43 units which did not have effluent treatment plants at the beginning of the Ganga Action Plan have been persuaded to set up the same. As a result of legal and administrative measures taken under the provisions of the Environment (Protection) Act, 1986 and the Water Pollution Control Act, the number of industries which have set up Effluent Treatment Plants (ETP) or are in the process of setting up the same has increased to 50. It is also planned to reinventorise industrial pollution load in the Ganga Basin on revised norms covering the polluting units on the major tributaries of the Ganga.

6.1.6 Innovations under the Ganga Action Plan

6.1.6.1 The Ganga Action Plan has introduced new technologies for sewage treatment. The 'Upflow Anaerobic Sludge Blanket' technology has been developed in collaboration with the Dutch Government. A five mld plant has been set up at Kanpur and studied. This technology is also being adopted at Mirzapur and Chapra. Another technology called 'Rotating Biological Rope Contractor Process' developed by the National Environmental Engineering Research Institute, Nagpur has been tried at Swarg Ashram in Rishikesh.

6.1.6.2 Another new method adopted is afforestation with raw sewage. This process has been developed by the Central Soil Salinity Research Institute (CSSRI) at Karnal. This requires more land but is inexpensive. This method is being tried out in Varanasi and Buxar.



Fig 25: Aerial view of 5 MLD upflow Anaerobic Sludge Blanket (USAB) plant at Kanpur.



Fig 26: Sewage Treatment Plant at Belur.

6.1.6.3 Two turtle hatcheries at Varanasi and Lucknow were started to use the scavenging qualities of turtles for river cleaning. They mainly feed on animal carcasses, human corpses and dead aquatic creatures. About 2500 turtles have been released in a 7 km stretch near varanasi.

6.1.6.4 Automatic water quality monitoring stations have been installed at 9 locations. The instruments have been manufactured in India with only about 8% of the value being in imported components.

6.1.6.5 A chrome recovery plant has been set up in a pilot tannery in Jajmau area of Kanpur with the assistance of the Dutch Govt. This would not only stop the harmful chromium from going to the river, it will also return back the chromium to the tanner for tanning. Cost of this plant can be recovered in 1½ years.

6.1.6.6 It is proposed to set up improved wood crematoria under the Ganga Action Plan. These require only half the amount of wood required in normal cremation. Besides helping in reducing the pollution of the river, they would also affect wood saving. The crematoria are cheap and easily acceptable to the people.

6.1.7 Studies on minimum flow in the Ganga.

The CGA had agreed in principle to the construction of a gated barrage at Kanpur for maintaining a minimum flow of the river in the city and also to divert requisite quantum of water towards the bank on which Kanpur is situated. The proposal, however could not make headway in the absence of financial commitment from the Government of UP towards its estimated cost of Rs. 150 crores. A less costly alternative of providing a permanent pilot channel for diverting at least 10 cusecs of flow from Unnao side to Kanpur is under consideration of the Ministry of Water Resources and a model study is being undertaken. The capital cost of this

option is Rs. 20 crores with a recurring component of Rs. 2 crores.

6.1.8 Studies on Minimum flow in the Yamuna

In the context of pollution abatement of Yamuna, an Inter-Departmental Group of experts was set up under the Central Water Commission to undertake a study on the Yamuna situation and to suggest specific measures to maintain minimum flow. The Group recommended that a minimum flow of 58 cusecs of water would be necessary at Wazirabad, New Delhi to maintain the river water quality below 3mg/l BOD, if the wastewater is treated to bring it to 10 mg/l BOD before its discharge into the river.

The Central Water Commission has collected data related to actual and committed use of river water in each State for deciding the sharing of Yamuna water among various states. Discussions are being held by the Ministry of Water Resources with the concerned State Governments to finalise the issue.

6.1.9 Public participation and Awareness Programmes

During the year, special attention was given to People's participation through voluntary agencies, NGOs etc., in the Ganga Action Plan. Two films viz. 'Ecology of the River Ganga' and 'Resource Recovery from Sewage Treatment' have been commissioned and are nearing completion.

Various Organisations have participated in Ganga Seva Shivirs. Himalaya Sewa Sangh, (a voluntary organisation) was assisted in printing a book 'Ganga-cultural heritage' in Hindi. School of Fundamental Research, Calcutta, organised Dr. Ambedkar Mela, comprising of padayatra. Financial assistance was also provided to Shri Kashi Ganga State Sudhar Samiti for putting up hoardings and wall posters to create awareness.



Fig 27: People's participation in Ganga Seva Shivar.

The Ganga Pollution Awareness Campaign Phase-II was launched in 76 schools of four districts of UP for training the teachers and distributing the water quality monitoring kits.

A debate competition was organised for school children, and prizes were distributed. An essay competition in Hindi was also organised in three states on the role of people in restoring and maintaining the purity of the river.

The Ganga Project Directorate participated in designing booklet through National Council of Developments Communication, Varanasi and in an exhibition during global consultation on safe water in New Delhi.

A booklet on the Ganga Action Plan has been prepared and is being published.

6.2 WASTELANDS DEVELOPMENT

6.2.1 The programme of the National Westlands Development Board was restructured in 1989 and the

Wastelands Development Programme was made a Technology Mission on 5.10.89. Subsequently, in April 1990, it was decided that the Wastelands Development programme will be guided and overseen by the National Wastelands Development Board, (NWDB) which will adopt a mission approach for enlisting people's participation, harnessing the inputs of science and technology and achieving inter-disciplinary coordination in the programme planning and implementation. The programme would focus on checking land degradation and putting wastelands in the country to sustainable use, increasing biomass availability, especially fuelwood, fodder and forest produce, and restoring the ecological balance. Accordingly, the National Wastelands Development Board has been reconstituted.

To implement the programme, the Board Secretariat was organised around six mini-missions as follows:

- Planning & Policy
- People's Participation
- Technology Extension



Fig 28: A vast expanse of Thar Desert—a challenge for afforestation.

- Regeneration of Degraded Forests
- Greening of Public Lands
- Farm Forestry

6.2.2 Planning & Policy

6.2.2.1 Micro level Planning

The main aim of micro-level planning is to develop appropriate methodologies for preparation and implementation of watershed-based village level action plans. Such plans are to be eventually drawn up in selected 146 districts for which wastelands maps on 1:50,000 scale have already been prepared under the national Wastelands Identification Project. During the year, 16 districts have been selected for this work in different agro-climatic zones.

6.2.2.2 Policy Advisory Groups

Policy Advisory Groups were set up to resolve crucial policy and relevant inter-ministerial coordination issues pertaining to the following subjects.

- Fuelwood Conservation
- Wood Substitution
- Grazing and Livestock Management
- Benefit Distribution from common lands
- Institutional Finance and Fiscal Incentives for Farm Forestry

6.2.2.3 Planning

During the Seventh Five Year Plan, the total allocation for the National Wastelands Development Board was Rs. 292 crores, against which an expenditure of Rs. 251 crores was incurred. During the Eighth Plan period, a much higher allocation is envisaged to implement the revised mandate.



Fig 29: A Savannah with good grass canopy.

6.2.2.4 Reorienting Schemes of NWDB

In view of the restructuring of the Wastelands Development Programme, the schemes of the National Wastelands Development Board have been reoriented. Three schemes, namely; Rural Fuelwood Plantation, Operation Soilwatch and Establishment of Silvopastoral Farms, have been discontinued from 1990-91. The Rural Fuelwood Plantations Scheme has been merged with the Fuelwood Fodder Projects Scheme. Similarly, components of Operation Soilwatch have been included in the Integrated Wastelands Development Project Scheme which takes into account the major features of the revised programme.

6.2.2.5 Afforestation under 20-Point Programme

The targets and achievements under the programme during the Seventh Five Year Plan are given in the Table 9.

	1985-86	1986-87	1987-88	1988-89	1989-90
Target (in Million ha.)	1.45	1.71	1.79	2.0	1.68
Achievement (in Million ha.)	1.51	1.76	1.77	2.12	1.71

As per the restructured programme, implementation will not be confined merely to tree planting, but a more broad-based strategy will be followed. Hence the targets for 1990-91 have been set in terms of the following two parameters:

- Seedlings, distributed (Farm Forestry Sector)
- Area covered (in respect of forest lands and non-forest public and community lands)

For 1990-91, the targets and achievements, in terms of the above mentioned parameters are given below:

	1990-91	
	Seedling (in lakhs)	Area (in Million ha.)
Target	25000	0.55
Achievement (upto 31.1.91)	11536	0.67

6.2.3 Plan Schemes

6.2.3.1 Fuelwood and Fodder Projects

The main objectives of the scheme are to promote integrated development of identified watersheds by combining activities like tree planting, agro-forestry, silvopasture development, horticulture, soil and moisture conservation, with a view to checking land degradation and regeneration of degraded lands/wastelands, augmenting

production of fuelwood, fodder and forest produce and also to involve the village communities/local people in the programme. The scheme is being implemented in 22 States with an area coverage of 0.8 ha.

6.2.3.2 Decentralised People's Nurseries

This scheme aims at decentralising the seedlings production, with peoples' participation, to meet the local needs with 100% Central assistance limited to a maximum subsidy of 45 paise per sapling. During 1990-91 an outlay of Rs. 17.00 crores has been made for raising 38.5 crore seedlings. The scheme is also being promoted through nodal agencies like the National Dairy Development Board, IFFCO, Self Employed Women's Association (SEWA), Gandhi Gram Rural Institute and Bharatiya Agro Industries Federation (BAIF). These organisations will also provide training and extension to the nursery persons using their available infrastructure.

6.2.3.3 Margin Money Assistance

The objective of the scheme is to encourage flow of institutional funds for socially beneficial afforestation and Wastelands development projects by extending Central assistance, so that such projects can be brought within the economic viability criteria of NABARD. During the year, a provision of Rs. 100 Lakhs has been made for raising 5000 hectares of plantations involving agro-forestry and urban fuelwood projects.

6.2.3.4 Integrated Wastelands Development Projects

The main thrust of this scheme, initiated in 1989-90, is to develop integrated land use planning capability at the village micro-watershed level, and to support specific activities aimed at conservation of ecologically fragile watersheds, regeneration of degraded forests, technology extension for reclamation of lands with special problems, fuelwood and



Fig 30: Natural regeneration in the Great Indian Desert.

fodder production etc. All these are to be attempted with people's participation, specially by involving the small/marginal farmers and the landless people. The scheme is both centrally sponsored and in the central sector with provision for 100% financial assistance as grant. State Governments, autonomous bodies, corporations, voluntary agencies, cooperative societies, and other registered institutions are eligible for assistance under this scheme.

6.2.3.5 Aerial Seeding

The objectives of the scheme are to take up large scale afforestation of inaccessible areas, and to upgrade as well as standardise the various operations involved in aerial seeding. About 26,500 ha. of area is being covered under this scheme during the year.

6.2.3.6 Conservation and Development of Minor Forest Produce Including Medicinal Plants

Minor forest produce form an intrinsic part of the country's forests and contribute to genetic bio-diversity. They are also an important source of livelihood, providing food, medicine, raw material for building and local handicrafts to the people living adjacent to the forest areas, especially the tribal people. With the increasing pressure on the forest areas, the species providing the minor forest produce have been seriously depleted. A scheme, with 100% Central assistance to the States, is, therefore, being implemented to conserve and improve the productivity of minor forest produce through effective protection and adoption of appropriate planting and silvi-cultural practices.



Fig 31: *Erythrina Variegata*—a Plant used in tribal medicine.

6.2.3.7 Seed Development

The scheme is being implemented with 100% Central Assistance to help the States in developing proper facilities for collection, testing, certification, storage and distribution of quality seeds of known origin.

6.2.3.8 Grants-in-Aid to Voluntary Agencies

Under this scheme, grants are given to voluntary agencies for motivating the people to set up nurseries and to undertake plantation work, besides organising awareness campaigns and training camps. During 1990-91, 84 new projects have been sanctioned under the scheme at a total cost of Rs. 3.40 crores upto 31.1.91.

6.2.4 Projects

6.2.4.1 Technology Extension

To arrest the process of land degradation through Deforestation, soil erosion and various natural and induced processes and to enhance the biomass production potential, a technology extension programme has been launched with the assistance of a number of technical and scientific institutions/organisations. During the year, six new projects focussing on saline/alkaline soils, marshy and water logged areas, arid, gullied and ravinous lands, were taken up under this programme. An area of over 140 ha. has been taken up at a cost of about Rs. 51 lakhs under these projects.

6.2.4.2 Monitoring and Evaluation

A working group was set up to review the existing procedures and formats used in the States for collection, analysis and dissemination of social forestry data. The group has made specific recommendations with regard to these subjects, and are proposed to be implemented soon.

6.2.4.3 Categorisation and Identification of Wastelands

During the next phase of the National Wastelands Identification Project, 84 districts have been selected for preparation of wasteland maps on 1:50,000 scale using remotely sensed data. Selection of these districts has been made on the basis of the estimate that 5% or more of their area are under wastelands. The project is being implemented through the National Remote Sensing Agency, Hyderabad.

6.2.4.4 Geographic Information Systems

Nine pilot projects have been initiated in different agro-climatic zones in the country to study the possible utilisation of the GIS technology to land use management, decentralised planning, and the wastelands development programme.

These projects are being implemented in collaboration with some of the leading scientific/technical institutions in the country.

6.2.5 Other Activities

6.2.5.1 Regional Centres

Seven Regional Centres have been set up under the World Bank aided National Social Forestry Project in different universities and national level institutions. The objective is to provide technical and extension support to the State Forest Departments in formulating projects for wastelands development and afforestation with the people's participation, set up a forum for cross-fertilisation of ideas and experiences amongst the States concerned, and to carry out problem-specific studies and training relevant to afforestation/social forestry. The outlay provided for 1990-91 is Rs. 150 Lakhs.

6.2.5.2 Training

Fifty Forest Officers and specialists working on externally-aided Social Forestry Projects in different States were sponsored for training overseas, and to participate in seminars/symposia held in different countries during 1990-91.

A training programme in collaboration with the Tata Energy Research Institute (TERI), New Delhi, was organised during December, 1990, in which 38 forest officers from different States participated. The course coverage focussed on rural energy planning needs and forestry and included a field visit to an experimental site located at Gwal Pahari in Haryana.

6.2.5.3 Tree Growers' Cooperatives

Under the on-going pilot project of the Tree Grower's Cooperatives, taken up in 5 States in collaboration with the



Fig 32: Nursery developed by tree grower's cooperative society, Malken Hally (Tamil Nadu).

National Dairy Development Board, 73 cooperatives have so far been registered with the total membership of 7,770. These cooperatives have been leased 10,055 ha. of land by the State Governments for raising nurseries, fodder and tree crops. IFFCO has also promoted 35 farm forestry cooperatives in 3 States. NWDB has provided Rs. 35 Lakhs to these cooperatives for raising 75 lakhs seedlings. 4000 ha. of land has so far been afforested by them.

6.2.5.4 Institutional Finance

With a view to promoting farm forestry projects, the National Wastelands Development Board, in close collaboration with NABARD, has prepared a comprehensive project proposal of Rs. 941 crores for a separate line of credit to be supported by the World Bank. The project is presently under active consideration of the World Bank.

6.2.5.5 National Fund for Afforestation & Wastelands Development

To encourage donations from individuals as well as corporate/non-corporate bodies towards the national effort to regenerate degraded areas/wastelands, a National Fund for Afforestation and Wastelands Development has been set up. Donations to the Fund are eligible for 100% tax deduction under the relevant provisions of the Income Tax Act. The Fund will be managed by a Committee headed by the Minister of Environment and Forests.

6.2.5.6 Communication Advisory Committee

A committee was constituted to advise the Board on all matters relating to communication, extension work, and to lay down general guidelines to consider and approve specific schemes/projects and also to undertake periodical review of progress made. Four meetings of the Committee have been held so far. Communication strategy for involving people in all stages of Wastelands Development Programmes is being formulated.

6.2.5.7 Experience Sharing Workshops

Experience sharing workshops involving NGOs/Voluntary Agencies, forest officials and other related people in the field of wastelands development are being organised through the Regional Centres and NGOs. These workshops provide a forum for the NGOs/Voluntary Agencies and Government officials to share their experiences and exchange ideas for better coordination. Five workshops have been held so far as follows.

- Three by the Regional Centres at Shillong, Bhopal & Solan
- One jointly by the Regional Centre (AFC) and the NGOs at Udaipur, and
- One by the CPR Environmental Education Centre at Madras.

6.2.5.8 Green Haryana Programme

Green Haryana Programme has been launched to achieve the following objectives:

- Check land degradation and desertification
- Regeneration of natural resources vital for preserving life support systems.
- Sustain agricultural productivity
- Increase biomass availability—especially fuelwood/fodder
- Generate rural employment and incomes.

During the year, the programme has covered 40,000 ha. of land through i) schemes of the State Forest Department as well as the externally aided projects like the World Bank-aided Social Forestry Project and the EEC Project for Development of Aravalli hills; and ii) inputs by the other Government agencies, non-governmental organisations and voluntary agencies. The Departments of the State Government like Agriculture, Education, Public Works, Revenue, Public Health etc. have been involved to ensure their cooperation in taking up tree planting in compounds of offices, schools/colleges, agriculture farms, etc. Industrial units have also been requested to adopt a few villages near their establishments for greening. Voluntary agencies have been approached for taking up plantation work with assistance from NWDB.

6.2.5.9 Green Delhi Campaign

In order to improve the environment and to make Delhi a greener city, a massive tree planting campaign has been launched by Delhi Administration at the instance of the NWDB. Various agencies, namely the Delhi Development Authority, Forest Department, Municipal Corporation of Delhi, Public Works Department, Horticulture Department, New Delhi Municipal Corporation, Delhi Water Supply and Sewage Disposal Undertaking, Industries, Resident Association, School, and Colleges are actively participating in the campaign. During 1990-91, a target of planting 54 lakh saplings of shady and ornamental species has been fixed. A wild-life sanctuary is also being developed at Asola. Delhi Administration had established a number of nurseries from where people can obtain their requirements of saplings at reasonable rates. A task force to monitor this programme has also been set up.

6.2.5.10 Green Rajasthan Programme

The Green Rajasthan Programme was launched on the occasion of World Environment Day on 5th June, 1990. Guidelines are issued to the State Government for preparation of the Action Plan. A State level meeting was convened under the chairmanship of the Chief Secretary, Rajasthan to coordinate the Green Rajasthan Programme.

The State Government has set-up 3 Task-Forces State, Zonal and District level to oversee and coordinate programme implementation. District-wise and Agency-wise targets have been finalised for the year 1991-92; a total coverage of about 1 lakh ha. is envisaged. District-level Action Plans have been prepared for 28 Districts of the State.

6.2.5.11 Integrated Land use

In keeping with the revised Wastelands Development Programme, efforts are being made to promote integrated land use on watershed basis. This is being initiated under the programme through the preparation and implementation of integrated village level action plans (micro plans) in selected micro watersheds. Action to prepare and implement the micro-plans has already been initiated in 16 districts in different States. Some more districts will be taken up for this work during 1991-92.

