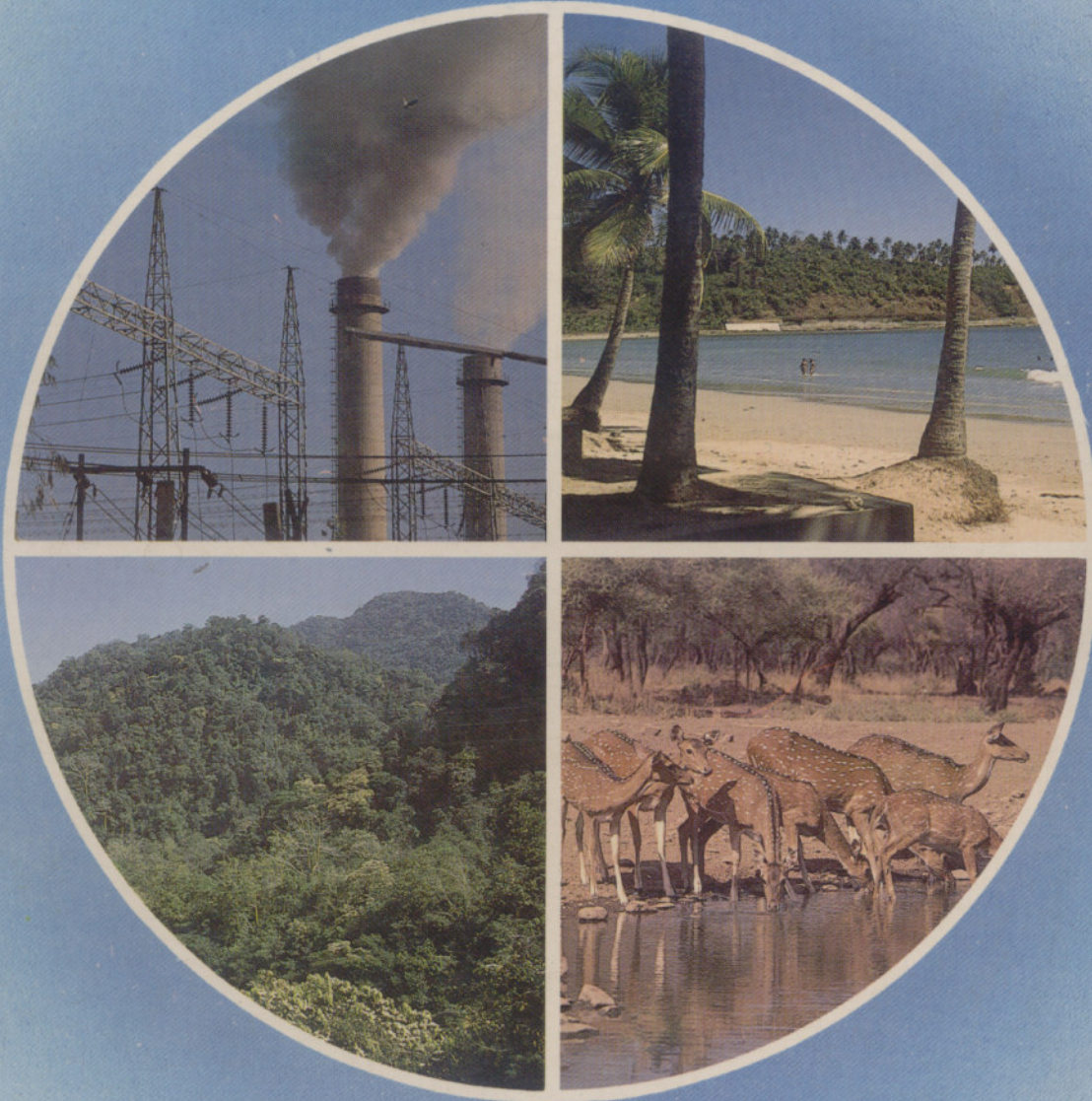




ANNUAL REPORT 1988-89



MINISTRY OF ENVIRONMENT & FORESTS
GOVERNMENT OF INDIA

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1. INTRODUCTION

1.1 ROLE AND ORGANISATION

1.1.1 The Ministry of Environment & Forests serves as the focal point in the administrative structure of the Central Government for the planning, promotion and coordination of environmental and forestry programmes. The Ministry's main activities include the survey and conservation of flora, fauna, forests and wildlife, prevention and control of pollution, afforestation and regeneration of the degraded parts of the environment. The main tools utilised for this purpose include impact assessment, support to organisations implementing the programmes, environmental and forestry research, extension, education and training to augment the requisite manpower, collection, collation and dissemination of environmental information and creation of environmental awareness.

1.1.2 Allocation of Business

The following are the items of work allocated to the Ministry of Environment and Forests:—

- Environment and ecology, including environment in coastal waters, in mangroves and coral reefs but excluding marine environment on the high seas;
- Botanical Survey of India and Botanical Gardens;
- Zoological Survey of India;
- National Museum of Natural History;
- The Water (Prevention and Control of Pollution) Act, 1974;
- The Water (Prevention and Control of Pollution) Cess Act, 1977;
- The Air (Prevention and Control of Pollution) Act, 1981;
- The 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 forests and forest administration in so far as the Andaman and Nicobar Islands are concerned;
- Indian Forest Service;
- Wildlife preservation and protection of wildbirds and animals;
- Fundamental research including coordination thereof and higher education in forestry;
- Padmaja Naidu Himalayan Zoological Park;
- National Land Use and Wasteland Development Council;
- National Wastelands Development Board; and
- Central Ganga Authority.

1.1.3 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

- Plant surveys in certain priority areas of Andaman & Nicobar, Sikkim, Uttar Pradesh, Jammu & Kashmir, South Western Ghats and Pondicherry, were initiated by the Botanical Survey of India (BSI) and 25% of the work was completed.
- Volume II of the Red Data Book on Indian Plants, containing about 200 rare and endangered species was completed and printed.
- Several publications were brought out, the major ones being the Flora of India: Fascicle 19, and the State Flora of Rajasthan, Volume I.
- The BSI Gardens planted 560 plants of 50 species of rare and potentially useful plants for conservation and multiplication.

—Fauna

- One hundred twenty six Faunistic Surveys, covering various ecosystems of 40 districts of Several States of the Country were conducted by the Zoological Survey of India.
- During the status survey of endangered species, the small Travancore Flying Squirrel has been collected from Kerala after a lapse of roughly one hundred years.
- The construction of Marine Aquarium-cum-Research Centre at Digha, West Bengal for exhibiting live marine fauna for educational and recreational purposes is nearing completion.
- Studies on the fauna of the mangroves of Sundarbans and Andaman & Nicobar Islands have made good progress.
- Four volumes of the Fauna of India were published, besides other regular publications of the ZSI.

—Forest Survey

- The State of Forest Report—1987 has been published by the Forest Survey of India (FSI).
- A digital image processing system configured around a Vax 11/780 computer and a Floating Point Array Processor have been installed at the National Forest Data Management Centre of the FSI.

—National Natural Resources Management System (NNRMS)

- The Department is participating in the multi-departmental NNRMS.
- Out of 37 projects identified by the Standing Committee on Bio-resources and Environment, four more projects have been finalised during the year. These are Environmental Impact on Coastal Wetlands of Vedaranyam; Impact of Industrialisation on Environment in Indore—Dewas—Ujjain regions of M.P.; Remote Sensing Studies for Regeneration of Pushkar Lake Valley System; and Monitoring of Impact of Iron Ore Mining on Bailadilla. Seven projects were sanctioned during last year.

1.2.2 Conservation of Natural Resources

—Forest Conservation

- The revised National Forest Policy was finalised and introduced in the Parliament. The new policy lays emphasis on maintenance of environmental stability, restoration of ecological balance and preservation of the remaining natural forests. In view of the symbiotic relationship of the tribals with the forests, the Policy emphasises meeting the basic needs of the tribals living within forests. Afforestation and tree planting to meet the needs of the poor is one of the aims of the Policy.
- The Forest (Conservation) Act, 1980 has been amended to facilitate its stricter implementation and to provide for penalties for violators.
- The strict implementation of the Forest (Conservation) Act, 1980 continued. During the year, diversion of 18,765 hectares of forest land was permitted for development projects under strict conditions of compensatory afforestation.

—Substitution of wooden track sleepers with concrete sleepers by the Railway Ministry continued to make progress.

—The UNDP assisted Modern Forest Fire Control project aimed at promoting prevention, detection and suppression of forest fires continued to make progress.

—The Five Regional Offices set up earlier to monitor and evaluate on-going forestry development projects and schemes have been re-organised and a Sixth Regional Office is being set up at Chandigarh. During the year, Environmental Wings have also been sanctioned for the six Regional Offices.

—Wildlife Protection

—Sixty seven National Parks and 394 Sanctuaries have been set up so far all over the country representing 4% of the total geographic area.

—A comprehensive report "Planning a Wildlife Protected Area Network in India" prepared by the Wildlife Institute of India was released by the Prime Minister during the year.

—The Indian Board for Wildlife's award of the Best Managed Wildlife Reserve for 1981-84 was given to the Dachigam National Park, Jammu and Kashmir.

—The 17th Tiger Reserve has been established in Tamil Nadu with Kalakad and Mundanthurai Wildlife Sanctuaries as its core area. The 17 Tiger Reserves in the country cover 26,643 sq.kms. in 13 States.

—The Captive Breeding and Rehabilitation Programme was continued. A project has been taken up in the Pobitara Wildlife Sanctuary in Assam with a view to providing an alternate home for the Manipur Brow-Antlered Deer in Assam.

—Based on the guidelines developed by eminent conservationists and leading international experts in zoo management, the first part of the master plan for the National Zoological Park, New Delhi has been prepared.

—Biosphere Reserves

- Out of the 13 identified potential sites for setting up Biosphere Reserves, four biosphere reserves have been set up so far. These are: Nilgiris in Tamil Nadu, Kerala and Karnataka, Nanda Devi in Uttar Pradesh, Nokrek in Meghalaya and the Great Nicobar in Andaman and Nicobar Islands.
- Concurrence of the State Governments has been received in respect of the proposed Biosphere Reserves at Sundarbans (West Bengal), Gulf of Mannar (Tamil Nadu) and Manas (Assam).

—Wetlands and Mangroves

- The National Wetland Management Committee has added 6 more wetlands for conservation & preparation of Management Action Plans, to the already identified 10 wetlands.
- Action Plans for Bhoj Lake (MP), Wullar (J&K), Sukhna (Chandigarh) and Chilka (Orissa) were sanctioned.
- A directory on wetlands of India has been published.
- The National Mangroves Committee had identified 15 areas last year for drawing up Action Plans. During the year, the respective Steering Committees set up at the State level have drawn up the Action Plans which include natural regeneration in selected areas, afforestation by mangrove species and protective measures.
- Action Plans for the mangroves at Bhitarkanika (Orissa), Goa, Gulf of Kutch (Gujarat), Andaman & Nicobar Islands, Mahanadi Delta (Orissa), Pichavaram (Tamil Nadu) and Vembanad (Kerala) were sanctioned.

—Conservation Strategy

- A core Committee under the Chairmanship of Dr. M. S. Swaminathan has been constituted to recommend the framework and operational details of a National Conservation Strategy for our country. The committee held meetings and decided to involve the State Governments, other relevant agencies and Non-Governmental agencies.

1.2.3 Environmental Impact Assessment

- The divisions in the Ministry dealing with Impact Assessment have been strengthened to cope with the expanded work.
- In addition to the earlier guidelines and questionnaires/checklists, developed for projects in different sectors such as River Valley Projects, Thermal Power Projects, Mining Projects, Industries, Shipping and Harbour Projects and Development of Beaches, guidelines for Transportation, Tourism and Communications sectors are being prepared.
- It has been decided to accord single-window clearance to projects requiring environmental as well as forest clearance.
- Two hundred fifty two development projects were appraised during the year, out of which 96 were cleared. Thirty two projects were rejected out of which 6 were on grounds of environmental incompatibility and the others due to non-receipt of requisite information. The remaining projects are being examined.
- The scope of the Narmada Control Authority, constituted to oversee the execution of the Narmada Sagar and Sardar Sarovar projects, has been enlarged to cover the implementation of the environmental aspects. A Narmada Control Cell has been created in the Ministry to follow up on the environmental aspects of these projects.
- The Ministry has pursued with the coastal states, the preparation of Status Reports and Management Plans for the coastal areas particularly keeping in view the general restrictions on construction and other activities within 500 meters of high tide line of the sea.
- The Doon Valley has been designated as an ecologically fragile area under the Environment (Protection) Act, 1986. The Doon Valley Board under the Chairmanship of the Minister for Environment & Forests, continued its work to conserve the Valley and to restore the degraded areas.
- The Dehradun Master Plan is being recast; a Regional Master Plan for the Doon Valley region has been prepared and orders restricting

industrial area to approximately 133 ha in Dehra dun have been issued by the U.P. Govt.

- The Island Development Authority (IDA) under the chairmanship of the Prime Minister continued to issue guidelines for environmentally sound development of Andaman, Nicobar and Lakshadweep Islands. Under the instructions of this Authority, a part of Great Nicobar Island has been declared as a biosphere reserve. The project document on the North Andaman Biosphere Reserve is being finalised.
- An Expert Group for recommending norms for determining ecologically fragile areas in the country has been set up.
- Chembur and the central area of Bombay city have been identified for studying human exposure with reference to pollutants, heavy metals and air pollutants under the WHO/UNEP scheme of Human Exposure Assessment Locations.
- Under the Indo-Dutch bilateral Programme, a programme for 15 workshops and 3 high level policy seminars on environmental impact assessment aimed at reorienting decision makers of the development sectors has been initiated.

1.2.4 Control of Pollution

—Control of Water and Air Pollution

- The Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981 continued to be implemented through the Central Pollution Control Board and the State Pollution Control Boards.
- During the year, Goa and Tripura have constituted State Boards. With this, all States excepting the States of Manipur, Nagaland, Sikkim, Arunachal Pradesh and Mizoram have constituted their State Boards.
- Water quality monitoring of rivers is being done through a network of 306 monitoring stations. During the year, 106 new stations have been added to the 200 existing earlier.
- Coastal water monitoring continued through 173 monitoring stations established by the Central Pollution Control Board and the Department of

Ocean Development. Data collected for 25 parameters are being processed to formulate schemes to monitor and control pollution of the coast.

- Water quality monitoring and the inventories studies in the river basins of the Kaveri, Mahi, Mahanadi and Godavari have been completed.
- A Project on Waste Water Recycling is in operation which aims at finding out optimum quality, quantity and periodicity of application of waste water on land which will not cause ground water pollution, soil drainage problem and health hazard.
- Thirty four national ambient air quality monitoring stations were sanctioned during the year out of which 9 are operational.
- During the year, effluent standards in respect of natural rubber industry and emission standards for thermal power plants have been notified under the Environment (Protection) Act, 1986. This is in addition to the environmental standards notified for 24 industries earlier. Final reports from experts for preparing standards for 6 more industries have been received and are under process. Experts have been appointed for preparation of standards for 7 more industries. General effluent standards for industries not covered by the specific standards have also been issued during the year.
- Comprehensive industry documentation work with reference to the pollution control status is progressing in respect of 9 industries.
- The National and Zonal Task Forces set up to pursue the implementation of standards in industries, have been reconstituted. So far, 3270 prosecutions have been launched by the Central and State Pollution Control Boards since the enactment of the Water and Air Acts in 1974 and 1981 respectively. Of this, 1198 cases were launched during the year. Under the Environment (Protection) Act, 1986, the Central Government has taken action against 47 units. Twenty eight units have been directed to close down and 19 units have been directed to set up their effluent treatment plants.
- A Memorandum of Understanding has been signed between the Council for Scientific and

Industrial Research and the Central Pollution Control Board for collaborative research and development work in the areas of industrial pollution control, water and air quality monitoring and industrial effluent monitoring. The National Environmental Engineering Research Institute, Nagpur, will be the executing counterpart agency on behalf of the Council of Scientific & Industrial Research (CSIR).

- The scheme of assistance to State Pollution Control Boards for strengthening their technical set-up and laboratories was continued. Seventeen State Pollution Control Boards have so far availed of this assistance.
- Two multi-parameter continuous ambient air monitoring stations were installed in Delhi with financial assistance from the European Economic Community (EEC).
- Intensive air quality surveys of the residential and industrial areas in Delhi were conducted. A noise pollution survey of Delhi and monitoring of river Yamuna have been taken up.

—Management of Hazardous Substances

- Under the Environment (Protection) Act, 1986, action to finalise rules for the manufacture, import and storage of hazardous and toxic chemicals, for the transportation of hazardous and toxic chemicals by road and for the management of hazardous and toxic wastes is under progress.
- Twenty States and Union Territories have designated nodal departments in their States to deal with hazardous chemicals. The States and Union Territories have made progress in identifying hazardous chemicals units in their areas and in preparation of on-site and off-site plans.
- Under the Central Scheme of assistance to States for manpower development and equipment, 6 States have been provided with financial assistance, while proposals from 7 States are under consideration.
- A Global Convention on Transboundary Movement of Hazardous Wastes is under discussion under the auspices of the United

Nations Environment Programme. India is participating in the discussions.

1.2.5 Regeneration and Development

—Ganga Action Plan

- Two hundred sixty two schemes have been sanctioned so far under the Ganga Action Plan at a cost of Rs. 258.44 crores covering the States of U.P., Bihar and West Bengal. Of these, 50 schemes have been completed and the rest are in good progress.
- The schemes at Allahabad to divert sewage from various drains to pumping stations have been completed well in time for the Kumbh Mela, the religious festival at Allahabad where several millions of people participated. Several pumping stations in the city have been renovated and the capacity of the main pumping station has been doubled. A very large low cost sanitation programme at a cost of Rs. 7.74 crores, jointly financed by the Ganga Project Directorate, Ministry of Social Welfare, the Housing and Urban Development Corporation and the Government of Uttar Pradesh has been taken up in the city. A special multi-media campaign was mounted during the Kumbh Mela at Allahabad to generate public awareness and cooperation.
- The low cost sanitation programme in U.P. was continued and it is expected that 54000 pour flush latrines and 3000 public toilet complexes will be constructed.
- Diverse public participation programmes, especially for the youth, students and pilgrims were organised during the year.
- Several documentary and television news films on the activities of the Ganga Action Plan have been produced and telecast in the National Network programme of Doordarshan.

—Wasteland Development

- The future strategy and programmes of the National Wasteland Development Board have been restructured and these will form the basis for the proposals to be incorporated in the Eighth Five Year Plan. Under the afforestation programme of the 20 Point Programme, 5.04

million hectares have been planted during the first three years of the 7th Five Year Plan. The target of planting 2 million hectares in 1988-89 is nearing completion.

- The scheme of Rural Fuelwood Plantations and is being implemented in 159 fuelwood deficient districts in 25 States and the Union Territory of Delhi.
- The target of 24.50 crore seedlings during 1988-89 under the decentralised people's nurseries programme is nearing completion.
- The schemes of decentralised nurseries and silvipasture development are also being implemented by the National Dairy Development Board through its village milk cooperatives and tree growers cooperatives working under Operation Flood.
- Besides its regular programmes for afforestation and wasteland development the National Wasteland Development Board has initiated new schemes of Aerial Seeding for development of remote and inaccessible wastelands in various hills, mountains, etc. A centrally sponsored scheme of raising plantations of minor forest produce has been introduced in the States. A Seed Development Scheme has also been introduced.
- For the year 1988-89, ten Indira Priyadarshni Awards are proposed to be given to individuals, panchayats, schools, voluntary agencies and districts in recognition of work relating to wasteland development and afforestation.

—Other Activities for Regeneration

- In addition to the ecological task forces of ex-servicemen deployed in the Kiarkuli catchment near Mussorie, Uttar Pradesh and the Indira Gandhi Canal area, Rajasthan for ecological restoration, a third ecological Task Force has been raised during the year for Jammu and Kashmir state to work for the ecological restoration of the Shivalik Hills.
- Field demonstration projects for ecological restoration, undertaken in the areas of Pushkar Lake Valley (Rajasthan), Cherrapunjee (Meghalaya), Auroville (Tamil Nadu), Shivalik

Foothills (Punjab), Tumkur (Karnataka), Gopeshwar (UP), continued as planned. A new project around Binsar Sanctuary, Almora has been sanctioned during the year.

- 64 eco-development camps were organised in various parts of the country involving more than 5000 participants.

1.2.6 Research

—Environmental Research

- Under the Environmental Research Programme and the Man and Biosphere Programme, 11 new projects were approved, while 19 projects sanctioned earlier were completed.
- Support to the research work under the All India Coordinated Research Projects on Ethnobiology, Heavy Metals, and Conservation of Endangered Plants and Tissue Culture was continued.
- Seven new schemes in the Himalaya region were supported under the Integrated Action Oriented Research, Demonstration and Extension Programme on Eco-development. 12 projects sanctioned earlier were completed.
- Under the same scheme, 8 new projects were sanctioned for the Western Ghats region, while one project was sanctioned for the Eastern Ghats Region.
- A major portion of the research programme undertaken by 14 universities located along the river Ganga has been completed and the results obtained have been compiled into a document "The Ganga—A Scientific Study".
- Six review workshops were held to monitor the progress of various projects under the Environment Research Committee and Man and the Biosphere Schemes, wherein 45 projects were reviewed.
- Three review workshops for monitoring projects under the integrated action oriented research, demonstration and extension programme on eco-development were held.
- Under the scheme of Centres of Excellence a new Salim Ali Centre for Ornithology and Natural

History has been sanctioned during the year at the Bombay Natural History Society, Bombay.

— The progress of the Ecological Research and Training Centre, Bangalore and the Centre of Mining Environment, Dhanbad was reviewed during the year.

— The Gobind Ballabh Pant Institute of Himalayan Environment and Development established by this Ministry as an autonomous institute started operating from its temporary office at Kosi near Almora from August 1988. Apart from the core programmes to be implemented by the Institute directly, the Institute will also interact with the existing institutions and Non-Governmental Organisations operating in the Himalayan region.

—Research on Biosphere Reserves

— Research on various aspects of the biosphere reserves is being promoted through academic and research institutions.

— Five research projects for Nilgiri Biosphere Reserve and one project for Nanda Devi Biosphere Reserve, have been sanctioned so far covering hydrological studies, human ecology, eco-restoration, long term monitoring of biological processes, etc.

—Research on Mangroves

— Research projects on various aspects of mangroves conservation are considered by the National Mangrove Committee. During the year, three projects have been completed and one more project has been sanctioned. A total of 9 projects are operational at present.

—Research on Wetlands

— Research proposals on wetlands conservation are considered by the National Wetland Management Committee. 7 projects are operational while 3 projects have been completed.

—Forestry Research

— The Indian Council of Forestry Research and Education (ICFRE) has started working as an apex body to coordinate and guide the research and

education related to forestry. Three meetings of the Council have been held and areas of research identified.

— Research areas for each of the five research institutes set up last year, and their infrastructural needs have been worked out. Each institute will carry out national level research on one or more facets of forestry and will also take care of the regional research needs.

— More than 25 research projects on various aspects of forestry were undertaken by the different institutes.

— The focus of the research work was on nutrient cycling, alternatives for wood, pathology of seeds, afforestation technologies, rooting behaviour, biomass production, nutrient distribution in important social forestry tree species, employment potential of sal seed and tendu leaf in tribal areas etc.

—Wildlife Research

— The Wildlife Institute of India conducted research on the movement and habitat utilisation of elephants in North-Western U.P., ecology of endangered species like turtles, the Indian flying fox, snow leopard and the aquatic mammals of the National Chambal Sanctuary.

— The Institute offered technical advice and assistance to a number of State Forest Departments relating to conservation and management of wildlife.

— The Bombay Natural History Society continued the work on the following major research projects:

Ecology of the Keoladeo Ghana National Park, Bharatpur, Ecology of the Indian Elephant, Ecology of the Point Calimere Sanctuary, Tamil Nadu, study of the migration pattern of birds and setting up of a migration data bank and ecology of floricans.

1.2.7 Education and Information

—Formal Education and Training

— One hundred and fifty IFS Probationers and 9 trainees from foreign countries completed their

training at the Indira Gandhi National Forest Academy, while 278 IFS Probationers and 14 foreign trainees are undergoing training at present.

- One hundred and thirteen officers of the State Forest Services passed out of the State Forest Service Colleges at Burnihat, Coimbatore and Dehradun; 118 officers are undergoing training.
- Forest Ranger's Colleges at Balaghat, Chandrapur and Kurseong trained 187 Forest Rangers during the year while 208 Rangers are undergoing training.
- Thirty one-week training courses were organised to train about 800 officers of the Indian Forest Service in various central, state and other training institutes in various topics such as general management and forest protection.
- The new complex of the Indian Institute of Forest Management (IIFM) at Bhopal was inaugurated in June 1988 by the President of India. The Institute will work as an apex research institute in forest management in the country.
- A two-year Post-graduate diploma course in forestry has been started by the IIFM.
- The Wildlife Institute of India continued its programme of training wildlife managers and personnel in various aspects of wildlife management.
- Two to three weeks capsule course in wildlife management for inservice officers was launched by the Wildlife Institute during the year and the first course was held in Bandipur National Park.
- The programme of short training courses for the Zoo Keepers was continued at the National Zoological Park, New Delhi.

— Non-formal Education, Information and Awareness

- The major theme for the National Environment Awareness Campaign 1988 was "Conserving our Water Resources". November 19th to December 18th was observed as the National Environment Month (NEM). 215 voluntary and other agencies from all over the country participated in the campaign and organised seminars, meetings,

camps, rallies, padayatras, exhibitions, competitions, etc. All possible media were utilised and target groups covered under the campaign.

- The Centre for Environment Education (CEE), Ahmedabad conducted 5 zonal workshops covering 245 resource persons from all over the country.
- During the NEM, the National Museum of Natural History, New Delhi organised a large number of programmes for varied target groups.
- Eight projects on non-formal environmental education and awareness were sanctioned during the year.
- Thirty two educational institutions and NGOs were supported for organising seminars on various technical environmental topics of current interest.
- A new gallery on 'Conservation' was inaugurated on 5th June, 1988 at the National Museum of Natural History. The gallery deals with various aspects of conservation of forests, wildlife, land, air and water.
- The museum participated in the Festival of India in USSR by organising an exhibition "India—Natures & Bounty" in Moscow and in Ordzennikidze. A photographic exhibition on Indian Wildlife was organised at Tokyo for the Festival of India in Japan.
- Besides organising activities under the National Environment Awareness Campaign, the CEE, Ahmedabad developed and installed an exhibition in the Gujarat University on the evolution of life.
- Work under the Indo-US collaborative Children's Environmental Education Television Project continued in the CEE, Ahmedabad.
- CEE has taken up a project to produce video films and audiovisuals on environmentally sound technologies for the Gujarat Energy Development Agency.
- Using the water quality monitoring kits developed by the CEE, students from nearly 80 schools were involved in testing the Ganga river quality.

- A Regional Cell of the CEE has been set up in Bangalore.
- A Centre for Environmental Education has been sanctioned to be set up at the C.P. Ramaswami Aiyar Foundation, Madras for meeting the environmental educational needs.
- The Environmental Information system (ENVIS) network, with the Department as its focal point and 10 ENVIS Centres continued to operate.
- Paryavaran Abstracts—the quarterly journal reporting Indian research inputs on environment and related areas continued to be published.
- Under the query-answer service, more than 600 queries were attended to.
- The Pitambar Pant National Environment Fellowship 1987 was awarded to Prof. S. C. Pandeya of the Saurashtra University, Rajkot.
- The Kerala Sastra Sahitya Parishad has been selected for the Indira Gandhi Paryavaran Puraskar 1988, for its significant contribution towards environmental protection.
- It has been decided to undertake afforestation work and set up a Desert Ecology Interpretation Centre at Khejarli Village near Jodhpur, Rajasthan, to commemorate the event in 1730 AD when several men and women sacrificed their lives to prevent cutting down of the trees by the soldiers of the local king.
- A Chair in Environmental Law titled 'Jawaharlal Nehru Professorship' has been created in the Jawaharlal Nehru University, New Delhi to commemorate the Birthcentenary of Pandit Jawaharlal Nehru.

1.2.8 Legislation and Organisation

- Necessary rules have been framed under various sections of the Environment Protection Act, 1986. Besides the standards notified earlier regarding 24 industries, standards for two more industries and general effluent standards applicable to all industries were notified during the year.
- The Water (Prevention and Control of Pollution) Act 1974 has been amended, on lines similar to the

amendment enacted in 1987 of the Air (Prevention and Control of Pollution), Act 1981, to confer more powers on the implementing agencies to control pollution and to impose more stringent penalties for violation of the Act. The Central Board has been empowered to carry out the functions of any State Board for a limited period and purpose in certain cases. Powers have been given to Boards to give directions including directions for closure or stoppage of water and electricity and other services to the offending establishments. Any citizen can lay a complaint before the courts against offenders. Pollution Control Boards have to furnish all the relevant information to the complainant citizens.

- During the year, the states of Mizoram, Punjab and Manipur set up Environment Protection Councils. With this, 14 states and 3 Union Territories have Environment Protection Councils so far. The Ministry has nominated representatives to each of these Councils.
- The Forest (Conservation) Act, 1980 has been amended to make the existing provisions more stringent. Leasing of forest land for afforestation and clear felling of natural tree growth even for purposes of reafforestation have been prohibited without the prior approval of the Central Government. A penal clause has been introduced prescribing penalty for violation of the provisions of the Act.
- The State Departments of Environment have been provided assistance for strengthening their technical manpower. Two hundred thirty four technical staff and 242 supporting staff have been sanctioned to the State Governments and Union Territories.
- A scheme for assisting environmental laboratories other than State Pollution Control Boards Laboratories have been introduced. So far, 76 laboratories have been recognised as Govt. laboratories under Section 12 of the EPA including 50 laboratories recognised during the last year.

1.2.9 International Cooperation

- Social Forestry Projects continued to be undertaken in several States with assistance from the World Bank, Canadian International Development Agency, and the Swedish International Development Agency.

— Food and Agricultural Organisation (FAO) continued its support to the Wildlife Institute of India, Dehradun and in projects of aerial seeding and training in forest inventory.

— UNDP continued its assistance to the Modern Forest Fire Control Project.

— The SAARC has proposed to undertake a study of environmental degradation and natural disasters in the SAARC region and for this purpose the Ministry has drafted a format for studies to be adopted by each country. The draft is under consideration by the member countries.

— An agreement has been finalised for consultancy assistance to the Government of Tamil Nadu by the Overseas Development Agency of the UK to prepare a detailed project report for upgradation of the waterways in Madras City.

— Under the Memorandum of Understanding signed between India and the Netherlands, a project on the water quality of Yamuna river has been initiated in collaboration with the Central Pollution Control Board and Industrial Toxicology Research Centre.

— Under the Indo-USSR integrated long-term programme of cooperation in Science and Technology (including environment and ecology), a firm programme for exchange of visits of scientists in identified institutions and expeditions has been finalised and areas of collaborative research have been identified.

— Delegations from China, Mauritius, Nigeria, Indonesia, Sri Lanka and Vietnam visited India to study different areas related to forestry.

— India participated in international conferences of environmental relevance.

— An Indo-FRG Training Workshop on Environmental Impact Assessment was held for the scientists and engineers of Pollution Control Boards.

— A five-month training for 'Analytical Methods' was held in India by German experts and the training continued in West Germany.

1.2.10 Administration and Budget

— In accordance with the revised recruitment rules for Group 'A' Scientific posts in the Ministry, direct recruitment to several categories of scientific posts in the Ministry and its associated offices were made during the year.

— The Hindi Salahakar Samiti of the Ministry met four times and reviewed the progress in the use of Hindi.

— A quarterly journal 'Paryavaran' in Hindi has been started during the year with a view to encourage creative writing in Hindi among the employees of the Ministry.

— Three thousand eight hundred thirty Hindi books worth about Rs. 2 lakhs on environment and general topics were purchased for the Departmental Library. Besides, 615 scientific and technical books on environment and related areas were also procured for the library.

— Preliminary estimates for 16 civil engineering projects were finalised and sanctions for 9 projects were accorded.

— The amount of prize money to encourage writing of original books in Hindi on environment, forests and wildlife has been increased.

— The Revised Budget Estimate for the Ministry during 1988-89 is Rs. 182.00 crores.

2. SURVEY OF NATURAL RESOURCES

2.1 SURVEY OF FLORA

2.1.1 The Botanical Survey of India (BSI) was established in 1890 with the basic objective of identifying through surveys, the plant resources of the country. The Survey, with its headquarters at Calcutta, has 9 circles located in different areas of the country. It has 4 specialist research units in the headquarters at Calcutta. It has so far completed survey of plant resources in about 3/5ths of the country. A comprehensive review of the activities of the BSI was carried out in 1987-88, based on which its objectives were redefined and its perspectives delineated in a time frame spanning upto 2000 A.D.

2.1.2 The objectives of the BSI have been classified into primary and secondary objectives. These include:

- Survey of the entire plant resources of the country,
- Taxonomic studies of all the flora (identification and categorisation of plants),
- Listing of endangered species,
- Preparation of national data-base on herbarium collection including types, live collection, plant genetic resources, plant distribution and nomenclature,
- Studies on selected critical and fragile ecosystems, and
- Ethno-botanical and geo-botanical studies in specified areas.

2.1.3 As per the targets set, the BSI will complete survey of the remaining 2/5ths of the country by 1998. Certain priority areas like North-Eastern regions, Andaman & Nicobar Islands, Sikkim, South-Western Ghats, cold areas of Jammu & Kashmir and Himachal Pradesh have been identified where taxonomical studies will be completed by 1994. Publication of the National flora covering the entire country will be brought out in 24 volumes by 2000 A.D. Data regarding all endangered species will be inventorised by 1992. The BSI has been restructured to achieve these objectives.

2.1.4 The activities of the Survey during the year under report, are as follows:

2.1.4.1 Survey and taxonomic studies:

The BSI initiated plant surveys in the following priority areas to collect, identify and document the resources:

- *Andaman & Nicobar Islands*
Survey of Kalipur, Lamia Bay I & II, Saddle Peak, East Island, Smith Island and Kalighat of North Andaman Group, was undertaken.
- *Sikkim*
Palung plains, Muguthang valley, Kongrala and Saknyong valley areas ranging from 1300 metres to 5000 metres altitude were surveyed.
- *Uttar Pradesh*
Nilang valley in Uttarkashi and areas of Nandadevi Biosphere were surveyed.
- *Jammu & Kashmir*
Cold deserts of Ladakh were surveyed.
- *South Western Ghats*
Meghamalai, Pachaimalai, Vellimalai, Pachaikamachi Hills of Madurai District, Seithur and Sivagiri Hills of Kamarajar District (Tamil Nadu); Goodrical forest of Pathanamthitta (Kerala) were surveyed.
- *Pondicherry*
Karaikkal, Auroville were surveyed.

About 25% of the survey work has been completed in the priority areas listed above. During the explorations, 8,123 plant specimens were collected, processed and preserved for further study. Besides, 1455 species were mounted on herbarium sheets, 421 species were identified from these collections and 335 were accessioned to enrich the existing collections of the BSI herbaria. These specimens were also sent on exchange to other herbaria in India and outside. During explorations, live plants of economic importance, rare and endangered species, less known useful plants and plants of biological importance were collected and introduced in the gardens of the BSI.

Apart from the explorations, identification of specimens from explored areas has been carried out with a view to initiate the writing of State Floras of Manipur, Assam, Nagaland, Mizoram, Jammu & Kashmir. About 25% of work covering 750 species has been completed.



Fig. 1 Rhodendron in full bloom

2.1.4.2 Rare and Endangered Species

Red Data Book on Indian Plants Vol. 2 containing about 200 rare and endangered species was completed and printed. 15 rare and endangered species listed in the volumes of Red Data Books have been collected and introduced for acclimatisation and multiplication in Indian Botanic Garden and other experimental gardens of the BSI.

2.1.4.3 National Flora and State Flora

National Flora:

- Flora of India: Fascicle 19 encompassing families Alangiaceae, Burmanniaceae, Cochlospermaceae, Coronaceae, Lardizabalaceae, Lebeliaceae, Malvaceae and Nyssaceae was published and released.
- Florae Eumeratio Indicae: Asteraceae was completed and published.
- Florae Enumeratio Indicae: Vol. 1 (Monocoty-

ledens)—printing is nearing completion. Manuscripts covering 514 species belonging to 15 families have been completed for Flora of India. Manuscripts of 6 families comprising 312 species were edited for publication of Flora of India fascicle 20.

State Flora:

- Manuscript of State Flora of Tamil Nadu (Vol. 3) was completed, edited and sent for publication. Compilation of State Flora of Rajasthan (Vol. 2), State Flora of West Bengal (Vol. 1) and State Flora of Maharashtra (Vol. 1) are nearing completion.

2.1.4.4 National Data Base

- Fifty per cent of the work relating to listing of type specimens available in Indian herbaria and live collection of BSI gardens was completed.
- Data on distributional pattern for 750 species of Indian plants was recorded and completed.

— Nomenclature of 630 species was brought upto date.

2.1.4.5 Studies on Selected Critical and Fragile Ecosystems:

— Work on Manual for identification of Mangroves has been completed.

— Compilation of the manuscript for the Mangroves of the Mahanadi Delta was completed. Work on Mangroves of other areas proposed to be completed by 1990 has been initiated.

2.1.4.6 Environmental Impact Assessment:

Impact assessment studies with reference to floristic aspects were conducted in Pillur river areas for a proposed water supply project in Tamil Nadu and the report was submitted.

2.1.4.7 Ethnobotanical Studies:

Under the All India Coordinated Project on Ethnobiology, work on ethnobotany of Santhal Parganas, Onges of Andaman Islands and some tribals of Andhra Pradesh was completed and manuscripts prepared.

2.1.4.8 Geobotanical Studies:

The project was undertaken jointly with the Geological Survey of India in the areas of Singhbhum (Bihar) and Khetri (Rajasthan) Copper belts. Six field trips were made to the areas to collect plant and soil samples. About 523 samples were chemically analysed.

2.1.4.9 Other Activities

Apart from maintaining the large National Collections of herbarium specimens, identification services, distribution data and information on cultivation etc. were provided to the scientists of other research organisations and individuals working on plants. About 5,128 specimens were identified during the year.

— Central National Herbarium (CNH), the nucleus of herbaria in India regularly exchanged specimens with other Indian and Foreign herbaria. 414 specimens were sent on loan to taxonomists in India and outside. An equal number of specimens were received on loan for study. The Type Section was enriched with 40 type specimens, and 100

cibachrome prints of type specimens from Royal Botanical Gardens, Kew, U.K. Palynological unit attached to CNH completed light microscopic palynological studies (studies on pollen grains) on 110 species belonging to Leguminosae, Dilleniaceae, Lecythidaceae, Nymphaeaceae, Tetracentraceae, rosaceae, Gontianaceae, Sapotaceae.

— Cytology unit recorded chromosome number counts in 40 species of Indian flowering plants and collected information on 1510 species for supplementary volume of Chromosome Atlas of the Indian sub-continent.

— Economic Botany Section documented ethnobotanical information from about 5122 herbarium specimens of CNH and Industrial Sections of the Indian Museum.

— Industrial Section of the Indian Museum, which maintains exhibits of plant products, has taken up modernisation of galleries.

— The Indian Botanic Garden celebrated its completion of 200 years from September to December, 1988 by organising seminars, exhibitions, and educational tours for school children. A Tree planting ceremony with distribution of saplings to public was organised to mark the occasion. The garden regularly exchanged seed materials with other gardens in India and abroad.

— BSI gardens introduced 560 plants belonging to 50 species of rare endemic and potentially useful plants for conservation and multiplication. About 30,000 saplings were supplied for planting in Shakti Sthal at New Delhi.

— BSI scientists participated in different Seminars and Conferences in India and abroad and presented research papers.

2.1.4.10 Publications

During the year under report the following publications were brought out by the BSI:

- Flora of India: Fascicle 19.
- State Flora of Rajasthan Vol. 1.
- Flora of Saurashtra Part 2.
- Flora Indicae Enumeratio: *Asteraceae*
- Flora of Akola District (Maharashtra)
- Flora of Sindhudurg District (Maharashtra)

- Flora of Cannanore District (Kerala)
- Key works of the Floristics of India
- Taxonomic revision of the Tribe Dalbergieae in Indian sub-continent.
- Bulletin of the Botanical Survey of India Vol. 28.

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. It has so far surveyed about one-third of the country. The Survey's collection comprises of nearly 1 million specimens.

2.2.2 A complete review of the activities of the ZSI was carried out in 1987 on the basis of which its objectives were redefined and its perspectives delineated in a time frame spanning upto 2000 A.D. The objectives of the ZSI have been classified into primary and secondary objectives. These include:

- Exploration and survey of faunal resources,
- Taxonomic studies,
- 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, and
- Central referral, information, advisory and library services.

2.2.3 As per the targets set, the ZSI will complete survey of 75% of the remaining areas by 2000 A.D. Some areas requiring immediate attention such as faunistically rich habitats and fragile ecosystems have been identified. In these areas, faunistic studies will be completed by 1995. The status survey of the endangered species will be completed and Red Data Book compiled by 1995. Sixty two volumes of Fauna of India will be brought out by 2000 A.D. A detailed restructuring of the ZSI has been done in order to achieve the above objectives.

2.2.4 Details of the operations of the ZSI during the year are as follows:

2.2.4.1 Exploration and Survey of Faunal Resources

Faunistic Survey in various Ecosystems

- A total of 126 faunistic surveys covering different ecosystems of 40 districts of various states were conducted during the year.

— *Himalayan Ecosystem*: Surveys were conducted in the districts of Kinnaur, Simla, Sirmaur and Solan (Chail Sanctuary) in Himachal Pradesh; Districts of Dehradun (Chakrata Hills) and Pithoragarh in U.P.; Sikkim and in districts of Dibang Valley (Mahai Wildlife Sanctuary), East and West Kamong, East and West Siang, Lohit and Subansiri in Arunachal Pradesh.

— *Desert Ecosystem*: Surveys were undertaken in the districts of Ahmedabad, Kutch, Baroda, Bharuch, Valsad, Dang, Panch Mahal and some areas in the districts of Junagadh, Bhavnagar and Jamnagar in the state of Gujarat.

— *Tropical Rain Forest Ecosystem*: Surveys were undertaken in the States of Meghalaya and Tripura in the North-Eastern India, Districts of Cannanore, Kozhikode and Ponnani of Western Ghats and in the Nilgiris Biosphere Reserve.

— *Wetlands*: Two surveys of Kabar Lake in Bihar were undertaken by a joint Task Force of Fresh Water Biological Station, Hyderabad and the Gangetic Plain Regional Station, Patna.

— *Estuarine Ecosystem*: Survey was undertaken in Hooghly Matla Estuary (West Bengal) and Gopalpur Creek (Orissa).

2.2.5 Faunistic Studies

2.2.5.1 Fauna of West Bengal

Studies on the collections of faunistic surveys conducted in West Bengal were continued during the year. Several thousand specimens were identified. Studies on groups such as Protozoa, Bryozoa, Sipuncula, Polychaeta, Annelida, Mites, Ticks, Mollusca, Odonata, Orthoptera, Hemiptera, Thysanoptera, Coleoptera, Lepidoptera, Amphibia, Birds and Mammals were completed and manuscripts of the papers submitted for publications. It is proposed to complete the studies on the fauna of West Bengal by the end of 1989.

2.2.5.2 Fauna of Lakshadweep

Studies of collection of Mollusca, Meiofauna, Crustacea and on some insect groups were completed



Fig. 2 'Brown Bear'—an endangered Himalayan Species

and the manuscript of papers submitted for publication. Mollusca forms by far the largest group and as many as 424 species under 204 genera belonging to 104 families were recorded, of which 60 species were reported for the first time. The recording of a common freshwater Mollusca, *Indoplanorbis exuctus* (Deshayes) is of significance since it is a common freshwater form and serves as an intermediate host for trematode parasites causing diseases in cattle. It is proposed to complete the studies on the fauna of Lakshadweep by the end of 1989.

2.2.5.3 Fauna of Meghalaya and Tripura

Based on the faunistic surveys conducted during the year 1988, studies have been initiated on the fauna of Meghalaya and Tripura.

2.2.5.4 Fauna of Mangroves

Fauna of Sunderban Mangroves

A study on Sunderban Mangroves has been completed

after about 10 years field explorations of the area. Besides study of fauna, observations on food chain, wild life and various environmental adaptations were also recorded. About 800 species are listed from the area along with description of their habitats. Inter-relationship of fauna and flora is also discussed. A volume containing the results of the study on Sunderban Mangroves is under publication.

Fauna of Andaman and Nicobar Island Mangroves:

During the present study, emphasis was laid on various aspects of terrestrial fauna besides marine forms of Andaman mangroves.

The terrestrial mangrove fauna of Bay Islands include mammals, birds, reptiles, insects, mites, centipedes, pseudoscorpions, etc. Besides, gall causing insects, insect borers (heartwood borers, sapwood borers, stem borers and fruit borers) and myrmecophytic ants have been dealt with in detail.

Among the marine elements, polychaetes, molluscs, crustaceans, fishes are investigated in detail.

Emphasis has been laid on the study of mangrove borers (both molluscan and crustacean) and foulers and mangrove inhabiting crabs. The faunal zonation of the mangroves of the Bay Islands are discussed besides quantitative studies on some mangrove crabs.

A complete systematic list of the mangrove fauna of the Bay Islands reported so far including the present investigation has been prepared. The report on the Fauna of Mangroves of Andaman and Nicobar Islands is under publication.

2.2.6 Status Survey of Endangered Species

The status survey of endangered species is being done along with the regular surveys of different ecosystems. Some of the species covered were Hoolock Gibbon, Phayre's Leaf Monkey, Capped Langur, Malabar Civet, Small Travancore Flying Squirrel and Monitor Lizard. Out of these, the small Travancore Flying Squirrel, has been collected from Kerala after a lapse of roughly one hundred years.

2.2.7 Limnological Evaluation of Kabar Lake, Bihar

Limnological investigations on the Kabar Lake, Bihar were carried out during the period. The present study, first of its kind, embodies the results of preliminary investigations on the diurnal variation in physicochemical parameters of the lake, in relation to fishery resources and avifauna. Data on temperature, pH, dissolved oxygen, alkalinity, chloride, hardness, phosphate, nitrate and sulphate were collected for further study.

2.2.8 Development of National Zoological Collections

The National Zoological Collections were further enriched by the addition of 37,702 identified specimens pertaining to 3,767 species. These include 37 type specimens belonging to 10 new species.



Fig. 3 'Slender Loris'—an endangered primate

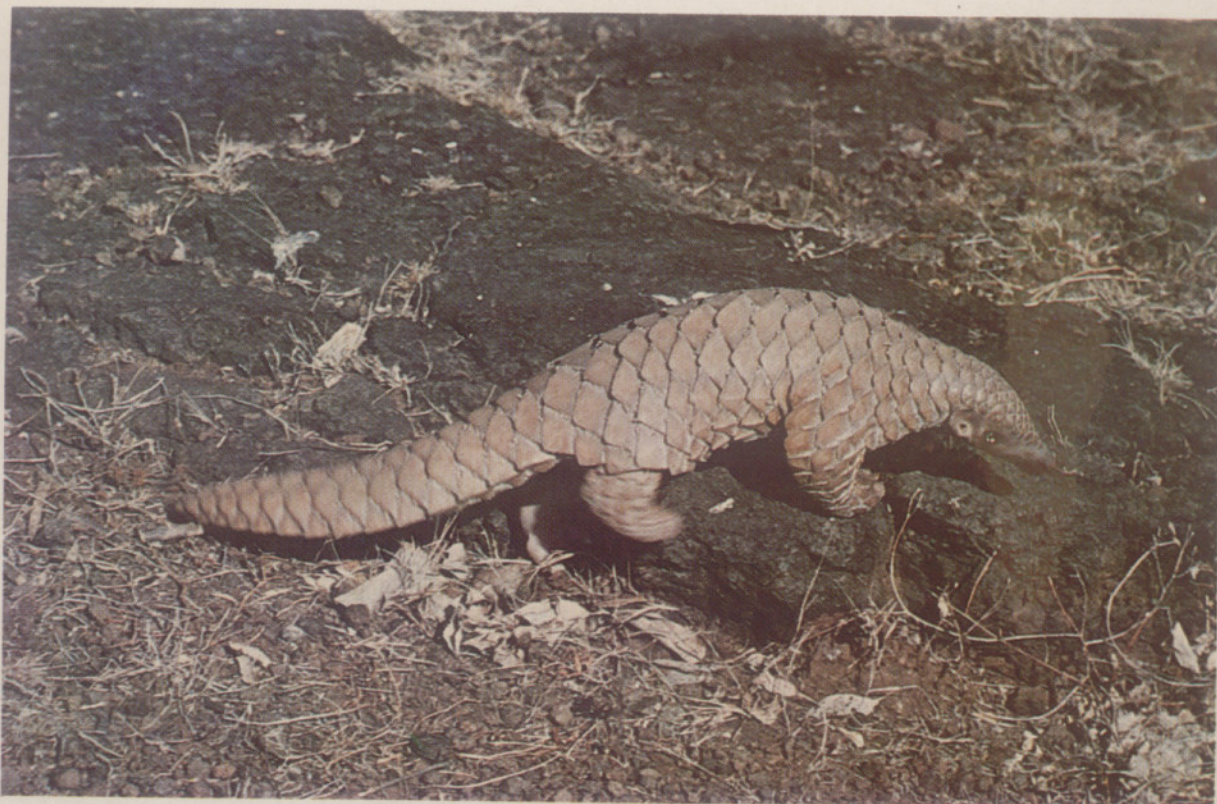


Fig. 4 'Pangolin'—The Indian ant-eater

2.2.9 Identification and Advisory Services

The Zoological Survey of India continued to render identification and advisory services to various research and teaching institutions in the country and abroad, different Central and State Government Departments and individuals. During the period under report, more than 1,000 zoological specimens pertaining to 299 species were identified for 141 outside parties. In addition, 29 other enquiries of scientific and technical nature requiring information and advice on various zoological and allied problems, were also attended to.

2.2.10 Marine Aquarium-cum-Research Centre, Digha

The Marine Aquarium-cum-Research Centre under construction at Digha (West Bengal), will have following objectives:

- Exhibition of live marine fauna in aquarium for educational and recreational purposes and for observation on their locomotion, sensory

perception, feeding habit, breeding biology in captivity etc.

- Carrying out research on selected marine forms. The construction of the building is in progress and is expected to be completed soon. Necessary staff and equipment have been sanctioned. The aquarium is expected to become operational by June, 1990.

2.2.11 Publications of Zoological Survey of India

During the year, the ZSI brought out the following publications:

- Fauna of India—4 Volumes viz., Dermaptera, Part 1; Aphidoidea, Part-4; Schizothoracinae and Cladocera.
- Technical Report on Namdapha Biosphere Reserve.
- Fauna of conservation area—2 Volumes, one on Nanda Devi National Park; and the other on Corbett National Park.
- Record of the Zoological Survey of India—Vols 85 Part 1 and Part 2.

- Occasional Papers, Record of the Zoological Survey of India—11 Nos.
- Memoirs of the Zoological Survey of India—Vol. 16, Part 4.
- Annual Report of Zoological Survey of India for the year 1982-83.

2.2.12 Other Activities

- Action has been initiated for computerisation of data on different types in the national collection.
- Renovation of mammal gallery in the Indian Museum is in progress.
- Action has been initiated for setting up the Regional Museums at Northern Regional Station, Dehradun, High Altitude Zoology Field Station, Solan, Eastern Regional Station, Shillong and Southern Regional Station, Madras.

2.3 SURVEY OF FORESTS

2.3.1 The State of Forests Report

The Forest Survey of India (FSI), Dehradun, has published 'The State of Forest Report 1987' during the year. The Report is an analytical study of the forest cover in India and deals with various conflicting demands on forests, as well as steps taken to conserve and develop this valuable resource. It gives all statistics necessary for making an adequate assessment of forests and forestry in India. Following are the salient features of the report:

- The recorded forest area in the country is 75.18 million hectare. However, the actual extent of forest cover is 64.20 million hectare which is 19.52% of the geographical area of the country. The good forest cover is 10.88% of the geographical area of the country.



Fig. 5 Rainforests of Meghalaya

- The estimated growing stock of wood in the country is 4196 million cum. The net annual increment is 52 million cum.
- The natural regeneration is either absent or inadequate in 52.8% of the forests in the country.
- The current annual demand of firewood in the country is 235 million cum against the estimated production of 40 million cum.
- Ninety million domestic cattle graze in forests far beyond the carrying capacity of the resource.
- Since the beginning of first five year plan till 1986, 11.44 million ha of land were afforested or replanted.

2.3.2 Digital Image Processing System

A digital image processing system configured around a Vax 11/780 computer and a floating point Array Processor has been installed at the National Forest Data Management Centre of the Forest Survey of India. The System will be used for digital processing of remote sensing data.

2.4 NATIONAL NATURAL RESOURCES MANAGEMENT SYSTEM (NNRMS)

2.4.1 The need for national development makes it imperative to adopt a comprehensive approach to the

management of natural resources. For the purpose, the Government of India has established the National Natural Resources Management System (NNRMS).

2.4.2 Based on the recommendations of the Standing Committee on Bio-resources and the Environment, seven projects sanctioned during last year were evaluated during the year and remedial measures suggested so as to ensure their completion within the Seventh Plan Period.

2.4.3 During the year, the following four more projects have been sanctioned:

- Environmental Impact on Coastal Wetlands of Vedaranyaam.
- Impact of industrialisation on Environment in Indore—Dewas—Ujjain regions of Madhya Pradesh.
- Remote sensing studies for regeneration of Pushkar Lake Valley System.
- Monitoring of impact of iron ore mining in Bailadilla.

2.4.4 An appraisal workshop to orient various Principal Investigators with the latest technology in the use of remote sensing was held at the Space Application Centre, Ahmedabad in February, 1989.

3. CONSERVATION OF NATURAL RESOURCES

3.1 FOREST CONSERVATION

3.1.1 Revision of National Forest Policy

The issue of revision of the Forest Policy formulated in 1952 has been under active consideration of the Government for some time. Although the 1952 Forest Policy aimed at forest coverage of one-third of the total land area of the country, this could not be attained for various reasons and the deforestation which has occurred since has endangered the ecological stability. This has necessitated a re-examination of the Forest Policy and giving emphasis to the conservation and ecological aspects of forests.

The revised National Forest Policy was finalised during the year after extensive consultations with the States, experts and all relevant agencies and placed before both the houses of the Parliament.

The salient features of the new Forest Policy are:

- Maintenance of environmental stability through preservation and restoration of ecological balance.
- Conservation of the natural heritage of the country by preserving the remaining natural forests and protecting the vast genetic resources for the benefit of the posterity.
- Meeting the basic needs of the people, especially fuelwood, fodder and small timber for the rural and the tribal people.
- Maintaining the intrinsic relationship between forests and the tribal and other poor people living in and around forests by protecting their customary rights and concessions on the forests.

The main approach outlined in the revised Policy is as follows:

- Existing forest land and forests will be fully protected and their productivity will be improved. Emphasis will be given to enhancing the forest cover on hill slopes and catchment areas of rivers.
- In order to conserve biological diversity the network of sanctuaries, national parks, biosphere reserves and other protected areas will be extended and better managed.
- The people will be actively involved in programmes

of protection, conservation and management of the forests.

Appropriate legislation backed by adequate infrastructure and financial support for forestry have been envisaged in the document for implementation of the revised Policy.

3.1.2 Forest (Conservation) Act, 1980

The Forest (Conservation) Act, 1980, was enacted with a view to checking indiscriminate dereservation and diversion of forest land to non-forest purposes. Under this Act prior approval of Central Government is required before any reserved forest is declared as dereserved or forest land is diverted to non-forest purposes. During the year, the Act has been amended to make the existing provisions more stringent. (Details are given in Chapter 9).

3.1.2.1 The present status of the 3256 proposals received under the Forest (Conservation) Act, 1980 till 31st December, 1988 is given below:—

—Total approved	1472
—Total not approved	489
—Rejected for non-furnishing of requisite information by the States/UTs	1024
—Proposals withdrawn by the States/UTs	97
—Total pending for final decision	174

3.1.2.2 Diversion of forest land for non-forest purpose

Prior to the enactment of the Forest (Conservation) Act, 1980, the average rate of diversion of forest land for non-forest purpose used to be in the range of 1.5 lakhs ha. per year. Since the enactment of the Act the rate of diversion of forest land has been brought down to about 16,746 ha per annum. Details are given below:—

Year	Forest Land Diverted in Hectares
1980	Nil
1981	2672.04
1982	3246.54
1983	5702.01
1984	7837.59
1985	10608.07
1986	11963.11
1987	72780.05
1988	18765.353

3.1.2.3 Compensatory Afforestation

Whenever forest land is utilised for any non-forest purpose, suitable equivalent non-forest land must be identified for raising compensatory forests. Under the provisions of the Forest (Conservation) Act, 1980, compensatory afforestation is insisted upon where forest-land needed for non-forest purpose is more than one hectare.

In cases of diversion of forest land involving areas less than one hectare, unless specifically asked for by the Ministry, normally compensatory afforestation is not insisted upon.

The following norms are being followed for compensatory afforestation:—

- Where non-forest lands are available, compensatory afforestation be raised over equivalent area of non-forest land.
- Where non-forest land are not available, compensatory plantation be raised over degraded forests twice in extent to the area being diverted.
- Where non-forest land available is less in extent to the forest land being diverted, in addition to compensatory afforestation on available non-forest land, plantation be raised on degraded forest land twice in extent to the difference between forest land being diverted and available forest land.

3.1.3 Wood Substitution

As a part of the overall conservation strategy, all out efforts need to be made to reduce the demand for conventional wood produce through wood substitution. More than one-third of the total annual consumption of wood in the country is estimated to be in the building construction industry. As substantial quantity of wood is consumed in the building industry, the Ministry of Urban Development has issued instructions to encourage the use of alternative materials.

The Ministry is pursuing with the Railways for substituting wooden track sleepers to conserve the forest resources. Consequently, the Railways have stepped-up production of concrete sleepers and has achieved a production level of 22.9 lakhs sleepers in the financial year 1987-88 and is expected to reach a production level of 38 lakhs in another 2 years time. Concrete sleepers are being utilised wherever

feasible. Metal sleepers are also being used so as to avoid use of wooden sleepers. During the current year, Railways plan to procure only 8 lakh wooden sleepers.

3.1.4 Modern Forest Fire Control Project

The plan scheme 'introduction of Modern Forest Fire Control Methods in India' was launched in 1984-85 and is continuing in the Seventh Plan. This is a UNDP assisted project under which UNDP assistance is available in the form of expert services, equipment and training fellowships. The project has been launched in certain areas of the State of Maharashtra and Uttar Pradesh to devise, test and demonstrate principles and techniques of prevention, detection and suppression of forest fires. Achievements during the year 1988-89 are as under:

- Ground fire suppression system including the use of handtools, machanised equipment and water handling equipment has been implemented.
- Handtools utilised in the forest fire control have been manufactured indigenously.
- Osborne fire finders used for locating forest fires have been manufactured indigenously.
- Use of aerial fire suppression system including the use of helicopter in forest fire control has been demonstrated.
- Use of radio communication system in ground to ground and ground to air communication in forest fire control has been implemented.
- Demonstration in use of modern technology and equipment for forest fire control was organised for the officers of various States/UTs.

3.1.5 Regional Offices for Monitoring of Conditions and Safeguard

The Five Regional Offices established earlier at Bhopal, Bhubaneswar, Lucknow and Shillong as part of the Secretariat of the Department, to deal with forest conservation matters, have been reorganised and a sixth Regional Office is being set up at Chandigarh. The Regions, the Headquarters of the Regional Offices and the jurisdictions of the respective Regional Offices are as follows:—

Region	Regional Headquarters	Jurisdictions
North-east	Shillong	Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura.
East	Bhubaneswar	Bihar, Orissa, Sikkim, West Bengal and Union Territory of Andaman and Nicobar.
North	Chandigarh	Haryana, Himachal Pradesh, Jammu & Kashmir, Punjab and Union Territory of Chandigarh.
South	Bangalore	Andhra Pradesh, Goa, Karnataka, Kerala, Tamil Nadu, and Union Territories of Lakshadweep and Pondicherry.
Central	Lucknow	Rajasthan and Uttar Pradesh
West	Bhopal	Gujarat, Maharashtra and Madhya Pradesh and Union Territories of Dadra and Nagar Haveli and Daman & Diu.

(The Union Territory of Delhi will be looked after by the Ministry directly).

In view of the increasing work relating to all aspects of environmental management including pollution control and environmental management of projects and activities in the country and to follow up the Ministry's work in this regard, Environmental Wings have been sanctioned for the six Regional Offices.

The functions of the Regional Offices are as follows:—

Forestry Functions

- To monitor and evaluate all ongoing forestry development projects and schemes with specific emphasis on conservation of forests;
- To assist the States and Union Territories in preparation of the proposals involving diversion of forest lands for non-forestry purposes under the provisions of the Forest (Conservation) Act, 1980 for expeditious processing and disposal of such cases;
- To undertake physical inspection of sites in cases of diversion of forests involving an area of more than 40 ha.
- To monitor the implementation of conditions and safeguards stipulated by the Central Government in regard to diversions approved under the Forest (Conservation) Act, 1980;
- To assist the States and Union Territories in the

preparation of management plans for working of forests under their control within the framework of guidelines issued by the Central Government from time to time; and

- To assist the States and Union Territories in streamlining collection, collation, storage and retrieval of data covering all the facets of forests and forestry activities and to transmit such data to the Central Government/Central Data Processing Centre.