In addition to the above, NWDB is also co-ordinating with the Department of Agriculture and Co-operation, Department of Rural Development, Department of Non-conventional Energy Sources, etc. at the Central level, to ensure that financial, technical, manpower and other resources are integrated with a view to promote appropriate and sustainable land use, specially at the field level.

6.2.5.12 Evaluation/Survival Rate Studies under the 20 - Point Programme

The State Governments have their own arrangements to monitor programmes under tree planting/afforestation. However, at the Central level, the achievements are monitored by the NWDB and evaluation studies are also taken up through independent agencies. The achievements under the 20 Point Programme in respect of tree planting/afforestation have been evaluated at the instance of the NWDB in five States (Gujarat, Karnataka, Tamil Nadu,



Fig 33: Green Haryana Programme.



Fig 34: Khejarli Plantation under Green Rajasthan Programme.

Uttar Pradesh and West Bengal). The results obtained through evaluation in these studies are summarised in the Table 10.

6.2.6 Board Meetings

6.2.6.1 During 1990-91, one meeting of the National Wastelands Development Board was held on 17/8/90 under the chairmanship of the Union Minister of Environment and Forests.

6.2.6.2 The composition of the Board has also been revised with the Union Minister in-charge of Environment and Forests as its Chairperson. The present composition of the Board is given in Annexure IV.

6.2.7 Publications

During the year NWDB brought out the following publications:

- Description, Classification, Identification and Mapping of

Wastelands.

- Brochure on Pole Planting for Instant Greening
- Brochure on Vanjyoti Choolah
- Nursery Manual in Hindi
- Mission Document
- Brochure on the National Fund for Afforestation and Wastelands Development
- Rules and Regulations of the National Fund for Afforestation and Wastelands Development
- Work Programme for 1990-91
- People's Participation in Forest Management and the Role of NGOs and Voluntary Agencies

6.3 OTHER ACTIVITIES ON ECO-REGENERATION

The main objectives of the eco-regeneration schemes are to demonstrate technologies for regeneration of ecologically degraded and fragile areas to undertake integrated environmental improvement projects and to create

Table 10

Survival rate in percent

State	Farm Forestry	Non-Farm Forestry%				All Planta %
		Woodlots	Strip	Forest Deptt. Land	Others	
Gujarat	43.67	78.18	66.78	66.49	87.85	63.64
Karnataka	61.60	82.85	75.04	83.85	80.48	79.39
Tamil Nadu	52.92	64.61	53.29	58.52	60.62	60.57
Uttar Pradesh	70.42	53.32	53.80	64.13	50.06	60.69
West Bengal	69.88	75.00	58.05	66.67	80.21	67.56

Five other Survival Rate Studies are also being carried out presently through the Regional Centres.

environmental awareness. These activities are being carried out by organising Eco-Task Forces of Ex-servicemen, Field Demonstration Projects and Eco-Development Camps.

6.3.1 Field Demonstration Projects

This scheme is intended to demonstrate technologies for restoration of selected degraded areas and integrated ecological development. Under these projects, works such as nursery raising afforestation, soil conservation, development of water resources, installation of smoke less chullahs and solar cookers, cultivation and maintenance of medicinal plants, organisation of training and awareness camps etc. are undertaken. Following projects remained operational during the year:

- Ecological Improvement of Gopeshwar Area, Distt. Chamoli (U.P.) by Dasholi Gram Swarajya Mandal, Gopeshwar.
- Integrated Environment Development around Binsar Sanctuary, Almora (U.P.) by Paryavaran Jan Jagaran Samiti, Binsar, Almora
- Eco-development, afforestation and eco-regeneration of degraded hill slopes in Pathanjaliपुरी, Distt. Coimbatore by the Arya Vaidyar Rama Varier Educational Foundation of Ayurveda, Coimbatore.
- Eco-regeneration in the jurisdiction of Marathwada University, by Marathwada Agricultural University Parbhani.
- Ecological improvement of some villages in Baghmundi & Jahalda blocks of Purulia Distt. in West Bengal by School of Fundamental Research, Calcutta.
- Compact Hill Area Development Training and Extension Module, Chitreswar, Almora (U.P.) by Ecology

Environment and Energy Conservation Organisation Chitreswar, Almora (U.P.)

- Eco-regeneration of Pushkar Valley Ecosystem, Ajmer by the Consortium of Indian Scientists for Sustainable Development, Ajmer.

6.3.2 Eco-Task Forces

Eco-Task Forces of ex-servicemen is a joint venture of the Ministry of environment & Forests, Ministry of Defence and the concerned State Governments, to undertake ecological restoration work in selected environmentally degraded areas, particularly in unapproachable and hostile terrains. The scheme provides for re-employment of the ex-servicemen



Fig 35: Construction of Wood efficient burning chullahs.

besides serving the cause of ecological improvement. The activities include afforestation, pasture development, soil and water conservation and other restorative works. Eco-Task Forces are deployed in Uttar Pradesh, Rajasthan and Jammu & Kashmir.

6.3.2.1 Eco-Task Force (TA-127), Uttar Pradesh

This Task Force is deployed in the Kiarkuli micro-catchment near Mussoorie. The work done during the year is as follows:

— Plantation (Nos.)	4,00,1000
— New area covered (ha)	229
— Protection of old plantation (Nos.)	26,96,000

6.3.2.2 Eco-Task Force (TA-128), Rajasthan

This Task Force continued to work on the left bank of Indira

Gandhi Canal, Rajasthan. The main achievements during the year are as follows:

— New plantation (Nos.)	8,00,000
— New area covered (ha)	500 ha
— Maintenance of old plantation	28,00,000

This battalion was awarded the Indira Priyadarshini Vriksha Mitra Award for 1989.

6.3.2.3 Eco-Task Force (TA-129), Jammu & Kashmir

This Task Force was created in 1988 and is engaged in eco-regeneration work in Jammu region near Samba. The main achievements during the year are as follows:

— New plantation (Nos.)	1,20,000
— New area covered (ha)	800
Fencing (meters)	42,000

7. RESEARCH

7.1 ENVIRONMENTAL RESEARCH

7.1.1 Introduction

7.1.1.1 Environmental research aims at identifying and developing data bases for judicious utilisation of resources besides planning, formulation and development of strategies for environmental protection, conservation and management. It also envisages improvement of the overall scientific/technological base with the creation of infrastructural facilities and development of technical capabilities.

7.1.1.2 At present, 101 projects are in operation in various Universities and institutions all over the country. There are two major means of research programmes, viz. Man and the Biosphere Programme and Environmental Research Programme. The Man and the Biosphere Programme deals with the problems of ecology with emphasis on biological aspects and ecosystem functioning, whereas the Environmental Research Programme addresses itself to the problems in the areas of Chemical and engineering sciences and environmental management.

7.1.1.3 During the year 18 new projects were sanctioned, 12 projects under the Man and Biosphere and 6 under the Environmental Research Programme. List of the sanctioned projects is given at Annexure II.

Fifty two research projects were completed during the year. List of the completed projects during the year is given at Annexure III.

7.1.2 Coordinated Research Projects

7.1.2.1 Ethnobiology

All India Coordinated Research Programme on Ethnobiology (AICRPE) is an integrated trans-disciplinary, multi-institutional and action-oriented research programme. It is aimed at an indepth study, evaluation and analysis on the multi-dimensional perspectives of the tribal life, culture, traditions and their impact on the surrounding environment. The project also intends to develop strategies for conservation/preservation of traditional life, knowledge system and resource utilisation. The Institutions participating in the project are as follows:

- National Botanical Research Institute, Lucknow,
- Botanical Survey of India,
- Central Drug Research Institute, Lucknow
- Regional Research Laboratory, Jammu,
- Post-graduate Research Centre, Trivandrum, and
- Nagpur University, Nagpur.

7.1.2.2 Studies on Sea Level Rise.

An All India Coordinated Programme for studies on Sea

level rise at 10 different Institutions has been initiated during the year. The main objectives of the programme are to study the following:

- Sea Level trend analysis
- Inundation of land areas.
- Frequency of storm surges
- Coastal erosion/aggradation and their effects on harbour, coastal waterways/beaches.
- Coastal fisheries, wetland ecosystem coral reef etc.
- Changes in estuarine hydrography and impacts on the ground water reservoirs and freshwater aquifers due to salt water intrusion
- Impact on existing industrial, power, defence, municipal and other instalations.
- Socio-economic impacts and abatement of pollution

7.1.2.3 All India coordinated Research Project on Conservation of Endangered Plant Species-Tissue Culture Programme. This programme on tissue culture involves identification and enumeration of endangered medicinal plant species, undertaking studies on gene pool conservation, artificial propagation in natural habitats, development of techniques in mass-multiplication of selected plant species with a view to developing agro-technological packages for cultivation of threatened plant species. It also includes creation of cryo-preservation centres for preservation of propagules of genetically rich strains.

The following institutions are involved in the programme;

- Department of Botany, University of Delhi, Delhi
- High Altitude Plant Physiology Research Centre, H.N. Bahuguna Garhwal University, Srinagar, Garhwal.
- Department of Botany, University of Calcutta, Calcutta;
- Department of Botany, North Eastern Hill University, Shillong;
- National Chemical Laboratory, Pune; and
- Central Institute of Medicinal & Aromatic Plants, Lucknow.

The important findings of this project are as follows:

- Micro-propagated plants of *Saussurea lappa*, *Picrorhiza kurra*, *Delphinium malabaricum* and *Pedophyllum hexandrum* have been transplanted and plants of *Valeriana wallichili* and *Nepenthes khasiana* raised through tissue culture have been established under field conditions.
- Biology of some of the important medicinal plants (*Coptis teeta*, *Pedophyllum hexandrum*, *Valeriana spp.*, *Acenitum spp.*, *Picrorhiza kurres* and *Nardestachys jatamansi*) was successfully investigated.
- Phytochemical investigations on the medicinal plants covered under the programme revealed that the Indian species (*Coptis teeta*, *Podophyllum hexandrum* etc.) have

higher quantities of active principles than the related Japanese and American species.

7.1.3 Integrated Action-Oriented Research, Demonstration and extension Programme for Eco-Development

The Programme is aimed at finding solutions to the local environmental problems through integrated research projects and evolving action plans for undertaking eco-development activities in Himalayas, Western and Eastern Ghats regions of the country.

During the year, 12 projects were sanctioned under the programme out of which four are for the Himalayan region, three are for the Western Ghat and five for Eastern Ghat Region. The list of projects sanctioned is given in annexure II.

Twelve projects of Himalayan region, ten projects of Western Ghat region and eight projects of Eastern Ghat region completed during the year. The list of the completed projects is at annexure III. Besides the 30 projects in the Himalayan region, 27 in the Western Ghats and 11 in the Eastern Ghats are in progress.

7.1.3.1 Himalayan Region

The main objectives of the programme were to identify and develop technology packages and strategies for restoration and regeneration of derelict Himalayan ecosystems through involvement of the universities, institutions and NGOs. So far, more than 100 projects have been sponsored under this programme in various thrust areas. During the year four new projects were sanctioned and 12 projects were completed. The completed projects during the year had focussed on development of technology packages conducive to hill people, problems of landslides, hydrological problems, grassland ecosystems, social forestry, transfer of propagation technology of Assam Bamboo in Himachal and socioeconomic problems of the hill people.

7.1.3.2 Western Ghats

The programme was initiated during 1983 with major emphasis on developing suitable strategies and technology packages to deal with the ecosystems of the region by involving the universities, institutions and NGOs. During the year 3 new projects were sanctioned and 10 projects completed. Some of the out puts of the completed projects are as follows;

- Development of data base and technological packages in the areas of fodder conservation and rehabilitation of the displaced people due to irrigation projects;
- Identification of suitable plant species for regeneration of mined areas;
- Eco-development plans for restoration of river catchments

and landslides;

- Development of fodder grasses, legumes and trees for hill people

7.1.3.3 Eastern Ghats

This programme was launched in the beginning of 7th five year Plan to study the inter-relationships between man and environment; and to develop a scientific rationale for management of natural resources of Eastern Ghats on a sustainable basis. The programme is essentially problem-oriented and hence is multi-disciplinary and multi-institutional. During the year, five new research projects were sanctioned and eight projects were completed. The completed projects focussed on the following areas;

- Identification of the species rich areas and fragile areas.
- Elucidation of the status of sea-grass eco-system of the coromandal coast.
- Enumeration of the degradation of aquatic resources along with the pollution status.
- Planning for appropriate land use and eco-development.

7.1.3.4 Kaveri Programme

This programme, involving 9 Universities and 12 colleges located along the stretch of the river from its source to sea, has been implemented with effect from 1st October, 1989, with Madras Science Foundation as the Coordinating Unit. The following technical manuals have been prepared.

- Determination of physico-chemical properties of water quality parameters;
- Biological parameters of water quality; and
- Macrophytes and Periphytes (aquatic fungi)

The instruction manual for collection aquatic insects and methodologies for phytoplankton and algal studies have also been standardised. During the year, data on hydrobiological status of river Kaveri with special attention to epidemiological studies and inventories of sources of pollution along the river stretch have been compiled.

7.1.4 Monitoring of research Projects.

Thirty nine research projects belonging to environment and man and Biosphere Programme were reviewed at the monitoring workshop and MAB committee meeting respectively. Thirty eight research projects out of which 25 belonging to action oriented eco-development research programme in the Himalayan region and 13 to eastern ghats region were reviewed at workshops organised at Srinagar (UP) and Tiruchirapalli respectively.

7.1.5 Publication

During the year, the following has been published.

- Environmental Research; Executive summaries of completed projects, vol. I 1990.

7.2 GOVIND BALLABH PANT HIMALAYAN PARYAVARAN EVAM VIKAS SANSTHAN

This autonomous organisation of the Ministry came into existence in August, 1988. The Institute comprises of a central Unit at Katarmal, Almora, supported by regional units at Srinagar (Garhwal Himalayas); Gangtok (Eastern Himalayas) and Mokakchung (North Eastern Himalayas). All units of the Institute are controlled from the central unit located at Kosi-Katarmal, Almora.

The work on the following projects remained in progress:

- Restoration of Degraded land and sustainable rural development at Katarmal (Almora) in Kumaon Himalaya.
- Designing ecologically sound natural resource management strategies for sustainable rural development in Kapkot Block, Almora District in Central Himalaya.
- Development of Agroforestry model at Sumari village in

Garhwal Himalaya

- Integrated Watershed Management: a case study in Sikkim
- Jhum and sustainable Development of a village cluster in Nagaland.
- Mechanisms of the maintenance of Biological Diversity and their role in ecosystem organisation and function in conservation areas.
- Environmental Impact Assessment and Rehabilitation on Jhroli Magnesite Mining Area in Himalaya
- Publication of 'Agricultural Economy of Kumaon'
- Audio-visual Production on 'Ecology and Sustainable Development in the Himalayan Region';
- Environmental Management Information system for the Himalayan Region.
- Introduction of Rainwater harvesting Technology for sustainable rural development in the Himalayas
- All India-coordinated project on water, health and sanitation (involvement of Rural woman)
- Ecology of earth-worms and soil arthropods in Central Himalayan District of Almora.



Fig 36: Pelicans nesting on a tree top.



Fig 37: A Wetland eco-system.

7.3 RESEARCH ON WETLANDS, MANGROVES AND BIOSPHERE RESERVES:

7.3.1 Wetlands

Research on various aspects of wet lands is promoted through universities and other research institutions. So far, 19 projects have been funded by the Ministry and during the year one more project to demonstrate comprehensive usage of the wetland at Ujni, based on biological, hydrological and socio-economic surveys of the conditions of the wetland and its surroundings has been sanctioned. A list of sanctioned and completed research projects is given at Annexure-II and Annexure-III, respectively.

7.3.2 Mangroves

Research on various aspects of mangroves is promoted through universities and other research institutions. So far, 12 projects have been sanctioned and during the year one more project on the impact of pollution on the mangrove fauna of Thane Creek near Thane City has been sanctioned.

A list of sanctioned and completed research projects is given at Annexure II and Annexure-III, respectively.

7.3.3 Biosphere Reserves

Research on various aspects of Biosphere Reserve areas is being promoted through academic and research institutions by the Research Committees constituted for each Biosphere Reserve. So far, research projects covering meteorological and hydrological studies, human ecology and eco-restoration and long term monitoring of biological processes and atmospheric chemistry have been taken up under Nilgiri and Nanda Devi Biosphere Reserves. The list of completed projects is given at Annexure-III.

7.4. FORESTRY RESEARCH

7.4.1 Indian Council of Forestry Research & Education (ICFRE)

ICFRE has been set up to oversee the activities relating to forestry research and education in the country and for

coordinating the efforts of all the concerned institutes/organisations. The functions of the Council are as follows:

- To ensure the best method of all sources of scientific knowledge to the solution of technical and practical problems of forestry;
- To engage in basic research in areas where lack of fundamental knowledge impedes progress;
- To oversee and coordinate the activities and programmes of institutes engaged in forestry research and other organisations conducting research in related areas;
- To lay down, within the overall personnel policies of the Government, policies and service conditions of research scientists and workers;
- To prepare the overall forestry research policy of the country, review it periodically, monitor the progress of research schemes and allocate resources;
- To act as a clearing house for research results and other

technical information pertaining to forestry research.

- To conduct other activities incidental and conducive to the attainment of the above mentioned objectives which the council may consider necessary; and, to support forestry education programmes in State Agricultural Universities and other Universities and provide facilities for post-graduate studies in forestry research institutes.

The ICFRE was registered as a Society under the Societies Act, 1860 on 12th March, 1991.

7.4.2 Funding of Forestry Research

During the year, 16 research projects on forestry have been approved for funding. An amount of Rs. 14.60 lakhs has been sanctioned to various Universities as grants-in-aid for forestry research.

7.4.3 Forest Research Institute (FRI), Dehradun.

During the year, the research activities of various Divisions of FRI are as follows:



Fig 38: A panoramic view of forest plantations.

7.4.3.1 Silviculture Division

Studies on the habitat, management and growth of social forestry species and shrubs for wasteland reclamation were carried out.

7.4.3.2 Minor Forest Products (MFP)

Efficient extraction techniques for commercial products from forest plants such as Katha and Agar Oil have been developed. Steam distillation of camphor from *Occimum* species was improved to yield 50 to 80 percent camphor.

7.4.3.3 Resource Survey & Management Division

Case studies on cost benefit analysis of forest plantations have been carried out. Bio-mass productivity trials have been carried out in several diversified plantations in seven states of the country. Studies on employment potential in the forestry sector reveals that there is a possibility of employing 15 million persons round the year in this sector.

7.4.3.4 Package of practices have been evolved to provide pesticidal umbrella to polypot seedlings in nursery and young plantations in problem soils using less persistent non-conventional insecticides of recent origin. Control measures have been investigated for *Rhizoctonia* leaf blight in Khasi pipe, neem and bakain.

7.4.3.5 Genetics and Tree Propagation Division

Tissue culture techniques have been standardised for *Eucalyptus* hybrid. Studies on radio sensitivity of selected forest tree species using gamma rays are in progress, aimed at developing high-yield hybrids in 5-6 important social forestry species.