Environmental Management and Pollution Control Functions

- To follow up implementation of conditions and safeguards laid down for projects/activities when environmental clearance is given;
- To follow up pollution control measures taken by industries, local bodies, Government (Centre/State) Undertakings, etc.
- To collect and furnish information relating to environmental impact assessment of projects, pollution control measures, methodology and status, legal and enforcement measures, environmental protection special conservation areas like wetlands, mangroves and biosphere reserves; and
- To maintain liaison and provide linkage with the concerned State Governments, with Central Government Agencies, (including Regional Offices of BSI, FSI and ZSI) with Project Authorities, with the Regional Offices of the Central Pollution Control Board; with State Pollution Control Boards and with non-Government organisations involved in implementation of programmes relating to environment.

3.2 WILDLIFE PROTECTION

3.2.1 The main strategy of the Wildlife Directorate of the Ministry continues to be the promotion of the establishment of an effective and representative network of protected areas in the country and to continue with the implementation of the National Wildlife Action Plan. Thus, as of today, there are 67 national parks and 394 sanctuaries in India, representing 4% of the geographic area of the country. The enforcement of the Wildlife (Protection) Act, 1972, through the regional offices of the Directorate in Bombay, Calcutta, Delhi and Madras, the Wildlife protection set-up under the State Governments and the Police and Customs authorities has been further

strengthened. Specific schemes involving Central assistance for the conservation and protection of endangered species like the tigers, elephants and rhinos have been continued, as also similar Central assistance to the States for captive breeding of some other endangered animals.

3.2.2 Indian Board for Wildlife

The 18th meeting of the Indian Board for Wildlife was held during the year under the chairmanship of the Prime Minister. During this meeting, the Board's award of the Best Managed Wildlife Reserve for 1981-84 was given to the Dachigam National Park. The Board deliberated upon and took decisions regarding several important issues, such as, the framing of guidelines for control of visitors to wildlife reserves, a national policy on management of zoos, the need for posting competent, motivated and well trained personnel in the protected areas, and the urgency of curbing encroachments in these reserves, while at the same time taking measures to reduce man-animal conflicts, and a stricter control of poaching and illegal trade in wildlife. The Board also urged upon the States to provide larger allocations for wildlife preservation.

The report "Planning a Wildlife Protected Area Network in India" prepared by the Wildlife Institute of India and containing detailed recommendations for expanding the present protected area network and to better manage the same, was released by the Prime Minister. This report, also called the 'Bio-Geographic' report, has been recommended to all the States and Union Territories for implementation. A Committee has been constituted to help implement and to monitor the progress made with regard to the setting up of the protected area network as recommended in the report.

3.2.3 Project Tiger

3.2.3.1 The Centrally sponsored Plan Scheme 'Project Tiger' was launched on 1st April, 1973 with the following objectives:

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

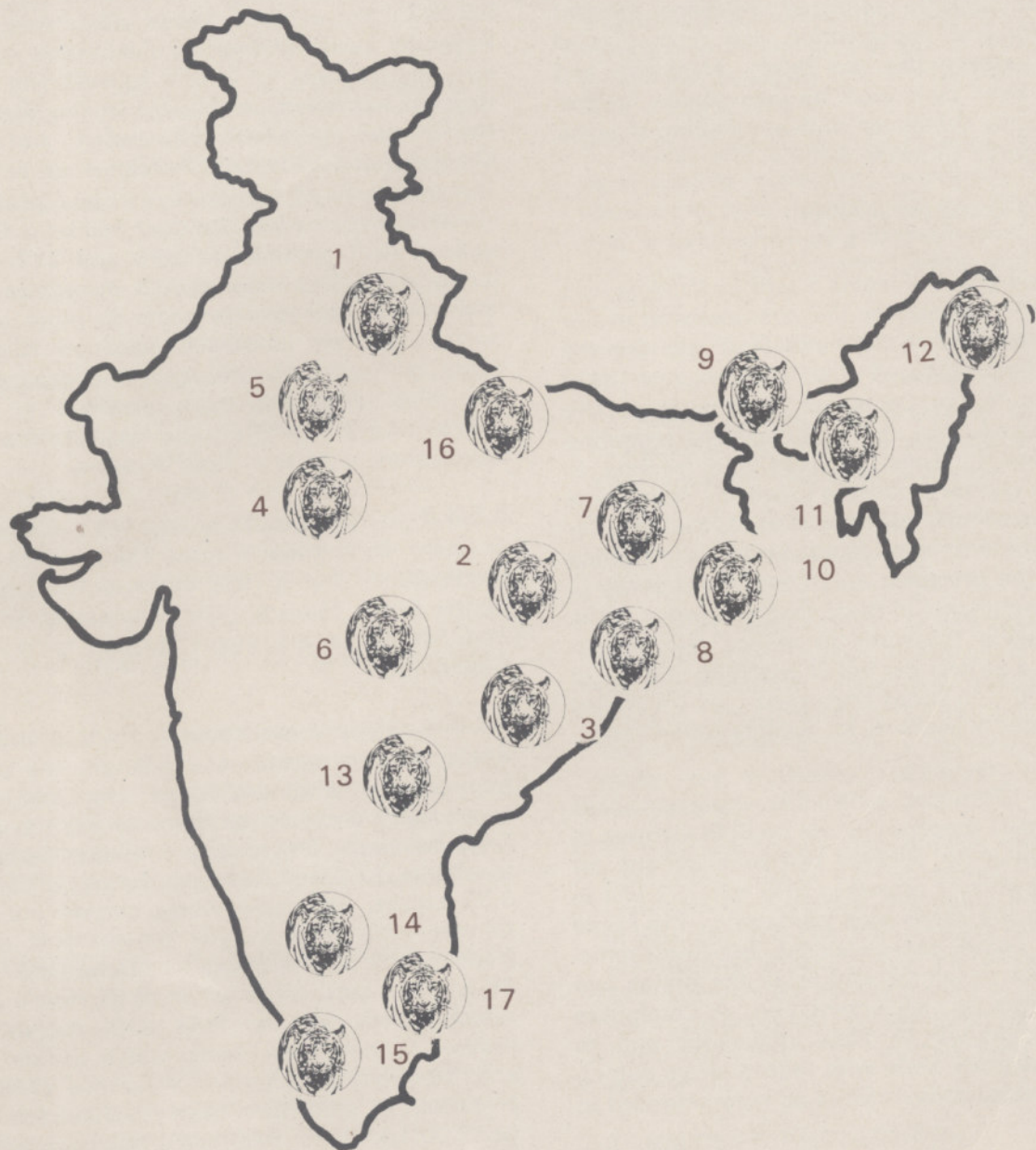
3.2.3.2 To achieve these objectives, 17 Tiger Reserves have so far been established in 13 States, covering an area of 26643 sq.kms. The 17th Tiger Reserve has been established in the State of Tamil Nadu during 1988-89, with Kalakad and Mundanthurai Wildlife Sanctuaries as its core area. The total area of this tiger reserve representing the southern-most limit of the tiger habitat in India is 800 sq.kms. (571 sq.kms. as core and 229 sq.kms. as buffer area). This reserve, rich in orchids and ferns, will also provide a safe home to other endangered species like the lion-tailed macaque, Nilgiri langur, Nilgiri tahr, wild elephant, gaur and leopard. A sum of Rs. 95.0 lakhs has been provided to the State Government as Central assistance for the establishment of this Tiger Reserve.

3.2.3.3 The Project Tiger receives guidance from the Steering Committee (Project Tiger) which has been reconstituted during 1988-89 under the Chairmanship of the Prime Minister. The Minister of Environment and Forests is the Vice-Chairman of the Steering Committee.

3.2.3.4 Central assistance is being provided to the State Governments at 50% of the recurring expenditure and 100% of the non-recurring expenditure on approved items of work in all the 17 Tiger Reserves. The total Central assistance provided to all the 17 Tiger Reserves during 1988-89 is Rs. 3.55 crores. The main works carried out with the Central assistance include replacement of 13 old jeeps, purchase of 4 trucks for fire fighting works and 28 wireless sets, construction of 87 new buildings in remote areas for the field staff, maintenance of firelines, water holes, roads, watch towers, research and interpretation centres. New fire arms for the protection of staff have been purchased at a cost of Rs. 7.00 lakhs. Rs. 6.00 lakhs has been provided as payment of compensation to the owners of the cattle killed by tigers. 100% Central assistance has been provided for research and veterinary works. An area of 140 ha. of private lands has been acquired inside the newly established Kalakad-Mundanthurai Sanctuaries and added to the Tiger Reserve at a cost of Rs. 80.00 lakhs.

3.2.3.5 Other important activities during the year are as under:

- The Management Plans of Manas, Melghat, Ranthambhore and Bandipur Tiger Reserves have been revised.



- 1 Corbett National Park
- 2 Kanha National Park
- 3 Indravati National Park
- 4 Ranthambore National Park
- 5 Sariska National Park
- 6 Melghat Sanctuary
- 7 Palamau Tiger Reserve
- 8 North Simlipal National Park

- 9 Buxa Sanctuary
- 10 Sundarbans National Park
- 11 Manas Sanctuary
- 12 Namdapha National Park
- 13 Nagarjun Sagar Shrishailam Sanctuary
- 14 Bandipur National Park
- 15 Periyar National Park
- 16 Dudhawa National Park
- 17 Kalakad and Mundanthurai Wildlife Sanctuary

Fig. 6 Project tiger field areas



Fig. 7 The Royal Bengal Tiger which represents a conservation success story in India

- A detailed study has been undertaken by the National Institute of Rural Development, Hyderabad, in the Similipal Tiger Reserve and guidelines formulated for the relocation of tribal villages from the core areas of the Tiger Reserves. The observation of the Institute reiterates the policy of Project Tiger that villages located in the core areas of the Tiger Reserve are to be relocated outside the reserve, giving them equivalent land so that they may get the benefit of developmental activities like construction of roads, schools and hospitals. A Workshop has also been organised at the Institute for Field Directors of Reserves where relocation of tribal villages is to be undertaken.
- A study tour of all the Field Directors was organised during October-November, 1988. The team visited Sariska, Ranthambhore, Dudhwa, and Corbett Tiger Reserves and studied the management practices. It has been decided that the team of all the Field Directors will visit four Tiger Reserves every year so that a comparative study of all the 17 Tiger Reserves may be made.
- An All India Tiger Census is proposed to be undertaken during 1989. The last All India Tiger Census was held in 1984. Along with the Tiger Census, survey of certain other species, such as the snow-leopard, gaur, wild buffalo, Indian elephant, lion, lion-tailed macaque, rhinoceros, swamp deer, wild yak, Tibetan antelope, morkher, Kashmir stag, Indian wild ass, urial and the Great Indian Bustard, will also be undertaken. During this Census, a map of tiger habitats available in India will be prepared and the prey population estimated.
- A three day workshop on research in Tiger Reserves was organised in January, 1989 at the Kanha tiger Reserve for training of the Research Officers of all the Tiger Reserves.

3.2.4 Conservation Programmes

- Central funding to the tune of Rs. 225 lakhs was released to support 30 national parks excluding those covered under Project Tiger. Under this Scheme, Central assistance is given 100% for non-

recurrent expenditure, and 50% for recurrent expenditure.

- Central assistance amounting to Rs. 350 lakhs was made available to support conservation and development activities in 111 Wildlife Sanctuaries. Central assistance under this Centrally Sponsored Scheme is given on a 100% basis for identified items of non-recurrent expenditure.
- The Scheme, "Conservation of Rhinos in Assam", was continued during the year with full Central support on 100% basis for both recurring and non-recurring expenditure. A sum of Rs. 175 lakhs which included support to mitigate the effects of unprecedented floods in Rhino areas in Assam, was released during the year.
- Under the Centrally Sponsored Scheme, "Control of Poaching and Illegal Trade in Wildlife", a sum of Rs. 24 lakhs has been released to 13 States during this year. This scheme involves sharing of expenditure with the States and Union Territories on 50% basis.

— The scheme "Nature Education and Interpretation Programmes" which aims at familiarising visitors to Wildlife reserves with the educational aspects of nature and eco-conservation was continued during the year on equal cost sharing basis between the Central and State Governments and grants amounting to over Rs. 20 lakhs have been provided to 14 States and Union Territories.

- During the year, Central assistance for the Captive Breeding and Rehabilitation of Endangered Species has been given on a 50% basis to 7 States. The species covered include such highly endangered ones as the Manipur Brow-Antlered Deer, the Phayre's Leaf Monkey and Blythe's Tragopan.
- A new Project for the conservation of the Snow-Leopard has been drafted with the objective of introducing it as a new Centrally Sponsored Scheme on the lines of Project Tiger during the Eighth Five Year Plan.
- A project has been taken up in the Pobitara Wildlife Sanctuary in Assam with a view to providing an



Fig. 8 Painted Storks at Keoladeo Ghana National Park, Bharatpur

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Fig. 9 The Great Indian one-horned Rhinoceros—A protected species

alternate home for the Manipur Brow-Antlered Deer or 'Sangai', which is one of the most endangered animals in the world today having only one natural habitat in the wild. A sum of Rs. 9.23 lakhs was released for this propose during 1988-89.

3.2.5 Zoological Parks

3.2.5.1 National Zoological Park, New Delhi

The National Zoological Park, New Delhi, with its present stock of 1199 species of birds, 382 of mammals and 21 of reptiles, continues to be a major attraction of the capital, drawing, on an average, 13 to 16 lakh visitors each year. During the year, construction of the pheasant aviary has been completed, while that of the reptile house, staff canteen and the CPWD office was in progress. Desilting of the moats was carried out during the year. Based on the guidelines developed by eminent

conservationists and leading international experts in zoo management, the first part of the master plan for the National Zoological Park has been prepared, which spells out the objectives, scope and the nature of activities to be taken up for the long-term development of the park. The programme of training zoo keepers, initiated last year, was continued during this year. Successful breeding of rare and endangered species like the Thamin deer and the lion-tailed macaque was carried out.

3.2.5.2 Padmaja Naidu Himalayan Zoological Park

This zoological park in Darjeeling, West Bengal, administered by the State Government, continued to house and breed a number of endangered and rare species of wildlife. The park also conducts research on the behaviour and breeding biology of the fauna of East Himalayan Region and provides visitors a rare opportunity to learn about the high altitude fauna and flora.



Fig. 10 A wild Tusker

3.3 BIOSPHERE RESERVES

3.3.1 The biosphere reserves are intended to preserve genetic diversity in representative ecosystems and provide for in-situ conservation of plants, animals and micro-organisms. They also provide scope for research in natural ecosystem vis-a-vis man-modified ecosystem.

3.3.2 A core advisory group of experts set up by the Government of India in 1979 have identified 13 potential sites for setting up of Biosphere reserves in India. These are:

Site	State(s)
Nilgiri	Tamil Nadu, Karnataka & Kerala
Namdapha	Arunachal Pradesh
Nanda Devi	Uttar Pradesh
Uttarkhand	Uttar Pradesh
(Valley of flowers)	
North Islands of Andamans	Andaman & Nicobar
Gulf of Mannar	Tamil Nadu
Kaziranga	Assam
Sunderbans	West Bengal
Thar Desert	Rajasthan
Manas	Assam

Kanha
Nokrek (Tura Range)
Little Rann of Kutch

Madhya Pradesh
Meghalaya
Gujarat.

3.3.3 So far, four Biosphere Reserves have been set up in the country—Nilgiri (1986), Nanda Devi (1988), Nokrek (1988) and Great Nicobar (1989).

3.3.4 Concurrence of the State Governments has been received in respect of proposed Biosphere Reserves at Sundarbans (West Bengal), Gulf of Mannar (Tamil Nadu) and Manas (Assam). Notifications of the same are under process.

3.3.5 Projects documents in respect of five Biosphere Reserves (Thar Desert, Gulf of Mannar, Namdapha, Manas and Uttarkhand) have been sent for approval of the respective State Governments. Draft project documents in respect of four Biosphere Reserves (Little Rann of Kutch, North Andamans, Kanda and Kaziranga) are in different stages of preparation. The Action Plans for the Biosphere Reserves are broadly on surveys, protection, restoration, research on various aspects, education and awareness.



Fig. 11 Forest Canopy, Western Ghats

3.4 WETLANDS AND MANGROVES

3.4.1 Wetlands

3.4.1.1 Wetlands may be defined as submerged or water saturate lands both natural and artificial, permanent or temporary with water that is static or flowing, fresh, brackish or saltish, including areas of marine water, the depth of which at low tide does not exceed 6 mts., for the major portion of the year. Such areas include swamps, marshes, fens, peat lands, lagoons, lakes, etc. Wetlands serve as a suitable niche for fish and other aquatic animals, as breeding and nursery ground for water fowls and as filters for sediments and pollutants. The wetlands are being affected due to biotic interference and anthropogenic pressure. Considering the importance of wetlands, steps have been initiated for their conservation and management, to educate the public on the need for their conservation and on their economic utility and to commence scientific and application oriented studies on their productivity.

3.4.1.2 The National Wetland Management

Committee had earlier identified ten wetlands for preparation of Management Action Plan. During the year, based on the recommendations of the committee, six more new wetlands have been identified along with the nodal research institutions for each of the areas. These six wetlands are as follows:—

Table 1

Name of the wetland	State/UT	Nodal Research Institution.
Sukhna	Chandigarh	Punjab University
Sasthankota	Kerala	Kerala University
Renuka	H.P.	H. P. University, Shimla
Kabar lake	Bihar	Bhagalpur University
		Freshwater Biological Station, Hyderabad
Nalsarovar lake	Gujarat	Gujarat University
Kanjli	Punjab	Punjab Agricultural University, Ludhiana

3.4.1.3 The action plan for the concerned wetlands is drawn up by the Steering Committees set up at the

State level. Action plans had been sanctioned for Kolleru (Andhra Pradesh) and Harike (Punjab) last year. Four more action plans have been sanctioned for Bhoj lake (M.P.), Wullar (J&K), Sukhna (Chandigarh) and Chilka (Orissa) during the current year. Action plans for Ashtamudi (Kerala) and Loktak (Manipur) have been received and are being processed.

3.4.1.4 The National Wetland Management Committee had detailed discussions on the contents of the action plans which cover broadly the areas of dewatering, protective measures, treatment of catchment areas and soil conservation. Based on this, guidelines have been issued to the State Governments concerned.

3.4.1.5 Simultaneously, research on various aspects of wetlands is being taken up through the universities and academic institutions.

3.4.1.6 A directory on the wetlands of India has been published.

3.4.1.7 An Indo-US workshop on Wetlands, Mangroves and Biosphere Reserves has been held from 4-7th January 1989 to identify possible areas of collaboration between India and USA in respect of selected conservation areas.

3.4.2 Mangroves

3.4.2.1 Mangroves are the salt tolerant forest ecosystems found mainly in tropical and sub-tropical inter-tidal regions. They consist of swamps, forest land within and its spread areas. The total area of mangroves in India is estimated to be 6740 sq.km. which is about 7% of the world's mangroves. While the mangrove areas of Sunderbans, West Bengal, and Andaman & Nicobar Islands constitute 80% of the mangroves of India, the remaining are scattered in the States of Andhra Pradesh, Tamil Nadu, Orissa, Maharashtra, Gujarat, Goa and Karnataka. Mangroves in India have been subjected to exploitation and vandalism.

3.4.2.2 Realising the importance of this ecosystem, the Government of India have introduced a scheme for conservation of mangroves in the country. A National Mangroves Committee consisting of experts has been reconstituted. The terms of reference of this Committee include:

— Advise the government on appropriate policies for conservation of mangroves and related ecosystems.

- Advise on research and training on mangroves and related ecosystems.
- Suggest mangroves areas for conservation.
- Advise on collaboration with UNDP/UNESCO in the field of mangrove research and conservation; and
- Suggest suitable action programmes for conservation of mangroves and coral reefs.

3.4.2.3 Action plans for the 15 areas identified by the Committee last year have been drawn up by the respective Steering Committees set up at the State level and such Steering Committees have now been set up in all the States concerned. The components of the action plan include natural regeneration in selected areas, afforestation and protective measures. While the action plan for Sunderbans, West Bengal, was sanctioned last year, action plans for Bhitarkanika (Orissa), Goa, Gulf of Kutch (Gujarat), Andaman & Nicobar Islands, Mahanadi Delta (Orissa), Pichavaram (Tamil Nadu) and Vembanad (Kerala) have been sanctioned during the year.



Fig. 12 Mangrove Forests at Pichavaram, Tamil Nadu

3.4.2.4 Simultaneously, research on various aspects of mangroves is also being taken up through the academic institutions.

3.4.2.5 The coral reefs in India are facing deterioration due to industrialisation, off-shore mining and other activities. In order to save these coral reefs, it is imperative to evolve a suitable conservation strategy. Accordingly conservation of coral reefs has been included as one of the terms of reference of the National Mangroves Committee. A draft management plan has been drawn up and is under consideration.

3.4.2.6 A film on mangroves is being produced through the Ministry of Information and Broadcasting.

3.5 NATIONAL CONSERVATION STRATEGY

To recommend the framework and operational details

for evolving a national conservation strategy, a core committee has been constituted in December 1988 under the chairmanship of Dr. M. S. Swaminathan. The committee decided that the State Governments will be urged to formulate conservation strategies at the State level within the broad framework of national conservation strategy. Besides the State Governments, the committee will also interact with the relevant agencies and non-governmental organisations. In order to evolve necessary policy inputs for planning the conservation strategy, it is proposed to organise a series of workshops and brainstorming sessions on specific issues of environmental concern and to commission indepth studies in selected sectors.

4. ENVIRONMENTAL IMPACT ASSESSMENT

4.1 Introduction

The Ministry of Environment and Forests has been assigned the responsibility for appraisal of projects with regard to their environmental implications. Based on environmental impact assessment and issues arising thereto, decisions are taken by the competent authorities in respect of the projects including selection of sites.

4.2 The projects in various sectors, which have so far been brought under the purview of such a procedure, include the following:

- Major irrigation projects (covering 10,000 hectares and above).
- River Valley Projects.
- Hydel Power Projects.
- Thermal Power Projects (using coal, lignite gas and other feed stock) including atomic power stations.
- Mining Projects.
- Industries.
- Ports and Harbours.
- Human Settlements, new towns and cantonments.
- Tourism projects including beach resorts.
- Projects in coastal areas.
- Projects in ecologically fragile areas (e.g. Doon Valley, Andaman & Nicobar and Lakshadweep Islands).
- Communication Projects.

4.3 Apart from environmental clearance, clearance from forestry angle is required, if forest land is involved in the project. Under the Forest (Conservation) Act, 1980, diversion of forest land for non-forest use requires the prior approval of the Central Government. For such diversion, the Ministry of Environment and Forests considers the proposals on recommendation of the State Forest Departments.

4.4 Organisational set up for Appraisal and Monitoring

Impact Assessment Divisions

To deal with the projects in various sectors, the Ministry has an environmental Impact Assessment Wing comprising the following Divisions vested with responsibilities for specific areas:

- *Impact Assessment Division-I (IA-I)*: River Valley Projects, Major Irrigation Projects, and Hydel Power Projects.

- *Impact Assessment Division-II (IA-II)*: Industrial Projects, Thermal Power Project and Mining Projects.

- *Impact Assessment Division-III (IA-III)*: Ports and Harbour Projects, Tourism Projects, Human Settlement, Projects in Ecologically Fragile areas, and Communication Projects.

A multi-disciplinary staff complement in the respective Divisions is responsible for scrutiny of the projects, site visits wherever required, interaction with the project authorities and consultations with experts on specific issues as needed for analysis of various aspects.

In addition to the Impact Assessment Divisions, the Forest Conservation Division in the Ministry examines the projects which involve diversion of forest land for non-forestry purposes.

4.5 Environmental Appraisal Committee (EAC)

To elicit multi-disciplinary inputs for appraisal of projects, the Ministry has constituted Environmental Appraisal Committees for the following sectors:

- River Valley, multipurpose, irrigation and hydel power projects;
- Industrial projects.
- Mining projects; and
- Thermal Power Projects.

For advice on proposals regarding diversion of forest land for non-forestry purposes, which require statutory clearance of the Ministry under the Forest(Conservation) Act, 1980, an Advisory Committee has been set up in the Ministry, as envisaged in the Act.

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.

The Appraisal Committees consist of experts from varied disciplines like water resources management, pollution control, forestry, ecology, landscape planning etc. The membership of these Committees also includes specialists from concerned organisations and individuals who are knowledgeable about the projects under consideration.

4.6 Regional Offices

Depending on the nature of projects, certain safeguards are recommended while according environmental clearance. For monitoring the implementation of these safeguards and to interact with the concerned authorities in different regions including the State Departments of Environment and State Pollution Control Boards, the Ministry has recently set up environmental wings in the Regional Offices of the Ministry.

4.7 Procedures for Environmental and Forestry Clearance

The Ministry has developed guidelines and questionnaires/checklists for appraisal of projects in different sectors. The project authorities are required to provide the relevant information as per prescribed questionnaires/checklists along with the feasibility/detailed project reports. These are examined by the concerned Divisions of the Impact Assessment Wing in the Ministry. After preliminary scrutiny, the project proposals are placed before the Environmental Appraisal Committees in respective areas. Project authorities are invited for discussions with the experts of the Committees and wherever necessary site visits are made for on-the-spot assessment of environmental aspects.

On the basis of such exercise, the Appraisal Committees make their recommendations for approval or rejection of particular projects. While recommending approval of a project, the Committees also suggest certain safeguards in specific cases.

The recommendations of the Appraisal Committees are then processed for approval or rejection of the projects.

Similarly, proposals for diversion of forest land are considered by the Advisory Committees which look into the essentiality of the requirement, ecology of the forest involved and make recommendation as to acceptance with suitable safeguards or rejection of such proposals.

Projects involving diversion of forest land as well as approval from environmental angle are processed simultaneously by the Forest Conservation Division and the concerned Impact Assessment Divisions.

To facilitate expeditions decisions, the following procedures for forestry and environmental clearance

have since been adopted:

4.8 Single window clearance

When a project requires both environmental clearance and approval under the Forest (Conservation) Act, 1980, proposals for both are required to be simultaneously given to the corresponding Divisions in the Ministry. The processing is done simultaneously for clearance/rejection, although separate letters may issue in each case. If the project does not involve diversion of forest land, the case is processed only for environmental clearance.

4.9 Environmental clearance

For environmental clearance, the proposals from the project authorities are to be sent to the Ministry with all necessary details. If all the particulars, information and action plans are available, the ministry will take a decision on the clearance within three months of receipt of the proposal.

Often, it is found that the proposals lack necessary details and essential information. In such cases, Ministry asks the project authorities for the details and missing information. Under the present procedure, the project authorities are required to submit the missing information/action plans within three months. If available, the case is considered for decision. If full information/action plans are not made available within three months, the case is rejected for non-furnishing of information.

After getting the essential information, action plans and other details, and after obtaining the comments of the Environmental Appraisal Committee concerned, whenever necessary, the case will be examined on the merit and if found suitable, the case will be cleared environmentally. However, if the proposal is not acceptable environmentally, it will be rejected on merit.

4.10 Appraisal under Forest (Conservation) Act, 1980

Proposals for diversion of forest land for non-forest purposes are considered taking the advice of the Advisory Committee and a decision is taken usually within six weeks of the receipt of the proposal, if all the required information are available. If the proposal lacks maps, details regarding compensatory afforestation, or some other essential information, the

State Governments and project authorities are required to submit the required information. If particulars are not available within one month of asking for the information, the cases are rejected for non-furnishing of essential information.

4.11 Reopening of the cases rejected for non-furnishing of information

Cases rejected for non-furnishing of information may be reopened provided the following conditions are satisfied:—

- All the required information has been made available;
- Delay in providing the information is satisfactorily explained; and
- There is no change in the proposal in terms of scope, purpose and other important aspects.

4.12 Information required for Environmental Appraisal of Projects

4.12.1 The project authorities are required to furnish the following documents for environmental appraisal of a development project:

- Detailed Project Report (DPR)
- Filled in Questionnaire on environmental aspects
- Environmental Impact Statement along with Environmental Management Plan.

4.12.2 The Detailed Project Report is necessary to seek information on the technical and financial aspects of the projects.

4.12.3 The questionnaire is meant for providing information on specific queries for determining the likely environmental impacts of a development project. The Environmental Impact Statement (EIS) is an exercise of self-assessment on the part of the project authorities regarding the likely impact (positive and negative) of their projects. Some of the issues that need to be dealt with while preparing the statement include the following:—

- Impact on soil, water (hydrological regime, ground water and surface water) and air quality.
- Impact on land use, forests, agriculture, fisheries, tourism, recreation etc.
- Socio-economic impacts including short and long term impact on population.

— Impact on Health.

— Impact on flora and fauna (wildlife) particularly endemic and endangered species.

— Cost-benefit analysis including the measures for environmental protection.

4.12.4 The Environmental Management Plan (EMP) needs to cover the following aspects:

- Safeguards and control measures proposed to prevent or mitigate the adverse environmental impacts.
- Plans for rehabilitation of project oustees.
- Contingency plans for dealing with accidents/disasters.
- Monitoring and feed back mechanism on implementation of necessary safeguards (e.g. setting up of Environmental Management Cells).

4.13 Guidelines and Questionnaires for Environmental Clearance

To help the project proponents for inhouse evaluation of their projects from environmental angle and to elicit specific information on environmental aspects as required for environmental clearance, the Ministry of Environment and Forests has prepared guidelines and questionnaires for the following sectors:—

- River Valley Projects.
- Thermal Power Projects
- Mining Projects.
- Industries.
- Shipping and Harbour Projects
- Development of Beaches.

4.13.1 Salient features of the guidelines

The guidelines broadly deal with the environmental aspects that need to be considered during the planning and implementation of development projects. These include siting criteria from environmental view point and major aspects of environmental concern as related to specific types of projects vis-a-vis preventive measures. Some of the aspects that are covered in the guidelines on industries and river vally projects are briefly mentioned as follows.

4.13.1.1 Industrial Projects

The guidelines provide an indicative list of ecologically or otherwise sensitive areas which may be avoided for siting of industries. These include coastal areas (at least 500 metres from the high tide line), National Parks and Sanctuaries, estuaries, wetlands, archaeological monuments, flood plain of the riverine systems and major human settlements.

While referring to the types of projects which would require detailed Environmental Impact Assessment, the guidelines outline the factors which need to be addressed to. These are: meteorology and air quality, hydrology and water quality, occupational safety and health effects and impact on sensitive targets.

The guidelines also enlist some of the aspects to be incorporated in the Environmental Management Plans. These are: treatment and disposal of liquid effluents, emissions and solid wastes, prevention and control of noise and vibrations, precautions for occupational safety and health, preventive maintenance of control systems, recovery and reuse of waste products, plantation and vegetal cover, disaster planning and environmental management plans for ensuring implementation of necessary safeguards.

4.13.1.2 River Valley and Hydel Power Projects

The environmental side effects of river valley and hydel power projects could be classified in three categories viz.,

- Impacts within and around the area covered by the dam and reservoir;
- Downstream effects caused by alteration in hydraulic regime;
- Regional effects in terms of overall aspects including resource use and socio-economic impacts.

The impacts caused by construction of dams and reservoirs include changes in the micro-climate, loss of vegetal cover, soil erosion, variation in water table and enhanced seismic activities due to pressure of water. Not all these impacts are perceptible and significant in every project. The nature and magnitude of the impacts vary with the project locations and the conditions obtained therein. For instance, in the hilly tracts, the ancillary activities associated with the project such as blasting operations for construction of roads can cause considerable damage to the environment through loosening of hill sides and

resultant landslides, sedimentation of reservoirs, drying up of springs and flash floods. The creation of new settlements for the workmen and rehabilitation of project oustees in the watershed areas could aggravate the seriousness of advance impacts.

The guidelines refer to the environmental components that need to be kept in view during site selection. These include: short and long term impact on population in the inundated and watershed areas, impact on wildlife, impact on land use, potential seismic impact of reservoir loading, water balance and hydrological regime, siltation, socio-economic impacts such as rehabilitation of project oustees and public health problems. The guidelines also provide some Dos and Don'ts during construction activities.

For cost benefit analysis, it has been suggested in the guidelines that the costs for environmental protection and mitigative measures should also be included in the overall estimates. These should include measures like compensatory afforestation, restoration of land in construction areas, control of aquatic weed, control of water and soil borne diseases and rehabilitation of project oustees.

4.13.2 Guidelines under preparation

In addition to the guidelines which have been prepared, comprehensive guidelines are also being prepared for the following sectors:—

- Transportation
- Tourism
- Communications

The agencies which are primarily responsible for the respective sectors are closely associated in the process of preparing the guidelines. For instance, the membership of the Group for preparing the guidelines for Transportation includes the representatives of organisations like Ministry of Surface Transport, Ministry of Civil Aviation, Border Road Development Board, Inland Waterways, National Transport Planning Research Centre and Town and Country Planning Organisation. Similarly, the Group on Tourism include the representatives of the Ministry of Tourism and Archaeological Survey of India along with the individual experts. The basic idea is to ensure that the guidelines are evolved through a consultative process involving the concerned Ministries/Organisations who will be eventually responsible for implementation of the guidelines.

4.14 Status of Appraisal of Development Projects

The status of appraisal of various development projects referred to the Ministry for approval from environmental angle during the year is given in Table 2.

4.14.1 Narmada Sagar, Madhya Pradesh and Sardar Sarovar Project, Gujarat

These two major projects in Narmada Basin were accorded environmental clearance in June, 1987 stipulating a number of environmental studies and surveys to be carried out to suggest effective safeguards for mitigating adverse environmental impacts. The environmental action plans and safeguards were to be executed pari passu with the engineering works failing which the engineering works would be brought to a halt. The execution of these projects is overseen by the specially constituted Narmada Control Authority (NCA). The scope of the NCA was enlarged to cover the implementation of the environmental aspects. Two Sub-Groups, namely, Environmental Sub-Group and Rehabilitation and Resettlement Sub-Group have been constituted under the Narmada Control Authority to specifically ensure that satisfactory Environmental Action Plans and Rehabilitation Plans are formulated and implemented.

A Narmada Control Cell has been created in the Ministry to follow up on the various environmental

aspects and action plans concerning Narmada Sagar and Sardar Sarovar Projects in particular and the development of various projects in Narmada Basin in general.

4.15 Development Plan for Bombay 1981-2001

The Ministry has communicated its comments on the Bombay Development Plan and D'Souza Committee report to the State Government for necessary action.

4.16 Other Programmes relating to Environmental Impact Assessment

Some of the important decisions, programmes and activities relating to environmental impact assessment may be mentioned here. These are outlined below:

4.16.1 Coastal Area Management

As per the Prime Minister's directive issued in 1981, no construction activities are to be undertaken within 500 metres of the High Tide Line so as to protect the cultural, aesthetic and ecological values in coastal areas. The Directive has been addressed to all the coastal States for ensuring that indiscriminate construction activities within the stretch of 500 metres of the High Tide Line do not result in serious environmental impacts in these areas. The Coastal States have also been advised to prepare Status Reports and Coastal Area Management Plans. Under the Environment (Protection) Act, 1986, a directive

Table 2

	Projects pending at the beginning of the year (April 1988)	Projects Received	Projects Total	Projects (April—December 1988)			Additional information sought
				Projects Appraised	Projects cleared	Projects Rejected	
	1	2	3	4	5	6	7
River valley & Hydel Projects	13	12	25	25	6	9	10
Thermal	32	20	52	47	15	1	31
Mining	50	11	61	47	9	14	24
Industries	22	20	42	39	23	3	13
Other Projects	8	65	73	73	44	5	24
	125	128	253	231	97	32	102

has been issued whereby location of industries (excepting those which are in connection with the promotion and development of tourism and those which are permitted by the Central Government after examining the environmental impacts) within 1 km along the coastline of Murad-Janjira in Maharashtra has been prohibited. This is in view of the fact that indiscriminate industrial activities would adversely affect the natural ecological features of the area which could be gainfully used through promotion of tourism.

4.16.2 Doon Valley

The Doon Valley, bounded by Mussoorie ridge line, lesser Himalayan ranges, Shivalik ranges, Ganga and Yamuna, is an ecologically fragile area which has been subjected to considerable environmental degradation due to industrialisation, mining operations, deforestation, excessive grazing, unrestricted tourism activities, etc.

A Board for Doon Valley and adjacent watershed areas of Ganga and Yamuna set up under the

chairmanship of the Union Minister of Environment and Forests to regulate the developmental activities continued its work to ensure that the natural resources are put to optimal use without creating adverse environmental impacts. The Doon Valley has been designated as an ecologically fragile area under the Environment (Protection) Act, 1986.

Industries have been classified into three categories namely: Green, Orange and Red. Green category units are non-polluting industries and orange category industries are those which can be permitted with adequate pollution control measures. The Red category industries are highly polluting in nature and are not permitted in the Doon Valley.

A notification under the Environment (Protection) Act, 1986 has also been issued for regulating the location and types of industries, mining operations, tourism development grazing and land use in the Doon Valley.

While the Dehra Dun Master Plan is being recast, the Regional Master Plan for the Doon Valley region

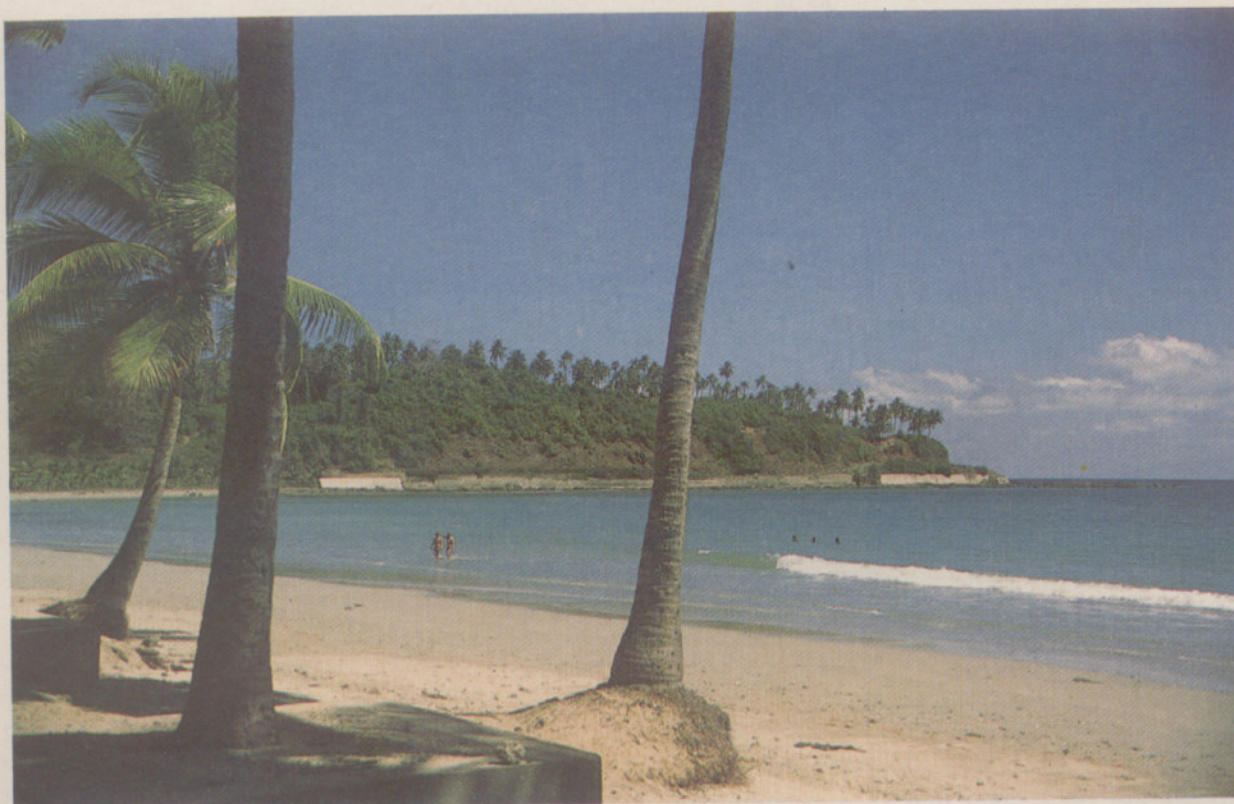


Fig. 13 A view of Sea-beach at Port Blair, Andamans

has been prepared using satellite imagery and remote sensing techniques. The U.P. Government has issued orders restricting industrial area to approximately 133 ha in Dehra Dun. The ministry in consultation with the U.P. Government, has set up a finance Committee to work out details of incentive packages for the shifting of lime kilns from Dehra Dun to Shyampur and Beharigarh. Distribution of sheep and goats under the Integrated Rural Development Programme (IRDP) has been stopped. Study on carrying capacity of the identified sites in Doon Valley is likely to be completed soon.

One of the most serious environmental problems of the Doon Valley has been large scale lime stone quarrying resulting in deforestation, air pollution, polluting of water sources, soil erosion and disfigurement of hills. The judgement of the Supreme Court in a public interest case has resolved the problem to a large extent; the Court has allowed mining only in four cases subject to environmental safeguards. Under the directives of the Court, the Ministry constituted a Monitoring Committee under the Chairmanship of Secretary, Ministry of Environment and Forests to oversee re-afforestation and to ensure that the mining activity by the four mines is carried out in accordance with the law and with proper environmental safeguards.

The Government of India, considering the fragile eco-systems of the Doon Valley and to ensure that developmental activities are consistent with the principles of environmental conservation, has issued Notification under Section 3(2)(v) of Environment (Protection) Act, 1986 and Rule 5(3)(a) and Rule 8 of Environment (Protection) Act, 1986 restricting location of industries, mining operations and other developmental activities in the Doon Valley in UP. Objections received are being examined.

4.16.3 Island Development Authority

The Island Development Authority (IDA) under the chairmanship of the Prime Minister continued to issue guidelines for environmentally sound development of Andaman & Nicobar Islands and Lakshadweep Islands.

The Ministry of Environment and Forests has been involved in follow up of various recommendations/ issues arising out of the IDA and Steering Committee meetings. Some of the major issues with which the Ministry has been involved include: environmental

impact studies, setting up of biosphere reserves, tourism projects, and forest survey.

The Government of India has declared a part of Great Nicobar Island as a biosphere reserve. Approximately 85% of the primary forest areas in this island are still virgin and rich in species content. The Project document on North Andaman Biosphere Reserve is being finalised by the Ministry.

4.16.4 Identification of fragile eco-systems

The Ministry has set up an Expert Group for recommending norms for determining ecologically fragile areas in the country so that future development programmes in sensitive ecosystems can be planned accordingly.

The expert Group has submitted its interim report to the Ministry. The Group has enlisted ecosystems which could be considered as ecologically fragile. These are:

- Ecosystems with unique properties
- Ecosystems with intrinsically low resilience.
- Ecosystems with high species richness and biological diversity
- Ecosystems susceptible to species loss
- Ecosystems linking two or more protected ecosystems.
- Ecosystems with aquifers and water recharge areas of mountain springs
- Areas of active geological faults and susceptible to seismic hazards.

4.17 Human Exposure Assessment Location (HEAL)

The project has been developed as a part of the Health Related Monitoring Programme by World Health Organisation (WHO) in cooperation with United Nations Environment Programme (UNEP). The project was started initially with three components i.e. air monitoring, water quality monitoring and food contamination monitoring on a global basis. The objectives of the HEAL Project are:

- provide the framework required to develop an international consensus on techniques and procedures for measuring and assessing human exposure to environmental pollution and to demonstrate their applicability in locations with different life styles and pollution profiles.

— provide a standing arrangement for making detailed human exposure assessments for pollutants considered to be of priority importance by countries/institutions participating in the project and provide better support and data for epidemiological studies on health effects on environmental pollution.

— provide a means to promote research/development of new procedures and approaches for the assessment of human exposure environmental pollution.

Chembur and Central area of Bombay city have been identified for studying human exposure with reference to pollutants such as chlorinated pesticides (DDT and BHC); heavy metals (Pb and Cd) and air pollutants (NO_x). The following institutions are participating in this programme:

— National Institute of Occupational Health, Ahmedabad.

— Maharashtra Pollution Control board, Bombay

— Air Quality Monitoring and Research Laboratory, Bombay.

— Municipal Corporation, Bombay.

4.18 Studies/Workshops/Training

— The work on a case study regarding environmental management in the Neyveli lignite mines is nearing completion. Two more case studies—one related to environmental management in Noamandi iron ore mine of Tata Iron and Steel Company (TISCO) and the other related to Dhanpuri Opencast Project of Coal India Ltd—have been commissioned during the current year to document the status of environmental management in these projects.

— The work regarding preparation of a model Environmental Management Plan in respect of Bailadila Opencast Mining Project initiated during the last year is progressing and requisite data has been collected.

— A training programme on Environmental Impact Assessment Procedures in Surface Mining Projects was organised in November, 1988 in collaboration with the National Council for Cement and Building Materials at Ballabgarh.

— A project for the preparation of a manual on

environmental impact assessment of thermal power plants on the ambient air qualities has been completed.

— A study on taxonomic and ecological survey of Perumal Par and Sant Coral Bank between the Amini and Pitti Islands has been entrusted to the Goa University. Another study on the coral reefs of these two group of islands is likely to start this year. Central Agricultural Research Institute, Port Blair, is carrying out a study on Environmental Impact Assessment of red oil palm plantation.

— Two separate Working Groups have been constituted for preparation of environmental guidelines on transportation and communication projects. Under the transportation sector, preparation of guidelines for transport projects like railways, roadways, waterways, airways, pipelines, ropeways, etc. have been undertaken.

— Under the communication sector, preparation of environmental guidelines for communication projects such as television stations and towers, radio stations and transmitters, telecommunication projects, microwave towers, telephone lines and exchanges has been undertaken.

— Under the Indo-Dutch bilateral programme it has been programmed to organise 15 workshops and three high level policy seminars on environmental impact assessment during the next three years. The workshops will cover the following sectors:

- Water resources development
- Land use planning
- Siting of industries, and
- Ports and harbours.

The workshops will be organised in selected institutions within the country and the faculty members will include Indian and Dutch experts in the identified areas. The workshops are meant for the project managers/technical personnel involved in the development projects. In addition to the workshops, three high level policy seminars would be held during the next years. The purpose of the seminars is to sensitise the participants about the need for environmental impact assessment and the role it can play in formulation of environmentally sound projects.

5. CONTROL OF POLLUTION

5.1 CONTROL OF WATER AND AIR POLLUTION

5.1.1 The main instruments for control of pollution of water and air are the Water (Prevention and Control of Pollution) Act, 1974, the Air (Prevention and Control of Pollution) Act, 1981 and the Environment (Protection) Act, 1986. The Water (Prevention and Control of Pollution) Cess Act, 1977 provides for levy of cess on water consuming industries.

5.1.2 The Water and Air Acts are implemented through the Central Pollution Control Board and the State Pollution Control Boards.

During the year, Goa and Tripura have also constituted their State Boards. With this, all States, excepting the States of Manipur, Nagaland, Sikkim, Arunachal Pradesh and Mizoram have constituted their State Boards. The Central Board looks after pollution control activities in the Union Territories.

5.1.3 To facilitate closer coordination between the State Boards and the Central Board, two Zonal Offices of the Central Board were established earlier at Calcutta and Chandigarh. During this year, four more

Zonal Offices were set up and are functioning at Kanpur, Shillong, Vadodara and Bangalore.

5.1.4 Assessment of Water Quality

Under the National Water Quality Monitoring Programme, 106 new stations have been added during the year to the already existing 200 stations, thus taking the total number of water quality monitoring stations to 306 all over the country. This includes 11 ground water stations and 27 stations under the Ganga Action Plan.

In Figure 14 riverwise distribution of the Stations has indicated. It is proposed to increase the number of monitoring stations to 400 by the year 1990.

5.1.5 Assessment of Coastal Water Quality

During the year, the Central Pollution Control Board, in collaboration with the Department of Ocean Development, has established a network of 173 monitoring stations along the entire coastal stretch of the country to assess the coastal water quality. The

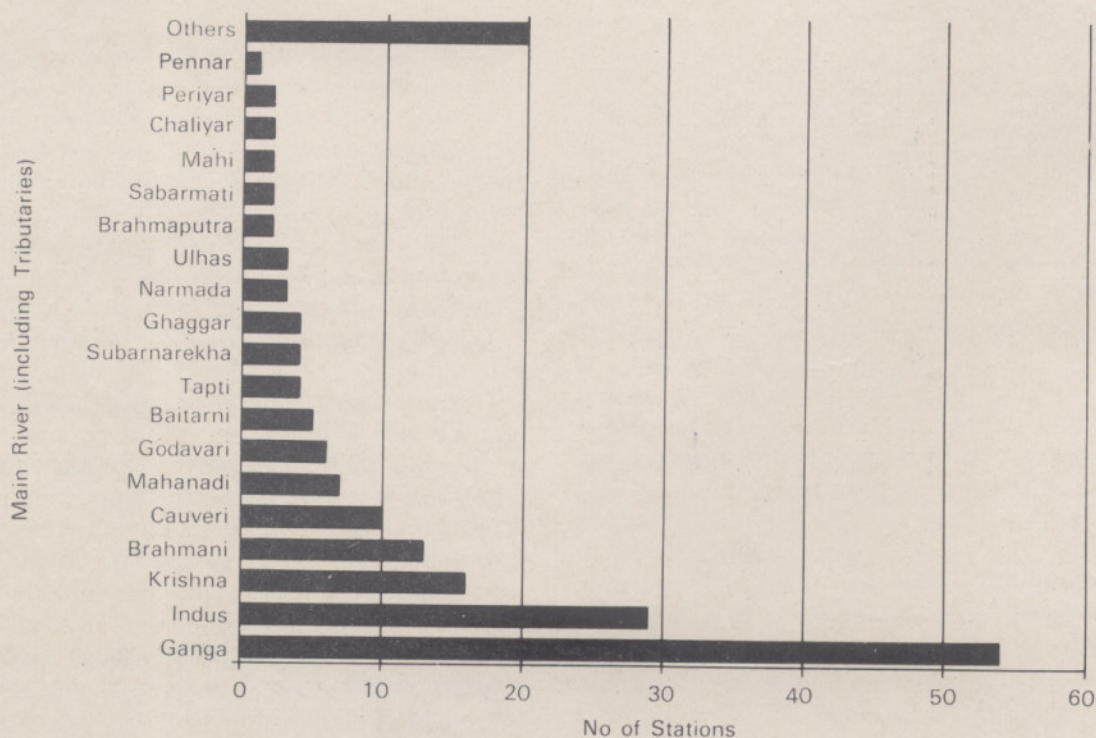


Fig. 14 Riverwise distribution of Monitoring Stations

Central Board, the Eastern Zonal Office of the Central Board and State Pollution Control Boards of Gujarat, Maharashtra, Kerala and Tamil Nadu along with institutions such as the National Institute of Oceanography, Goa, the Institute of Preventive Medicine, Hyderabad, the Fisheries College, Mangalore and the Centre for Earth Science Studies, Trivandrum are involved in the survey. Data collected for 25 parameters are being processed to formulate schemes to control and monitor pollution of the coast.

5.1.6 River Basin Studies

Water quality monitoring (wet) studies and inventorisation (dry) studies initiated on the Kaveri River Basin covering the States of Karnataka, Kerala and Tamil Nadu have been completed. Similar studies initiated last year on the Mahi, the Mahanadi and the Godavari have also been completed. Reports on the river-basin studies on the Sabarmati and the Krishna are being finalised.

5.1.7 Waste Water Recycling

A project on wastewater recycling is in operation under the Pollutionally Relevant Schemes. The project is aimed at finding out optimum quality, quantity and periodicity of application of waste water on land which will not cause ground water pollution, soil drainage problem and health hazard. Based on such an investigation, guidelines will be evolved for application of waste water on land so as to use land as treatment medium for partially treated wastewater. The scheme was initiated at three sites at Nagpur, Gwalior and Vadodara. Flow assessment and characterisation of the wastewater to be recycled have been completed. Monitoring is taken up by National Environmental Engineering Research Institute (NEERI), Nagpur, Madhya Pradesh Pollution Control Board and the Gujarat Industrial Development Corporation (GIDC) as per the programme.

5.1.8 National Ambient Air Quality Monitoring Network

A National network of ambient air quality monitoring stations initiated in 1984 has been progressively expanded. During the year 34 new stations were sanctioned out of which 9 are operational. With this, the total number of stations sanctioned under this network is 140 out of which 103 stations are operational. Ten more stations, 5 each for Bombay and Calcutta are likely to be sanctioned soon. Three

automatic ambient air quality monitoring stations (two stationary and one mobile) were established at Delhi during this year under the Indo-EEC bilateral programme.

5.1.9 Preparation of Environmental Standards

5.1.9.1 Based on the standards prepared by the Central Board and the Bureau of Indian Standards (BIS), effluent standards in respect of natural rubber industry and emission standards for thermal power plants have been notified under the Environment (Protection) Act, 1986. General standards for the discharge of all types of effluents from any source have been notified. However, these general standards shall not apply to those industries for which specific standards have been already notified by the Central Government. This is in addition to the standards for 24 industries notified earlier.

5.1.9.2 Final reports from the experts appointed earlier for preparation of standards for six industries, i.e. bullion refining, foundry, pesticides, drugs and pharmaceuticals, petro-chemicals and plastics and stone crushers have been received and the same are being processed for notification. Experts have been appointed during the year for preparation of standards for seven more industries, namely, glass and ceramics including fibre glass production and processing, oil drilling and gas extraction, soap and detergents, explosives, acids and alkalis, slaughter houses, meat and sea foods processing. As per a new understanding reached with the Bureau of Indian Standards, preparation, review and notification of environmental standards shall henceforth be the responsibility of this Ministry. The Bureau of Indian Standards will be responsible only for the preparation of Indian Standards in respect of terminology and testing methods.

5.1.9.3 Comprehensive Industry Documentation work regarding the pollution control status has been initiated and is continuing in respect of the following industries.

- Soda Ash
- Natural Rubber
- Dye and Dye Intermediaries
- Paints
- Tannery
- Pulp and Paper (large)
- Organic Chemical Manufacturing Industries
- Dairy
- Vanaspati

5.1.9.4 Inventorisation of Pollution Sources

During the year, the Central Pollution Control Board has taken up inventorisation of pollution sources like vehicular pollution in all the 12 metropolitan cities, pollution generated from Class I and Class II cities and pollution generated from large and medium industries. So far the draft inventory of vehicular pollution in metropolitan cities has been completed. Data received from 205 of the 218 Class I cities and 203 of the 217 Class II cities are processed and the first part of the report covering Class I cities is under preparation. Information of the inventory to the water polluting industries has been received from 13 States and 4 Union Territories and the information is being processed for bringing out in the form of a publication.

5.1.10 Enforcement of Standards

Minimal National Standards (MINAS) and air emission standards are evolved by the Central Board for major categories of water and air polluting industries respectively and they refer to the maximum limit of effluents and emissions that an industry may discharge into any water body or 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 emission discharges.

National and Zonal Task Forces have been reconstituted for the implementation of standards in fertilizer industries, iron and steel, cement, pulp and paper (small) and thermal power. These task forces interact with the concerned industry representatives and State Pollution Control Boards and also take up inspection of pollution control systems installed at source and monitor the progress of implementation of MINAS and emission standards.

The status of implementation of MINAS and emission standards in respect of some important industries are as follows:

5.1.10.1 Fertilizer Industry

Out of a total of 100 units in operation, pollution control status is given below:

Table 3

Industry	Number of Operating Units
—Phosphatic (P)	60
—Nitrogenous (N)	26
—Complex (NPK)	14
—Total operating units	100

Status of Compliance of Standards
Table 4

	Phosphatic (P)	Nitrogenous (N)	Complex (NPK)	Total
MINAS Emission Standards	37	10	5	52
Both MINAS and Emission Standards	17	14	9	40
	16	9	5	30

5.1.10.2 Petroleum Refinery

Standards Development

— MINAS for refineries have also been extended to petroleum processing of Oil and Natural Gas Commission, Gas Authority of India Ltd. and Oil India Limited.

— Standards for drilling and production facilities have been taken up.

Total operating units 12

Status of Compliance of Standards
Table 5

Standards	No. of Units
MINAS Emission Standards	6
Both MINAS and Emission Standards	5
	2

5.1.10.3 Pharmaceutical Industry

There are 85 operating units, out of which 22 units have Effluent Treatment Plants (ETPs), while in 4 units, ETPs are under planning. MINAS and Emission Standards for the pharmaceutical industries are under various stages of preparation and notification.

5.1.10.4 Integrated Iron and Steel Plant

Total No. of Industries 7

Status of ETP
Table 6

No. of ETP operating in full	2
No. of ETP operating partially	4
No. of ETP under planning	1
No. of units with partial emission control measures	2

5.1.10.5 Small Pulp and Paper Mills

Total number of Industries 314

Status of ETP
Table 7

No. of ETP existing	174
No. of ETP operating in full	72
No. of ETP operating partially	102
No. of ETP under construction	30

Seventy-eight ETP's are complying with the first phase of MINAS, while 25 are complying with the final phase of MINAS.

5.1.10.6 Large Paper and Pulp Mills

There are 40 large paper and pulp mills, all of which have the ETP's. However, none of the ETP's has complied with MINAS so far.

5.1.10.7 Asbestos Products Industry

There are 18 operating units, all of which have the control equipments. The emission standards for this industry were finalised during the year. Implementation of these standards will start shortly.

5.1.10.8 Sugar Industry

There are 390 operating units, out of which information with regard to the status of ETP's has been received from 212 units which had responded to the questionnaire survey. The details are as follows:

Status of ETP's
Table 8

No. of ETP existing	153
—Complying with BOD Standards	65
—Not complying	88
No. of ETP under construction	7
No. of units without ETPs	52

5.1.10.9 Distillery Industry

There are 199 operating units, out of which information with regard to the status of ETPs has been received from 111 units which had responded to the questionnaire survey. The details are as follows:

Table 9

	No. of Units
ETP existing*	82
ETP under construction	03
No. of units without ETP's	26

*No ETPs are complying with the BOD Standard.

5.1.10.10 Cement Industry

No. of Industries 95

Status of Implementation of Standards
Table 10

	No. of Units
Complying with Emission Standards	53
Provided time schedule for installation of pollution control equipment.	30
Provided no time schedule for installation of pollution control equipment	9
Closed	3

5.1.10.11 Thermal Power Plants

No. of plants 67

Status of pollution control implementation is as follows:

Table 11

	No. of Units
Complying with Standards	8
ETP existing but standards are not being met.	40
Provided time schedule for meeting emission standards	7
No information available	12

5.1.11. The enforcement of the standards on various defaulting units is sought to be done through prosecution in courts of law under the Water and Air Acts. Since the enactment of the Water and Air Acts

in 1974 and 1981 respectively, a total of 3251 prosecutions have been launched by the Central and State Pollution Control Boards.

5.1.12 Action taken against industries under the Environment (Protection) Act, 1986

In pursuance of the provisions under Section 5 of the E.P. Act, the Central Government initiated action against 82 units (including those identified under Ganga Action Plan) which had not taken the necessary pollution control measures. 28 units have been directed to close down and 19 units to set up their effluent treatment plants within the specified time-frame. Action against 25 units has been withdrawn as these have taken the necessary pollution control measures. Action against the remaining 10 units is pending for want of detailed information from the concerned State Pollution Control Boards.

In pursuance of a decision of the Central Ganga Authority, 17 public sector undertakings were asked to submit their time bound programmes for setting up the effluent treatment plants. Thirteen units have submitted their programmes and have been given directions to set up their effluent treatment plants. Out of the ten private sector undertakings identified, six have been issued directions for closure by the Central Government, one by the State Government of Bihar and the remaining three are closed for other reasons.

5.1.13 Training

During the year, the Central Pollution Control Board had organised and sponsored several training courses on various aspects of pollution control such as:

- "Fundamentals of biological processes as aid to environmental pollution control" conducted by Centre for Environmental Studies, Anna University, Madras.
- A three-day training on Industrial Emission Monitoring
- A one-day workshop on Water Quality Monitoring of the Ganga with special emphasis on sampling and analysis techniques
- Training in Analytical Quality Control for Water Quality Monitoring sponsored and conducted at NEERI, Nagpur

- A two-week training course on "Application of Meteorology to Air Pollution Control" by Jawaharlal Nehru University, New Delhi, conducted at Hyderabad in collaboration with the Andhra Pradesh Pollution Control Board.

- A month-long tour of 16 officials from State Pollution Control Boards to various industries in the country under the Group Education Activity sponsored by WHO.

- Forty eight engineers/scientists from Central Pollution Control Board were sent for training within the country while 8 were sent abroad for training.

5.1.14 Awareness

- The Central Board conducted a Pollution Control Camp at Okhla Industrial Area.

5.1.15 Publications

The Central Pollution Control Board brought out the following publications during the reporting year:

- Report on Identification of Import Component of Waste Treatment Technology and Knowhow
- Ground Water Quality in Union Territory of Delhi (abridged)
- Characterisation of Wastewater from Wazirpur Industrial Area
- Guidelines for Cooling Water Management
- Water Pollution from Mass Bathing in Ganga River during Kumbh melas
- Effect of Mass Bathing on Quality of Brahma Sarovar (Kurukshetra) during the Solar Eclipse.
- Use Classification of India Coasts Part-IV (Gujarat and Maharashtra Coast)
- Report of the National Committee on Waste Water Quality Monitoring Instruments

5.1.16 Memorandum of Understanding with CSIR

The Council of Scientific and Industrial Research (CSIR) and the Central Pollution Control Board signed a memorandum of understanding during 1988. The memorandum provides for collaborative research and development work in the area of industrial pollution control, water and air quality monitoring and industrial effluent monitoring, and will be valid for a period of five years. The National Environment Engineering Research Institute, Nagpur, a CSIR unit will be the executing counterpart agency on behalf of the CSIR.

The following areas have been identified for cooperation between CSIR and the Central Board:

- Air quality monitoring studies on chemical forms, physical/chemical transformation of toxic pollutants and receptor modelling approach.
- Studies on environmental assimilative capacities in selected location to enable objective site selection for industries in delineated land use plans.
- Studies on low/non-polluting technologies in select industrial sectors.
- Development of management information system for water and air polluting industries.
- Development of rapid BOD, bacteriological and virological tests.
- Development of rapid bioassay tests to ascertain toxicity of wastes using microflora and fauna.
- Demonstration of Powdered Activated Carbon Treatment (PACT) process for treatment of toxic and recalcitrant organic chemical industry wastewater-pilot plant study.
- Development and demonstration of thermal and chemical methods of treatment for hazardous wastes.