7.4.3.6 Forest Products Division

Solar kiln for seasoning of timber has been developed. About 70 commercial unit have been installed so far. A simple vapour phase ammonia plasticization technique has been developed for producing bent wood for novelty consumer durables leading to economy in wood use. Modification of chemi-mechanical process was achieved to obtain higher yield of pulp couples with improved binding properties or better grades of paper. Current research includes recovery procedures for ligno-enlphonate from spent higher. When developed, this would substitute imported dispersant in oil and cement industries.

7.4.3.7 Ecology and Conservation Division

Soil and hydrology studies under mono-culture of *Eucalyptus* and *Chir* have been carried out. Mined area reclamation on phosphate mines in Doon valley was tried

through eco-restoration techniques. The techniques have also been extended to lime stone quarries and have been standardised for eco-restoration of aimed areas of Doon Valley.

7.4.3.8 Forest Botany Division

Useful tree legumes for plantations have been identified through studies on nitrogen fixing trees and their effect on on soil fertility of degraded areas. Electron microscope techniques was successfully applied for identification of bamboos on the basis of epidermal features of leaf and culms.

7.4.3.9 Forest Operation Division

Efforts to develop mechanised tools for digging of pits for forest plantations are in progress. Development of tractor/motor operated plantation auger.

7.4.3.10 Social Forestry Division

Schedule of operations have been standardised to optimise returns from agro-forestry systems. Impacts of various crops on agricultural production have been studied under different agro-forestry management systems. Clonal trials of Poplar were carried out for finding the best suitable clone for particular agro-climatic zones.

7.4.4 Institute of Deciduous Forests, Jabalpur

The Institute aims at carrying out national level research on the problems of decidm Forests. Main activities of the Institute during the year include;

- Large scale mortality of Sal and Teak tree species in M.P. and Orissa.
- Productivity, Comparative studies on Biomass productivity in M.P. and Orissa.
- Effect of biotic factors like fire, grazing and shifting cultivation;
- Hydro-geology of plantations;
- Studies on soil moisture dynamics,
- Development of nursery techniques on selected species like *A. Latifolia*, *A. Pendula*, *Adina cardifolia*, *Boswellia serrata*, *pterocarpus marsupium* and *Sterculia urenous*;
- Studies of the diseases and insect pests of forest trees, nurseries, and
- Biological control of major diseases.

7.4.5 Institute of Forest Genetics and Tree Breeding, Coimbatore

The Institute aims at carrying out national level research

in the field of forest genetics and tree breeding. It also deals with regional research needs of the southern region. Main activities during the year include;

- Studies on intraspecific differentiation of important primary and secondary timber species of natural ever green reserves, provenance trials of *Eucalyptus incrotheca*, *E. terreticornis*, *Acacia* and *Albizia* species,
- Standardisation of technique for vegetative propagation of *Eucalyptus*, *Acacia* and *Albizia* and studies on clonal micropogation techniques for selected tree species;
- Studies for improving yield in short spady and short rotation forestry of selected tree species;
- Studies relating to pathological aspects of important species and effect of pathogens,
- Trials of species in degraded lands and studies on important mixed tree cropping;
- Development of methodology for assessing the impact of field application of research outputs of the Institute.

7.4.6 Institute of Wood Science and Technology, Bangalore

The Institute has been set up to carry out national level research in the field of wood science and technology including physical and chemical properties of forest produce, their uses, processing and substitution of wood by alternate materials.

Main activities of the institute during the year include:

- Studies in wood properties of plantaion grown species of *Albizia falactaria*, *Hevea braziliensis*, *Eucalyptus camaldulensis* and *Dalbergia sissoo*,
- Studies on wood seasoning in *Eucalyptus camaldulensis* and *Acacia nilotica*;
- Studies on effect of preservatives in *Eucalyptus camaldulensis*;
- Production of animal feed from wood residue and
- Isolation of wood extractives having biological activity.
- Physiological studies on marine wood-boring crustacean, durability of treated and untrated timber under marine conditons, and
- Efficacy of Copper Chrome Arsenic (CCA) and Copper Chrome Boric (CCB) preservations.

7.4.7 Institute of Arid Zone Forestry Research, Jodhpur and Institute of Rain & Moist Deciduous Forests Research Jorhat.

These two institutes carry out research in problems of

forestry in the Arid Zones and Humid Zones in the North Eastern Region of the country. Both the institutes are engaged in developing infrastructural facilities for carrying out the research activities.

7.4.8 Indian Plywood Industries Research Institute, Bangalore

The Indian Plywood Industries Research Institute was transferred to this Ministry from the Department of Industrial Development w.e.f. 1.5.1990.

The Main objectives of the Institute are;

- To formulate and carry out a continuing time-bound, result-oriented programme of research and developmental work for plywood and allied industries.
- To render technical services including extension and demonstration essentially to manufacturing units who are members of the Institute and to others on payment of fees,
- To serve as an information, training and testing centre for wood based industries.

The eight divisions of the Institute are as follows:

- Structure, properties and protection of Wood;
- Development Engineering and Sawdoctoring,
- Adhesive Technology
- Products, Application, Sawmilling and Development,
- Statistics, Operation research and Information and Training and,
- Extension,

During the year the following activities have been undertaken by the Institute:

- Two research reports and 7 technical notes were published and 2 more research reports are being published.
- Out of 33 research projects, 13 projects are expected to be completed during the year.
- During the year, 86 sample tests on differant types of plywood were conducted for conformity to relevant Indian Standards for Bureau of Indian Standards, various Government agencies and private and public sector users.
- Eight saw mills were visited by FAO saw-doctoring experts for creating awareness on saw-doctoring tools and veneer knives.
- The library of the institute was strengthened by adding more national and international journals in the concerned area.

7.5 WILDLIFE RESEARCH

Research on various aspects of biology, ecology and management problems of wildlife is mainly conducted by the Wildlife Institute of India and the Bombay Natural History Society.

7.5.1 Wildlife Institute of India

The following 18 research projects initiated in the earlier years were continued:

- The ecological studies of snow leopard and its associated prey species in Hemis High Altitude National Park, Jammu & Kashmir. This study has gathered ecological information on blue sheep which is the major prey species of the snow leopard. In addition, data on movement pattern and habitat utilisation of snow leopard has been collected.
- An investigation of the habitat ecology of major ungulates in Kedarnath Musk Deer Sanctuary, U.P. The densities of and habitat utilisation by major ungulates were estimated in different habitat types. In addition, detailed vegetation study has been carried out. Data was collected on the impact of human pressure on the habitat and ungulate densities and distribution.
- The ecology of the sympatric herbivores in Sariska Tiger Reserve: The herbivores selected for this study are the sambar, nilgai and cheetal. The study covered estimation of the densities of these species in the study area, rate of predation and habitat evaluation.
- Ecology of Indian wild ass (*Equus hemionus khur*) in Rann of Kachch, Gujarat: Besides general ecological studies on the Indian wild ass, specific information on population distribution with respect to habitat type. It was found that the area under salt production has increased by 140 per



Fig 39: A wild ass in Rann of Kachch.



Fig 40: A sick Rhino in Dudhawa National Park.

cent from 1959 to 1988 in Little Rann of Kachch. More animals were found outside the sanctuary in the highly disturbed area.

- Monitoring of rhinoceros reintroduced in Dudhwa National Park: Detailed studies on habitat use by rhinos continued during the year.
- Management and ecology of swamp deer (*Cervus duvauceli duvauceli*) in Dudhwa Tiger Reserve: The study has shown that there is a steady decline in the number of swamp deer in its western sub-population in Sathiana.
- Genetical and ecological studies on the Asiatic wild buffalo: The study is aimed at determining the extent of genetic contamination of wild buffalo populations of the Assam and Madhya Pradesh. Field studies in the Kazinanga National Park are in progress.
- Introduction and monitoring of Sangai (*Cervus eldi eldi*) in Pabitora Wildlife Sanctuary, Assam.
- Study of interrelationship between village ecosystems and elephant corridor habitat in the forest linking Rajaji and Corbett National Park with a view to developing compatible management strategies: Assessment of human pressure on corridor forest was done. Results of the preliminary analysis show that the pressure is more towards the south of the corridor forest and in the areas dominated by the Gujars and the Bhotias.
- Study of impact of the Narmada Sagar Project on flora & fauna with attendant human aspects.
- Ecological studies to evaluate crop damage by nilgai and blackbuck in Haryana and to formulate mitigation strategies: During the year intensive studies, including quantitative assessment of damage to agricultural crops were carried out.
- Movement and habitat-utilisation of elephants in north-western Uttar Pradesh: An elephant herd in the Chilla

Sanctuary was studied. This herd was followed to collect data on its ranging pattern for one complete year (till June'90).

- Ecology of aquatic mammals in National Chambal Sanctuary: The study covers the gangetic dolphin and the otter. Data was collected on movement and activity pattern of these species.
- Monitoring of restocked mugger crocodile in Manjira, Ethipothalla and Siwaram wildlife sanctuaries in Andhra Pradesh: A fresh batch of reintroduced crocodiles was marked and their movement, dispersal and home range studied.
- Strengthening of national wildlife data base.
- Biology, ecology and conservation of Phayre's leaf monkey in Tripura: Thirty major food plant species have

been identified so far. The species is largely a folivore preferring immature leaves and rarely fruits.

- Study of the rural ecosystem of Masinagudi village in the Mudumalai Wildlife Sanctuary with a view to evolving a model ecodevelopment plan to ensure compatibility between the village community and the sanctuary: Data was collected on land use and ownership, demography of people and cattle, milk production and employment and so on. Cattle movement patterns were recorded and villagers were interviewed for gathering socio-economic data. Following this work a picture of the economy based on the land resources of the area has emerged.
- Ecological factors pertinent to improved management of the Asiatic lions in India: Data based on of kills and scat and radio-tracking of collared lions has given an insight into the male's territorial defence mechanisms and predation patterns.



Fig 41: An elephant habitat—requires compatible management strategies.



Fig 42: A muggar crocodile resting on the bank.

7.5.1.1 The Institute's research programme was further strengthened with the launching of the following new projects in 1990-91.

— Ecology and genetics of *Capra ibex siberica* in India: The study will generate valuable data about the status, habitat requirements and general ecology and behaviour of this major prey of the snow leopard. The centre of the study will be the Pin Valley National Park, Himachal Pradesh.

— Movement and Habitat utilisation of Elephants in Western Uttar Pradesh (Phase-II): This will be a continuation of the study of ecology of elephants in the Rajaji National Park. Key areas to be investigated are the population structure, regeneration pattern of key elephant food trees and damage by elephants.

— Creation of laboratory facility at the WII to standardise the methods of determination of carnivore diet: The study is intended to develop a laboratory facility to standardise scat analysis and zoo based feeding trials.

— A study of impacts upon lion and ungulate habitats of management practices in Gir National Park and Sanctuary: This will be a continuation of the study on the ecology of lions and ungulates in Gir forests. Under this study the impact of cattle grazing, wood cutting, fire and management practices on the vegetation of the Sanctuary and national park will be estimated. The study will lead to findings capable of devising crisp management measures.

— Study of dependency of local people on the natural resources of Ranthambhore National Park: The study will identify the possible alternatives to mitigate human and cattle pressure on the national park.

In addition to the above, a research project on the status, ecology and conservation of the Giant Squirrel, with the main objective of developing management prescriptions for the old growth forests which are the habitat of this endangered species, was sanctioned under the Indo US Rupee Fund Programme for a period of 5 years.



Fig 43: A pair of barn-owls—rapidly losing their habitat due to urbanisation.

7.5.1.2 The Institute brought out the following publications during the year. A Manual of Census Techniques, which contains guidelines for carrying out systematic census of all herbivores and carnivores, and is meant primarily for field managers. Proceedings of the High Altitude Ecology Workshop held in Dehra Dun in July '90: The report contains papers which describe the different habitats and their use by wild animals in the high altitudes and trans-Himalayan areas. Habitat use by snow leopards and human aspects of wildlife management in the region are also featured. Stratification and Evaluation of Habitats in Rajaji National Park: The report documents the findings of the Institute's research in Rajaji National park habitats which greatly vary with terrain and aspects of the Siwalik hills. Habitat stratification, descriptions of vegetation and inferences for animal use are also discussed. Habitat Evaluation and Wild Ungulate use in Gir Conservation Area: This is the outcome of a research project of WII to study vegetation types of Gir National Park and Sanctuary

respectively without and with the presence of Maldhari cattle. Research also covered systematic censusing of wild ungulates over a two year period. The Report documents the findings which have useful management implications.

7.5.2 Projects entrusted to the Bombay Natural History Society

Under the Indo-US Rupee Fund Programme, the Ministry has been sponsoring a number of research projects implemented by this Society. Seven research projects taken up earlier under the Indo-US Rupee Fund Programme continued during the year. These are:

- Ecology and Management of Keoladeo National Park: The main finding of the study is that the wetland area of the Park is being converted into grassland-woodland bio-type. Steps to control the menace of aquatic weeds have been recommended. The study has been extended upto September, 1991.

- Ecology of Point Calimere Sanctuary, Tamil Nadu: Various disturbances being caused to the endangered ecosystem which this sanctuary represents have been identified.
- Migration of birds and setting up of a migration data bank: Under this project field stations for bird-ringing and observation of bird movement patterns were set up in Andhra Pradesh, Gujarat, Bihar, Punjab, Madhya Pradesh, Orissa and Tamil Nadu. Several important recommendations for management of the Chilika Lake (Orissa), Harike Lake (Punjab) and Khabertal Lake (Bihar) have been made.
- Ecology of the Indian Elephant: The study covered the elephant populations of Tamil Nadu, Karnataka and Bihar and has yielded information regarding migration pattern of the elephants and the extent of degradation of their habitats. These findings have provided valuable inputs for formulating project Elephant.
- Ecology and Behaviour of Raptors: The study is meant for obtaining information on the current status and distribution of the birds of prey, and their role as indicators of pollution of the forests and wetlands. Techniques for captive breeding and releasing in the wild of the highly endangered birds will also be developed.
- Ecology of Grasslands: The study involves survey of the remaining wild subtropical grasslands of the Indian plains, which are the habitat of highly endangered species like the hispid hare, pigmy hog, floricans and bustards. Once the important grasslands are identified from the point of view of endangered biotic communities, both floral and faunal, prescriptions for their conservation will be developed.
- Revision of the Handbook of Birds of India and Pakistan: The internationally recognised "Handbook of the Birds of India and Pakistan" by Dr. S Dillon Ripley and Late Dr. Salim Ali has been taken up for revision to incorporate data made available since the book was last edited.

7.5.3 Ecology of Large Carnivores in Nagarhole National Park, Karnataka

The study has been sponsored by this Ministry as a part of the Indo-US Rupee Fund Programme and is implemented by the Centre for Wildlife Studies, Mysore. The objective of the study is to determine the relation between the populations of the carnivores like tigers, leopards and wild dogs and their prey-base, and to suggest steps to reduce man-animal conflicts in the peripheries of the National Park.

7.6 National Natural Resource Management System (NRRMS)

The Scheme of NRRMS involves utilisation of remote

sensing technology for accurate inventory of resources such as land water, forests, minerals, oceans etc., and to utilise this information for monitoring changes, ecological systems. The Ministry has constituted a Standing Committee on Bio-resources and Environment with the following objectives.

- Examine and identify the key issues in the management of (including information systems) bio-resources and environment.
- Study the national requirements and identify the potential user/users for remote sensing technology,
- Identify improved methods for management of resources by integrating conventional surveys and remote sensing techniques and generate specific national programmes/projects for achieving the above,
- Identify the data sources required for NRRMS especially bringing out the requirement of remote sensing data,
- identify supporting research, training programmes, joint experiments and technology development/transfer for the above.
- So far, eleven projects have been sanctioned under this programme out of which two projects have been completed.

7.7 Details of Research Activities under Ganga Action Plan

7.7.1 Under the Ganga Action Plan, 48 University Research Projects started in 1985-86 and completed in 1989-90 by the 14 Universities along the River Ganga on the physico-chemical and biological profile and the baseline data have been completed and the same is being publishing as a book. This document serves as a base-line reference apart from imparting hands on training to about 1000 scientists on the ecological aspects of the River Ganga.

7.7.2 The Ganga Action Plan (GAP) Research Committee has identified thrust areas of applied research with implementable concrete results as their objective for achieving the overall objective of Ganga Action Plan, that is water quality improvement and eco-restoration. Ten research projects are on hand through premier national research institutes and universities of eminence in the areas of water quality monitoring, modelling, pollution monitoring, resource recovery from sewage, eco-restoration and productivity improvement and impact assessment of GAP schemes.

7.7.3 The pollution monitoring of Ganga water quality is being monitored for physico-chemical and bacteriological parameters by the Pollution Control Boards and for heavy metals and pesticides by ITRC, Lucknow. A review of the water quality data of the last four years reveals discernible improvement at those towns like Hardwar and Allahabad

where majority of the diversion and treatment plants have been commissioned while at rest of the places the water quality is still to reach the objective set for bathing water criteria by ICMR especially on the macro biological aspects. In some places the level of pesticides observed is much higher than permissible limits. A research project with IARI has been initiated to correlate the pesticides application, intensity and irrigation and cropping pattern with the residues in ground and river water in order to optimise the use of these chemicals to minimise the environmental hazards.

7.7.4 In the areas of bio-conservation, research projects/studies have been taken up for studying the causes of decline of certain endangered macro fauna of the Gangetic system including important fish species and to suggest ways and means to bring back their population in the Ganga system.

A turtle project for captive hatching and breeding of soft shelled scavenger turtles has been taken up from 1986 in collaboration with the UP Forest Department and a sanctuary has been declared at Varanasi where 2500 turtles have been released and 18,000 turtles are being reared in captivity. These scavenging animals will feed on decaying organic matter of vegetable and animal origin and rid the river of

the pollution-cum-solid waste.

7.7.5 Premier national institutes like CSSRI, Karnal and IARI, Pusa, CICFRI, Barrackpore and Madurai Kamaraj University, Madurai are taking up research projects such as recovery of nutrients from treated/raw sewage by growing fodder/fiber and pisciculture while simultaneously developing guidelines for design and operational criteria of these systems to safeguard the worker, consumer and the micro-environment.

7.7.6 An environmental impact assessment study for quantifying the benefit of Ganga Action Plan schemes at two important towns namely Varanasi and Nabadwip has been taken up by NEERI, Nagpur and AIH&PH, Calcutta. This project is co-sponsored by ICMR for additional inputs on health aspects apart from engineering and cost analysis.

In the area of water quality modelling, 4 models have been developed by experts through sponsored projects from IIT, Bombay and Thames Water International, UK, for application at macro level and micro level, on the fresh water stretch as well as at macro level on the estuarine stretch. The estuarine model is being calibrated through field studies. Using these as tools, predictions are made for water quality changes with the implementation of GAP schemes.

8. EDUCATION AND INFORMATION

8.1 FORMAL TRAINING

8.1.1 Forestry Education and Training

8.1.1.1 In Service Courses

Indira Gandhi National Forest Academy (IGNFA), Dehra Dun.

The Indira Gandhi National Forest Academy (IGNFA), Dehra Dun Continued its primary task of training Indian Forest Service (IFS) Probationers.

Sixty-two probationers belonging to 1990-92 batch and two foreign trainees from Bhutan are undergoing training in the Institute.

A Board, set up to monitor the activities of the academy has made suggestions for all round improvement of training activities. The Board has set up a Syllabus Committee and an Examination Committee. The Syllabus Committee held 15 meetings to finalise the syllabus outline and the Examination Committee is looking into the modification of teaching pattern and evaluation at the Academy. The report of the Examination Committee is being finalised. A computer cell has been established in the Academy to impart training to IFS probationers in EDP fundamentals, use of standard software packages, preparation of course materials and computerisation of office work. Hardware Equipment like PC-ATs, PC/XTs and peripheral accessories have been acquired to strengthen the computer centre.

8.1.1.2 State Forest Service Colleges

Three State Forest Service Colleges located at Dehra Dun (UP), Burnihat (Assam) and Coimbatore (Tamil Nadu) continued to train officers of the State Forest Services (SFS). These Colleges run two years courses for SFS Officers. Out of the 120 trainees 70 are likely to complete their training during the year.

The Syllabus of the two year SFS Course has also been revised to ensure uniformity of training.

8.1.1.3 Rangers College

The Forest Rangers College at Kurseong (West Bengal) continued to train Range Officers of the State Forest Departments. One hundred and fifty four trainees are expected to complete their training during the year. Eight Officers including 4 from Laos are undergoing training in the college for a six months diploma course.

8.1.2 Orientation Courses

The Indian Plywood Research Institute, Bangalore, organised 19 short-term courses in the areas of saw-doctoring, saw-milling, plywood manufacturing, maintenance of

plywood machines, log grading etc., during the year. In all, 97 persons were trained for upgradation of skills. The first batch of 11 months certificate course in Mechanical Wood Industries Technology was completed and the 2nd batch commenced in September, 1990. Twelve short term vocational training programmes are also being conducted.

8.1.3 Forestry Education

The Indian Council of Forestry Research and Education (ICFRE) oversees forestry education in the country. Financial support to the tune of Rs. 1.15 crores is provided to The Indian Council of Agricultural Research (ICAR) through ICFRE to continue under-graduate courses in forestry in 14 State Agricultural Universities and post graduate courses in two universities.

8.1.4 Indian Institute of Forest Management, Bhopal

8.1.4.1 The Indian Institute of Forest Management, Bhopal, was set up in the year, 1982, as an autonomous organisation of the Ministry with the objective of providing training in management and allied subjects to persons from the Indian Forest Service, State Forest Service, Forest Development Corporations and Forest related industries to develop Forestry Management skills.

8.1.4.2 The Institute continued Post Graduate Diploma Programme for graduates from different discipline. During the year, 27 candidates are being trained under the Course. The Institute also conducted Management Development Programmes, One Week refresher courses and Orientation course for IFS Officers.

8.1.5 Wildlife Education and Training

8.1.5.1 The Wildlife Institute of India, Dehra Dun, continued its various programmes of wildlife education and training. Eighteen Officer Trainees and 19 Range Officers complete the nine month P.G. Diploma course and the three month certificate course respectively in wildlife management during the year.

8.1.5.2 Apart from a compulsory course in wildlife for IFS Officers, the Institute conducted a special 'Capsule' course for zoo managers to introduce the required level of scientific management in the zoos.

8.2 ENVIRONMENTAL EDUCATION AND AWARENESS

Priority is accorded by the Ministry to promote environmental education, and creation of environmental awareness among various age groups of the country's population through several programmes and mass media campaign.

8.2.1 National Environment Awareness Campaign National Environment Month—1990

8.2.1.1 The Ministry has been organising a National Environment Awareness Campaign (NEAC), since 1986, to create environmental awareness at the National level. As a part of this campaign 19th November to 18th December of every year is observed as National Environment Month (NEM). During this year also the activities under the NEAC and NEM continued.

8.2.1.2 The major theme for NEAC-1990 was "Save the environment Save yourself". The campaign also addressed the whole gamut of environmental issues such as afforestation, eco-regeneration, pollution control, conservation of flora and fauna etc.

More than 480 organisations comprising of NGOs, schools, colleges, universities, research organisations, professional bodies, women and youth organisations, Government Departments etc., from various States and Union Territories have been involved in organising various



Fig 44: A padayatra in Tamil Nadu during NEAC 1990.

programmes such as seminars, workshops, training camps, public meetings, rallies, padayatras, jathas, audio-visual/film shows, display of posters, drama, folk dances, street theatres tree-plantation drives, essay/debate/painting competitions for school children and preparation and distribution of environment educational resource material to create environmental consciousness. The Target groups like students/youth, teachers, women, tribals, administrators, professionals, legislators, industrial workers, voluntary workers, armed forces and the general public have been covered under the campaign.

8.2.1.3 During the campaign, the Centre for Environment Education, Ahmedabad, organised about 90 one-day-cluster level NGO-teacher meetings for planning school programmes, organising action projects and initiating resource centres in selected schools. The Centre has also undertaken the formation of clusters of schools and linking them up with voluntary organisations for ensuring action oriented projects in schools and for qualitative expansions of the teacher trainings programme. The Centre also acted as a Regional Resource Agency (RRA) for NEAC-90 for the Western region.

8.2.1.4 The C.P.R.Environmental Education Centre organised a communication training programme during NEAC-90 highlighting various environmental issues for the participants especially from Tamil Nadu and Pondicherry. The Centre also acted as a Regional Resource Agency (RRA) for NEAC-90 for the Southern Region.

8.2.1.5 The National Museum of Natural History, New Delhi, organised a large number of programmes for the school children, teenagers, teachers and residents of housing colonies and army camps as part of the National Environment Awareness Campaign. The activities included the following:

- A teacher orientation workshop on development of environmental education resource materials;
- Mobile Museum service to schools and rural areas;
- Quiz, declamation and painting contests for children;
- Film shows in housing colonies and army camps; and
- Wildlife study tours to Bharatpur and Sariska for school children and teachers.

8.2.1.6 During the Campaign, Doordarshan telecast fortnightly programmes on environment and related areas in the National hook-up and a variety of programmes were also boardcast by All India Radio. The Regional Centres of Doordarshan also continued telecasting environmental programmes in regional languages.

8.2.1.7 During the year, the Department considered several proposals on non-formal environmental education



Fig 45: A mobile exhibit depicting various environmental issues-developed by CPR EEC, Madras.

and awareness and provided financial assistance to various organisations which included the following:—

- Production of two documentary films on 'noise pollution' and 'Waste Water Management'. A list of documentary films sponsored by the Ministry its given at Annexure V.
- Setting up of eco-clubs in selected schools in Tamil Nadu, Andhra Pradesh, and West Bengal.
- Indira Gandhi Conservation Monitoring Centre (IGCMC) at the World Wide Fund for Nature-India at New Delhi, for collection, analysis, interpretation and dissemination of data/information related to the conservation of species, habitats and micro-organisms, wildlife trade and protected areas, set up by the Ministry earlier, started functioning.
- Various Non-governmental organisations, educational institutions professional bodies etc., were motivated for celebrating "Earth Day" and "World Environment Day"

to spread the message of environmental protection among the public.

- A National Painting Competition for school children was organised on the theme 'Technology and Environment'. A total number of 1000 schools from all over the country participated in the competition. Paintings of National winners were sent to ESCAP in the regional painting competition in Bangkok and one of the them bagged the 2nd prize.

8.2.2 Centres of Excellence

The Department has set up the following 5 Centres of Excellence in the areas or environmental education, ecology and mining with a view to strengthening research and training in priority areas of environmental science and management.

- Centre for Environment, Education, Ahmedabad,

- C.P.R. Environmental Education Centre, Madras,
- Ecological Research & Training Centre, Bangalore and
- Centre for Mining Environment, Dhanbad.

The Salim Ali Centre for Ornithology and Natural History at Bombay Natural History Society has been inaugurated in June 1990.

8.2.2.1 Centre for Environment Education, Ahmedabad

The Centre established in 1984, continued its activities relating to development of environment education materials and creation of environmental awareness among the children and the general community. Programmes and activities of the Centre during the year was as follows:

- The interpretive programme at Kanha National Park, including orientation and visitors centres, signage and publications, were formally handed over to the Madhya Pradesh Government and made available to the visitors. This programme, developed in collaboration with the U.S. National Park Service, is a pioneering project of its kind in India, and will serve as a model interpretive programme for other national parks and sanctuaries in the country.
- Work on the Indo-US collaborative Children's Environmental Education Television Project continued. During the year, a publication entitled 'Essential Learnings in Environmental Education', was brought out. This book enumerates 600 concepts which form the basis of understanding the environment and serves as a resource book for teachers, curriculum planners and those involved in the development of educational material.
- The Centre started an eight month training programme on Environment Education during the year.
- The Centre undertook the public awareness campaign for the television serial 'Race to save the Planet' produced by WGBH, Boston, in collaboration with UGC, India, which was telecast over Doordarshan during the year. This involved producing publicity material a brochure and a poster, as well as developing and disseminating special news packages through CEE-NFS, the Centre's Network for Information sharing. These packages included a synopsis of the forthcoming film, write-ups on case studies from the film and some thought provoking points related to the film.
- Sundarvan, CEE's nature education facility, continued to attract large numbers of visitors from Ahmedabad. Regular programmes like snake shows, school visits continued. The new camping facility developed by Sundarvan at Bakore also gained momentum with camps organized for schools and other groups.

- The programmes of the Southern Regional Cell of the Centre, situated at Bangalore continued. This Cell coordinated NEAC Programmes and The Ministry of Human Resource Development programmes of CEE in the Southern Region. The Cell also caters to the training needs of NGOs and other educational institutions in the area.
- The Centre is being designated as an ENVIS Centre in the area of Environmental Education by the Ministry. Work has been initiated on analysing information needs in the area, collecting information and setting up systems for its effective dissemination.
- CEE, in 1988, was designated a nodal agency for the Scheme of Environmental Orientation to School Education of the Ministry of Human Resource Development. Under the scheme, CEE in coordination with NGOs prepared proposals for the development of locale specific environment education materials. Twenty two NGOs from different bio-geographic regions of the country are involved in these programmes.
- Programmes for schools around the Sariska Tiger Reserve continued through CEE's field office at Alwar. A workshop for teachers from this area was organised at CEE in June 1990.
- In collaboration with the National Drinking Water Mission, CAPART, Defence Laboratory, Jodhpur and Gujarat Jalseva Training Institute, CEE organised a week long workshop for representatives of voluntary organisations, to train them in the use of a water quality kit developed by the Defence Laboratory. Twenty eight persons from 16 voluntary organisations participated in this workshop.

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

The C.P.R. Environmental Education Centre was set up by the Department in 1988 with the objective of creating and increasing consciousness and knowledge about the environment as well as generate resource material and educational packages on environmental conservation. The Centre continued its activities to spread awareness and interest among the public including voluntary workers, educators, farmers, women, youth and children on all aspects of environment and ecology with the purpose of promoting conservation of nature and natural resources. The activities undertaken by the Centre during the year are as follows:

- Workshops, rural training programmes, communication training programmes, experience sharing programmes for wastelands development etc., for the voluntary organisation in Tamil Nadu and Andhra Pradesh were organised.

- An intensive interactive awareness raising programming especially for middle school children was organised on different environmental themes like health and hygiene, pollution, forests and its importance, water resources management, slum improvement and animal welfare.
- A six week programme on environmental education or children of the age group 5-15 was organised keeping in view the United Nations Environment Programmes' theme for the year viz., "Children and Environment"
- Two exhibitions, one on "Mangroves" and the other on "Trees of Madras" were organised during the year.
- A nursery was set up by the Centre at Injambarkam village near Madras and saplings were distributed to various schools and voluntary organisations for mass plantations.
- A water testing kit and a soil testing kit for non-technical persons were developed by the Centre.
- The Centre brought out various resource materials in the form of books, Pamphlets, posters, video films etc., in Tamil, Telugu, Hindi and English languages.
- The Centre continued its periodic publication of the news letter entitled "EEC NEWS".

8.2.2.3 Ecological Research and Training Centre, Indian Institute of Science, Bangalore.

The Centre, established in 1983, with a mandate to focus on ecological problems of the Western Ghats, continued its activities during the year and completed 15 major projects. The activities of the Centre may be broadly defined as follows:-

- Scientific research;
- Field action programmes in eco-development based on the application of baseline data collected by the Centre;
- Ph.D. training and teaching in the field of ecology; and
- Spread of environmental awareness to NGOs, Zilla Parishad mandals etc.

8.2.2.4 Centre for Mining Environment, Dhanbad

This Centre was established in March 1987 to encourage, develop, and strengthen the available expertise to generate scientific data for sustainable mining.

The construction of the building of the Centre was completed and vital research equipments have been procured including software for computers. During the year, the Centre organised five training programmes on management and engineering aspects of mining activity for middle to senior-level in service professionals and started a

M.Tecn. Course in Environmental Science & Engineering. The Centre mainly concentrates its research studies on following aspects;

- Problem of air and water pollution in mining areas;
- Mined land reclamation with predetermined land use pattern;
- Safe disposal of tailings; and
- Impact of mining on flora and fauna and their habitats.

8.2.2.5 Salim Ali Centre for Ornithology and Natural History, Bombay

The Salim Ali Centre for Ornithology and Natural History was inaugurated on 5th June, 1990. The broad objectives of the Centre are as follows:

- Conducting research in the field of Ornithology and Natural History;
- Applied research of direct relevance to Ornithology; and
- Creation of data bank on Indian Ornithology.

8.2.3 National Museum of Natural History

The National Museum of Natural History (NMNH), New Delhi, an associated organisation of the Department, has been set up to promote non-formal education in the area of Environment and Conservation. This objective is achieved by the museum through its permanent exhibit galleries, temporary exhibitions and a large number of educational programmes and activities. A brief report of the activities of the Museum during the year is as follows:

8.2.3.1 Renovation and updating of Exhibit galleries

The galleries on 'Introduction to Natural History' 'Ecology' and 'Conservation' as well as the 'Discovery Room' for children were renovated and updated with new exhibits, photographs, transillies and labels. Software for several new interactive computer programmes on ecology was added to the Bio-science Computer Room of the Museum.

8.2.3.2 Temporary Exhibitions

The NMNH organised two temporary exhibitions entitled "The Wonderful World of Birds" and "The Wonderful World of Mammals". An exhibition on "Sacred Plants of India" was also organised at the International Garden and Greenery Exposition in Osaka, Japan as part of India's participation in the Expo.

8.2.3.3 Educational Activities

- NMNH continued its regular educational activities such

as School Loan service, film shows, public lectures, audio-visual presentations etc.

- On the occasion of the 12th Anniversary of the Museum and the World Environment Day on 5th June, 1990, a Foundation Day Lecture on "Birds as Indicators of Environmental Quality" was organised and a special exhibition entitled. 'The Wonderful World of Birds' was inaugurated.
- NMNH also conducted special programmes such as Quiz and Declamation Contests for teenagers, nature painting and poster design contests for children and programmes for handicapped children on the occasions of the Earth Day and Wildlife Week.
- NMNH organised a monthlong Summer Programme entitled 'Exploring the Environment' for teenagers which consisted of a combination of museum sessions, outdoor nature exploration, study of environmental problems in the city, wildlife tours, camping at a national park,

environmental quiz and declamation for the participants and preparation of a Nature Magazine by them. The programme laid special emphasis on sensitising the young minds on what they could do to protect the environment. Month long programmes of Nature Painting and Animal modelling were also conducted for younger children.

8.2.3.4 Publication

During the year, NMNH brought out the following publications:

- 'Architecture and Design for Natural History Museums' containing the proceeding of an Indo-US Workshop on the subject organised by the Museum under the auspices of the Indo-US. Subcommittee on Education and Culture.
- Information folders on the Discovery Room of NMNH.
- Brochure on Birds and Mammals coinciding with the temporary exhibitions.



Fig 46: Children working on animal magnetic board at NMNH, New Delhi.

8.2.3.5 Regional Museum of Natural History, Mysore

Construction of the building for the Natural History Museum, Mysore, is nearing completion. Gallery designs for the first two exhibit areas of the museum have also been completed. The Museum, functioning from its temporary premises organised several educational programmes and field trips for local school children as well as special activities during the World Environment Day, Wildlife Week and the National Environmental Awareness Campaign.

8.2.4 Support to Seminars/Symposia/Workshops

The Ministry continued its support to the organisation of seminars, symposia, etc., on various environmental topics of current interest. During the year, 65 universities, non-governmental organisations, research institutions and professional bodies have been provided financial assistance for organising such seminars. These are in addition to the large number of Seminars/Symposia/Workshops supported under NEAC 1990.

8.3 FELLOWSHIPS AND AWARDS

8.3.1 Pitambar Pant National Environment Fellowship Award

The Pitambar Pant National Environment Fellowship Award was instituted by the Department in 1978 to encourage and recognise excellence in any branch of research related to the environmental sciences. Nominations for the award for the year 1990 are being invited.

8.3.2 Indira Gandhi Paryavaran Puraskar

The Department, in 1987, instituted the Indira Gandhi Paryavaran Puraskar to be awarded every year to an Indian Organisation or an individual for significant contributions in the field of environment. The award is of the value of Rs. 1.00 lakhs.

More than 250 nominations from various individuals and organisations for the award received for the year 1990 are being considered.

8.3.3 Jawaharlal Nehru Professorship

A chair in environmental law established by the Department in 1988 at the Jawaharlal Nehru University, New Delhi, continued its functioning in the field of environmental law during the year.

8.3.4 Indira Priyadarshini Vrikshamitra Awards

These annual awards were instituted in 1986 to give recognition to the exceptional contribution of individuals and organisations in the field of afforestation and wastelands

developments. At present, 10 awards are given covering five categories viz-individuals, educational institutions, panchayats, voluntary agencies & Government agencies (not above the level of District). Each Award carries a medallion, citation and cash component of Rs. 50,000. Awards for the year 1989 were presented on 17/8/90 by the Prime Minister. Nominations received for the 1990 awards are under consideration.

8.4 ENVIRONMENTAL INFORMATION

8.4.1 Environmental Information System (ENVIS)

Environmental Information System (ENVIS) was set up by the Ministry in December, 1982, as a decentralised information system network of distributed subject oriented centres ensuring integration of national efforts in environmental information collection, collation, storage, retrieval and dissemination by avoiding duplication of efforts. ENVIS has been functioning since then and providing environmental information to decision makers, policy planners, scientists, engineers, research workers and the public all over the country.

ENVIS Network presently consists a focal point at the Ministry and 10 subject oriented ENVIS Centres set up in various organisations/establishments in the country in selected areas of environment like pollution control, toxic chemicals, central and off-shore ecology, environmentally sound and appropriate technology, energy and environment, Bio-degradation of wastes, media and environment etc., A list of existing ENVIS Centres is given at table 11. An ENVIS operating links are also described in figure 48.

The activities of ENVIS Focal Point and its various centres during the year are given below.