5.1.17 Assistance to State Pollution Control Boards

In order to carryout the environmental monitoring, the State Pollution Control Boards are being strengthened by giving financial assistance for equipment and technical and scientific staff for laboratories and field. Seventeen State Pollution Control Boards have so far availed of this assistance. 122 laboratory staff and 228 field staff have been sanctioned to the State Boards to carry out the programme under this scheme. Rs. 34 lakhs were sanctioned for augmenting their technical staff out of which Rs. 24.41 lakhs were disbursed.

5.1.18 Pollution control activities in the Union Territories

- During the year, a total of 556 consents were issued. 753 industrial effluent samples and 9800 emission samples were analysed for six and three

parameters respectively. During this year, 10 effluent treatment plants (ETP) and 37 emission control systems were installed and commissioned while 2 ETPs and two emission control systems are under erection. Legal actions were initiated against seven recalcitrant industries.

- Two multi-parameter continuous ambient air monitoring stations procured with the financial assistance from the European Economic Community (EEC) were installed in Delhi. These stations are designed to measure continuously Sulphur dioxide (SO₂), Carbon monoxide (CO), Oxides of Nitrogen (NO_x), Suspended Particulate Matter (SPM) and certain meteorological parameters such as temperature, humidity, wind speed and directions.
- Intensive air quality surveys of the residential areas and industrial areas in Delhi were conducted. Noise pollution survey in Delhi and intensive monitoring of river Yamuna have been taken up.

5.2 MANAGEMENT OF HAZARDOUS SUBSTANCES

5.2.1 The Environment (Protection) Act, 1986 provides for laying down procedures and safeguards for handling of hazardous substances and prevention and control of accidents. As the Ministry of Environment and Forests has been designated as the nodal ministry for the management of hazardous substances and prevention of chemical disasters, a separate Hazardous Substances Management Division has been created this year to take care of the above tasks.

5.2.2 In accordance with the relevant provisions of the Act and also in exercise of the powers conferred by Section 6, 8 & 25 of this Act, the following three sets of rules have been prepared by the ministry:

- Rules for the manufacture, import and storage of hazardous and toxic chemicals.
- Rules for the transportation of hazardous and toxic chemicals by road.
- Rules for the management of hazardous and toxic wastes.

These rules have been discussed with the expert panel constituted by the ministry and with the concerned Departments of the State Governments and Union Territories. These rules will be notified after consulting the Law Ministry.

5.2.3 The existing control procedures for the management of chemical accidents have been reviewed. A Crisis Management Plan has been worked out to deal with the emergencies that are likely to occur in units handling hazardous chemicals. The Crisis Management Plan provides a three-tier system i.e. the establishment of a Central Crisis Group, State Level Crisis Group and Local or District Level Crisis Group. The ministry has notified the constitution of the Central Crisis Group headed by Secretary, Ministry of Environment and Forests.

An effective communication system is being planned for coordinated action in case of a crisis with a Control Room working in the Ministry round-the-clock.

5.2.4 As in previous years, action taken by various Governments and Union Territories on various aspects of hazardous chemical control has been closely reviewed. Twenty States and Union Territories have designated the nodal departments in their States to deal with hazardous chemicals. So far eighteen States and Union Territories have identified hazardous chemical units in their area and have also prepared on-site and off-site plans in some areas. Eighteen States and Union Territories have formed coordination committees to deal with crisis situations. In order to equip the concerned state agencies with necessary manpower and equipments, a central scheme of assistance of Rs. 2.34 crores was approved for the remaining two years of the 7th Five Year Plan. Six States, namely, Andhra Pradesh, Goa, Karnataka, Maharashtra, Tamil Nadu and Uttar Pradesh have already been given assistance under this scheme. Proposals received from seven other States, namely, Bihar, Kerala, Assam, Orissa, Meghalaya, Haryana and Rajasthan are being processed for assistance.

5.2.5 Hazardous Wastes

The dumping of the hazardous chemicals and wastes by some firms from the developed countries into the developing countries has become a major problem of concern to the latter. Under local laws, some exporting countries are informing the importing country about such imports. However, the information given by these countries is too scanty to take appropriate control action. Necessary provisions have now been included in the draft rules framed by the Ministry so that proper controls could be undertaken. A global convention on transboundary movement of hazardous wastes is under discussion under the auspices of the United Nations Environment Programme. India is participating in these discussions.

5.2.6 Micro-organisms

The Ministry has prepared Draft Rules for regulation and Control of the environmental effects of micro-organisms and has proposed a mechanism with a structure for the control of microorganisms to the Department of Biotechnology of the Government of India. The establishment of the International Centre for Genetic Engineering and Biotechnology at New Delhi has also been reviewed from the environmental angle and necessary safeguards to be provided for the functioning of the Institute have been suggested to the International Organising Committee of the Institute.

5.2.7 Radioactive Substances

During the year, the Ministry reviewed various safety procedures at various Atomic Energy Establishments including Narora Atomic Power Station from the environmental angle.

6. REGENERATION AND DEVELOPMENT

6.1 GANGA ACTION PLAN

6.1.1 The Central Ganga Authority was constituted in February, 1985 to guide and oversee the implementation of a programme for restoring the quality of the river Ganga. The Authority, under the Chairmanship of the Prime Minister reviewed the overall progress of Ganga Action Plan during the year and provided guidance. The Monitoring Committee of Ganga Action Plan met three times to monitor 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 execution of various schemes and utilisation of funds under the Ganga Action Plan. The Ganga Project Directorate (GPD) of the Ministry co-ordinated 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 implementing agencies and non-officials have been set up for each of the major towns to oversee the programme.

Schemes Sanctioned

6.1.3 As on date, 262 schemes necessary for completion of the Plan, have been sanctioned. The State-wise position regarding the schemes sanctioned is as follows:

Table 12

State	(Rs. in crores)	
	Scheme Sanctioned No.	Cost
Uttar Pradesh	106	115.85
Bihar	45	33.62
West Bengal	111	108.97
Total	262	258.44

6.1.4 Schemes sanctioned under the Ganga Action Plan can be broadly divided into 6 categories as shown in Table 13.

6.1.5 Under the scheme for intercepting and diverting of about 800 mld of waste water, 10 sewage treatment plants (STP) are to be renovated and another 25 new plants are to be constructed in different locations. The renovation of STP at Lakkarghat in Rishikesh, at Banaras Hindu University, at Diesel Locomotive Works in Varanasi and at Saidpur and Beur in Patna have been completed and their expansion is in progress. Work on all other treatment plants is either under progress or tenders are being finalised and land is being acquired.

6.1.6 Resource recovery is an important component of the treatment process which is being taken up in different locations as under:

- Utilisation of treated effluent of the oxidation pond at Lakkarghat in Hardwar-Rishikesh for irrigation.
- Recovery of bio-energy and conversion of the same into electricity in major high capacity treatment plants at Hardwar-Rishikesh, Allahabad, Kanpur, Varanasi, Patna and some units in Calcutta Metropolitan District.
- Pisciculture schemes for Behrampore, Nabadwip, Panihati and Serampore in West Bengal.

6.1.7 Out of 262 schemes sanctioned, 50 have been completed and, 84 schemes costing Rs. 52.32 crores are nearing completion. The work to be completed includes construction and commissioning of intermediate pumping stations, interception of drains, renovation of sewage farms, low cost sanitation facilities, etc. Upon completion of these schemes, substantial quantity of waste water will be diverted in locations such as Hardwar, Rishikesh, Kanpur,

Table 13

	Uttar Pradesh		Bihar		West Bengal		Total	
	No.	Cost	No.	Cost	No.	Cost	No.	Cost
Interception and diversion	40	3000.41	17	1511.03	31	5121.14	88	9632.58
Treatment of Waste Water	13	6058.11	7	871.20	15	3795.29	35	10724.60
Low Cost Sanitation	14	989.08	7	460.76	22	601.42	43	2051.26
River Front Development	7	547.95	3	116.22	24	682.45	34	1346.62
Electric Crematorium	3	102.60	8	296.77	18	666.14	29	1065.51
Other schemes	29	887.19	3	105.93	1	30.47	33	1023.59
Total	106	11585.34	45	3361.91	111	10896.91	262	25844.16

Allahabad, Patna, Bharatpur, Titagarh, Chandannagar, etc.

Schemes at Sangam—Allahabad, Uttar Pradesh

6.1.8 In view of the Kumbh Mela at Allahabad, several steps have been taken to protect the confluence from additional sewage. At present, sewage is flowing into the river Yamuna and Ganga upstream of the confluence through various drains and the existing sewerage system. There are altogether 13 drains carrying sewage into Yamuna above the Sangam, out of which four are the major ones i.e. Chachar, Ghaghar, Salori and Mori.

6.1.9 The Chachar nalla, which is a major source of pollution accounting for 27% of the total waste water flow above the Sangam at Allahabad, has now been diverted to the main pumping station. Ghaghar, Salori and Mori have been similarly diverted. The

intermediate pumping stations at Lukarganj, Mamfordganj and Alopibagh have been renovated. The main pumping station for the entire city at Gaughat has been doubled in its capacity. All the waste water previously flowing into the rivers through the major drains is now flowing to Gauhat and is being pumped across Yamuna River in Naini and Dandi sewage farms. Pending construction of an intermediate sewage treatment plant at Naini, this waste water is being conveyed by special bypass channel which has been completed. This channel will take such waste water as is not used in the sewage farm to lower reaches of Ganga 7 kms. down stream of Sangam.

6.1.10 Since Allahabad does not have an effective sewer system, a very large low cost sanitation programme at a cost of Rs. 7.74 crores jointly financed by GPD, Ministry of Social Welfare, HUDCO and U.P. Government, has been taken up. So far, 26 of

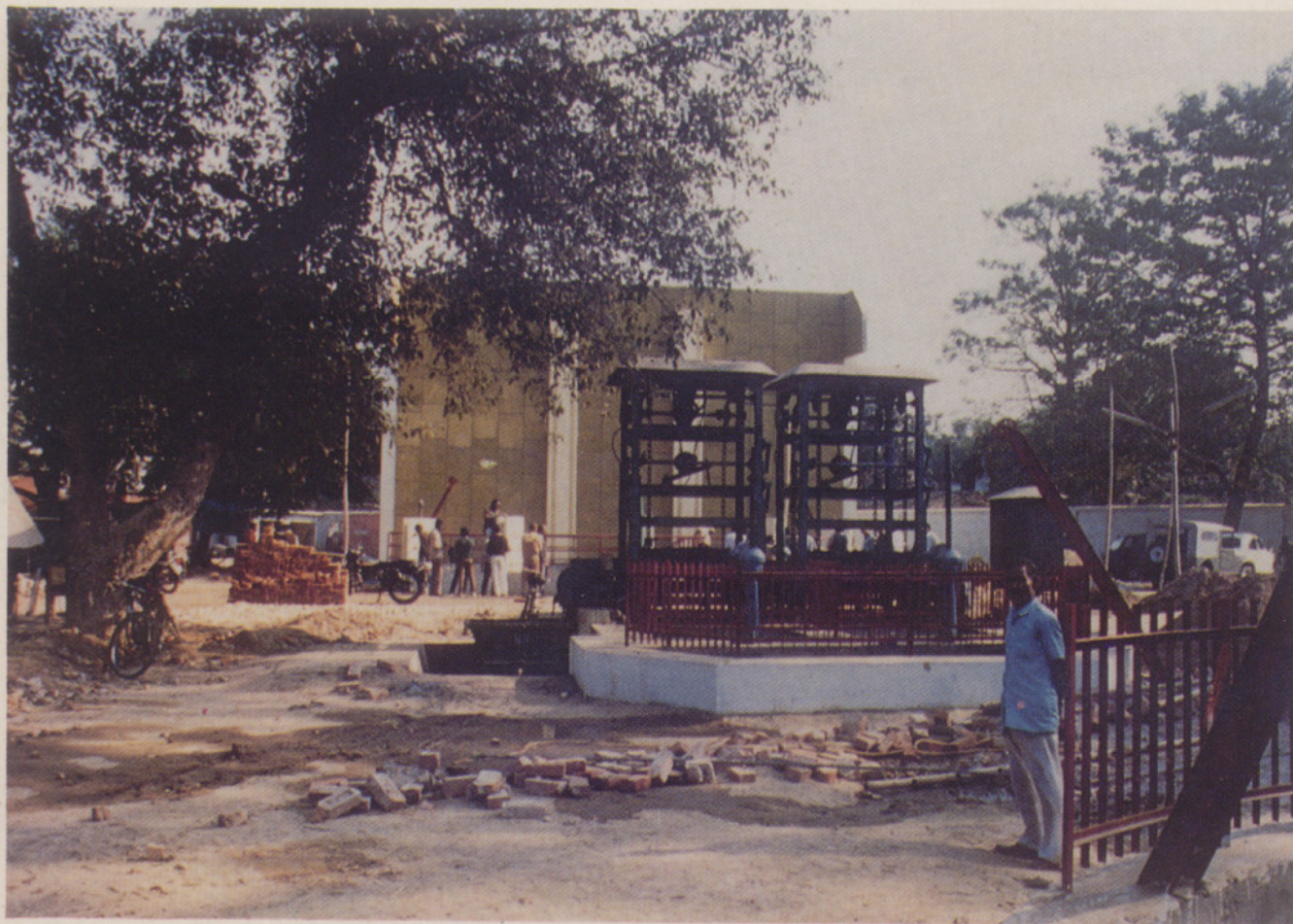


Fig. 15 Gaughat sewage pumping station in Allahabad

community toilets and 18,000 pour flush latrines have been constructed.

6.1.11 A scheme for integrated development of Saraswati Ghat and adjoining areas near Sangam has been taken up under the Ganga Action Plan at an estimated cost of Rs. 28.18 crores. The works covered are public amenities at main ghat, development of Nehru Ghat, bathing facilities, jetty line-cum-pathway, repairs to existing ghat, boat club building and adjacent ghat, approach road and lighting, afforestation and land scaping, etc.

6.1.12 The works completed at Allahabad well in time for the Kumbh Mela have obtained wide appreciation of the millions of Indians and thousands of foreigners who attended the Kumbh Mela.

Other Schemes

6.1.13 Though the bulk of the schemes under the Ganga Action Plan relate to Sewerage and Sanitation

some additional schemes to supplement these efforts have been taken up as follows:

- Schemes for plantation in the denuded stretches of Mansa Devi hills, soil conservation and construction of check dams to reduce silt intrusion into the drains and sewers of Hardwar.
- Biological conservation of fresh water turtles in Varanasi. These turtles are now endangered and represent a major biological fauna of the river.
- A scheme for improving safety for river using public at Varanasi through increased patrolling to prevent dumping of solid wastes remove floating animal carcasses and dead bodies and control mooring of vessels.
- Construction of 32 electric crematoria in 22 towns at a cost of about Rs. 9.25 crores which will reduce the demand for fire wood by about 3000 quintals



(Courtesy: Smt. K. S. Bagchi)

Fig. 16 Kumbha Bathing in the pollution free water of the Ganga at Sangam



(Courtesy: Smt. K. S. Bagchi)

Fig. 17 Pollution free water at Sangam (Allahabad) before Maha Kumbh

per year equivalent to the produce of 900 hectares of forest.

6.1.14 Under the low cost sanitation scheme, Ganga Action Plan has provided assistance of Rs. 20.51 crores which will enable construction of about 54,000 pour flush latrines and 3000 public toilet complexes.

6.1.15 The additional schemes undertaken in the previous year to supplement the existing schemes relating to sewerage and sanitation were continued during the year.

6.1.16 Schemes under Ganga Action Plan will also be supplemented by ongoing schemes for improving urban infrastructure such as in Kanpur, Allahabad and Varanasi where an outlay of Rs. 85 crores has been programmed till 1991-92 under Urban Development schemes. In Calcutta Metropolitan District, an urban

development programme of Rs. 110 crores is being implemented which will supplement the schemes under the Ganga Action Plan. Special mention may be made of the scheme for rendering Allahabad scavenger free by pooling together the allocations from Ganga Action Plan, Ministry of Social Welfare, HUDCO and the State Government.

Monitoring and Evaluation

6.1.17 During the year, work relating to monitoring of physical progress, monitoring of water quality in the river at the 27 monitoring stations and development of water quality models to enable prediction of the quality of the river under different scenerios continued. The projected BOD concentrations in April, 1991 i.e. at the end of the 7th Five-Year Plan compared to the measured average BOD concentrations in April for the year 1981-86 is given in Figure 18.

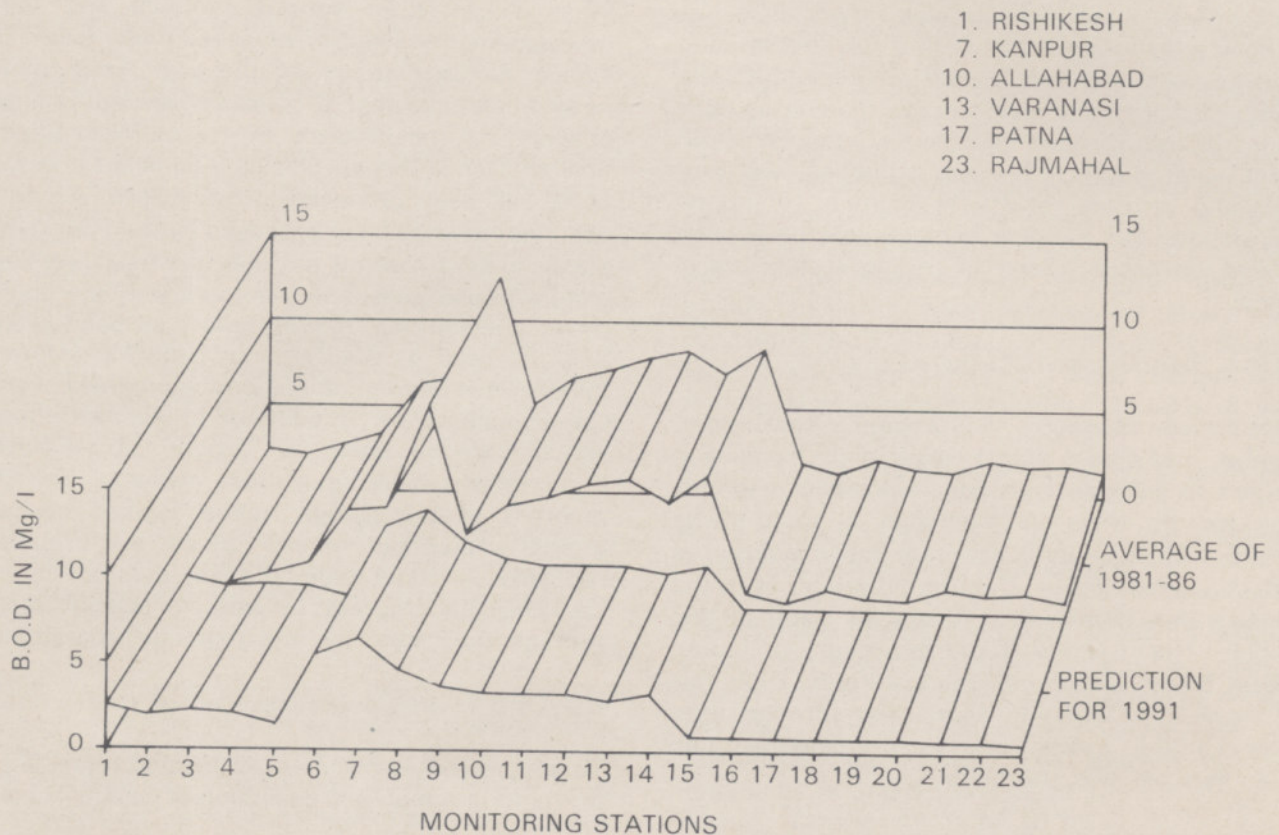


Fig. 18 Projected Ganga River Water Quality

6.1.18 Public Participation in the Ganga Action Plan

6.1.18.1 Efforts to secure public participation in the implementation of the Ganga Action Plan have been stepped up considerably during the year. Main objectives in this regard are the following:—

- Promote awareness of the problems of pollution of rivers in general and Ganga in particular;
- Disseminate the importance of the initiative taken by the Prime Minister towards a cleaner Ganga;
- Promotion of right attitudes towards use of rivers;
- Improve motivation and performance on the part of those engaged in the Ganga Action Plan;
- Promote awareness of related issues such as the siltation of rivers, soil erosion, afforestation, industrial pollution, conservation of water resources etc. and
- Secure public cooperation and participation in the implementation of the Action Plan.

Many of the awareness creating programmes are addressed to specific target groups as follows:

6.1.18.2 Youth and Ganga

The Nehru Yuva Kendra, National Service Scheme, Yuva Mandal and other youth organisations have participated in 7 Ganga Sewa Shivirs held at Allahabad, Varanasi, Patna, Sonapur and other places in West Bengal. As part of these camps, cleaning of Ghats, Prabhat Pheris, Padyatra and awareness campaigns were organised in which over 3000 volunteers participated. Aquatic sports such as swimming and boating to enable the youth to cultivate an active interest in maintaining the cleanliness of the river have been organised in Allahabad, Uttar Pradesh and Murshidabad in West Bengal.

6.1.18.3 School Children and Ganga

About 4000 school children have participated in

programmes of public awareness in all major Ganga Action Plan towns. A programme involving secondary school children in 88 schools along the Ganga has been developed through the Centre for Environment Education, Ahmedabad under which specially prepared kits for simple water quality monitoring have been distributed. Through the scheme, school children will test water quality in the river stretches near their schools and compare results. In addition, songs and dance, debate and painting competitions have been organised for school children by various social clubs in Varanasi.

6.1.18.4 Pilgrims and Ganga

In Allahabad, Sonapur, Sultanganj, Serampore, Chinsurah and Ganga Sagar, exhibitions have been organised to coincide with congregation of pilgrims. During Kumbh Mela in Allahabad, a multi-media campaign was mounted to generate public awareness on environmental issues. Cultural programmes in the folk media were organised at Allahabad, Varanasi and Sonapur. The Society for Promotion of Indian Classical Music & Culture Amongst Youth, Delhi has been involved in creating awareness through their regular cultural events and lecture-demonstration programmes all over the country.

6.1.18.5 Media and Ganga

Press teams from various national and regional newspapers and magazines visited major towns under Ganga Action Plan during the year. Four television news films have been produced covering the progress of work in Uttar Pradesh, Bihar and West Bengal. A film on Ganga Action Plan in Allahabad and Kumbh Mela has been produced and televised. A one hour documentary has been produced by the Films Division along with a twenty minute theatrical version for picture house release in the country. A one hour long travelogue entitled 'Pradakshina' has been produced and televised in the National Network. Information folders have been produced on the progress of work in Ganga Action Plan. In addition, public awareness kits which can be used by various non-government organisations have been made available. The overall progress of the Ganga Action Plan is covered in quarterly progress reports which are brought out regularly. All India Radio and Doordarshan have been covering the progress of work in specific locations through their network and regional programmes.

6.1.18.6 Participation of Elected Representatives

To secure the involvement of elected representatives in the formulation and execution of Ganga Action Plan



Fig. 19 Public involvement in Ganga Action Programme

schemes, the Uttar Pradesh Government has set up city level and state level committees involving the local MLAs and MPs. The Committees meet periodically to review the progress.

6.2 WASTELANDS DEVELOPMENT

6.2.1 The National Wastelands Development Board was set up in 1985, with the following main objectives:

- to increase tree and other green cover on wastelands;
- to prevent good land from becoming wasteland;
- to formulate within the overall National Policy, perspective plans and programmes for the management and development of wastelands in the country.

The thrust has been in favour of massive afforestation with special emphasis on fuelwood, fodder and small timber with the involvement of the people.

Based on the experience of the last three years and keeping in view the need for addressing the ecological and socio-economic crisis facing the country, the future strategy and programmes of the NWDB have been restructured and the main elements of the same are given below:

- Building land use planning capability, specially at district and village levels, aimed at integrated management of wastelands.
- Conservation of selected ecological fragile areas, specially the Upper Himalayan Catchments, the Western Ghats and the Aravallis.
- Regeneration of degraded forest areas.
- Reclamation of special problem lands, e.g. ravines, usar lands, arid tracts, mine spoils, etc.
- Grassland and fodder development.
- Agro-forestry, Farm Forestry and qualitative changes in the on-going Special Forestry Programme.
- People's participation at all stages and a conscious effort to involve small and marginal farmers.

The restructured programme is to form the basis for

the proposals to be incorporated in the Eighth Five Year Plan.

6.2.2 Afforestation under 20 Point Programme

NWDB is the nodal agency for coordinating and monitoring the afforestation activities under the 20 Point Programme being implemented through the States. The afforestation target for 1988-89 was 2.00 million hectares and the achievement till the end of December, 1988 was 1.90 million ha. In the first three years of the Seventh Five Year Plan, 1986-88, 5.04 million hectares were planted. A study recently conducted in 5 States, namely Gujarat, Karnataka, Tamil Nadu, West Bengal and Uttar Pradesh revealed a survival rate ranging between 43.60% to 70.42%.

6.2.3 Other Programmes and Projects of NWDB

6.2.3.1 Soil, water and tree conservation in the Himalayas (Operation Soil Watch)

The scheme, being implemented in 14 Himalayan States, envisages treatment of identified catchments on micro-watershed basis by adopting an integrated approach, with a view to preserve the fragile Himalayan eco-system. The pattern of Central assistance is 100% (50% grant and 50% loan to the States). During 1988-89, 0.25 lakh hectares are targetted to be treated with an outlay of Rs. 12 crores. During the past three years, the targets/achievements are as under:—

Table 14

Year	(In lakh ha)		Financial (Rs. in crores)	
	Target	Achievement	Target	Achievement
1985-86	0.32	0.32	12.00	11.78
1986-87	0.37	0.38	10.78	10.78
1987-88	0.32	0.33	13.00	12.78
1988-89	0.25	—	12.00	—

6.2.3.2 Rural Fuelwood Plantations and Afforestation of Eco-Sensitive Non-Himalayan Areas

The main objective of this scheme which is included in the Minimum Needs Programme is to meet the fuel, fodder and timber needs of the rural people and to conserve the soil and moisture in the planted areas. The pattern of Central assistance is 50% in respect of States and 100% to UTs, limited to the permissible unit cost. The scheme largely benefits the tribals living in and around forests, by providing them wage labour

employment, and is being implemented in 159 fuelwood deficient districts in 25 States and the UT of Delhi. During the year, plantations over 0.60 lakh hectares, involving an outlay of Rs. 17.00 crores are likely to be raised. The National Council of Applied Economic Research has been engaged to evaluate this scheme.

The target/achievements and financial outlay during the past three years has been as under:

Table 15

Year	Plantation		Financial outlay		Actual Expenditure
	(in lakh hectares)		(Rs. in crores)		(Rs. in crores)
	Target	Achievements	Outlay	Central assistance released	
1	2	3	4	5	
1985-86	1.07	0.94	26.00	15.91	
1986-87	0.90	0.84	22.10	16.13	
1987-88	0.90	0.80	20.00	18.73	
1988-89	0.60	—	17.00	8.68	

(Upto Sep., 88)

6.2.3.3 Decentralised People's Nurseries

Under this scheme, decentralised people's nurseries are being promoted through participation of people, especially the landless poor, small and marginal farmers, schools, mahila mandals, youth groups, other NGOs, etc., with a view to decentralising seedling production for local needs at cheaper production cost. The scheme is also being implemented by the National Dairy Development Board through the field functionaries of the milk unions and federations in various States. It is proposed to raise 35.50 crore

seedlings involving an expenditure of Rs. 16.00 crores during 1988-89.

The target and achievements for the past three years are given in Table 16.

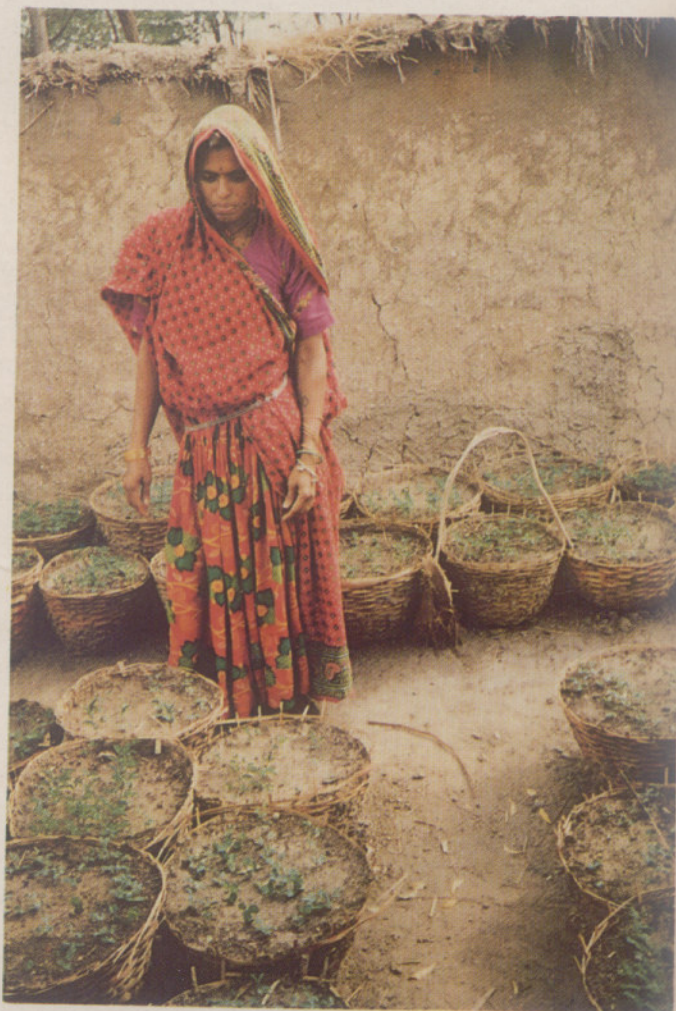


Fig. 20 A view of Basket Nurseries

Table 16

Year	Target		Achievements	
	Financial	Physical	Financial	Physical
	(in Rs. Lakhs)	(Seedlings in crores)	(in Rs. Lakhs)	(Seedlings in crores)
1	2	3	4	5
1985-86	414.00	9.10	414.00	Nil
1986-87	850.00	19.00	994.29	32.33*
1987-88	1200.00	26.70	723.83	31.84
1988-89	1600.00	35.50		Likely to be achieved fully

*Includes physical progress of 1985-86 as Rs. 414 lakhs were released on 31.3.86 only.

6.2.3.4 Silvipasture Development

The scheme was introduced in 1986-87 with the objective of augmenting the production of good quality grass and fodder on government, institutional community lands and marginal/sub-marginal private lands for meeting the fodder needs in the country, besides encouraging stall feeding and reducing the grazing pressure on the country's limited forest wealth. The scheme expenditure is financed on 50 : 50 basis between States and the Centre, with the central assistance limited to a maximum of Rs. 1,250 per hectare. Gram Panchayats/Gram Sabhas are being involved in creation, protection and maintenance of the grass/fodder farms on community lands, and the target of 17,000 hectares involving an outlay of Rs. 2.00 crores, is likely to be achieved. This scheme is also being implemented by the National Dairy Development Board (NDDB) through the village milk cooperatives and the Tree Cooperative Societies working under Operation Flood.