8.4.2 Activities of the ENVIS Focal Point

8.4.2.1 Documentation Service

During the year, the ENVIS has built up a reasonably good information base in the form of publications, reports, reprints, bibliographies, abstracts, data bases etc., as well as numerical data i.e. statistics relating to environment. The information base/repository is being continuously strengthened through regular collection, collation and storage of scientific and technical information on environment and related areas by the Focal Point as well as by the other ENVIS Centres.

The ENVIS also looked after the various activities undertaken by the Departmental Library which acts as a documents repository of the ENVIS Network. During the year, the Departmental library enhanced its collection of books, national/international scientific periodicals, conference proceedings etc., environment and related areas.

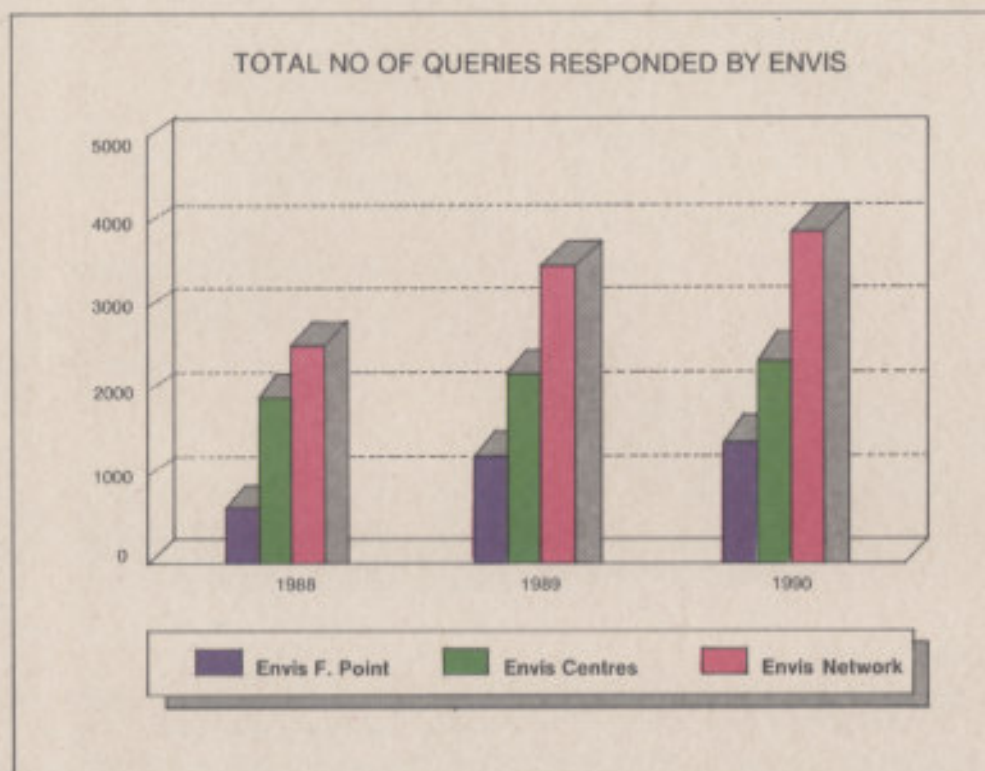


Fig 47: Number of queries responded by ENVIS.

Table 11

Institution	Area
Central Pollution Control Board (CPCB), New Delhi	Pollution Control (water and air)
Industrial Toxicology Research Centre (ITRC), Locknow	Toxic chemicals
Society for Development Alternatives, New Delhi	Environmentally sound and appropriate technology
Environmental Services Groups (ESG), New Delhi	NGO, Media and Parliament related to environment
Andhra University, Visakhapatnam	Eastern Ghats Ecology
Tata Energy Research Institute (TERI), New Delhi	Renewable energy and environment
Centre for Environmental Studies, College of Engineering, Anna University, Madras	Bio-degradation of wastes; Environmental Impact Assessment
Centre for Ecological Studies, Indian Institute of Science Bangalore	Western Ghats Ecology
Environmental Planning and Co-ordination Organisation (EPCO), Bhopal	Environmental management related to the state of Madhya Pradesh
National Institute of Occupational Health (NIOH), Ahmedabad	Occupational Health

At present, the Library has a collection of over 16,000/- books and about 3,000 scientific and technical reports. Besides, it subscribed to over 150 national/international journals in the scientific and environmental fields. Departmental Library also provides the reprographic facilities for the substantive information provides by ENVIS to its user group. Apart from technical books and journals, the Departmental library has acquired a wide range of general books and magazines both in English and Hindi for use of the officials of the Ministry.

8.4.2.2 Query/Answer Service

The ENVIS network as a whole responded to various requests for information on diverse areas related to environment from different user groups. Besides receiving several national/international queries, ENVIS as the National Focal Point of INFOTERRA/UNEP and Regional Service Centre of INFOTERRA has also responded to various queries from INFOTERRA users and those from South Asian sub-region countries by providing substantive information in the form of bibliographies, reprints/reports etc. During the year, the ENVIS Focal Point alone handled 1408 queries out of which 1351 were national and 57 international. The ENVIS Centres separately responded to 2545 queries out of which

2133 were national queries and 412 were of international nature. A detailed breakup of number of queries processed by ENVIS during the last three years is given in Fig. 47. In some cases where substantive information is not readily available, ENVIS provides referral services to users in response to their queries. For responding to the queries, focal point make use of the ENVIS Network, INFOTERRA Network as well as other potential sources of information in the country.

8.4.2.3 Publication of the Annual Report

During the year, ENVIS focal point coordinated, compiled and published the Annual Report (89-90) of the Ministry.

8.4.2.4 Abstracting Service

The Focal Point continued its publication of a quarterly abstracting journal "Paryavaran Abstracts" containing information about the Indian Research inputs in the area of environment. More than 500 environment related journals are referred to in the compilation of these abstracts. The abstracts are arranged under 12 major subject categories i.e. Environmental Management, Air Pollution, Water Pollution,

Noise Pollution, Ecology, Nature and Natural Resources Conservation, Health and Toxicology, Wastes, Forestry and Environment, Wildlife, Energy and Plants and Pollution. For precise retrieval of information, subject key words index is also given at the end of each issue. During the year, four issues of this journal containing about 600 abstracts were published.

8.4.2.5 Press Clipping Service

The ENVIS Focal Point continued its press clipping service by scanning all environment related information from the National dailies and magazines. About 30 news papers and 10 magazines are scanned regularly and more than 500 clippings related to environment are documented every month as a secondary information base for quick and easy retrieval.

8.4.2.6 Development of Data Bases

The Focal Point is increasingly using computers for processing environmental information to ensure its speedy dissemination to all concerned. During the year, the following computerised data bases have been developed/updated:

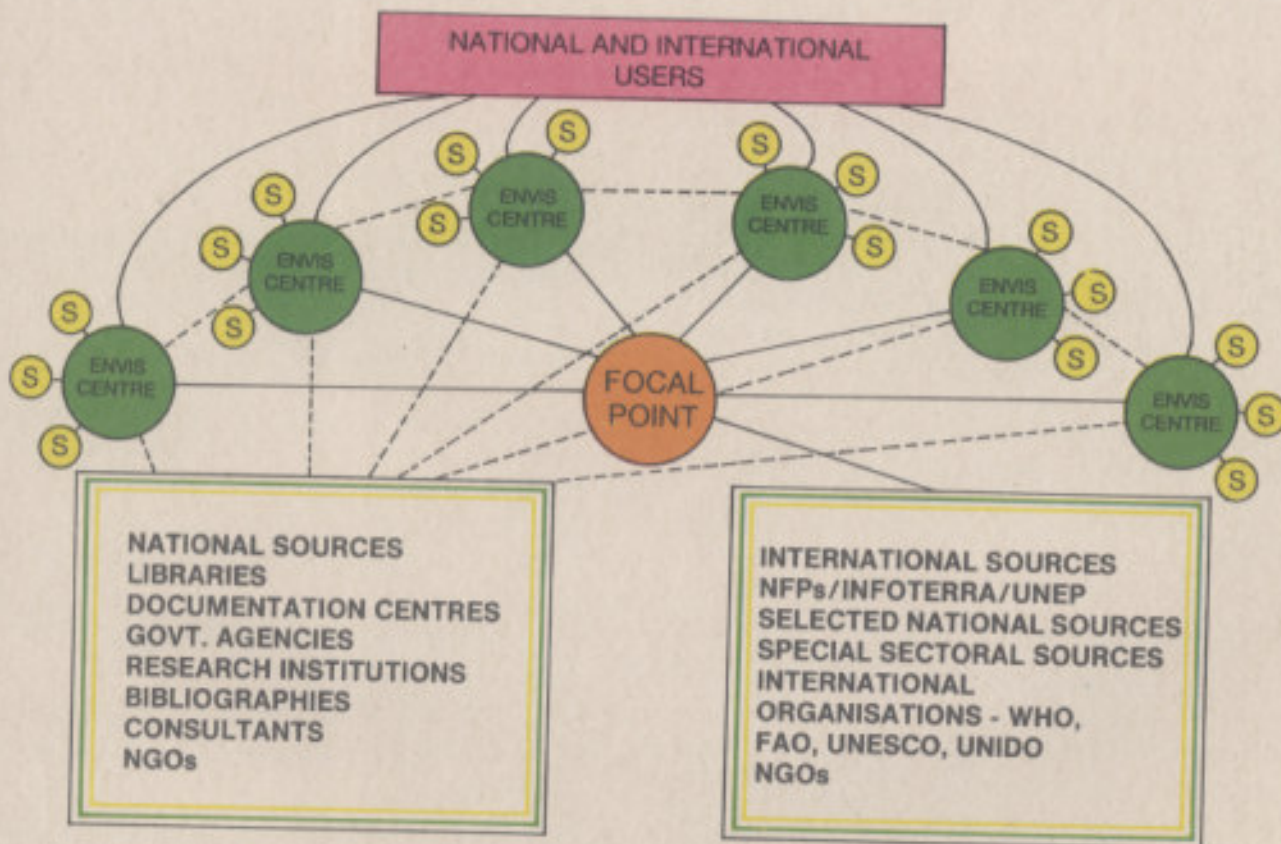


Fig 48: ENVIS operating links.

- A bibliographic data base on 'environmental research' in Indian context;
- A data base of Indian sources engaged in environment and related activities;
- A profile of NGOs of the country involved in environmental conservation and protection.

8.4.2.7 Liaison with other Information Systems

ENVIS maintains a close liaison with various other National Information Systems like National Information System on Science and Technology (NISSAT), Bio-technology Information System (BTIS), etc. for exchanging environmental information and to avoid duplication of efforts in the concerned fields.

8.4.2.8 INFOTERRA/RSC Activities

The Focal Point of ENVIS acts as a National Focal Point (NFP) of INFOTERRA network (An international referral system for sources of information) of the United Nations Environment Programme (UNEP). As INFOTERRA NFP, ENVIS Focal Point is connected to the international INFOTERRA network. The ENVIS Focal Point is the coordinating mechanism for all INFOTERRA activities within India and is concerned both the policy and operational aspects of environmental information flow.

The NFP has registered more than 500 Indian Sources engaged in environment related activities for inclusion in the 'International INFOTERRA Directory of Environmental Sources' published by the UNEP. These national sources are referred to by UNEP for environmental information in their corresponding disciplines. The NFP caters to the environmental information needs of the users from both within and outside the country. Based on the information potential of ENVIS, UNEP also designated ENVIS Focal Point as The Regional Service Centres (RSC) of INFOTERRA to cater to the environmental information needs of the South Asian Sub-Region countries. During the year, ENVIS as NFP and RSC of INFOTERRA responded to 3483 national and 469 international queries and provided substantive information to the users.

8.4.2.9 Coordination with ENVIS Centres

The ENVIS Focal Point Coordinates, monitors and reviews the activities of the ENVIS Centres to ensure effective functioning of the ENVIS network. Attempts are also being made by the Focal Point to ensure constant inflow of information from the ENVIS centres, so that a Central repository of environmental information on various subject areas is developed/updated for easy and quick retrieval and

dissemination. The Focal Point is also responsible for identifying priority areas and potential institutions for setting up new ENVIS centres.

8.4.3 Activities of ENVIS Centres

All the ENVIS Centres are engaged in collection, collation, retrieval and dissemination of information in their respective areas of specialisation. A brief account of the major activities undertaken/being undertaken by each of the ENVIS Centres during the year is given below:

8.4.3.1 ENVIS Centre at Central Pollution Control Board (CPCB), New Delhi

- Collection of information with regard to the status of effluent treatment plants in various industries in the country. The information has been compiled in the form of a report and a national inventory of water polluting industries and effluent treatment plant status has been published.
- Information regarding to the prosecutions launched against defaulters by the Pollution Control Board has been collected and updated.
- A quarterly newsletter consisting of data, reports, toxicity of the pollutants, latest developments in the area of pollution control technologies etc. is regularly published.
- A data book "Annual Water Quality Data of Fresh Water Bodies and Wells" has been published.
- The Centre responded to 37 specific queries from various users and provided substantive information.

8.4.3.2 ENVIS Centre at Industrial Toxicology Research Centre (ITRC), Lucknow

- Four volumes of toxicity data hand book have been published. Volumes 1 and 2 contain information on 109 industrial chemicals, while volumes 3 and 4 contain information on 119 pesticides. The information on these chemicals has been computerised with 228 chemicals on file.
- State of Art Reports on (i) Environmental Hygiene in India and (ii) Occupational Health in India have been published.
- Several bibliographies on industrial and environmental health, pollution problems in pulp and paper industry, etc. have been published.
- Manuals of safety, evaluation of chemicals, aquatic ecotoxicology and toxicology atlas of India have been published.
- Specific review on toxic chemicals like Arsenic, Aflatoxin and Endosulfan have been undertaken.

- The Centre responding to specific queries related to toxicology and toxic chemicals received from various users.

8.4.3.3 ENVIS Centre at National Institute of Occupational Health (NIOH), Ahmedabad

- Monographs on different toxic substances used in various industries and are hazardous to health have been prepared.
- Chemical safety cards containing common information like formula, physical property, chemical property, hazardous symptoms, prevention and precaution, first aid, spillage, storage and transport, fire and explosion etc. have been prepared.
- Bibliographies on trace metals which are hazardous to human health particularly to the workers directly these metals, have been prepared.
- The Centre responded to specific queries related to medical toxicology, occupational health, occupational medicine etc. received from various users.

8.4.3.4 ENVIS Centre at Centre for Ecological Sciences, Indian Institute of Science, Bangalore

- The Centre built up a comprehensive collection of documents related to Western Ghats and Nilgiri Biosphere Reserves.
- The Centre has developed an upto date inventory and a computer based system of information for Birds on Western Ghats.
- The Centre completed the computerization of data on biological diversity of Western Ghats.
- A geographic information system is being acquired by the Centre.

8.4.3.5 ENVIS Centre at EPCO, Bhopal

- A Directory of Non-Governmental Organisations in Environment in Madhya Pradesh has been updated.
- Information about the status of environmental research in various universities in Madhya Pradesh is being updated.
- The Centre has commissioned a video film on pollution aspects of cement industries in Madhya Pradesh.
- The Centre responded to specific queries received from various users.

8.4.3.6 ENVIS Centre at Environmental Services Group, New Delhi

- A Directory of Environmental NGOs in India, published earlier, is being updated.
- Compilation of Directories on Environmental NGOs in the United State of America and Europe.
- Profiles of media coverage on different important areas related to environment have been prepared.
- The Centre responded to 850 specific queries.

8.4.3.7 ENVIS Centre at Tata Energy Research Institute, New Delhi

- Publication of the biannual journal "Energy Environment Monitor" containing information on recent literature in this area continued.
- The information on recent literature is being computerised in the form of a data base for easy retrieval.
- The Centre attended to 56 queries and provided substantive information to users.

8.4.3.8 ENVIS Centre at Anna University, Madras

- Publication of news letter, abstracting journal on biodegradation of wastes and current literature listing continued.
- The Centre has built up a good collection of books, journals reports, thesis etc. on the subject which form a good resource base for information dissemination.
- The Centre responded to 174 queries on the specific subject area.

8.4.3.9 ENVIS Centre at Society for Development Alternatives (SDA), New Delhi

- Creation and updation of ESAT data base.
- Updation of documentary information base in thrust areas.
- The Centre responded to 1428 specific queries with substantive.

8.4.3.10 ENVIS Centre at Andhra University, Visakhapatnam

- Development of a documentary and numerical information base related to Eastern Ghats.
- Dissemination of information in the area of Eastern Ghats on a regular basis using DIALOG.
- Reference service, Press Clipping Service etc. continued.

8.4.4 Proposed New ENVIS Centres

New ENVIS Centres in priority areas mentioned below are being approved to be set up in phases:

- Plant Ecology
- Animal Ecology
- Environmental Problems of Mining
- Desertification
- Solid Waste including Hazardous Wastes
- Human Settlements
- Estuary, Mangroves, Coral and Lagoons
- Environmental Education
- Environmental Policy and Law
- Himalayan Ecology

9. LEGISLATION AND INSTITUTIONAL SUPPORT

9.1 LEGISLATION

9.1.1 Consequent upon the implementation of Environment (Protection) Act, 1986, the Ministry of Environment and Forests has taken several steps to provide legal and institutional basis which include issue of several rules, notification of standards, action regarding environmental laboratories, strengthening of State Departments of Environment and Pollution Control Boards, delegation of powers, identification of powers for carrying out various activities for hazardous chemicals management and setting up of Environmental protection Councils in the States. Additional responsibilities have been placed on the Central and State Pollution Control Boards under the provisions of the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981. Legal actions under these two acts are taken by the respective State Boards.

9.1.2 The Environment (Protection) Act, 1986 has also placed responsibility on the Central Government for laying down procedures and safeguards for handling hazardous substances and prevention of accidents. Rules have been notified by the Ministry under this Act for regulating hazardous chemicals at all stages of manufacture, import, storage, transport, use and disposal.

9.1.3 During the year the following activities have been undertaken:

9.1.3.1 Public Liability Insurance

Public Liability Insurance bill has been enacted to provide immediate relief to the victims of accidents caused by hazardous chemical industries. The Bill has been passed by both Houses of Parliament and President's assent has been received on 22nd January, 1991. The Rules under the Act are being framed for implementation.

9.1.3.2 Environment Courts-Civil Liability

A legislation on Civil Liability and setting up of Environment Courts at National and State level for dealing with payment of compensation for injury/damage suffered as a result of industrial activities particularly from hazardous industries is under consideration.

9.1.3.3 Amendment to existing Acts

9.1.3.3.1 The proposal to amend the Water (Prevention and Control of Pollution) Cess Act, 1977 for augmenting the resources of Pollution Control Boards is under finalisation.

9.1.3.3.2 Proposals to amend the Environment (Protection) Act, 1986 to make it more comprehensive and effective are under consideration.

9.1.3.4 Prohibition of Smoking in Public Places

A proposal regarding imposition of a ban on smoking in public places was examined in the Ministry. At the instance of this Ministry, necessary instructions/guidelines have since been issued by the Cabinet Secretariat for banning smoking in selected public places.

9.1.3.5 Legal Action against Polluting Industries

9.1.3.5.1 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, 1981 respectively. Legal action under these two acts is taken by the respective State Boards. The State-wise information regarding the number of cases filed by the Central and State Pollution Control Board is compiled on quarterly basis and analysed.

9.1.3.5.2 As on 31.12.90 no of cases filed by the Pollution Control Board under the Water Act and Air Act was 4429. Out of these, 1408 cases have been decided, 2880 are pending and 141 were dismissed. In 325 cases, convictions were obtained and in 229 cases, court passed restraint orders.

9.1.3.5.3 Action against more than 110 polluting industries identified under Ganga Action Plan has been initiated under Environment (Protection) Act, 1986 which includes 31 industries discharging their effluents directly into the river Ganga. As a result of directions, 12 out of 31 industries have commissioned their Effluent Treatment Plants (ETPs) and in five units ETP's are under construction. Monitoring of these units is being come on a regular basis. Prosecutions have been launched against 7 units which did not comply with the directions issued under Section 5 of the Environment (Protection) Act, 1987.

9.2 INSTITUTIONAL SUPPORT

9.2.1 Assistance to State Pollution Control Boards

The State Pollution Control Boards are being strengthened for upgradation of their laboratories, setting up of mobile laboratories, recruitment of technical personnel etc. Eighteen State Pollution Control Boards have so far been provided financial assistance for this purpose. One hundred and twenty two laboratory staff and 228 field staff have been sanctioned to the State Boards to carry out the programmes. An amount of Rs. 79.45 lakhs was disbursed to the State Boards during the year for equipment and scientific and technical staff for laboratories and field.

9.2.2 Assistance to State/UT/Deptt. of Environment

The scheme of providing assistance to the State/UT's Department of Environment for setting up Technical Cells

with technical/non-technical staff to deal with Environmental problems in the State/UT and to function as a coordinating agency in concerned State/UT was continued. Financial assistance to the tune of more than Rs. 21 lakhs has been provided to the Deptt. of Environment during the year for strengthening their technical set up.

9.2.3 Assistance to Environmental Laboratories other than State Pollution Control Boards

During the year three qualified Analysts, working in the

previously recognised Environmental Laboratories were recognised as Government Analysts under Section 12 of Environment (Protection) Act, 1986. A total of 84 laboratories have so far been recognised as Environmental Laboratories and one more laboratory has also been identified for recognition during the year.

10. INTERNATIONAL COOPERATION

10.1 INTRODUCTION

There has been growing awareness of global environmental concerns such as ozone depletion, the greenhouse effect and climate change, trans-boundary movement of hazardous substances and wastes, the threats to biological diversity, etc. There has also been a growing acceptance about the linkages between environment and development, which were highlighted by the report of the World Commission on Environment and Development, submitted to the U.N. General Assembly in 1987, have several processes which have been initiated to take a common view on global problems. These include the convening of a U.N. Conference on Environment and Development in June, 1992 and global agreements on protection of the ozone layer and on controlling the trans-boundary movement of hazardous wastes. Negotiations are currently on regarding a convention on climate change and a convention on the conservation of biological diversity.

10.2 INITIATIVES ON GLOBAL ENVIRONMENTAL ISSUES

10.2.1 1992 United Nations conference on Environment and Development

10.2.1.1 A United Nations Conference on 'Environment and Development' is scheduled to be held in Brazil in 1992 to mark the twentieth anniversary of 1972 Stockholm Conference on the Human Environment. A preparatory Committee has been set up by the United Nations Environment Programme (UNEP) for this Conference with a mandate to draft the provisional agenda for this Conference and to adopt guidelines to enable other countries to take a harmonised approach to their preparation. India is a member of this Committee. This Ministry have constituted an inter-ministerial Committee to suggest issues and formulate strategies for the Preparatory Committee meetings and the 1992 Conference and acts in consent with the Ministry of External Affairs.

10.2.2 Ozone Depletion

10.2.2.1 Use of certain chemical agents such as chlorofluoro Carbons (CFCs), Halons, etc., cause a depletion of the ozone layer. The problem of Ozone layer depletion has global repercussions. International community, has, therefore, entered into an agreement to eliminate the production and consumption of these ozone depleting substances. For this purpose, Montreal Protocol was adopted in 1987 which has come into force with effect from 1st January, 1989 after necessary ratifications. The Protocol seeks to phase out these substances in a phased manner. Different time schedules have been set for developed countries and developing countries keeping in view the development

requirements of the developing countries.

10.2.2.2 India is not a party to this Protocol as certain provisions of the Protocol were discriminatory against the developing countries. During the year, India actively participated in various international negotiations to seek amendments to this Protocol to make it more acceptable to the developing countries. India succeeded in achieving the required amendments during the second meeting of the Parties to the Montreal Protocol in London during June, 1990.

10.2.2.3 Besides phasing out of ozone depleting substances, alternatives to these have to be identified and developed which call for not only a combined effort at international level but also by individual countries. An international fund is also being created to assist the developing countries in their efforts to switch over to substitute technology. India is promoting R & D activity in this field.

10.2.2.4 India hosted a workshop during the year in collaboration with the Environment Protection Agency (EPA) of the United States of America on CFC alternatives and substitutes with a view to understand the critical issues for switching over to CFC alternatives and the new technologies.

10.2.3 Climate Change

10.2.3.1 The global community is considerably concerned about the 'Greenhouse Effect' and the consequent thrust of rapid climate changes. The delicate balance of the atmosphere is being disturbed by the emission of gases such as Carbon-di-oxide, Methane, Nitrous Oxide and Chlorofluorocarbons from human activity. The increased concentration of the gases is contributing to the greenhouse effect which tends to rise the average temperature of the earth and may cause other widespread climate changes. Such changes when occurring in a relatively short period of a few decades disrupt human activity considerably.

10.2.3.2 India actively participated in the deliberations of Inter-governmental Panel of Climate Changes (IPCC). Interim Report of IPCC was presented in August, 1990 and negotiations for global convention to deal with the threat of climate change have begun. During the year, India participated in the Climate change convention and conference held at Geneva.

10.2.3.3 At the national level, the Ministry has established an Expert Advisory Committee (EAC) chaired by Dr. A.P. Mitra to look into the entire range of issues related to climate change.

10.2.4 Biological Diversity.

Conservation of Biological Diversity has gained importance in the recent years. A need has now been felt to have a

convention on biological diversity and an effort has been launched in this regard at the International level, by the UNEP. India is taking an active part in the negotiations for the proposed convention on biological diversity. During the year, India participated in two working Group Meetings to commence negotiations. This is a vast subject, covering in-situ ex-situ conservation, botanical and zoological survey, Bio-technology, access to genetic material and the related issues of technology transfer, intellectual property rights etc. To develop India's position on these issues, the Ministry is carrying out wide-ranging consultation with experts and with all related Ministries and agencies of the Government. An effort was also initiated during the year to prepare a comprehensive status report about bio-diversity conservation measures in India.

10.2.5 South-South Cooperation on Global Environmental Issues

In order to evolve a common strategy amongst the developing countries to deal with global environmental issues, an international conference of selected developing countries was organised by the Ministry during April, 1990. Nineteen developing countries including China participated in the conference. Various issues such as Montreal Protocol, Green House Effect, Biological Diversity and Funding Mechanism to assist developing countries to tackle environmental problems were discussed. The conference achieved in developing a common approach on global environmental issues amongst the developing countries. India is closely associated with further such consultations being organised by the People's Republic of China in June 1991.

10.2.6 Conference on Science and Economic Research Related to Global Changes

India participated in the conference on Science and Economic Research related to global changes during April 1990 in Washington. Eighteen countries, both developed and developing, participated in this Conference

10.3 COOPERATION WITH OTHER AGENCIES AND BILATERAL COOPERATION

The Ministry of Environment and Forests serves as the nodal agency in the country for the 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). Financial contributions are made to these organisations and efforts are made through active participation to obtain adequate benefits. The Ministry and its agencies have undertaken projects with the collaboration

of UNEP, World Bank, European Economic Community (EEC), South Asian Association of Regional Cooperation (SAARC), Canada, United States of America (USA), Sweden, Norway, Denmark, United Kingdom (UK), the Netherlands and Germany. In addition, the Ministry has also signed Memorandum of Understanding (MOU)/protocol for cooperation in the environment sector with countries like Newzealand, France, USSR etc. The details of international co-operation are as follows:

10.3.1 Australia

During the year an agreement under Indo-Australian Cooperation was signed between the two countries for development assistance programme. The specific areas identified for assistance in the environment sector are as follows:

- Recycling technology
- CFC alternatives
- industrial effluent treatment.

10.3.2 Canada

The CIDA assistance for the Social Forestry Project in Andhra Pradesh continued during the year. CIDA is also considering to support two projects at Indian Farmers Fertilizer Cooperative Ltd., and National Dairy Development Board.

10.3.3 Denmark

Specific project proposals with Danish assistance in the States of Karnataka and Tamil Nadu are being taken up in consultation with the concerned State Governments.

10.3.4 European Economic Community (EEC)

A project on air quality monitoring with EEC assistance in the Central Pollution Control Board continued during the year and three ambient air quality monitoring stations have been set up. EEC is also providing financial assistance to South Bhagirathi Integrated Watershed Management Project in Tehri District in U.P. and greening of Aravali in Haryana.

10.3.5 Germany

The German assistance for strengthening of laboratories for Central and State Pollution Control Boards continued during the year. An amount of DM 10 million has been earmarked by the Government of Germany for an integrated project on development of Changar area in Himachal Pradesh under Indo-German Cooperation. Slots for scholarship in the field of forestry and environment have also been provided by the Government of Germany.

10.3.6 Japan

Under Indo-Japanese Cooperation, a project viz., "Afforestation of Indira Gandhi Canal Area (Rajasthan)" is being implemented with Overseas Economic Cooperation Fund (OECE) loan. The project on Afforestation of Aravalli Hills has also been agreed to by the Japanese Government. Three more projects viz., (i) Cleaning of Betwa River (MP) (ii) Integrated Development of Greater Nainital Lake area, and (iii) Ganga/Yamuna Action Plan, have been proposed to the Japanese Government for OECF loan for the year 1991-92. Two more projects one for setting up Environment Research Centre at Madras and the other on Environment Monitoring System and Training are being contemplated under Indo-Japanese collaboration.

10.3.7 The Netherlands

The Projects under Indo-Dutch cooperation are relating to (a) pollution abatement, (b) pollution control (c) industrial counselling and (d) institutional strengthening. The Dutch grant to the Government amounts to Guilders 200 million, out of which 15% has been earmarked for environmental sector Joint Working Committee (JWC) as per Memorandum of Understanding (MOU) has been constituted for identification, coordination and implementation of the projects. Nineteen schemes in Kanpur and Mirzapur under Ganga Action Plan were sanctioned with Dutch assistance out of which 16 have started functioning. Besides Ganga Action Plan, three on-going projects viz. (a) Environmental Impact Assessment Workshops (b) Bio-monitoring of River Yamuna, and (c) Training on Eco-toxicology are being implemented as per schedule.

During the year, ten new projects mostly relating to industrial counselling in various industries like leather tanneries, fertilizers, textiles and fly-ash utilisation and disposal are being contemplated under Indo Dutch cooperation.

10.3.8 Norway

Under Indo-Norwegian Cooperation, a specific project on pollution control in the State of Orissa is being identified and an environmental cooperation programme has been mooted for Aluminium Industry. In this regard a planning mission of Norwegian experts visited the aluminium plants at Renukot and Korba during the year.

10.3.9 Sweden

10.3.9.1 The Swedish International Development Agency (SIDA) continued its support to social forestry projects in the States of Bihar, Tamil Nadu and Orissa, SIDA agreed to provide SEK 7 million to the Indian Institute of Forest

Management for training, curriculum development and campus improvement. Organisation of seminars on forest development coordinated by IIFM Bhopal and the Ministry, have also been supported by SIDA.

10.3.9.2 During the year, a project proposal for Data Management Centre (NFDMC) under SIDA assistance is being formulated. The areas identified in environment sector under Indo-Swedish Cooperation are as follows:

- Training in pollution control
- Pollution abatement in paper and pulp and wood industries; and
- Hazardous waste management

Formulation of the project proposals on these areas has been taken up.

10.3.10 United Kingdom (UK)

Under Indo-UK Cooperation the British Government have announced an additional grant of \$ 40 million over a five year period for environment and forestry projects in India. A forestry project on Western Ghats in Karnataka has been taken up with an estimated outlay of Rs. 105 crores out of this grant. The Overseas Development Agency (ODA) has also proposed to take up environment and forestry projects in H.P. and U.P. hills.

10.3.10.1 Under the ODA assistance a research project on effects of fast growing tree species in Karnataka and a programme on raising captive plantation in an area of 1.4 lakh hectare for meeting the raw material needs of the Mysore Paper Mill are continued. ODA is also providing technical assistance for water quality monitoring and modelling under Ganga Action Plan.

10.3.10.2 Financial assistance is also being considered for the following under ODA:

- Wood Science Institute, Bangalore.
- Forest Genetic and Tree Breeding Institute, Coimbatore
- Establishment of Forestry Information and Record Service, FRI, Dehradun

Assistance to Forestry Training and Education

10.3.10.3 British consultants are providing assistance to the Government of Tamil Nadu for formulating a detailed technical report on cleaning of waterways in Madras. ODA is also contemplating providing financial assistance for the project of development and testing of possible substitutes of Chloro Fluro Carbons (CFCs) prepared by the National Chemical Laboratory, Pune. Financial and technical assistance for implementation of schemes on water quality

monitoring sewerage and sewage treatment systems and training under Ganga Action Plan is being provided by ODA.

10.3.10.4 The UK Government has offered 90 slots for training under Colombo Plan in Forestry and environment sector.

10.3.11 United States of America (USA)

10.3.11.1 Two categories viz. (i) assistance under US aid and (ii) assistance under Indo-US Indian Rupee Fund have been identified for bilateral cooperation with USA. Under US aid category, assistance is provided to National social forestry projects in the States of Arunachal Pradesh, Uttar Pradesh, Rajasthan and Gujarat.

10.3.11.2 Under Indo-US rupee fund, the Wildlife Institute of India, Dehradun and Bombay Natural History Society, Bombay, have taken up research studies in collaboration with the US on wildlife conservation and ecology, endangered species and their habitat.

10.3.12 UNDP/FAO

Modern Forest Fire Control Project and assistance to Wildlife Institute of India undertaken with UNDP assistance under Country Programme (CP-III) have been completed during the year. Under Country Programme (CP-IV) the following projects have been identified for UNDP assistance:

- Assistance to Indian Council of Forestry Research & Education
- Assistance to Wastelands Development
- Assistance to Wildlife Development
- Preparation of National Forestry Action Programme

10.3.13 UNEP

During the year, the Ministry participated in the Second

Special Session of the UNEP Governing Council held in Nairobi in August, 1990. The Special Session addressed itself to the issues referred to the first substantive session of the Preparatory Committee for the 1992 UN Conference on Environment and Development, besides deliberating on other global environmental issues such as climate change convention, technology transfer etc.

10.3.14 World Bank

The World Bank, through the International Development Agency (IDA) is assisting social forestry projects in collaboration with other bilateral donors in five States with an outlay of US \$ 345 million. World Bank has also offered assistance for forestry research, education and training for which services of the World Bank Consultant has been requested for finalising the project.

The Ministry has also formulated a Project proposal for World Bank assistance on industrial pollution control with the following components.

- Institutional Development of the Central and State Pollution Control Boards of Gujarat, Maharashtra, Tamil Nadu and Uttar Pradesh.
- Development and adoption of clean technology.
- Loans for common effluent treatment plants in clusters of small-scale industries and
- Loans to industries for installing pollution control equipment to meet the prescribed standards.

The World Bank is also assisting Ganga Action Plan to the extent of Rs. 63 crores. Proposals to the extent of Rs. 40 crores have already been approved by the World Bank and they are at various stages of execution in all the three states covering Ganga Action Plan.

11. ADMINISTRATION AND BUDGET

11.1 ADMINISTRATION

11.1.1 The strength of the Department including National Wasteland Development Board and Ganga Project Directorate at the Headquarters is 1154 (Group 'A': 230 'B' 349 Group 'C' 338 and Group 'D' 237).

11.1.2 Personnel Policies

In accordance with the revised Recruitment Rules for Group, 'A' Scientific posts in the Department, direct recruitment to several categories of Group 'A' Scientific posts in the Ministry as well as its associated offices was made. Under the Flexible Complementing Scheme 59 Group 'A' scientific officers were reviewed and 39 were promoted to the next higher grade with effect from 01.07.90 and 01.01.91

11.1.3 Reservation in service special drive to recruit scheduled castes/scheduled tribes during 1st July, 1990 to 30th September, 1990

11.1.3.1 A statement showing reservation of scheduled castes/scheduled tribes in the Department as on 31.12.1990 is given in the Table 12.

11.1.3.2 A special drive to fill up backlog of SC/ST vacancies for Group 'A' 'B', 'C' and 'D' posts in the Ministry and its associated offices was taken up. Recruitment action was initiated for 221 posts in all four groups. Selections for 28 posts which belong to CSS/CSCS/CSSS, are to be made by the Department of Personnel and Training. Out of the remaining 193 vacancies selection were made for 116 posts during this period thereby attaining 60% achievement in this regard.

11.1.4 Joint Consultative Machinery

The Departmental Council of the Ministry set up under the Joint Consultative Machinery and Compulsory arbitration for Central Government Employees continued its activities during the year. Three meetings were held to sort out issues raised by the employees. Office Council set up in the associated offices continued to function regularly. Office Council of the Ministry also held four meetings during the year. Regional Councils have also been set up in Botanical Survey of India and Zoological Survey of India under the Joint Consultative Machinery Scheme.

11.1.5 Use of Hindi

11.1.5.1 Hindi as official language is being progressively used in the Ministry and its attached and subordinate offices. The Hindi Salahkar Samiti—an advisory body for the Ministry on language policy—has met thrice during the year. The Official Language Implementation Committee of the Ministry also met regularly during the year.

11.1.5.2 Inspection of Offices

In order to ensure effective implementation of the Annual Programme and instructions on use of Hindi, 21 attached offices under the Ministry of Environment and Forests were inspected during the year.

11.1.5.3 Training in Hindi

Special arrangements for training in Hindi/Hindi typing/Hindi Shorthand were made for employees of the Ministry. During the year, four employees passed pragya Examination. Five Stenographers and seven typists passed Hindi Stenography and Hindi typing Examination respectively.

11.1.5.4 Hindi Week

Hindi week was organised during 10-14 September, 1990 during which various competitions were held and prizes distributed to the winners.

11.1.5.5 Incentives for Hindi Books on Environment Subjects

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 39 entries received under this scheme the following were awarded prizes.

Vatavaran Niyojan Evam Vikas By Prof. Dr. Jagdish Singh	Rs. 10,000
Vanya Prani Sanruxan Evam Praband Takneek by Dharamvir Kapil	Rs. 7,000 (Second)
Parichayatmak Paryavaran Pardusion Niyantaran Ek Samanya Vishlashan By Dalip Kumar Markandeya and Nilima Rajvadiya	Rs. 5,000 (Third)
Parvasi Jiv Jantu By Shyam Sunder Sharma and Dr. Ashok Kumar Malhotra	Rs. 2,000 (Consolation)

11.1.5.6 Publication of Journal

The quarterly Hindi journal 'Paryavaran' continued to be published by the Ministry in order to encourage creative writing in Hindi among its officers and employees.