6.2.3.5 Grants-in-aid to Voluntary Agencies

Under this scheme, voluntary agencies are financed for approaching and motivating the local people to set up nurseries and undertake plantation work, through awareness campaigns and training camps. A sum of

Rs. 3.60 crores has been disbursed to about 51 organisations so far for this purpose.

6.2.3.6 Margin money assistance to Autonomous Bodies/Corporations

Under this scheme, plantations of fuelwood, fodder and small timber species alongwith appropriate soil and water management techniques are promoted through projects to be executed by autonomous bodies and to receive upto 25% of the project cost as grants from the NWDB, provided the project is bankable and atleast 50% of the cost is met through loans from financial institutions. The scheme has been modified recently to cover Municipal Corporations and such other bodies also. Margin money assistance amounting to Rs. 22 lakhs has been released during the current financial year to the Karnataka Cashew Development Corporation for developing 3000 ha of wasteland.

6.2.3.7 Identification and Mapping of Wastelands

Under this project detailed wastelands maps for 145 districts are now available for use. It is now proposed to take up detailed village level planning for integrated use and management of wastelands.



Fig. 21 Saplings from State Nurseries distributed at Schools

6.2.3.8 Tree Patta Scheme

In collaboration with the Department of Rural Development, a Tree Patta Scheme was recommended to the States which is now under implementation in 7 States namely, Bihar, Madhya Pradesh, Uttar Pradesh, Tamil Nadu, Rajasthan, Gujarat and Andhra Pradesh, benefitting approximately 5 lakh rural poor.

6.2.3.9 Tree Grower's Cooperatives

In order to encourage initiative among the people to plant trees, a Pilot Project of Tree Growers Cooperatives has been taken up in collaboration with the National Dairy Development Board. Three such projects in Andhra Pradesh, Rajasthan & Orissa have been launched through cooperatives on the Anand pattern. These cooperatives will be engaged in raising seedlings and promoting fuelwood and fodder production by setting up Kisan and Gram Vans.

6.2.3.10 Computerisation for Monitoring and Evaluation

Computer based Monitoring Cells have been set up in 25 States/UTs out of 26 locations initially selected for this project. In addition, this facility is also being set up now in the Forest Department of Nagaland. Software package has been comprehensively tested, using simulative data as well as data received from the field. Updated version of the software is now being supplied to all States/UTs in the light of comments/suggestions received from them. During the year, 4 training programmes were organised for the States/UTs for imparting necessary training to the field staff regarding collection and reporting of data under the computerised system.

6.2.4 New Schemes

6.2.4.1 Aerial Seeding

A Centrally Sponsored Scheme on Aerial Seeding has been taken up in 1988-89, under which land can be quickly covered in a cost effective manner, specially in remote, inaccessible and difficult areas like ravines, hills, mountains, etc. A Pilot Project has been taken up during the year in Tamil Nadu.

6.2.4.2 Minor Forest Products

This scheme envisages raising plantations of minor forest products, such as fruit bearing trees, bamboo, cane, tendu, harra, bahara, lemon grass and medicinal

plants. The scheme is to be implemented by the States with 100% central assistance. A sum of Rs. 54.44 lakhs has been released until January, 1989 to the States of Meghalaya, West Bengal, Nagaland, Tripura and Orissa for taking up plantation work on 7050 hectares.

6.2.4.3 Seed Development

The objective of the scheme is to collect, grade and distribute good quality seeds of trees, grasses and legumes particularly to support a large afforestation programme. The scheme is being implemented during 1988-89 and until January, 1989 Rs. 9.93 lakhs has been released for Rajasthan and Gujarat.

6.2.4.4 Central Support Unit and Regional Centres

Under the National Social Forestry Project, being financed by the World Bank and USAID, a Central Support Unit and 5 regional centres have to be set up for special studies, project formulation and monitoring of social forestry programmes. NWDB has been deemed to be the Central Support Unit under the Project. Action has now been initiated for setting up 5 regional centres in the following Research Institutes and Universities:—

- University of Horticulture and Forestry, Solan.
- University of Agricultural Sciences, Bangalore.
- Indian Institute of Management, Ahmedabad.
- Agricultural Finance Corporation, Bombay
- Indian Institute of Forest Management, Bhopal.

6.2.5 Professional and Special Services/Studies

Committees on Fuelwood/Fodder and Grasses have been constituted and consultants have been engaged for preparing study reports and conducting special studies. These include evaluation of the "Rural Fuelwood Plantation Scheme" by the National Council of Applied Economic Research and a study on the 'Survival Rate of Trees Planted during the last five years under Social Forestry Programmes' by the Indian Institute of Public Opinion.

The NWDB seeks to convert the afforestation programme into a people's awareness programme among all sections of the people especially among the rural women. For this Television, Radio and the Print Media are utilised extensively.



Fig. 22 Unloading of seedlings for plantation

6.2.6 Indira Priyadarshini Vrikshamitra Award

The Indira Priyadarshini Vrikshamitra Awards were instituted in 1986 to recognise the work of people's involvement in wastelands development and afforestation. For the year 1988, 10 awards of Rs. 50,000 each are proposed to be given to individuals, panchayats, schools, voluntary agencies, and districts (2 awards for each category). The list of awardees, is as under:—

(i) Individuals

Shri Mohan Dharia, Pune, Maharashtra
Dr. P. R. Mishra, Daltonganj, Bihar

(ii) Voluntary Agency

Comprehensive Social Service Society Srikakulam,
Andhra Pradesh
Magra Mewar Vikas Sanstha, Ajmer, Rajasthan

(iii) School/educational institutions

Rekhade Vidyalaya, Nagpur, Maharashtra
Government Inter College, Chamoli, Uttar Pradesh.

(iv) District/government Unit

Social Forestry Division, Surat, Gujarat
Green Belt Division, Bangalore, Karnataka

(v) Panchayat/Local Body

Prathabaramapuram Panchayat
Thanjavur, Tamil Nadu
Sitarampur Panchayat, Midnapur,
West Bengal.

6.2.7 Awareness Creation

During the year, NWDB supported the production of a film on "Seed to Seedling" through the Electronic Trade and Development Corporation.

6.2.8 Training and Workshops

6.2.8.1 Training

For regions which are backward in terms of development, specific programmes are being taken up to develop training and extension system to educate, motivate and train the rural people specially the

women. The Voluntary Agencies are being assisted to take up afforestation including creation of awareness, imparting of training and mobilising people. The NGOs work, though spread all over the country, is concentrated in certain States such as Maharashtra, Gujarat, Rajasthan and Tamil Nadu. Efforts are on to have such activities in other States as well.

6.2.8.2 Workshops

Following workshops were organised or sponsored during the year:

- Cooperative approach to Wasteland Development (Pune)
- Wasteland Mapping, Hyderabad
- Workshop on Wastelands Development in Maharashtra
- Workshop on Extension needs for promotion of fodder and fuelwood trees conducted by Bharatia Agro-Industries Foundation.
- Workshop held by the International Genetic Congress.
- Workshop on Rangeland Management held by the International Rangeland Congress
- Workshop held on Regional Mapping, in Ahmedabad and Dehra Dun
- Wastelands Development in Maharashtra (Punjabrao Agricultural University).

6.3 OTHER ACTIVITIES FOR REGENERATION

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

Eco-Task Forces of ex-servicemen are a joint venture of the Ministry of Environment and Forests, the Ministry of Defence and the concerned State Government to undertake ecological restoration work in selected environmentally degraded areas particularly in inapproachable and hostile terrains. The activities include afforestation, pasture development, soil and water conservation and other restorative works. In addition to the UP and Rajasthan Task Forces working earlier, a new Task Force was raised during the year for Jammu & Kashmir.

6.3.1.1 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 below:—

Afforestation

Pit digging for plantation (Nos.)	1,24,924
Collection & Plantation of saplings (Nos.)	1,19,000
Planting shrubs (Nos.)	18,350
Planting of creepers (Nos.)	700
Fencing (metres)	21,000
Terrace preparation (Nos.)	231

Soil Conservation

Construction of check dams (Nos.)	839
Construction of balliecrates (Nos.)	203
Preparation of GI wire-mesh nets (Nos.)	1,375
Repair of retaining walls (Nos.)	77
Digging of tubular holes for planting (Nos.)	150
New area covered (ha)	130

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

The Task Force continued to work on the left bank of Indira Gandhi Canal, Rajasthan. The task force added a new dimension to its activities by including environmental awareness work among the people of the villages. The main achievements during the year are as follows:—

New Plantation (Nos.)	13,05,000
Casualty replacement (Nos.)	59,800
Maintenance of fencing (in meters)	1,34,500
Pasture development (ha)	60
Planting of grass slips (ha)	31
Construction of tree guards (Nos.)	7,000
Hoeing and weeding of plants and their maintenance (Nos.)	10,23,000
Nursery raising (No. of saplings)	90,675
New area covered (ha)	244

6.3.1.3 Eco-Task Force (TA-129) J&K

This Task Force was created in June, 1988 and is engaged in eco-regeneration work in Jammu region near Samba. It has created a nursery over an area of 2.2 hectares. Over 4000 pits were dug for creating

irrigation facilities, and soil conservation measures were undertaken over 100 ha of land.

6.3.2 Field Demonstration Programme

This programme is intended to demonstrate technologies for restoration of selected degraded areas and integrated ecological development. The salient features and achievements are given below:

6.3.2.1 Eco-regeneration of Pushkar Lake Valley, Ajmer

The Project is implemented by the Consortium of Indian Scientists for Sustainable Development, New Delhi. About 36,000 plants planted earlier were maintained and protected in critical sandy areas. Five nurseries were established to raise about 90,000 saplings of rare medicinal plants and *Khejri* (*Prosopis cineraria*). In order to augment water supply, 7 wells were deepened at Nedlia, Ganehara, Madhopur, Kanas, Saradhana and Srinagar. Seventy anicuts were built in the project area. For linking environment with education and extension, 30 environment based lessons were prepared. 3 puppet shows, 2 dramas and a video film have been prepared to create environmental awareness.

6.3.2.2 Ecological Restoration of Cherrapunjee, Meghalaya

This project was started in 1984 for ecological improvement of 98 ha of this high rainfall desert region of the east Khasi Hill District. The project is being implemented by the Government of Meghalaya. The afforestation work in the proposed area is expected to be completed by the end of this year.

6.3.2.3 Environmental Regeneration of Auroville, Tamil Nadu

A programme of afforestation, soil and water conservation was started in 1983-84 in 15 sites in the Auroville area. Over 1 lakh saplings of 15 different tree species have been planted in an area of 100 acres. Soil conservation measures have been carried out in about 180 acres. A social forestry programme was organised in 17 acres in Pattanaur village (Aurobrindaban). Training Workshops for 25 groups were organised for mobilising public participation in ecological restoration. The project is being implemented by Auromitra Foundation.

6.3.2.4 Eco-development in Shivalik Foothills, Hoshiarpur, Punjab

The project is implemented by the Society for Promotion of Wasteland Development. The activities include planting fodder, fuel and timber yielding trees on the vacant land stretches between the terraces, construction of water storage tanks and check dams, installation of fuel efficient chulhas and involvement of women in ecological improvement programmes. 6,21,000 saplings were planted on about 130 ha of land. Two check dams of 7-10 metres high were built for water storage. Nursery to raise 50,000 plants of different tree species per year was established.

6.3.2.5 Ecological Improvement at Tumkur, Karnataka

The project was started in 1987 to undertake training in nursery work, dibbling of seeds, planting techniques, budding, grafting and plant protection through field demonstrations. The special feature of the programme is the massive involvement of school children in tree plantation work. The programme completed during the year was implemented by G. G. Ben Soans Memorial Association, Tumkur.

6.3.2.6 Ecological Improvement of Gopeshwar Area, Distt. Chamoli, U.P.

The Project was initiated in 1987 for rehabilitation of 30 sq. km. area (at 30 patches) in Alakananda Catchment of the Himalayas. The activities include nursery raising, afforestation, soil conservation, bio-fencing and protection with stone wall and organising eco-development camps. About 24,000 meters of stone wall was constructed. 5 eco-development camps were organised and 9 nurseries have been established with the active involvement of local women. The project is being implemented by Dasholi Gram Swarajya Mandal, Gopeshwar.

6.3.2.7 Integrated Environment Development around Binsar Sanctuary, Almora (UP)

The project has been initiated this year to undertake the following activities:

- Plantation in 146 ha of community land with about 2.8 lakh saplings of multiple use.
- Establishment of 5 nurseries to grow 2.3 lakh saplings.
- Arrangements for drinking water for 3 villages.

-
- Development of water resources.
 - Construction of water storage tanks.
 - Creation of environmental awareness.

The project is being executed by Paryavaran Jan Jagran Samiti, Binsar, Distt. Almora.

6.3.3 Eco-development Camps

The aim of this programme is to create awareness

among the people particularly, the youth. Government as well as NGOs are provided financial support to undertake specific activities like tree plantation, soil conservation, management of water resources, health care and sanitation, promotion of non-conventional sources of energy and creation of environmental awareness through Camps. During the year, 64 camps have been sanctioned in various parts of the country, involving about 5000 participants.

7. RESEARCH

7.1 ENVIRONMENTAL RESEARCH

7.1.1 The programme for the promotion of research and development in the areas of environmental science and technology aims at developing strategies to harmonise environment and economic development and to mitigate the problems arising from degradation of environment.

7.1.2 At present, there are 139 projects in operation dealing with monitoring and control of air and water pollution, impact studies covering industrial effluents/emissions, agro-chemicals, engineering projects, conservation of fauna and flora, ethnobiological studies, effect of pollutants, ecotoxicology, fluorosis, development of instruments process and system for pollution monitoring and control and management.

7.1.3 During the year, based on the already determined research priorities, 11 projects were approved by the Environment Research Committee (ERC) and the Man and the Biosphere Committee (MAB). The list of the approved projects is given at annexure II. Nineteen research projects were completed during the year. The list of completed projects is given at annexure III.

7.1.4 Coordinated Research Projects

7.1.4.1 Ethnobiology

Under the project, studies have been undertaken to understand the inter-relationships and associations of the tribal communities with their surrounding environment. So far, 65% of the tribal population areas located in the states of Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Bihar, Jammu and Kashmir, Madhya Pradesh, Nagaland, Orissa, Kerala, Tripura and Uttar Pradesh (Hill Districts) have been studied through extensive surveys. Collection and documentation of plant and animal species utilised by tribal population have been completed. Phytochemical and pharmacological investigations on selected plant species have also been undertaken.

The tribal areas covered so far have revealed a number of wild plant with potential for exploitation. Over 7000 wild plant species used by tribals for meeting their varied requirements have been recorded so far. Out of 3000 wild plant species used by tribals for medicinal purposes, about 500 are found to be new claims and worthy of scientific scrutiny. Out of

2000 or more wild plant species used as edibles (as subsidiary foods/vegetable) by tribals, about 500 are new.

Biological screening and phytochemical investigation of about 300 wild tribal medicinal plants have been carried out so far.

Tribal population areas located in the remaining parts of India are proposed to be studied in Phase II of the coordinated project.

7.1.4.2 Heavy Metals

Phase I of the Programme was completed and following are the results:

- Levels of lead, cadmium, zinc, copper, chromium, nickel and manganese in samples of air analysed were within or below the minimum values recommended by WHO.
- Levels of lead, chromium, zinc and manganese were relatively high in a large number of water samples analysed.
- Levels of lead, chromium, zinc, manganese and cadmium were relatively high in the majority of samples of food analysed.
- The difference in the levels as affected by the season of sample collection or by location of the sampling sites in rural or urban setting were not very significant.

The Phase II programme consists of completing the analysis of blood and kidney cortex, verification of the results of some of the water samples showing high values and also to check the high concentration of certain metals in food. During this period, a statistical evaluation of the data generated by the different institutes will be done. The detailed survey of water and food samples will be limited to lead, cadmium, zinc, manganese, nickel, chromium and mercury.

7.1.4.3 Conservation of Endangered Plant Species—Tissue Culture Programme

The programme on tissue culture involves identification and enumeration of medicinal plant species which are endangered, and studies on gene pool conservation, artificial propagation in natural habitats, development of techniques for mass-multiplication of selected plant species, development

of agro-technological packages, and domestication and cultivation of threatened plant species.

7.1.5 Integrated Action Oriented Research, Demonstration and Extension Programme on Ecodevelopment

The programme envisages integrated research and development aimed at finding solutions to local environmental and ecological problems and is expected to evolve action plans which can be adopted by government agencies for eco-development in the Himalayan, Western Ghats and Eastern Ghats regions of the country.

During the year 7 new projects were sanctioned for the Himalayan region while 8 new projects were sanctioned for the Western Ghats region. The list of projects sanctioned is given at annexure II. Twelve research projects of Himalayan region and 13 projects of Western Ghats region were completed during the year and the list of completed projects is at annexure III.

Besides these, 42 and 28 projects are ongoing in the Himalayan and Western Ghats regions respectively.

Under the Eastern Ghats region, 12 projects are operational. The projects completed during the year relate to Chilka lake, ecology of insect communities and turtles and some timber plant species. (Details are given in Annexure III).

7.1.6 Integrated Action Oriented Research Programme on River Ganga Basin

A major portion of the research programme undertaken by 14 universities located along the river Ganga has been completed. A workshop was organised by GPD in November, 1988 to discuss the results obtained so far and to identify new areas of research which could be taken up in the second phase of the research.

The results obtained so far are compiled with interpretation into a document "The Ganga—A Scientific Study".

The identified new areas of research that would be taken up during the second phase are:—

- Lignocelolytic decomposition by geo-fungi.

- Biogeochemical cycling of carbon, nitrogen and phosphorus.
- Bioindicators of pollution of river Ganga with special reference to benthic flora, periphytons, zooplankton, etc. and heavy metal accumulation by organisms and in sediments.
- Use of Streptococci as against Coliform.

This programme of research is coordinated by GPD.

7.1.7 Monitoring

In order to monitor the progress of the ongoing research projects under different schemes, six review workshops were held to monitor the progress of projects under the ERC and MAB schemes, wherein 45 projects falling under major theme areas of air pollution and plants, ethnobiology, conservation of plant resources and environmental impact of developmental activities were reviewed. Three review workshops for monitoring projects under the integrated action oriented research, demonstration and extension programme on eco-development were held during which 23 projects of Himalayan region, 22 projects of the Western Ghats region and 12 projects of the Eastern Ghats region were reviewed.

7.1.8 Centres of Excellence

In order to strengthen research and training in priority areas of environmental science and management, the Department had earlier set up the following three Centres of Excellence in the areas of environmental education, ecology and mining.

- Centre for Environment Education, Ahmedabad
- Ecological Research and Training Centre, Indian Institute of Science, Bangalore
- Centre for Mining Environment, Indian School of Mines, Dhanbad
- A new Salim Ali Centre for Ornithology and Natural History was sanctioned to be set up in collaboration with the Bombay Natural History Society, Bombay.

7.1.8.1 Centre for Environment Education, Ahmedabad

The Centre established in 1984 to meet the country's need for creating high quality environment education material, continued to develop these material such as handbooks, posters, films etc. on various environment themes. During the year, five zonal workshops were organised by the Centre and 245 teachers trained. These teachers organised several State level teacher

training workshops all over the country. Details regarding the activities of the Centre are given in chapter 8.

7.1.8.2 Ecological Research and Training Centre, Indian Institute of Science, Bangalore

During the year, the entire programme of the above Centre since its inception was reviewed by a review committee. The committee has recommended the areas of work that should be taken up by the Centre during the Eighth Plan. These are being formulated by the Centre. The work relating to the action programme on Uttara Kannada District was continued.

7.1.8.3 Centre for Mining Environment, Indian School of Mines, Dhanbad

This Centre was set up in March 1987 with the aim of conducting studies on mines land reclamation, problems of air and water pollution in mining areas and impact of mining on flora and fauna. The progress of the Centre was reviewed by the monitoring committee in 1988 and after taking into account the work done by the Centre so far, the future work programme of the Centre has been finalised.

7.1.8.4 Centre for Ornithology, Bombay

A new Salim Ali Centre for Ornithology and Natural History has been sanctioned to be set up at the Bombay Natural History Society, Bombay under the scheme of Centres of Excellence, in November, 1988. The broad functions of the Centre are as follows:—

- Conducting research in Ornithology including research at post-graduate levels and short-term orientation courses in specialised aspects.
- Applied research of direct relevance to Ornithology.
- Creation of a Data Bank on Indian Ornithology.

7.1.9 Govind Ballabh Pant Himalaya Paryavaran Evam Vikas Sansthan

The G.B. Pant Institute of Himalayan Environment and Development established by this Ministry as an autonomous institute started operating from its temporary headquarter at the Hortico building at Kosi near Almora with effect from 1st August 1988. The institute has identified its core programmes and these are centred around land and water resource management, conservation of biological diversity, sustainable management of rural ecosystems,

ecological economics and environmental impact analysis. Apart from the core programme to be implemented through the institute's scientific staff, the institute will also have participatory interaction programmes with available scientific talent in the existing institutions in the Himalaya, as well as with the NGOs operating in the region.

On the basis of a three-day interactive workshop with scientists and NGOs of the Himalayan region, held in December 1988 at Kosi, a number of programmes have been identified. These programmes relate to Environmental Impact analysis of mined areas, development of bamboo resources in Central Himalayas, sustainable development of village ecosystems in Nagaland, a 16mm documentary on ecology and tribal development and restoration of highly degraded sites in Almora District.

7.2 RESEARCH ON BIOSPHERE RESERVES

Research on various aspects of Biosphere Reserve areas is being promoted through academic and research institutions. The proposals are considered by the separate research committee constituted for each biosphere reserve area. The research institutions for studies in various disciplines have also been identified. So far, 5 research projects have been sanctioned in respect of Nilgiri Biosphere Reserve and one project has been sanctioned under Nandadevi Biosphere Reserve covering hydrological studies, human ecology and eco-restoration and long term monitoring of biological processes. The list of sanctioned projects is given at Annexure II.

7.3 RESEARCH ON WETLANDS AND MANGROVES

7.3.1 Mangroves

Research on various aspects of Mangroves conservation is promoted through academical/research institutions. The proposals are considered by the National Mangrove Committee. During the year one project has been sanctioned while three projects have been completed. The list of sanctioned and completed projects are given at Annexures II and III respectively.

Besides these, there are several on-going research projects covering various aspects of different Mangrove Ecosystems such as Godavari Delta Complex, Mangrove soils of Sunderbans, Mangroves along the West coast, Bhopal.

7.3.2 Wetlands

Research on Wetlands conservation is promoted through academic and research institutions. The proposals are considered by the National Wetland Management Committee. During the year, four research projects were sanctioned while three research projects were completed. The list of projects sanctioned and completed during the year are given at annexures II and III respectively. Besides these, there are several on-going research projects covering various aspects of the following wetlands:

Manipur Valley, Dal and Nilnagh lakes in Kashmir, Sasthamkottah lake in Kerala, Aquatic ecosystem in Allahabad region etc.

7.4 FORESTRY RESEARCH

Forestry research has been totally reorganised after an indepth review. The philosophy behind the reorganisation was to achieve the twin goals of conservation of natural forests and the stepping up of the pace of afforestation and waste land development.

The Indian Council of Forestry Research and Education (ICFRE) has started working as an apex body to coordinate and guide the research efforts to evolve the most suitable method of application of all sources of scientific knowledge to the solution of technical and practical problems of forestry. Three meetings of the Council have been held and areas of research identified.

Reorganisation of forestry research has been completed with the setting up of five research institutes as follows in addition to the existing one at Dehra Dun:

- Institute of Forest Genetics & Tree Breeding, Coimbatore.
- Institute of Wood Science & Technology, Bangalore.
- Institute of Arid Zone Forestry Research, Jodhpur.
- Institute of Deciduous Forests, Jabalpur.
- Institute of Rain & Moist Deciduous Forests, Jorhat.

Each institute will carry out national level research on one or more facets of forestry and will also take care of regional research needs. Research areas of each institute and their infrastructural needs have been worked out and approved by the Council. Action is being taken to build up the necessary infrastructure for the functioning of the institutes.

Focus of research during the year was on the following:

- Nutrient budget in different forest eco-systems;
- Planting and nursery technology of important indigenous and exotic tree species;
- Radio sensitivity of selected seeds of forest tree species;
- Afforestation technology of degraded soils i.e. *bhata* lands in Madhya Pradesh and *usar* lands in Haryana and Uttar Pradesh;
- Effect of tree shade on crops like turmeric, ginger and colocasia;
- Effect of trees planted on field boundaries on yield of wheat and paddy under agro-forestry system;
- Biological control of *Poplar* defoliators;
- Entomology and pathology of forestry tree seed;
- Biomass production and nutrient distribution in different parts of important social forestry tree species;
- Employment potential of sal seed and tendu leaf in tribal areas;
- Development of gum tapping methodology for *Acacia nilotica*, *Prosopis juliflora* and *Leucaena leucocephala* with newly designed chisels;
- Increase in resin yield from chir pine by rill method with the application of 20% acid mixture;
- Anatomical studies of timbers of southern zone;
- Rooting of *Eucalyptus* cuttings;
- Bamboo flora of North-East;
- Strength and suitability indices for social forestry tree species;
- Radial sawing technique for *Eucalyptus* logs;
- Development of solar drier for tendu leaves;
- Development of non-toxic method for wood preservation;
- Development of non-leaching fire retardant;
- Development of panel products from bamboo, lantana and other wood wastes;
- Development of bamboo wire bound packing cases for fruits;
- Development of different types of forestry tools and implements; and
- Training of forest workers and study on the impact of training on their efficiency.

7.5 WILDLIFE RESEARCH

Research into 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, the latter with funding from the Indo-US Rupee Fund Programme.

7.5.1 Wildlife Institute of India

Some of the important research projects which are in progress at the Wildlife Institute of India are a study of the movement and habitat utilisation of elephants in North-Western Uttar Pradesh, ecology of some endangered species like turtles, the Indian flying-fox and the snow leopard and the aquatic mammals of the National Chambal Sanctuary.

The Institute offered technical advice to the Forest Department of Rajasthan for management of the drought-affected mugger crocodiles in the Jawai Lake, Pili district, and to the Forest Department of Assam in establishing the feasibility of introducing the Sangai or the Manipur Brow-antlered deer. The Institute has also given technical assistance to a number of States for the use, installation, construction and maintenance of electric-powered fences, including training of personnel for these purposes.

7.5.2 Bombay Natural History Society

Work on the following research projects, mainly on the ecology of the endangered species and conservation of their habitats, which had been previously taken up by the Society under the Indo-US Rupee Fund Programme was continued during the year:

— Ecology of the Keoladeo National Park, Bharatpur

The periodic reports prepared under the research project have been very useful for guiding management strategies for the park. A special area of study has

been the monitoring of the impact of pollution from the adjoining industries on the aquatic systems, including the fishes and other aquatic fauna.

— Ecology of the Indian Elephant

This is the most comprehensive study on the subject taken up so far. Beginning with observations in Bandipur, the study has been extended to a number of States in the South and the East.

— Ecology of the Point Calimere Sanctuary, Tamil Nadu

This project is mainly aimed at collecting information and interpretation of data for preparing a management plan for the sanctuary.

— Study of the migration pattern of birds and setting up of a migration data bank

Several field stations for collection of data and ringing of birds were set up.

— Ecology of Floricans

The project is aimed at the study of two endangered species: the Lesser Florican and the Bengal Florican. The survey of the Bengal Florican was continued during the year covering the whole tarai belt of Uttar Pradesh and Bihar, duars of West Bengal and the Brahmaputra Valley of Assam. The natural grasslands that serve as the habitats of this highly endangered bustard were identified during the survey. The work on the Lesser Florican had been completed earlier.

8. EDUCATION AND INFORMATION

8.1 FORMAL TRAINING

8.1.1 Forestry Education and Training

8.1.1.1 In Service Courses

- The Indira Gandhi National Forest Academy continued its primary task of training Indian Forest Service probationers. 150 IFS probationers passed out during the year and 278 probationers from two batches are being trained at the Academy at present. Nine trainees from foreign countries passed out during the period under report and 14 foreign trainees are undergoing training presently. To cater to the increased needs of the trainees, additional rooms have been built.
- The State Forest Service Colleges at Burnihat, Coimbatore and Dehradun continued to train officers of the State Forest Service. 113 trainees passed out during the year and 118 are undergoing training in the three colleges.
- The Forest Rangers' Colleges at Balaghat, Chandrapur and Kurseong continued to train forest rangers deputed by the States. 187 trainees passed out of these colleges and 208 trainees are undergoing training at present.
- Action has been initiated to strengthen the staff at all these institutes to ensure training of a high standard.

8.1.1.2 Refresher Courses

Refresher courses for Indian Forest Service Officers in various aspects of management was continued during the current year. During the period August 1988 to March 1989, 30 one-week training courses covering about 800 officers were organised in various Central, State and other training institutes on various topics such as general management, forest protection, role of forests in rural and tribal development etc.

Two special orientation courses were organised at the Indira Gandhi National Forest Academy for 48 officers to help them in taking up higher responsibilities at the level of Conservator of Forests.

Training in logging techniques and use of forestry tools was given to forest supervisors and forest workers.

8.1.1.3 Forestry Education

Financial support was provided to the Indian Council of Agricultural Research to continue degree courses in forestry in 14 Agricultural Universities.

8.1.2 Indian Institute of Forest Management

The new complex of the Indian Institute of Forest Management at Bhopal was inaugurated in June, 1988 by the President of India. The Institute has launched a two-year post-graduate diploma course in forestry for 30 students. The Indian Institute of Forest Management will work as an apex level forest management research institute in the country and for this purpose, a number of workshops, seminars and case studies are being conducted by the Institute.

8.1.3 Wildlife Education and Training

8.1.3.1 The Wildlife Institute of India, continued its programme of training wildlife managers and personnel in various aspects of wildlife management. The 9 month post-graduate diploma course for officers of the State Wildlife Wings was attended by 24 trainees from 14 States and the two-year M.Sc. programme in wildlife biology was continued. During the year, the Institute launched the programme of 2-3 weeks long 'capsule' courses in wildlife management for inservice officers. The first such course was held in Bandipur National Park, Karnataka in September, 1988. The Institute also organised several workshops and symposia covering important aspects of ecology and wildlife management, including workshops on wildlife census and habitat evaluation in Sariska.

8.1.3.2 As part of a consultancy assignment from the Department, the Institute prepared a report "Planning a Wildlife Protected Area Network in India". The report, published in two volumes and released by the Prime Minister during the meeting of the Indian Board for Wildlife, contains detailed recommendations and guidelines for setting up a viable protected area network essential for protecting and nurturing the natural heritage and biological diversity of the country. Two more publications "A pocket book of Indian pheasants" and "The Report of the Workshop on Conservation Education and Nature Interpretation" have also been brought out.

8.2 Information and Awareness

8.2.1 The Department gives priority for promoting environmental education, dissemination of

information and creation of awareness among all groups of the country's population through training programmes, seminars, workshops, eco-clubs, environment camps etc.

8.2.2 National Environment Awareness Campaign/ National Environment Month—1988.

8.2.2.1 The Department has been conducting National Environment Awareness Campaigns (NEAC) from the year 1986 with the aim of creating total awareness at the national level. As part of this campaign, November 19th to December 18th of every year is observed as the National Environment Month (NEM). The NEAC and NEM activities were continued during this year also.

8.2.2.2 While the major theme for NEAC—1988 was 'Conserving our Water Resources', the campaign also addressed the whole gamut of environment related issues such as afforestation, forests, flora, rural and civic problems, eco-degradation, citizen action population, pollution, etc.

8.2.2.3 Two hundred and fifteen voluntary agencies including youth and women organisations, schools, colleges, universities, research organisations, professional groups etc. from virtually every State and Union Territory have been involved in organising various programmes on environmental themes such as seminars, workshops, training courses, public meetings, camps, rallies, padyatras, jathas, audiovisual shows, films, advertisement campaigns, display of posters, drama, folk dances, street theatres, tree plantation drives, essay/debate/painting competitions for school children and preparation and distribution of educational resource materials. All possible target groups like students/youth, teachers, women, tribals, administrators, professionals, legislators, industrial workers, voluntary workers, armed forces and the general public have been covered by the campaign.

8.2.2.4 During the campaign, the Centre for Environment Education, Ahmedabad conducted 5 zonal workshops in different locations, covering 245 resource persons from all over the country, who were exposed to environmental issues as well as to techniques and methods of environment education. These resource persons in turn are organising several State level teacher training workshops all over the country. It is envisaged that each of the teachers thus trained, will organise environmental education programmes in their respective schools. During the

campaign, Doordarshan continued to telecast fortnightly TV programmes on environment, non-formal education and Awareness Projects.

8.2.2.5 During the National Environment Month i.e. 19th November to 18th December the National Museum of Natural History, New Delhi organised a large number of programmes for the benefit of school children, teenagers, teachers, handicapped children and family audiences, such as Quiz Contests, Declamation Contests, special activities for handicapped children, film shows in housing colonies, army units, schools and colleges, study tours to wildlife sanctuaries for children, teachers and college students, teacher orientation workshop on Resources for Environmental Education and special programmes and activities for the benefit of engineering students in Delhi.



Fig. 23 A NSS Procession during National Environment Month Campaign '88

8.2.3 During the year, the Department considered several proposals on non-formal environmental education and awareness and provided financial assistance to various organisations for the following projects:

- Production of a documentary film on "Rehabilitation in River Valley Projects"—The Irrigation Project.
- Clean Himalaya Expedition to the Barasjigri glacier of Lahul in H.P.
- Setting up of Eco-clubs in selected schools of Tamil Nadu, Goa and Andhra Pradesh.
- Preparation of Models for display in the Science Exhibitions on Water organised at the Teen Murti Bhavan.
- Production of a video film on wasteland reclamation titled "The Bankura Story"—West Bengal.
- A study of environmental awareness among the urban and rural population of Kanpur.
- Awareness campaign and seminar for college students at Cochin
- The third Awareness Kaveri Festival at Kumbakonam, Tamil Nadu.

8.2.4 Support to seminar/symposia/workshops

The Department supports the organisation of seminars on various technical environmental topics of current interest. During the year 32 colleges, universities registered non-governmental organisations and professional bodies have been provided financial assistance for organising such seminars. These are in addition to the large number of Seminars supported under NEAC-88.

8.2.5 National Museum of Natural History (NMNH)

The National Museum of Natural History (NMNH), an organisation of this Department is devoted to non-formal education in the area of environment. A brief report of its activities is given below:

8.2.5.1 Gallery on Conservation

The new gallery on conservation was inaugurated in June, 1988. The gallery deals with various aspects

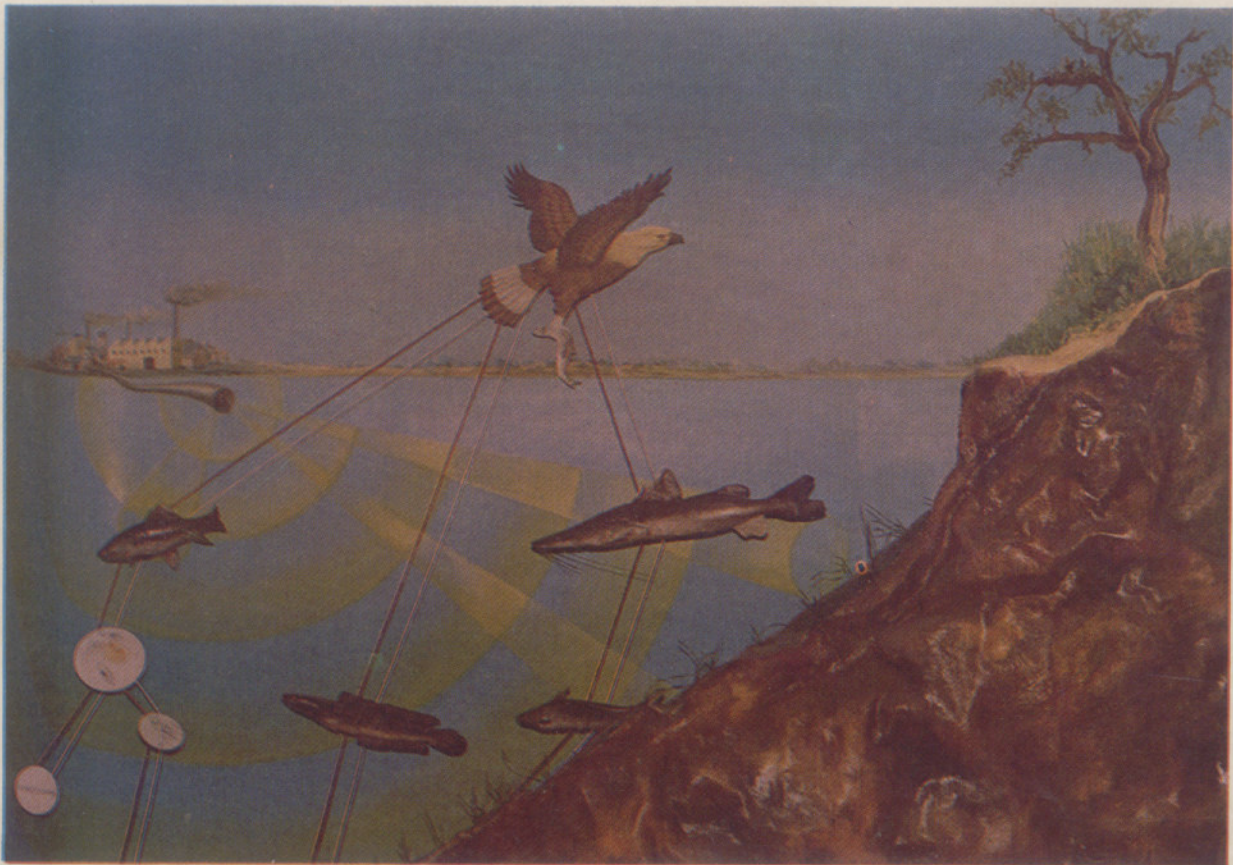


Fig. 24 An exhibit on 'Bio-magnification' at the Conservation gallery of NMNH'

relating to conservation of forests, wildlife, land, air and water.

8.2.5.2 Exhibitions

—The Museum participated in the Festival of India in USSR and Japan by putting up special exhibitions. In USSR an exhibition entitled "India—Nature's Bounty" was held in Moscow and Ordzennikidze. The first three prize winners of a Nature Painting contest organised in this connection were given a special award of a two weeks tour to visit various wildlife Sanctuaries and National Parks of India. The tour has been conducted.

—For the Festival of India in Japan, the Museum organised a Photographic exhibition on Indian Wildlife as part of the Children's Fair in Tokyo.

8.2.5.3 Educational Programmes

The museum conducted special summer programmes during June-July for school children which included a large number of indoor and outdoor activities, such as nature painting, animal modelling, study visits to understand urban environmental problems, nature walks and nature camps at Rajaji National Park. Two

special postage stamps—one on the khejri tree and other on the Jerdon's Cowser were released at the Museum premises on World Environment Day and during the Wildlife Week respectively.

During the Wildlife week, the Museum also organised a Nature Painting contest for children.

8.2.5.4 Publications

Several publications were brought out by the NMNH including a booklet on 'India—Nature's Bounty', a pamphlet on 'Our Village—Our Environment', Teachers' Guides for the School Loan Kit Programme and several Nature Fact Sheets for children, both in Hindi and English.

8.2.5.5 Mobile Museum

A new mobile exhibition entitled "Our village-our Environment" organised in collaboration with the Department of Rural Development of the School of Planning and Architecture, dealing with environmental issues related to rural areas, toured a large number of villages within a radius of 200 kms around Delhi. Film shows and other educational programmes were also organised in the villages in conjunction with the Mobile Exhibition.



Fig. 25 Three Soviet Children (accompanied by their escort) who won a free trip to India at a Nature Painting competition organised by NMNH during 'Festival of India' exhibition in Moscow

Earlier in the year another exhibition on Indian Wildlife mounted on the Mobile Museum was sent to the Ghaziabad Fair. This exhibition was awarded second prize among the exhibitions held at the Fair.

8.2.5.6 Natural History Museum, Mysore

Work relating to the setting up of a Regional Museum of Natural History at Mysore made significant progress during the year. Architectural plans for the building have been finalised and a local office has started functioning which organised several educational activities for school children during the year.

8.2.6 Centre for Environment Education (CEE), Ahmedabad

8.2.6.1 Programmes and activities of the Centre

- An exhibition on the evolution of life entitled "Story of Life" was developed and installed at the Gujarat University.
- The fabrication of the exhibits and signage for the Kanha National Park interpretative programme has been completed. The text for the handbook has also been completed. The fabrication of all the signage for the National Zoological Park, New Delhi, has also been completed.
- Under the Indo-US collaborative Children's Environmental Education Television Project, the approach to be taken for the series has been finalised. The research and script for the first film is in progress and the work on the print materials which will accompany the first film, has also been started. The basis for a plan to evaluate the effectiveness of the educational modules was also drawn up.
- The Centre for Environment Education—News and Features Service continued to bring out its weekly packages in Hindi and English.
- Communication materials to increase acceptance of defluoridation techniques by people in fluorosis affected areas, were developed for the National Drinking Water Mission.
- work continued on the two eco-development projects taken up by CEE. These projects are aimed at communities living around protected areas to reduce their dependence on these forests.

— CEE has taken up a project to make a set of video films and audio visuals on environmentally sound technologies for the Gujarat Energy Development Agency. Two of these have been completed and the others are scheduled to be completed by next year.

— Work continued on the Ganga Pollution Awareness Programme, which involves creating awareness among students and teachers in schools along the banks of the Ganga. Using the water quality monitoring kits developed by CEE, students from nearly 80 schools were involved in testing the river quality at regular intervals.

— A Regional Cell of the Centre was set up in Bangalore in December, 1988.

8.2.7 The C.P. Ramaswami Aiyar Environmental Education Centre, Madras

During the year a Centre for Environmental Education has been sanctioned to be set up at the C.P. Ramaswami Aiyar foundation, Madras for meeting the environmental educational needs. The Centre is now fully geared up to conduct seminars, workshops and exhibitions on environmental topics. The Centre organised an exhibition on "Conserving Our Water Resources" and released popular brochures on environment during the time of the exhibition.

8.3 ENVIRONMENTAL INFORMATION SYSTEM (ENVIS)

8.3.1 Environmental Information System (ENVIS), a Plan programme of the Department, set up in December, 1982, is a decentralised system using the distributed network of data bases to ensure integration of national efforts in environmental information collection, storage, retrieval and dissemination to all concerned including policy planners, decision makers, research workers and the public.

The ENVIS network with the Department as its focal point presently consists of 10 ENVIS Centres on diverse areas of environment such as pollution control, toxic chemicals, environmentally sound and appropriate technologies, coastal and offshore ecology, energy and environment, degradation of wastes, etc. These ENVIS Centres have been set up in specialised and reputed institutions in the country.

Table 17
List of ENVIS Centres

Institution	Area
Central Pollution Control Board, (CPCB), New Delhi	Pollution control (water and air)
Industrial Toxicology Research Centre, (ITRC), Lucknow	Toxic chemicals.
Society for Development Alternatives, New Delhi	Environmentally sound and appropriate technology
Environmental Services Group, (ESG), New Delhi	NGO; Media and Parliament related to environment
Institute for Coastal and Offshore Research, (INCOR), Andhra University, Visakhapatnam	Coastal and offshore ecology; Remote sensing for environmental mapping; and Eastern Ghats ecology
Tata Energy Research Institute (TERI), New Delhi	Renewable energy and environment
Centre for Environmental Studies, College of Engineering, Anna University, Madras	Eco-toxicology; Bio-degradation of wastes; Environmental impact assessment.
Centre for Ecological Studies, Indian Institute of Science, Bangalore	Western Ghats ecology
Environmental planning and Coordination Organisation, (EPCO), Bhopal	Environmental management related to the State of Madhya Pradesh
National Institute of Occupational Health, (NIOH), Ahmedabad	Occupational Health

8.3.2 Activities at the ENVIS Focal Point

The ENVIS Focal Point in the Department continued its information activities during the year, the major among these are:

- Publication of
 - Annual Report of the Department for the year 1987-88;
 - Paryavaran Abstracts—A quarterly journal reporting Indian research inputs on environment and related areas.
- Updating of the information on more than 500 Indian sources of environmental information was completed and forwarded to the UNEP for incorporation in the UNEP's 'International Directory of Environmental Sources'.
- Updating the existing bibliographic data on environment.

— Query-Answer Service was provided to national and international users. ENVIS continued to act as the National Focal Point as also the Regional service Centre for South-Asia Sub-region of INFOTERRA (Global Information Network) of United Nations Environment Programme (UNEP). More than 600 queries (national and international) were attended to and substantive information (bibliographies and photo copies of the relevant articles and research papers etc.) as well as specific documents were provided.

8.3.3 Activities at the ENVIS Centres

The ENVIS Centres continued to provide information in their respective areas of specialisation to different user groups. The major activities include:

- Energy Environment Monitor—a bi-annual journal continued to be published by the ENVIS Centre at TERI.
- Monographs have been prepared by the ENVIS Centre at National Institute of Occupational Health on
 - Ammonia
 - Phosgene
 - Sulphur Dioxide
- Chemical safety cards have been prepared by ENVIS Centres at National Institute of Occupational Health on
 - Ammonia
 - Chlorine
 - Hydrogen sulphide
 - Phosgene
 - Sulphur Dioxide.
- Environmental Abstracts on (i) Eco-toxicology (ii) biodegradation of wastes and (iii) environmental impact assessment have been published by the ENVIS Centre at Anna University, Madras.
- The ENVIS Centre at EPCO has prepared
 - A report on deleterious effects of lime kiln and cement plants in M.P.
 - State-of-art report on Jhabua with special references to drought.
- More than 1800 queries (national/international) were attended to by the ENVIS Centres and substantive information was provided in majority of the cases.

—The ENVIS Centre at CPCB has started publishing an ENVIS Newsletter from November, 1988.

8.4 PITAMBAR PANT NATIONAL ENVIRONMENT FELLOWSHIP AWARD

The Pitambar Pant National Environment Fellowship Award was instituted in 1978 to encourage and recognise excellence in any branch of research related to the Environmental Sciences.

During the year, Prof. S. C. Pandeya of the Saurashtra University, Rajkot, has been awarded the Fellowship for work in the field of Desert Ecology.

8.5 INDIRA GANDHI PARYAVARAN PURASKAR

Instituted in 1987, the Indira Gandhi Paryavaran Puraskar is awarded every year to an Indian organisation or individual for significant contribution in the field of environment. The award is of the value of Rs. 1 lakh.

This year, 199 nominations including 136 for individuals and 63 organisations were received for the Award. The Award Committee chaired by the Vice-President of India has selected the Kerala Sastra Sahitya Parishad for the Indira Gandhi Paryavaran Puraskar 1988, in recognition of its significant contribution towards environmental protection.

8.6 NATIONAL MEMORIAL AT KHEJARLI VILLAGE NEAR JODHPUR

To commemorate the incident at Khejarli Village in 1730 A.D. during which several men and women belonging to the Bishnoi community sacrificed their lives to save trees from felling, the Ministry has decided to undertake afforestation work in the area as well as to set up a Museum/Desert Ecology Interpretation Centre at Khejarli village near Jodhpur.

The Ministry has also approved institution of a fellowship at the Jodhpur University for study of Desert Ecology. The Ministry will work in close



Fig. 26 'Black Bucks'—traditionally protected by the Bishnois at Khejarli village, Rajasthan

collaboration with the State Government of Rajasthan, representatives of the Bishnoi community and leading non-governmental organisations of Jodhpur in implementing the project.

8.7 JAWAHARLAL NEHRU PROFESSORSHIP

To commemorate Pandit Jawaharlal Nehru's Centenary, the Department has established a Chair in

Environmental Law titled "Jawaharlal Nehru Professorship" at the Jawaharlal Nehru University during the year.

The major objectives of the Chair are to undertake research and training as well as to provide consultancy services in the field of Environmental Law.

9. LEGISLATION AND ORGANISATION

9.1 LEGISLATION

9.1.1 The Environment (Protection) Act, 1986 has been brought into force with effect from 19th November, 1986 and several steps have been taken for the implementation of the Act. These steps include notification of rules under the provisions of the Act, including standards for emissions and effluents; recognition of environmental laboratories and Government Analysts for the purpose of analysis of samples; delegation of powers vested in the Central Government to State Governments and other agencies including power to the state governments to issue directions of closure etc contemplated under section 5 of the Act. Administrative orders/directives were also issued to concerned agencies in matters relating to control of hazardous and toxic chemicals; guidelines for the management of chemical accidents; formation of Crisis Groups at the Central, State and district levels.

9.1.2 During the year, the following actions have been taken under the Environment (Protection) Act, 1986:

- Standards for discharge of effluents/emissions have been notified in respect of Thermal Power Plants and Natural Rubber Industry. With this, standards in respect of 26 specified industries have been notified. General Standards for discharge of effluents in respect of all other industries have also been notified.
- Seventeen more Laboratories were recognised as environmental laboratories taking the total to 76.
- Six more State Governments namely, Uttar Pradesh, Meghalaya, Punjab, Maharashtra, Jammu & Kashmir and Goa, were vested with powers of Section 5 by delegation. With this, 20 States have so far been delegated powers under Section 5.

9.1.3 The Air (Prevention and control of Pollution) Act, 1981 was amended last year to make the provisions more stringent. During the year, the Water (Prevention and Control of Pollution) Act, 1974 has been amended on the lines similar to the amendments of the Air (Prevention and Control of Pollution) Act, 1981. Salient features of the amendments are indicated below:—

- The Central/State Boards for the Prevention and Control of Water Pollution have been renamed as

Central/State Pollution Control Boards as the Boards also deal with air pollution.

- The definition of 'Occupier' has been changed on par with definition in the Factories Act.
- Central Board has been empowered to carry out the functions of any State Board for a limited period and purpose in certain cases.
- Penal provisions have been made more stringent.
- Powers have been given to Boards to give directions including directions for closure or stoppage of water and electricity supply and other services to the offending establishments.
- The amended Act enables citizens to file criminal complaints against offenders after giving 60 days notice to the Board and the Boards have to furnish all the available relevant information to the complainants.
- The Boards have been permitted to raise finances from specified sources.
- The Courts are now empowered to pass ex-parte orders to provide for urgent remedial action, where circumstances so warrant.
- It will be obligatory on the part of the persons to obtain consent even at the time of establishing the industrial plant.

9.1.4 Consequent upon the passing of the water (Prevention and Control of Pollution) Amendment Act 1988 by the Parliament, the Ministry has framed draft rules in the following major areas:

- Prescribing qualifications of Member-Secretary,
- Taking over of functions of the State Pollution Control Boards by the Central Board in public interest,
- Modification of consent application
- Powers to give directions for closure or stoppage of essential services to polluting units.
- The draft rules will be notified shortly in consultation with the Ministry of Law and Justice.

9.1.5 The Forest (Conservation) Act, 1980 has been amended during the year to incorporate stricter penal provisions against violators. Important amendments

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.
- No Forest land or any portion thereof may be cleared of trees which have grown naturally in that land or portion, for the purpose of using it for reforestation without prior approval of the Central Government.
- The scope of the existing definition of "non-forest purposes" has been extended to include therein cultivation of tea, coffee, spices, rubber, palms, oil-bearing plants, horticultural crops and medical plants. A further 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.
- Whoever contravenes or abets 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 fifteen days including public servants who are directly incharge at the time the offence is committed.

9.1.6 The Forest (Conservation) Rules have been amended during the year. The salient features of the amendments are as follows:—

- The Advisory Committees have been reconstituted to include three non-official eminent environmentalists.
- Every proposal received by the Central Government under the Forest (Conservation) Act, 1980 will be referred to the Advisory Committee for advice.
- The Committee will meet at least once a month.

9.2 ORGANISATION AND INFRASTRUCTURE

9.2.1 During the year, the states of Mizoram, Punjab and Manipur have set up Environment Protection Councils. So far 14 States and 3 Union Territories

have set up Environment Protection Councils with representation from legislators of all political parties, non-government organisations engaged in environmental activities, scientists, academicians and officials incharge of developmental activities. These Councils periodically review the environmental programmes of the States and suggest possible solutions. The Ministry of Environment and Forests have nominated representatives to each of these Councils.

9.2.2 Assistance to State Departments of Environment

The scheme of assistance to State Governments and U.Ts. for strengthening their technical set up was continued. So far 19 States and 4 UTs have availed this assistance. 234 technical staff and 242 supporting staff have been sanctioned to the State Governments and UTs under this scheme.

9.2.3 Assistance to Environmental Laboratories other than State Pollution Control Boards' Laboratories

The Environmental (Protection) Act, 1986 places the responsibility on the Central Government to make necessary arrangements for establishing or recognising environmental laboratories.

There is a large laboratory infrastructure in the country and, in order to fully utilise this infrastructure the Department has advertised widely and has written to more than 1250 laboratories requesting these laboratories to apply for recognition as environmental laboratories with details of facilities available to perform any of the environmental tests.

The applications received have been scrutinised and the facilities available with the laboratories have been got verified through experts. So far 76 laboratories have been recognised as Government laboratories under Section 12 of the Act. The qualified analysts working in these laboratories have been recognised as Government Analysts and the recognition which was initially given for a period of one year, has been renewed for two more years. Applications of some more laboratories are under process.

In order to provide facilities for all the needed environmental tests in each region of the country in the first instance, it has been decided that, wherever possible, existing laboratories may be strengthened to

achieve these objectives and where such strengthening is not possible, to establish new laboratories. A Committee of experts has been appointed to fulfil these tasks. As per the recommendations of the Committee priority is being given to fill up the gaps in toxicological testing.

9.2.4 Central Water Laboratory

According to the Water (Prevention and Control of Pollution) Act, 1974, the Central Government has to

establish a Central Water Laboratory or designate any laboratory to function as Central Water Laboratory. The Central Water Laboratory has to analyse the samples of water, sewage, or trade effluents in such cases where an independent report is to be obtained for legal purposes. In the event of any dispute, the report of the Central Water Laboratory will prevail in the courts of law. The Delhi Zonal Laboratory of the National Environmental Engineering Research Institute (NEERI), Nagpur, has been designated as the Central Water Laboratory.

10. INTERNATIONAL COOPERATION

10.1 The Ministry of Environment and Forests functions 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 benefit. The Ministry also functions as the nodal agency for participation in international agreements such as the Convention on International Trade in Endangered Species (CITES), the Convention on Migratory Species and the Ramsar Convention on Wetlands. In addition, the Ministry is the focal point for global environmental issues such as ozone depletion, green house effect and global warming, transboundary movement of hazardous chemicals and wastes, etc.

10.2 The Ministry and its agencies have undertaken projects with the collaboration of World Bank, Food & Agriculture Organisation (FAO), UNDP, WHO, UNEP, EEC, SAARC, Canada, USA, Sweden, Norway, Denmark, United Kingdom, Netherlands, Federal Republic of Germany, and USSR. The details of international co-operation are as follows:

10.2.1 World Bank

The World Bank continued to assist social forestry projects in Jammu & Kashmir, Haryana, Himachal Pradesh, Uttar Pradesh, Rajasthan, Gujarat, Karnataka and Kerala through the NWDB. It also continued its participation in some components of the Ganga Project.

10.2.2 FAO/UNDP

- FAO continued its support to the Wildlife Institute of India, Dehra Dun and in projects of aerial seeding and training in forest inventory, while UNDP continued its assistance to the modern Forest Fire Control Project.
- A proposal for seeking UNDP assistance to the tune of US \$ 2.7 million over a period of five years, for implementing the project "Assistance to Indian Council of Forestry Research and Education" is under process.
- Under the activities of the project 'Regional Wood Energy Development Programme' funded by the Netherlands and implemented by the FAO, a study

tour to India & Nepal was undertaken by ten experts of the region sponsored by the FAO to study social forestry.

10.2.3 WHO

- Under the collaborative project for control of air and water pollution, ten officials of the Central and State Pollution Control Boards were trained at Delft, Netherlands. Group education activities were conducted in India by WHO. A WHO consultant on the chloralkali industry worked with the Central Pollution Control Board officials.
- With WHO collaboration in the Human Exposure Assessment Location (HEAL) programme, quality control exercises in assessment of heavy metal content in biological samples were conducted by four different institutions in India.

10.2.4 UNESCO

This Ministry deals with natural sites in India in the World Heritage Convention. During the year, it participated in the World Heritage Week Celebration in November, 1988. The process of nomination of Nanda Devi national park as a world heritage site has reached an advanced stage.

10.2.5 UNEP

Under the UNEP sponsored project, Japanese experts studied safety and accident prevention in hazardous chemical units in India. The report of the experts has been received and based on this, training of personnel will be taken up.

10.2.6 EEC

The Central Pollution Control Board has taken up a project on air quality monitoring with EEC assistance.

10.2.7 IUCN

A four-day international symposium on Asian Otters at Bangalore in October, 1988 was jointly sponsored by the IUCN, Government of India and the Government of Karnataka during which an Action Plan for conserving the Asian Otter species was prepared.

10.2.8 South Asian Association for Regional Cooperation (SAARC)

The SAARC countries have decided to undertake a study of environmental degradation and natural disasters in the region. India was requested to draft a study format for adoption by each country. The ministry has drafted the format in consultation with the Ministries of External Affairs, Water Resources, Agriculture and Urban Development and the same is under consideration by the member countries.

10.2.9 SACEP

India participated actively in SACEP affairs with the primary objective of making it a viable institution.

10.2.10 Canada

The Canadian International Development Agency (CIDA) has supported a social forestry project in Andhra Pradesh. CIDA has also shown interest in training of middle and senior level management in the forestry and environment sectors over the next five years.

10.2.11 USA

The Bombay Natural History Society has a number of projects sponsored by this ministry in collaboration with the USA. The Centre for Environment Education, Ahmedabad, continued its projects on interpretative techniques in collaboration with the U.S. Fish and Wildlife Service. A project for development of the Wildlife Institute, Dehradun, has begun in collaboration with the US Fish and wildlife Service.

During the year, a collaborative project on geographical information system (GIS) for land use planning and conservation of mangroves, wetland and biosphere reserves, was initiated with the Universities of Ohio and Wisconsin under the U.S.—India Rupee Fund. The first Indo-US workshop on this project was held on January 4-7, 1989 at New Delhi to assess the suitability of GIS techniques and to develop programmes for conservation areas. The exchange of ideas in this workshop will be the basis for a number of collaborative projects between Indian and US agencies.

USAID continued its assistance to social forestry projects in Maharashtra and joint assistance with World Bank in U.P., H.P., Rajasthan and Gujarat.

10.2.12 Sweden

The Swedish International Development Agency (SIDA) continued its support to social forestry projects in the States of Tamil Nadu, Orissa and Bihar while the West Bengal project came to a close during the year. SIDA is also supporting the strengthening of the infrastructure of the Indian Institute of Forest Management at Bhopal. During the year, the ministry and SIDA jointly sponsored a seminar on forestry sector administration.

SIDA has expressed interest in taking up medium/long term collaborative projects in the field of environment. A project identification mission visited India in September 1988 and apart from discussions in Delhi, visited ITRC, Lucknow, NEERI, Nagpur and held discussions with the State Governments of Maharashtra, Tamil Nadu, Kerala, Karnataka and Andhra Pradesh. Eleven students from the School of Forest Engineers, Sweden, visited India for a period of three weeks to gain an all-round knowledge about Indian forestry including wildlife.

10.2.13 Norway

Two Norwegian consultants on coastal pollution monitoring visited India in November-December 1988 and had extensive discussions and consultation with the CPCB, the National Institute of Oceanography, Goa, and the Pollution Control Boards of some of the coastal States. While proposals for pollution abatement in the aluminium industry have been finalised for Norwegian technical assistance, proposals for the ferro-alloy industry made by the Steel Authority of India Ltd, were processed during the year.

Discussions on technical collaboration for risk assessment, hazard analysis and crisis management plans for particular industries and group of industries have been initiated with Norway.

10.2.14 Denmark

The Danish International Development Agency (DANIDA) continued its assistance to social forestry projects in Jammu & Kashmir and Haryana jointly with the World Bank. A project identification mission from DANIDA visited India during October 1988 and held discussions with a number of State Governments also. The Bhartiya Agro Industries Foundation (BAIF), Pune, will undertake agro forestry development in Karnataka with DANIDA assistance. Based on the

proposals received, DANIDA has compiled a detailed report which is being scrutinised for arriving at project priorities. It is expected that long term collaboration with DANIDA will be commenced in 1989-90.

10.2.15 United Kingdom

During the year, an agreement for consultancy assistance to the Government of Tamil Nadu by the Overseas Development Agency (ODA) of U.K. to prepare a detailed project report for upgradation of the waterways in Madras town was finalised. The work on preparing the project report has started with ODA consultancy. ODA also continued its assistance to social forestry projects in Karnataka, jointly with the World Bank. The Thames Water Authority continued to provide technical assistance in certain components of the Ganga Project.

10.2.16 Netherlands

The Netherlands continued its financial and technical assistance to Kanpur and Mirzapur sanitation projects within the Ganga Action Plan.

Collaboration with the Netherlands under the Memorandum of Understanding signed in January 1988 has started. The project on bio-monitoring of the water quality of Yamuna river in collaboration with the Central Pollution Control Board and ITRC has begun in November 1988. A team from the Central Leather Research Institute, Madras, visited the Netherlands for assessing Dutch capabilities and finalising projects for industrial counselling in the leather sector. A three-year programme for Indo-Dutch workshops on environmental impact assessment for the officials of various development departments has been finalised. Altogether, there will be 17 workshops in the project period covering the subjects of ports and harbours, land use and industrial siting, and development of water resources.

Collaborative projects for industrial counselling in the distilleries and fertiliser industry were processed during the year and would be finalised soon. The first meeting of the joint working committee for the Indo-Dutch programme was held at the Hague.