11.1.6 Orientation Course on Office Procedure

An in-house training programme in Office Procedure Noting and Drafting, Departmental Security Instructions and Parliamentary Procedure was organised for 21 newly

Table 12

Statement Showing the total Number of Government Servants and the Number of Scheduled Castes and Scheduled Tribes Amongst them in the Department of Environment, Forests & Wildlife as on 31.3.1991

Group	Sanctioned strength	Number position	Scheduled Castes	Percent to total Number of employees in position	Scheduled Tribes of employees	Percent to total number
1	2	3	4	5	6	7
Group 'A'	230	197	12	6.09%	5	2.53%
Group 'B'	349	271	26	9.59%	2	0.7 %
Group 'C'	338	283	20	7.07%	5	1.76%
Group 'D'	209	200	67	33.5 %	19	9.5 %
(excluding Safaiwala)						
Group 'D'	28	28	28	100%	—	—
Total	1154	979	153	15.63%	31	3.17%

recruited scientific officers of the Ministry from 30.07.1990 to 03.08.1990

11.1.7 Modernisation of Government Offices

Three FAX Machines have recently been installed, one each at Paryavarn Bhavan, New Delhi, Botanical Survey of India, Calcutta and Indian Council of Forestry Research and Education (ICFRE), Dehra Dun. This device has facilitated speedy communication between the Ministry and its Subordinate offices located at the two Centres.

11.1.8 Civil Construction Unit (CCU)

11.1.8.1 The Ministry of Environment and Forests has its own Civil Construction Unit, headed by a Chief Engineer, for securing expeditious completion of construction activities of the various Units of the Ministry viz. Botanical Survey of India, Zoological Survey of India, National Museum of Natural History, Indian Council of Forest Research and Education, Indira Gandhi, National Forest Academy, Forest Survey of India and National Zoological Park, New Delhi.

11.1.8.2 The CCU has Divisions and Sub-Divisions set up at Delhi, Bangalore, Dehra Dun, Mysore, Coimbatore, Jodhpur and Jabalpur, where works costing Rs. 23.6 crores are being executed by it directly. CCU looks after the pre-construction planning work while the execution is entrusted to CPWD for works at other places. All maintenance work is also looked after by CPWD.

11.1.8.3 At present CCU has undertaken 15 major construction projects amounting to Rs. 1213 lakhs. Some of the projects are:

- Construction of residential quarters of IGFA, Dehra Dun.
- Construction of Regional Museum of Natural History, Mysore.

- Construction of NMNH building, New Delhi.
- Construction of Institute of Wood Science and Technology, Bangalore.
- Construction of Institute of Northern Peninsular Deciduous Forests, Jabalpur.
- Construction of residential quarters for Forest Laboratory Sandal Research Centre, Bangalore.
- Construction of office-cum-laboratory building for F.S.I., Dehradun.

In addition, CCU has also taken up deposit works of G.B. Pant Himalayan Institute of Environment at Almora (U.P.) and some works of NMNH at New Delhi. The field workload of the unit during 1990-91 is about Rs. 60 crores.

11.2 WELFARE

11.2.1 An officer of the level of Under Secretary in the Ministry has been designated as Welfare Officer to attend to matters relating to staff welfare. The Recreation Club, set up with the objective of promoting sports, Cultural and other leisure-time activities, played very active role during the year.

11.2.2 The staff of the Ministry participated in interministerial Volley Ball and Cricket tournaments and Athletics. Employees from the Ministry secured the award for best Volley Ball player in the Central Secretariat and prizes in 1500' metres 100 metres races and 400 meters walk.

11.2.3 One of the employees participated in the National Athletic Meet and secured second prize in 800 metres and third prize in 400 metres races. Besides, he stood first in 4 × 400 metres relay race. He also participated in the World Veteran Athletic Meet held in the U.S.A.

11.2.4 A staff member of this Ministry, was selected as a member of the Central Secretariat sports Boards Cricket

Team. Another staff member participated in the Central Secretariat Basket Ball Team.

11.2.5 The Recreation Club organised a cultural meet on 28th July 1990. Prizes were awarded by the Ministry of Environment and Forests in a function organised by the recreation club on 10th February, 1990 to the participants of the cultural programme and to the winners of the inter-ministerial indoor and outdoor tournaments.

The Recreation Club also organised a picnic to Lotus Temple and Kalandi Kunj on 17th February, 1991 for the benefit of the staff and their families.

11.2.6 The sports Day of the Ministry, held on 28th March, 1991, attracted enthusiastic response from officers and staff. Several field and track events were held in which officers and staff and their family members participated.

11.3 BUDGET

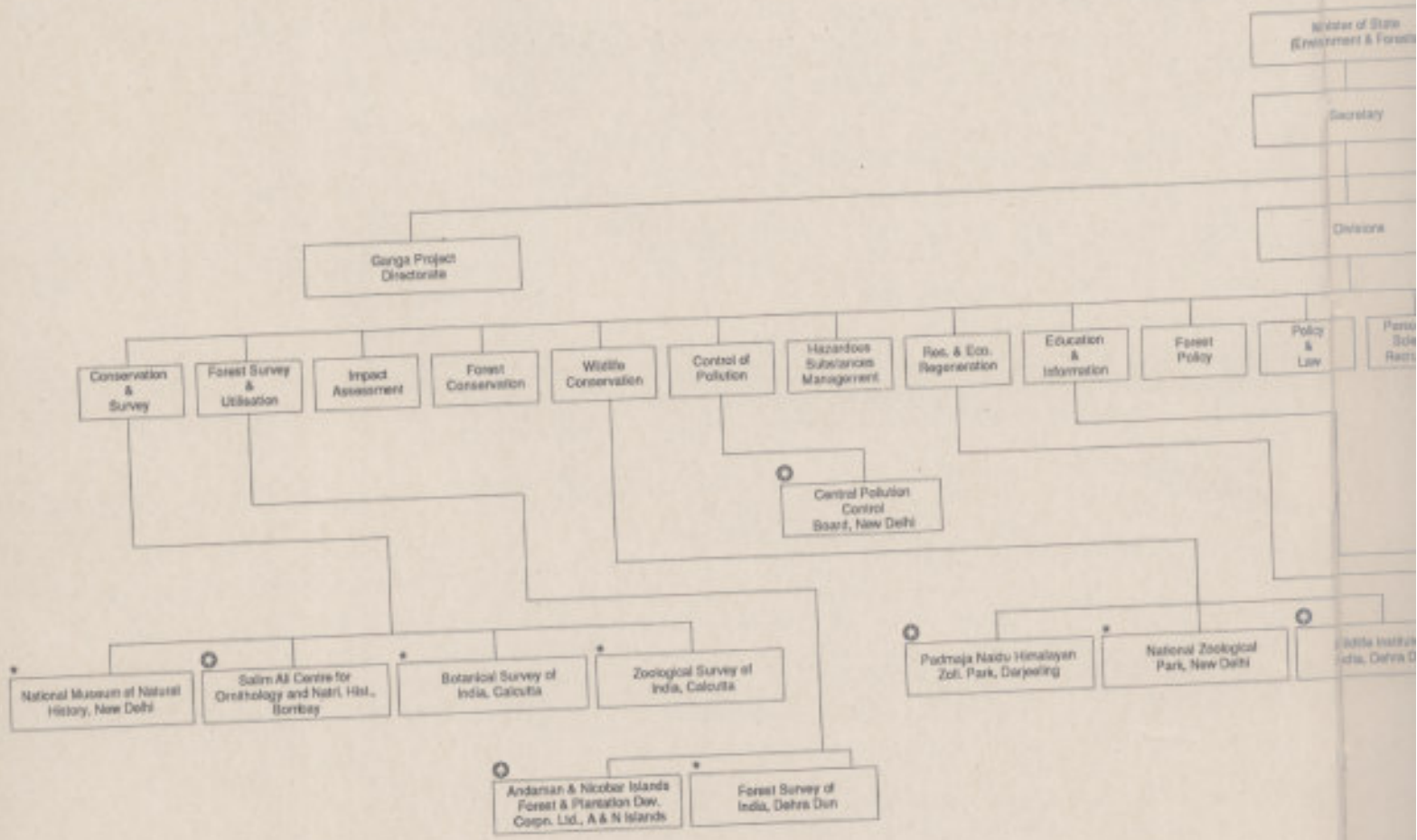
11.3.1 The total allocation for the Ministry for the year

1990-91 was Rs. 237 crores, which was revised to Rs. 209.26 crores in the Revised Estimates (RE), mainly to effect economy. The expenditure is estimated as Rs. 207.17 crores which means 99% utilisation.

11.3.2 The allocation provided for the Ministry in the Annual Plan 1991-92 is Rs. 300.44 crores, which is 26.8% higher than that provided in 1990-91 and 43.6% higher than the Revised Estimates for 1990-91. This increase in the allocation is indicative of the importance accorded to the work assigned to the Ministry. Sector-wise break up of the allocations is given below:

Sector	1990-91		1991-92
	BE	RE	BE
Environment	41.00	30.83	47.23
Ganga Action Plan	71.00	62.00	70.00
Forests & Wildlife	40.00	36.43	53.20
National Wastelands Development Board	85.00	80.00	130.01
Total	237.00	209.26	300.44

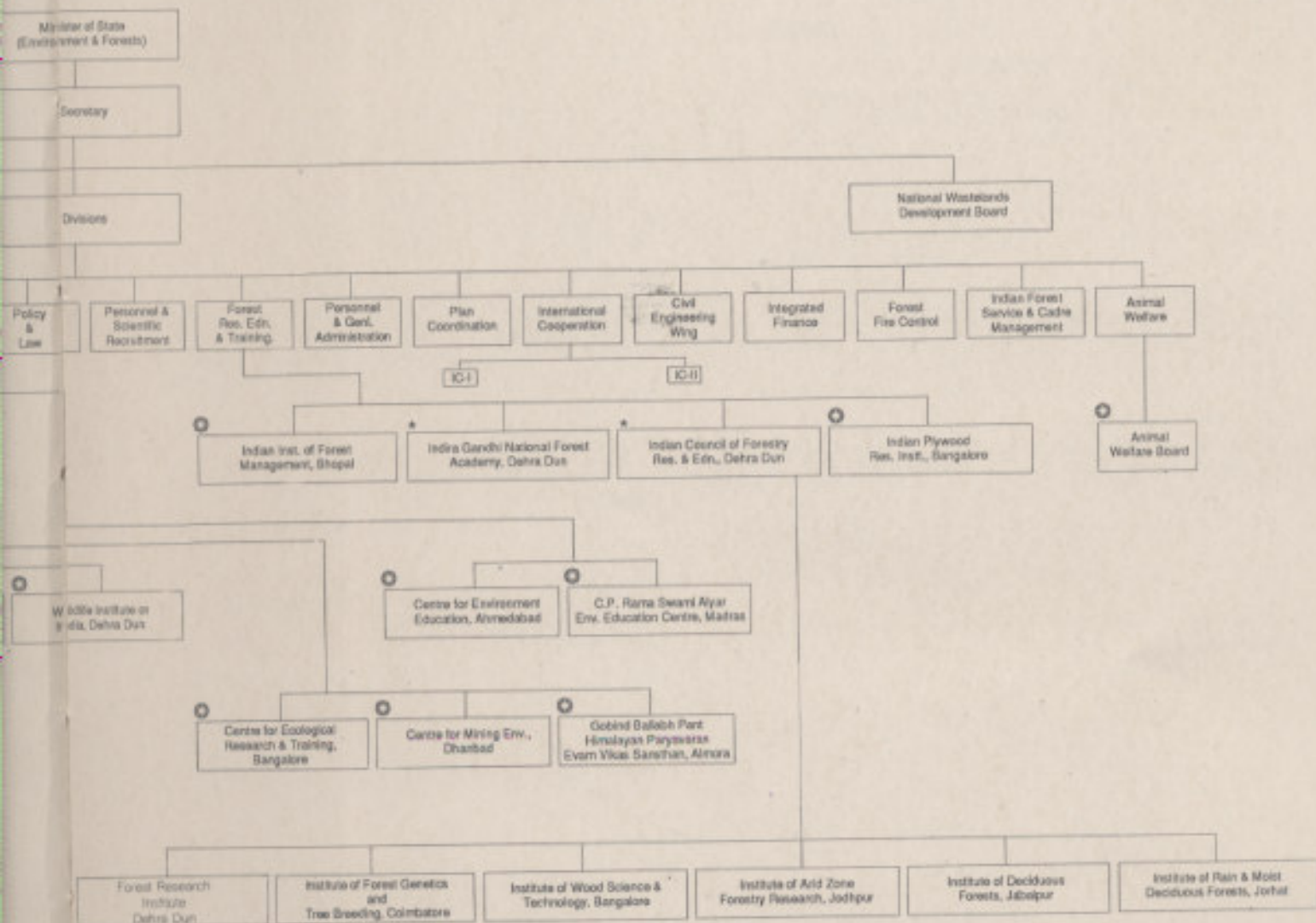
ORGANISATION CHART OF THE MINISTRY



○ —Autonomous agencies assisted by the Ministry.
 * —Associated Units under the administrative control of the Ministry.

ANNEXURE I

THE MINISTRY OF ENVIRONMENT & FORESTS



LIST OF PROJECTS SANCTIONED DURING 1990-91

Sl. No.	Title of the Project	Institution	Sl. No.	Title of the Project	Institution
Environmental Research/Man and the Biosphere					
1.	Exploration of nitrifying and denitrifying bacteria for microbial treatment of effluent from Nitrogen Fertilizer Industries.	Jamia Milla Islamia New Delhi-110 025.	15.	Ethnobiological investigations of Karnataka, North Kerala, and Lakshdweep and Ethnopharmacology of tribal drugs/folk medicines.	Regional Research Institute, Poojapura, Trivandrum-12.
2.	A study on the impact of oil exploration on the microflora in the rice fields of upper Assam.	Institute of Advanced Study in Science and Technology, Khanna Para, Guwahati.	16.	Environmental impact of increased ultra-violet-B Radiation on Fresh Water Algae.	Banaras Hindu University, Varanasi.
3.	Carrier mediated transport through liquid membrane in pollution abatement.	Banaras Hindu University Varanasi.	17.	Physiological and biochemical studies on algae from certain harsh environment.	Banaras Hindu University, Varanasi.
4.	Studies on rain chemistry and dry deposition in Agra.	Dayal Bag Educational Institute, Dayal Bag, Agra.	18.	Behaviour ecology and measures for conservation of bats.	School of Biological Science, Madurai Kamraj University, Madurai.
5.	Health effect of environmental pollution by Rayon grade pulp and fibre industry in Mavoor, Kerala.	Medical College and Kerala Pollution Control Board, Trivandrum.	Himalayan Region		
6.	Microbial degradation of poly cyclic aromatic hydrocarbons in soil and subsurface environment in vicinity of Mathura Oil refinery.	Inter disciplinary Biotechnology Aligarh Muslim University, Aligarh.	1.	Response of Hydrologic cycle to environmental degradation in the Khulgad Catchment, Distt. Almora, Uttar Pradesh.	Central Himalayan Environmental Association, Nainital-263 001.
7.	Studies on the Gangetic Dolphin (<i>platanista gangetic</i>) of Brahmaputra river with special reference to its population.	Department of Zoology, Gauhati University, Gauhati.	2.	Rare medicinal flora of Himalayan region; Active constituents and chemical variation with respect of the environmental factors.	Kumaun University Nainital-263 001 (U.P.).
8.	Production of certain biogenic matter dynamics and nitrogen mineralisation in major habitats of dry tropical environment.	Banaras Hindu University, Varanasi.	3.	Selection and clonal multiplication of Elite seedling plant of the Maggar Bamboo (<i>Dendrocalamus hamiltonii</i>).	H.P. Krishi Vishwavidyalaya, Palampur, Kangra (H.P.)
9.	Long-term effects of treated and untreated sewage irrigation and productivity of wheat and paddy crops.	Department of Botany, Banaras Hindu University, Varanasi.	4.	Aspects of Helminthiasis in animals of food value and human populations in Meghalaya.	North Eastern Hill University, Shillong, Meghalaya.
10.	Introduction multiplication, Conservation and documentation of Nelumbo (lotus) and Euryle Species/cultivars.	National Botanical Research Institute, Rana Pratap Marg, Lucknow.	Western Ghat Region		
11.	Ethnobiological investigation in Maharashtra.	Department of Botany Nagpur University, Nagpur.	1.	Experiments on the eco-restoration at the abandoned iron ore mine sites and the rejected dumps of Goa, India.	Dhemphe College of Arts and Science, Panaji, Goa.
12.	Ecology and distribution of Gastropod Molluscs of Jammu and Kashmir State together with the caracariae parasites in them.	University of Jammu, Jamm.	2.	Exploitation of Microbiol systems associated with forest tree species for the eco-development of the Vivekananda Puram of Karamadevi Block.	Avinashalingam Institute for Home Science & Higher Education for Women, Coimbatore, Tamil Nadu.
13.	Importance of Forests in tribal economy and effective management of forest resources.	Indian Institute of Public Administration, Delhi-2.	3.	Conservation through micro propagation of rare and exquisite orchids of the Western Ghats.	Tropical Botanic Garden and Research Institute, Palode, Trivandrum, Kerala.
14.	Publication of pocket flora of Central Tamil Nadu.	St. Joseph College, Tiruchirapalli-2.	Eastern Ghat Region		
			1.	Ecology & Management of Mammalian resources of the Eastern Ghats.	Department of Env. Sciences, Andhra University, Waltair.

Sl. No.	Title of the Project	Institution
2.	Hydrobiological investigations in some estuarine environments of South Orissa Coast.	Berhampur University, Berhampur (Orissa).
3.	Studies on the flora & vegetation of Kolli hills, Tamil Nadu.	Department of Botany, Vellalar College for Women, Erode (Tamil Nadu).
4.	Eco-development study of Mesas—the vanishing landform in Eastern Ghats of Orissa.	Department of Geology, Utkal University, Bhubaneswar.
5.	Studies on distribution and status of the river Otter for their conservation in three ecologically different habitats in the Eastern Ghats area.	Department of Zoology, Osmania University, Hyderabad.

Sl. No.	Title of the Project	Institution
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Wetlands

Project proposal to demonstrate comprehensive usage of the wetland land at Ujni based on biological, hydrological and socio-economic surveys of the conditions of the wetlands and its surroundings.	Ecological Society, Pune.
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Mangroves

Study of the impact of pollution on the mangrove fauna of Thane Creek near Thane City.	Department of Zoology, B.N.S. Bandodkar College of Science, Thane.
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LIST OF PROJECTS COMPLETED DURING 1990-91

Sl. No.	Title of the Project	Institution	Sl. No.	Title of the Project	Institution
Environmental Research-Man and the Biosphere					
1.	Monitoring and surveillance residues of organochlorine pesticides	Department of Zoology M.V. Mahavidyalaya Bhopal-462003.	15.	Role of physiological and immunological factors in human adaptation over long term exposure to pathogenic biopollutants	V.P. Chest Institute Delhi University Delhi.
2.	Impact of heavy metals and industrial wastes on some physiological and bio-energetics of two fresh water fishes.	Department of Zoology Banaras Hindu University Varanasi.	16.	Studies on ecology of participated food fishes and unpolluted estuarine and marine environment	Deptt. of Zoology Ahdyra University Visakhapatnam
3.	Airborne fungal spores in urban Calcutta in relation to allegenic diseases.	Bose Institute, Calcutta.	17.	Investigation into pollution of surface and ground water sources due to effluent of chemical industries under village Bichri, Distt. Udaipur Rajasthan and its impact on community.	Centre for Science and Environment, Delhi-10
4.	Herbicide Persistence and Behaviour in plant water & soil eco-system	FIPPAT, Paqappai Tamil Nadu.	18.	The effect of flouride toxicity and fluorosis on soft tissue calcification.	All India Institute of Medical Science, New Delhi-29
5.	Human and Animal Study on Ethopathogenesis of Dental Fluorosis.	Madras Dental College Madras.	19.	Design and construction of long path spectro-photometer for characterisation of some air pollution.	School of Energy Environment and Natural Resources Madurai Kamraj University Madurai
6.	Microbial degradation of waste water from coal gasification industries in treatment plants.	National Environment Engineering Research Institute, Nagpur.	20.	Biological Indicator in assessing the quality of water and pollution.	Deptt. of Botany Osmania University Hyderabad
6.	Microbial degradation of waste water from coal gasification industries in treatment plants.	National Environment Engineering Research Institute, Nagpur.	21.	Environmental studies of endemic fluorosis goitre and stone and their epidemiological inter relationship.	L.L.R.M. Medical College Meerut, U.P.
7.	Plant colonisation on industrial waste lands survey, ecology and survey of biological, peculiarities in the reclamation perspectives.	Department of Botany University of Calcutta, Calcutta-19.	22.	Study on removal of Lignin/color from pulp and paper mills waste by biodegradation on waste by biodegradation on waste cellulosic material during aerobic conditions.	National Environmental Engineering Research Institute Nagpur-20
8.	Impact assessment, methodology, against pesticide pollution estuarine and marine waters.	Department of Zoology University of Calcutta, Calcutta.	23.	Aero-aquatic fungr, their place and role in aquatic environment	Deptt. of Botany Lucknow University Lucknow 226007
9.	Chemistry and Ecological aspects of tiger Leopard Pheromones.	Indian Statistical Institute	24.	Cement dust hazard and strategies in its control.	M.L. Sakhadia University Udaipur
10.	Developing and application, of physiochemical speciation schemes for assessment of environmental impact of heavy metals with special ref. to chromium cadomum, lead & mercury.	National Environment Engineering Research Institute, Nagpur.	25.	A case study for the effects of resident and non-resident (pilgrim) population of Tirumala, Tirupati Area.	Sri Venkateswar University Tirupati
11.	X-ray flooreance, study of aerosol and water samples	Deptt. of Physics, Punjabi University Patiala.	26.	Studies on bioconversion of domestic and industrial wastes through biogas.	Department of Food Technology and Bio- Engineering Jadavpur University Calcutta-32.
12.	Studies on occurrence and behaviour of microflora in oil stressed soils of Pehrla Refinery	Deptt. of Botany Sri Rama Krishna Mission Vivekananda College Madras.	27.	A comperative study of the impact of Industrialisation and urbanisation of the environment of Visakhapatnam	Andhra University Visakhapatnam-3
13.	A case study of Agra Tennaries effluent	Deptt. of Botany Agra College, Agra.			
14.	Bioresources of the Krishna river system including the identification of Pathogen and pollutants	Zoological Survey of India 100, Santhome Road Madras			

Sl. No.	Title of the Project	Institution
28.	Ecophysiological and Biochemical studies on the vegetation of heavy metal deposite and polluted region.	M.L. Sukhadia University Udaipur
29.	Ecological studies including Biological indicators of water quality in Kukutapatty Nala, Hyderabad	Vivek Vardhini College Hyderabad
30.	Cost Benfit analysis of pollution leather tennery industry.	The Humanities Academy Madras.
31.	Conservation and Management measures for the Block buck (Antilope-Cervicapra) anendangered species in Andha Pradesh through analysis of habitat some range and social interactions including comparative observations on the Chiakara the Indian Gazelle.	University College of Science Osmania University Hyderabad-7.
32.	Bochemical mechanisms of function toxicity of propane 1,2 diot-on unsuspected environmental hazard.	Department of Biochemistry Punjab University Chandigarh.
33.	Ethnozoological survey and ecology of tribal areas of santhal paragan	Department of Zoology Bhagalpur University Bhagalpur
34.	Conservation to folk medicine tribal medicine of Kerala	Post Graduate Research Centre Ayurvede College Trivandrum-12
35.	Study and assessment of plant response against air pollution in industrial environment.	School of Studies in Botany Vikram University Ujjain
36.	Floristic investigation of Chandrapur division with special reference to Ethnobotany and phytochemistry.	Departmennt of Botany National Environmental Engineering Institute, Nagpur
37.	All India Coordinated Programme on Air Pollution and plants study of eco-physiological responses of regional plant species to the pollutants emitted by fertilizers and refineries.	National Environmental Engineering Research Institute, Nagpur
38.	Ecology of saline areas of Rajasthan and exploration of saline ecosystem for increased productivity.	Department of Botany Jodhpur University Jodhpur
39.	Himalayan Nomads tradition transition and environment.	Department of Political Sciences, University of Garhwal, Srinagar, UP.
40.	Influence of biotic and human activities onthe ecology and reproduction in the ferns and fernallies of Rajasthan	Department of Botany University of Jodhpur Jodhpur.
41.	Integrated project on environmental degradation of obra Renukoot Singrauli area and its impact on natural and derived ecosystems.	Department of Botany Banaras Hindu University Varanasi.

Sl. No.	Title of the Project	Institution
42.	Effects of pesticides on Rhixobium legume association..	Department of Zoology Sri Venkateshwara College, Delhi.
43.	Studies of the migratory bird Grey Pelican (Pelecanus Philippensis to analyse and assue ecological principles spelling survival on their traditional haunts in India during winter sojourn	Department of Zoology Osmania Universit Hyderabad
44.	Studies on long-term environmental effects of Beas-Sutlej Hydro-electric project (Stage I & Satage II).	Himachal Pradesh Krishi Vishwavidyala, Palampur, Himachal Pradesh.
45.	Study of air pollution in and around the Bombay urban area.	Department of Botany Indian Institute of Science, Bombay.
46.	All India Coordinated Research project of Ethnobiology	Regional Research Laboratory Canal Road, Jammu.
47.	Impact of construction and completion of BSL project the faunal components with particular reference to their.	Zoological Survey of India Solan (HP).
48.	Mussel watch programme.	Centre of Advanced Study in Marine Biology, Annamalai University, Parangipettai, Tamil Nadu.
49.	Succession diversity and trophic relationship of insects in the leaf littewr habital in some forests ecosystem and the impact of pollutants on the dynamics of litter fauna.	Division of Entomology Loyala College Madras Tamil Nadu.
50.	Study of pollution sink efeciency growth response & productivity pattern of plants with respect of fly-ash & SO2 pollutants.	Centre of Advanced Study in Botany Banaras Hindu University Varanasi.
51.	Ecological studies on environmental degradation affecting primary produtivity of terrestrial ecosystems in the plains and hills of Allahabad district and adjoining areas.	Department of Botany Allahabad University Allahabad.
52.	Genetical effects of environmental pollutants of living system and study of their antagonistic and synergistic action in relation to Biosphere.	Department of Botany University of Calcutta Calcutta

Himalayan Region

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| 1. | Eco-development of Shivalik Himalaya: Improvement of Ecosystem for sustained productivity conducive to the economic development of the Ghar Region. | Department of Botany Government PG College Kodwar Garhwal (UP) |
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Sl. No.	Title of the Project	Institution	Sl. No.	Title of the Project	Institution
2.	Geological and Geomorphological investigations on land slides in the Kumaun Himalaya: Causes and Prevention	Department of Geology Kumaun University Nainital-263 001 Uttar Pradesh.	2.	Socio-economic problems associated with displacement and rehabilitation of families in irrigation project areas of Western Ghats Region	Department of Agricultural Economics, Mahatma Phule Agricultural University, Rahuri, Maharashtra.
3.	Hydrology and sedimentation establishment of grazing meteorological station for collecting run-off and sediment data	GB Pant University of Agriculture & Technology Hill Campus, Ranichauri, Tehri Garhwal (UP).	3.	Response of plant to the mining sites situated at Pale and Sirigao	Department of Botany SP Chowgule College Marmagao, Goa
4.	Structure and Function of grassland ecosystems.	Department of Biosciences Himachal Pradesh University, Shimla.	4.	A pilot project to restore the biological diversity in one of the critical areas of Western Ghats with a view to improve the quality of vegetation, check erosion and subsequent sitting up of an irrigation reservoir and also to demonstrate to local people usefulness and benefits of horticulture and forestry.	Ecological Society Abhimanshree Society Rashan Road, Pune, Maharashtra.
5.	Social forestry for the rehabilitation of degraded community lands in the Hills of UP.	GB Pant University of Agriculture & Technology Hill Campus, Tehri, Garhwal, UP.	5.	Eco-development of selected micro-catchment in the Bedthi-Aghanashini river basins of the Uttar Kannada district of Karnataka State.	Karnataka State Council of Science and Technology, Bangalore, Karnataka
6.	Expansion in the area of fruit trees through exploitation of indigenous species.	GB Pant University of Agriculture & Technology Hill Campus, Ranichauri Tehri Garhwal, UP.	6.	Studies on landslides and landslides in Wynad Distt. of Western Ghats Region of Western Ghats Region.	surface Water Division Centre for Water Resources Development & Management Kunnamangalam (MBR) Kozikode- Kerala.
7.	Ecological studies on regeneration of a few tree species in subtropical wet hill forests of Meghalaya	School of Life Sciences North Eastern Hill University, Shillong-793 001, Meghalaya	7.	Flowering, seed set and seed quality in forest, plantation, forage and vegetable crops as influenced by the agro-techniques and pollutants affecting the ecological balance.	Agricultural College & Research Institute, Tamil Nadu Agricultural University, Coimbatore Tamil Nadu.
8.	Ecological process in the desertification of West Khasi Hills Distt. and the consequences	School of life Sciences, North Eastern Hill University, Shillong-793 001. Meghalaya.	8.	Scheme for developing forage grasses forage legumes and forage trees for hill areas of Palani hills of Western Ghats.	Department of Forage Crops Tamil Nadu Agricultural University Coimbatore, Tamil Nadu.
9.	Transfer of propagation Technology of Maggar Bamboo	Department of Basic Sciences, Himachal Pradesh Krishi Vishwavidyalaya, Palampur-176 062.	9.	Exploitation of microbial systems associated with plant species in the eco-development of Western Ghats Region	Department of Microbiology, Tamil Nadu Agricultural niversity Coimbatore, Tamil Nadu.
10.	Impact of sheep and goats on the economy and environment of high altitude area of HP.	Department of Agricultural Economics, HPKVV, Palampur-176062.	10.	Physico-chemical and biological analysis of some lakes and reservoirs on Western Ghats with special reference to pollution	Department of Environmental Pollution, Science College, Karad Karnataka
11.	Survey of Watershed of the Aglar Basin so as to evolve a techno-economically viable methodology to draw up an eco development plan.	Indian National Trust for Art & Cultural Heritage, 71, Lodi Road, New Delhi-3			
12.	A study of environmental and socio-economic issues, case study of Dhauli-ganga Hydroelectric Power Project areas.	Organisation for Applied Socio-economic system B-4/135, Paschim Vihar New Delhi-110 063			

Western Ghat

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| 1. | Integrated Research and Development Programme of fodder conservation and animal production in Western Ghat region of Maharashtra State. | Department of Genetics,
Mahatma Phule
Agricultural University,
Rahuri, Maharashtra |
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Eastern Ghats

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| 1. | A study on the floristic ecology of Sherwaroy hills of Salem Distt. (Eastern Ghats) | Bharathidasan University,
Tiruchirapalli |
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Sl. No.	Title of the Project	Institution
2.	Project Bihang: Conservation oriented appreciation of seasonality, population structure and dynamics of bird fauna and their service to human society in the Northern-Eastern Ghats and the surrounding habitat.	Nature and Wildlife Conservation Society of Orissa, Bhubaneswar
3.	A study of ecology and distribution pattern of wild rodents of Eastern Ghats.	Nature and Wildlife Conservation Society of Orissa, Bhubaneswar
4.	An integrated study of assessment of Eastern Ghats for terrain evaluation, land use, resources utilisation and eco-development	Department of Geology, Utkal University Bhubaneswar
5.	Survey and systematic description of Citrus, Mango, Jackfruit, and Tamarind in Eastern Ghats.	Department of Horticulture, Orissa University.
6.	Collection and retrieval of the available data on living resources (plants and animals) wetlands, soil climate and earth resources of Eastern Ghats for preparation of bioclimatic and other thematic maps (between Subarnarekha and Godavari section).	Department of Geography, Utkal University, Bhubaneswar.
7.	Seagrass ecosystem of the Coramandel Coast	Department of Chemical Engineering, IIT, Madras.

Sl. No.	Title of the Project	Institution
8.	Ecological studies of the grazing lands of Eastern Ghats.	School of Biological Sciences, Madurai Kamaraj University, Madurai (TN).

Biosphere Reserves

1.	Bio-ecological studies on the aquatic insects of Nilgiri Biosphere Reserve	Loyala College, Madras.
2.	Ecological studies and long term monitoring of biological processes in Silent Valley	Kerala Forest Research Institute Kerala.
3.	Studies on Hydrological Processes and their impact on Nilgiri Biosphere Reserve Remote Sensing Techniques	Centre for Water Resources Development & Management Kozhikode, Kerala.

NNRMS

1.	Ecological aspect of industrialisation and urban spread between Ahmedabad and Vapi.	GEER Foundation Ahmedabad
2.	Environmental impact on coastal wetlands of Vedaranniyam Tamil Nadu.	Anna University Madras
3.	Study of impact of industrialisation on urban and rural environment in Madras Metropolitan area.	Anna University, Madras and Madras Metropolitan Development Authority.

COMPOSITION OF NATIONAL WASTELANDS DEVELOPMENT BOARD

A. Ex-officio Members

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|--|--------------|
| (1) Union Minister in charge for Environment & Forests | —Chairperson |
| (3) Member, Planning Commission, in charge of Environment | —Member |
| (4-8) Secretaries to the Govt. of India in the Departments of: | |
| — Agriculture & Cooperation | —Member |
| — Rural Development | —Member |
| — Agriculture Research & Education | —Member |
| — Expenditure | —Member |
| — Science & Technology | —Member |
| (9) Member-Secretary, National Land Use & Conservation Board | —Member |
| (10) Inspector General of Forest, Govt. of India | —Member |
| (11) Chairman, National Bank for Agriculture and Rural Development | —Member |

B. Nominated Members

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| (12) Shri Dilip Singh Judeo, MP. | —Member |
| (13) One M.P. from Rajya Sabha | —Member |
| (14) Smt. Ela Bhatt | —Member |
| (15) Dr. V. Kurien | —Member |
| (16) Dr. U.N. Dev | —Member |
| (17) Shri Anil Aggarwal | —Member |
| (18) Chief Secretary to the Govt. of Rajasthan | —Member |
| (19) Chief Secretary to the Govt. of Karnataka | —Member |
| (20) Chief Secretary to the Govt. of Maharashtra | —Member |

C. Member Secretary

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| (21) Secretary (Environment and Forests) | Member Secretary |
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ANNEXURE V

LIST OF FILMS PRODUCED BY THE MINISTRY OF ENVIRONMENT & FORESTS

1. Ganga Action Plan—Patna-Hindi	(U-matic)	34. Our Environment—Our Future-Goa's Environment	(VHS)
2. Ganga Exhibiton—Patna, 19 Sept., 1986	(VHS)	35. Film on "Drought and Flood"	(U-matic)
3. Ganga the Eternal flow	(U-matic)	36. The causes underlying environmental Degradation in the Southern Aravallis	(U-matic)
4. The agony of Ganga—20 minutes	(U-matic)	37. "Whose Forests" Kadars of Kerla	(16 mm)
5. Action Kanpur—Hindi	(VHS)	38. Ecological Problems of Palani Hills	(U-matic)
6. Ganga Pradushan Niyantran	(VHS)	39. A series of 3 video films of Floods and droughts:—	
7. Public service messages	(VHS)	— Increasing frequency and ferocity of flood in India	(U-matic)
8. Ganga spot film	(VHS)	— Droughts, environmental issues causing droughts, solutions	(U-matic)
9. Pradaksheena-English version	(U-matic)	— Effect of deforestation on rainfall	(U-matic)
10. Haridwar Kumb: Ekta ka pratick—20 mts.(U-matic)		40. Video coverage of selected programmes of NEAC-87	(U-matic)
11. The Golden River: Action Allh.	(U-matic)	41. Meghdoot	(U-matic)
12. Environmental technology—English version	(VHS)	42. Van Vanita—a film on role of women on wastelands development	(U-matic)
13. Spot on Ganga (Nehru)	(U-matic)	43. Anokhi Hartal	(16 mm)
14. Ganga project—Feed from Varanasi	(U-matic)	44. Mycorhizze—The wonder root Fungus Association	(16 mm)
15. Ganga Action Plan-Up—Hindi (SAMPARK)	(VHS)	45. Conserving our Water Resources	
16. Spot on Ganga—Child	(U-matic)	46. Dream of Trees—A film on the involvement of school children in wastelands development	(U-matic/VHS)
17. Abhiyan Hardwar—Rishikesh	(U-matic)	47. Taru Deva Bhav (Tree is Good)—A general awareness film-Hindi	(VHS)
18. Ecology of river Ganga		48. Drumadala (Army of Trees) Series— Restoration: Social fencing and wastelands development by village Community	(VHS)
19. Ganga Pollution	(VHS)	49. Drumadala (Army of Trees)— Revival: Social Forestry in the Industrial Municipal Area of Pimpri Chinchwad	(VHS)
20. Ganga Seva Shivir—Nehru Yuvak Kendra	(VHS)	50. Drumadala (Army of Trees) Series: Transformation: The Success Story of Anna Sahib Hazare	(VHS)
21. Ganga Exh. at Calcutta	(VHS)		
22. Ganga Seva Shivir—Magh Mela-3 copies	(U-matic)		
23. Action West Bank—Calcutta	(VHS)		
24. Ganga Action Plan	(VHS)		
25. The life of Ganga	(VHS)		
26. NEAC-1986—A coverage of NEAC/NEM Programmes of Delhi	(U-matic)		
27. Ganga	(U-matic)		
28. Surya	(U-matic)		
29. Aspirations	(U-matic)		
30. Karkash on Noise Pollution & Environment	(U-matic)		
31. 'Hamsini' on Noise Pollution and Environment	(U-matic)		
32. Vanashri	(U-matic)		
33. Short film on Cobra & Corocodiles	16 mm		