10.2.17 Federal Republic of Germany

The third and last phase of the Dauladhar range soil erosion project was continued. A five-day Indo-FRG training workshop of Environmental Impact

Assessment was conducted during May 30-3 June 1988 for the benefit of mid-level scientists and engineers of pollution control boards. A five-month training in India under Indo-FRG programmes for 'Analytical Methods' was conducted from February-June 1988 in India by the German experts and the training continued for one more month in West Germany.

10.2.18 GDR

Under a cultural exchange programme two Directors of the East Berlin and Dresden zoos visited India for exchange of ideas on zoo management.

10.2.19 USSR

Under the Indo-USSR integrated long term programme of cooperation in science and technology (including environment and ecology), an Indian delegation visited the USSR in October 1988. A firm programme for exchange of scientist visits in identified institutions has been finalised and the first visits are to start soon. The areas of collaborative research would be (a) study of rational use and protection of biological diversity and forest resources and (b) environment impact assessment and pollution control.

The National Museum of Natural History, New Delhi staged an exhibition in Moscow as part of the Festival of India in the USSR.

10.2.20 China

A five member Indian delegation visited China in June-July 1988 to study poplar cultivation under the bilateral science and technology exchange programme between India and China. Under the same programme a Chinese delegation visited India for studying fuelwood and afforestation techniques.

10.2.21 Japan

The NMNH organised an exhibition on Indian wildlife at Tokyo in May 1988 as part of the Festival of India in Japan.

10.2.22 Mauritius

India participated in a conference on environmental concerns in development planning for Mauritius sponsored by the Government of Mauritius and the World Bank. During the conference a number of areas

were identified where Indian expertise could be useful for Mauritius.

10.2.23 Nigeria

Two delegations from Nigeria visited India for studying social forestry, community forestry, extension etc. for two and four weeks respectively.

10.2.24 Indonesia

A delegation consisting of three Forest Development Officers from Indonesia visited India for a week to study resin tapping, processing and research.

10.2.25 Sri Lanka

Fifteen students accompanied by two faculty members from the University of Jayawardenepura, Sri Lanka, visited India for a period of two weeks. The places/States visited by them included the Forest Research Institute, Dehradun, the Social Forestry Projects being implemented in the States of U.P., Gujarat, Karnataka and Kerala besides a National Park in Maharashtra.

10.2.26 Vietnam

A five member Vietnamese delegation led by H.E. Mr. Tran San Thuy, Vice Minister of Forests, visited India for two weeks to get acquainted with different forestry operations in the country. The two countries will cooperate on the following fields of forestry:

- Rehabilitation of degraded lands—Transfer of knowhow from India to Vietnam relating to raising of fast growing species including infrastructural support.
- Training of Vietnamese personnel in social forestry.
- To provide facilities to train four foresters from Vietnam in Indira Gandhi National Forest Academy, Dehradun, and
- Transfer of technology for making bamboo pulp and related disciplines.

In addition, two other delegations had also visited India from Vietnam—first a four member delegation of forestry teachers to Forest Research Institute, Dehradun, for a week to help Vietnam develop building up of their own forest vocational School and the other a five member delegation for two weeks concerning preparation and implementation of forest management plans.

10.3 India participated in a number of deliberations in the international fora:

- The 4th Governing Council Meeting of SACEP at Kabul in April, 1988.
- The 10th and 11th meetings of the Board of Governors of ICIMOD in May and December, 1988 at Kathmandu.
- The 40th Annual Meeting of the International Whaling Commission in which India has commissioner status, at Auckland, New Zealand in May-June, 1988.
- UNEP meetings on transboundary movement of hazardous wastes at Caracas, Venezuela in June and at Geneva in December, 1988.
- The 12th session of the preparatory committee for establishment of the International Centre for Genetic Engineering and Biotechnology (ICGEB) at Vienna in July 1988.
- An ESCAP Conference on Environment Impact Assessment of development projects at Bangkok in July 1988.
- The meeting of Expert Committee on environmental degradation and natural disasters at Kathmandu in July 1988.
- The 16th International Congress on Genetics at Ottawa, Canada in August 1988.
- A meeting of the Group of Government Experts on Environmental health Issues organized by WHO at Geneva in September, 1988.
- The 43rd Annual Conference of the International Union of Directors of Zoological Gardens at Stuttgart, FRG, in September, 1988.
- UNEP meeting on London guidelines for Exchange of Information on Hazardous Chemicals at Dakar, Senegal, in September, 1988.
- Meeting of parties to the Convention on Migratory Species at Geneva in October, 1988.
- The Inter Governmental Panel on Climate Change organised by WHO/UNEP at Geneva in October, 1988.

-
- The UNEP conference on the Ozone-layer at the Hague, Netherlands in October, 1988.
 - Deliberations on the role of small-scale farmers in sustainable development at the International Fund for Agricultural Development Rome, in November, 1988.
 - A Conference on Upland Conservation organised at Bangkok in November, 1988.
 - Preparatory discussion in December, 1988 at the Hague, Geneva, for a Minister-level international meeting on the Greenhouse effect scheduled for November, 1989, on a Dutch Initiative.
 - UNEP meeting on Awareness and Preparedness for Emergencies at the local level arising out of chemical accidents in Paris in December, 1988.
 - Informal consultation between Executive Director, UNEP and a small group of developed/developing countries at Nairobi in January, 1989.

11. ADMINISTRATION AND BUDGET

11.1 The total strength of the Department including National Wasteland Development Board at the headquarters is 1056 (Group 'A' : 215; Group 'B' : 325; Group 'C' : 331; Group 'D' : 185).

11.2 PERSONNEL POLICIES

In accordance with the revised recruitment rules for Group 'A' scientific posts in the Department, direct recruitment to several category of Group 'A' scientific posts in the Ministry as well as its associated offices was made. Under Flexible Complementing Scheme, cases of 159 Group 'A' scientific officers were reviewed for promotion to the next higher grade as on 1-1-1988 and 1-7-1988. Promotions to the higher grades were made.

11.3 PURCHASE WING

With the exemption of Scientific Departments from the purchases through DG S&D, new purchase and stores procedures have been introduced in the Ministry of Environment and Forests and its associated organisations. Purchase wings have been sanctioned in the Ministry, the Botanical Survey of India, the Indian Council of Forestry Research & Education, and the National Museum of Natural History, for implementation of procurement management system.

11.4 CIVIL ENGINEERING UNIT

Three Engineering Divisions, two in Delhi and one in Bangalore, were created to plan and execute the construction works. The Chief Engineer and the Divisions under him have been provided functional autonomy for time-bound execution of planned projects. Financial and administrative powers have been delegated to the Civil Construction Unit of the Ministry to facilitate quick execution of projects. During the year, 93 posts of various categories excluding Architectural Staff have been approved and 50 posts have been filled up. Consultants have been engaged for 14 building projects at a total cost of Rs. 2099.38 lakhs. Preliminary estimates for 16 projects amounting to Rs. 1319.90 lakhs were finalised during the year and sanctions for 9 projects costing Rs. 779.17 lakhs were accorded. Detailed survey work for the National Zoological Park, New Delhi has been carried out for preparation/revision of the Master Plan.

11.5 RESERVATION IN SERVICE

A statement showing reservation of SCs/STs in the Department as on 31-12-1988 is given in Table 18 at page 86.

Efforts are being made in consultation with the Department of Personnel/Staff Selection Commission to fill up posts reserved for physically handicapped persons in associated offices of the Ministry outside Delhi.

11.6 USE OF HINDI

11.6.1 With a view to encouraging original writing in Hindi on Environment, Forests and Wildlife, a prize scheme was instituted during 1987. The entries received under the scheme were evaluated by the Expert Committee and the first prize of Rs. 5,000/- was jointly awarded to Shri Virendra Chandra and Shri Naresh Chandra Tiwari for the book on "Usar Bhoomi Me Vriksharopan". The second prize of Rs. 3,000/- was jointly awarded to Shri Shyam Sunder Sharma and Smt. Mridula Garg for the book on "Pradushan: Karan Aur Nivaran". The third prize of Rs. 2,000/- was awarded to Shri Ghanshyam Saxena for the book "Jangal Aur Zindagi". The consolation prize of Rs. 1,000/- was awarded to Shri S. M. Hasan for the book on "Vanyaprani Prasang".

11.6.2 The Scheme has been continued during 1988 and it has been decided to increase the prize amount.

11.6.3 A quarterly journal 'PARYAVARAN' was started during the year with a view to encourage creative writing in Hindi among officers and employees of the Ministry. With the object of popularising and progressively increasing the use of Hindi among the employees in the Ministry, Hindi week was celebrated. Prizes were awarded to the winners of competitions organised to mark the occasion.

11.6.4 A total of 12554 books on environment and forestry are available in the library of the Ministry. During the year 3830 Hindi books and 615 English scientific and technical books on environment and related areas were also procured for the library.

11.6.5 In accordance with the Government policy, a training centre for training in Hindi and Hindi Typing and Shorthand was started in Paryavaran Bhavan so

Table 18

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 31.12.1988

Group	Sanctioned strength	Number in position	Scheduled Castes	Per cent to total number of employees in position	Scheduled Tribes	Per cent to total number of employees
Group 'A'	215	136	11	8	1	0.7
Group 'B'	325	236	21	8.9	2	0.8
Group 'C'	331	211	16	7.6	5	2.4
Group 'D' (excluding Safaiwala)	172	148	50	33.8	5	3.4
Group 'D' (Safaiwala)	13	12	12	92.3	—	—
Total	1056	743	110	14.8	13	1.7

that all the employees remaining to be trained could be covered according to a time-bound plan. Three workshops on functional Hindi were organised. Keeping in view the Government policy to extend the use of Hindi in training institutions, steps are being taken by the training institutions under the control of this Ministry to translate the available training material in Hindi. Posts of Hindi Officer/Translators necessary for this purpose have been sanctioned.

11.6.6 The Hindi Salahakar Samiti of the Ministry met four times and revised the progress in the use of Hindi.

11.7 TRAINING

11.7.1 The Ministry has taken steps to computerise the monitoring system of important references and also the information system for forests and environmental clearances which would expedite decision making. For effective implementation, officers of this Ministry were trained in the operation of computers.

11.7.2 A briefing course on security was organised during the year for officers of this Ministry.

11.8 ADMINISTRATIVE REFORMS

11.8.1 Constant efforts were made to tone up

administrative efficiency by reviewing systems and procedures of work. The distribution of work among important Divisions in the Ministry was rationalised and the procedure for clearances was streamlined.

11.9 JOINT CONSULTATIVE MACHINERY

11.9.1 The Departmental Council of the Ministry set up under the Joint Consultative Machinery and compulsory arbitration for Central Government employees continued to be active during the year. Four meetings were held to sort out issues raised by the employees. Office Councils set up in all the associated offices were activated during the year and steps were taken to ensure that meetings were held periodically as provided in the scheme. The Office Council of the Ministry also held four meetings during the year.

11.10 BUDGET

11.10.1 The Budget Estimate and Revised Estimate of the Ministry for the year 1988-89 is Rs. 182.00 crores.

11.10.2 Areawise distribution of the funds for the year 1988-89 (Revised Estimate) and the major scheme-wise distribution of funds are shown in Fig. 27 and Fig. 28 respectively.

AREA-WISE DISTRIBUTION OF FUNDS FOR THE YEAR 1988-89 (RE) (PLAN)
(In Rs. lakhs)

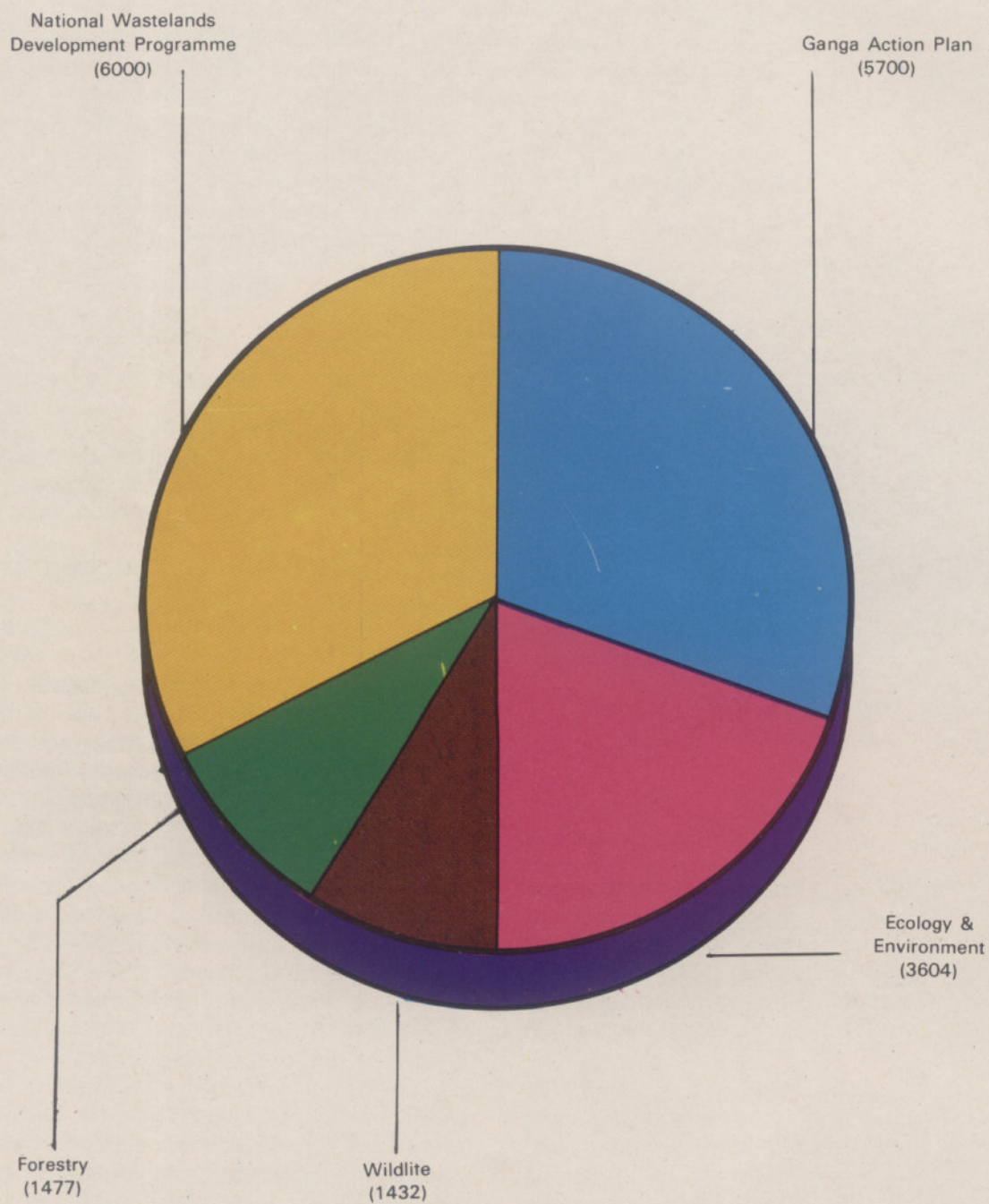


Fig. 27

SCHEMewise DISTRIBUTION OF FUNDS (PLAN)

(In Rs. lakhs)

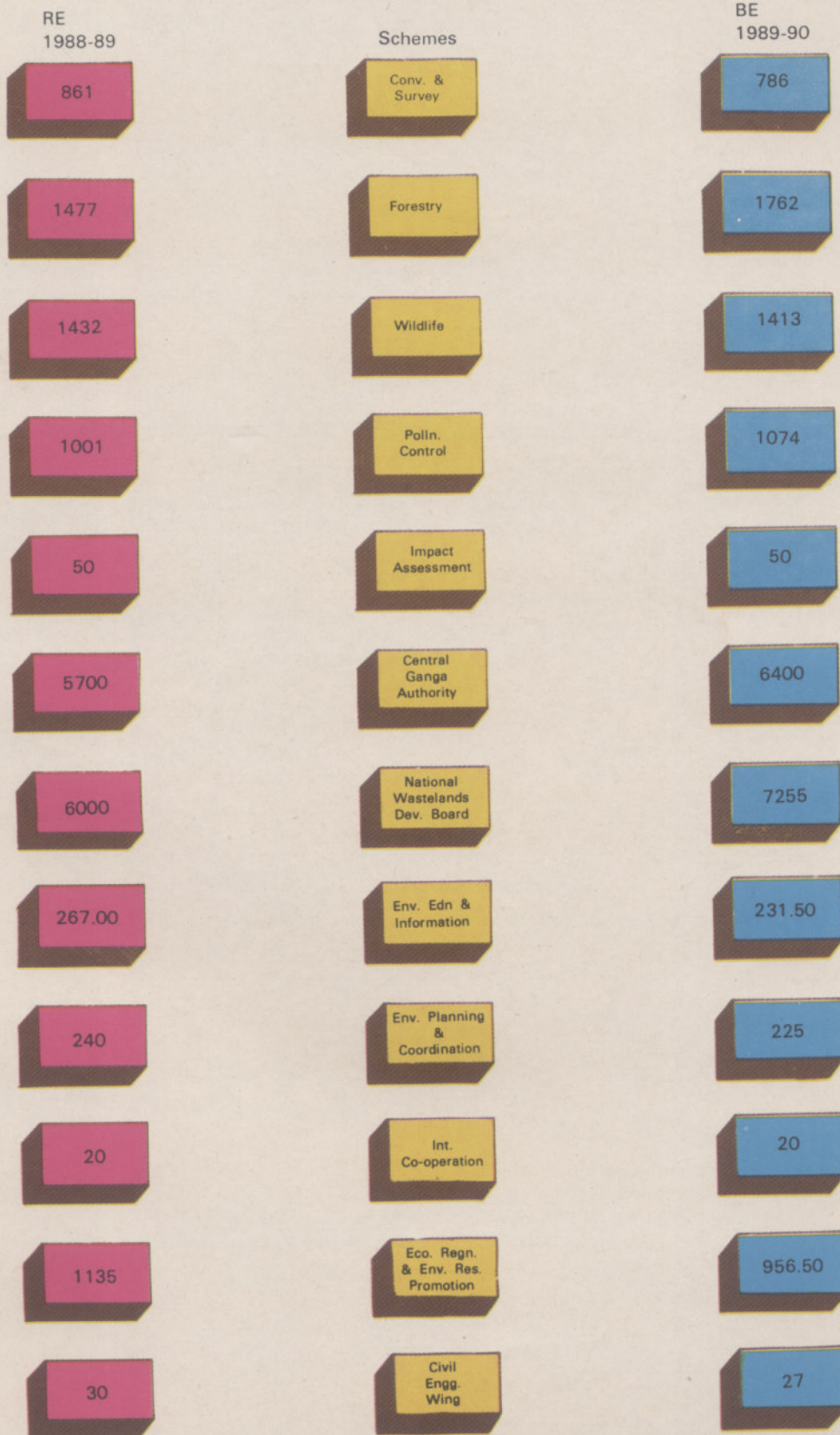
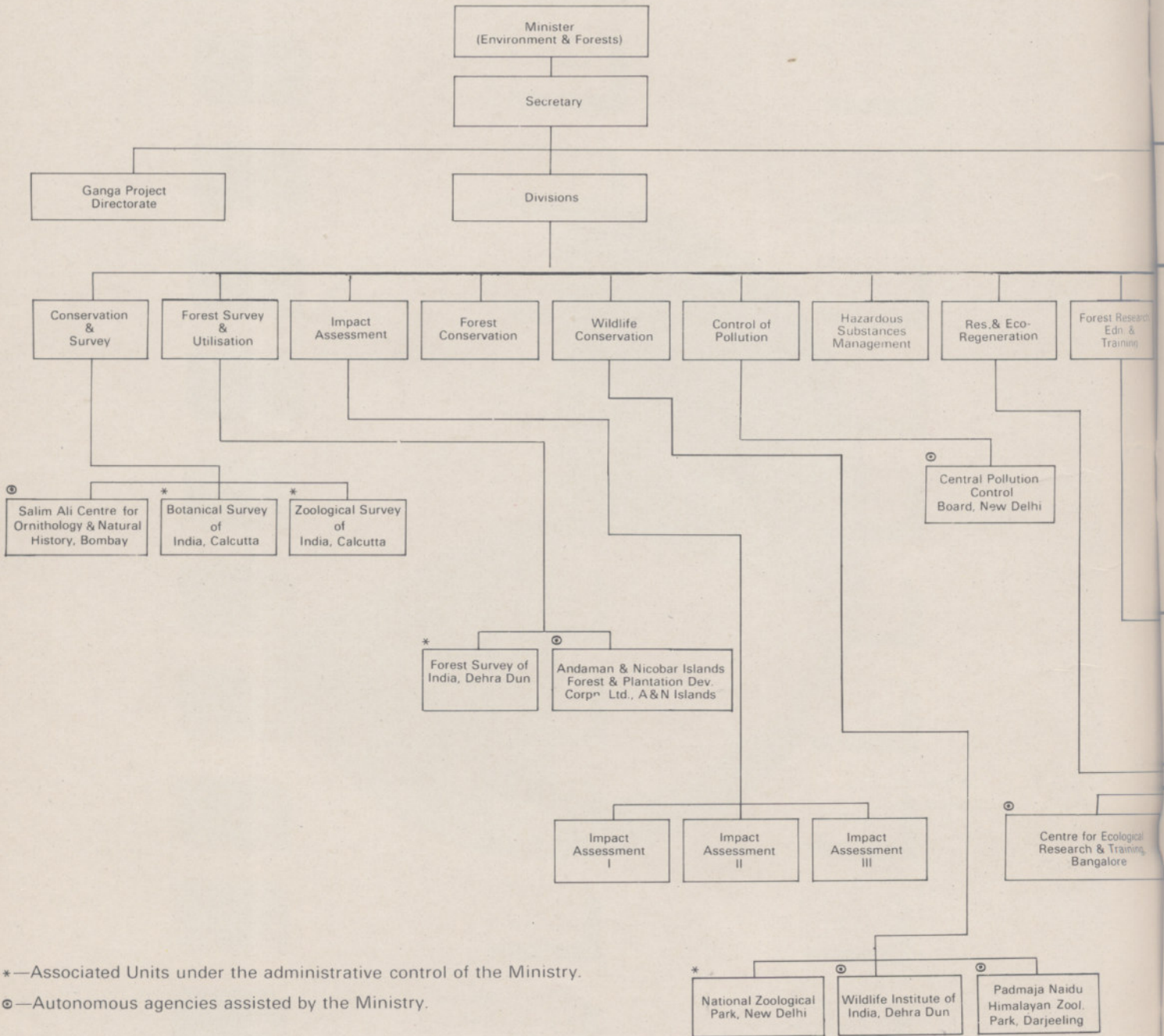


Fig. 28

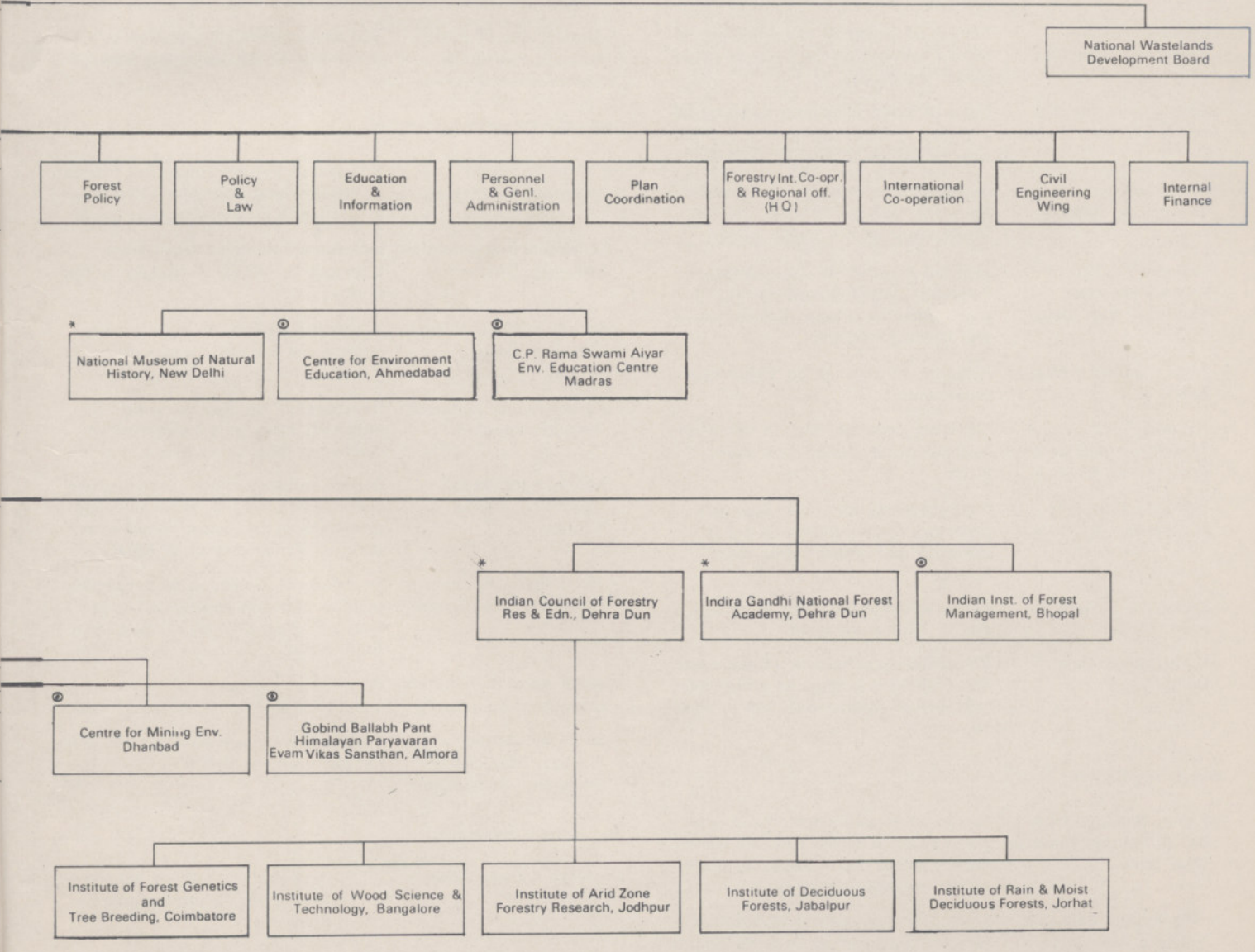
ANNEXURE I

ORGANISATION CHART OF THE MINISTRY OF ENVIRONMENT & FORESTS



*—Associated Units under the administrative control of the Ministry.

⊙—Autonomous agencies assisted by the Ministry.



ANNEXURE—II

LIST OF PROJECTS SANCTIONED DURING 1988-89

Institution	Title of the project	Institution	Title of the project
Environment Research/Man and Biosphere			
—Berhampur University Berhampur.	Studies on the algal vegetation in the inland waters of Berhampur, Orissa, with emphasis on pollution indicators species.	—Department of Bio- sciences, Jammu University, Jammu.	Germoplasm assessment and conservation of some threatened Himalaya umbellifers.
—Industrial Toxicology Research Centre, Lucknow.	Epidemiological, environmental and cyto-toxicological studies on atmospheric pollution due to coal combustion with particular reference to fly-ash.	—Department of Bio- sciences, Jammu University, Jammu.	Herpetofauna of Kashmir Himalaya: Ecology and Conservation.
—Madurai Kamaraj University, Madurai.	Studies on biological and physiological factors influencing degradation using model ecosystem.	—Assam Agricultural University, Jorhat, Assam.	Effect of environmental pollution upon the physiological changes of Muga silk worm food plants.
—CSIR Centre for Bio- chemicals, New Delhi.	Study of fungal airspora in extra-mural and intra-mural environments in Delhi with reference to allergic disorders.	—Department of Botany, Kumaun University Campus, Almora.	Eco-development of degraded ecosystem of Suyal catchment (Almora).
—Indian Institute of Technology, Bombay.	Biological treatment of waste water from the nitrogen fertilizer industry; Nitrification-Denitrification studies.	Western Ghats Region	
—National Council of Applied Economic Research, New Delhi.	Evolving a system of self-financing by Pollution Control Boards taking into account technical, legal, administrative and financial aspects.	—Centre for Earth Sciences, Trivandrum.	Analysis of the environmental impact of the low land to highland migration in the western ghats region, Kerala.
—Feroze Gandhi College, Raebareli.	Pollution awareness: an intervention programme.	—University of Agricultural Sciences, Dharwar	Integrated control of eupatorium Odoratum L. Weed in western ghats area.
—National Institute for Training in Industrial Engineering, Bombay.	Vehicular pollution and its effect on selected occupational population group.	—Kerala Sastra Sahitya Parishad, Cochin, Kerala.	A people's project on agro-forestry alternatives for soil conservation.
—Osmania University Hyderabad.	Phytochemical, ethnobotanical and pharmacological studies on tribal medicine and edible plants from forests.	—Kerala Forest Research Institute, Peechi.	Regeneration studies on some important trees in a natural moist deciduous forest ecosystem.
—Zoological Survey of India, Madras.	Conservation of the fresh water fishes and of Peninsular India.	—Kerala Agricultural University, Trichur, Kerala.	Impact of new settlers in the western ghats region on the socio-economic conditions of the tribal population in case of Wynad district of Kerala.
—University of Delhi, Delhi.	Chromatid exchanges in a fresh water fish <i>Channa punctatus</i> as a biological indicator of aquatic pollution in river Yamuna.	—Tamil Nadu Agricultural University, Coimbatore.	Environment protection by developing relation between vegetation, stream flow and ground water in Kodaikanal, Tamil Nadu.
Himalayan Region			
—Indian National Trust for Art & Cultural Heritage, New Delhi.	Survey of watershed of the Anglar basin so as to evolve a techno-economically viable methodology to draw up an ecodevelopment plan.	—Tamil Nadu Agricultural University, Coimbatore.	Schemes on evaluation of the extent of pollution in the Nilgiris (Western Ghats).
—Tata Energy Research Institute, New Delhi	Study of energy use and environmental effects in Garhwal region of the Central Himalaya and action plan for mitigation.	—Salim Ali School of Ecology, Pondicherry University, Pondicherry.	Ecological studies in Agastyamalai rain forests, Western Ghats.
—Department of Forestry, Kumaun University, Nainital.	Recovery of damaged forest ecosystem in Kumaun Himalaya, Phase II.	Bio-Sphere Reserves	
		—Loyola College, Madras	Biological studies on aquatic insects for Nilgiri Biosphere Reserve.
		—Centre for Water Resources Development and Manage- ment, Calicut.	Studies on hydrological processes and their impact on Nilgiri Biosphere using Remote Sensing Techniques.

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LIST OF PROJECTS SANCTIONED DURING 1988-89—Continued

Institution	Title of the project
—Kerala Forest Research Institute, Peechi.	Ecological studies and long term monitoring of biological processes in Silent Valley National Park.
—Kerala Forest Research Institute, Peechi.	Studies on Human Ecology and Eco-restoration of Attapady Valley.
—Indian Institute of Science, Bangalore.	Ecosystem monitoring through the study of plants, large mammals and insects.
—Kumaon University, Nainital	Pattern of soil and vegetation and factors determining their forms and hydrologic cycle in Nanda Devi Biosphere Reserves.
Mangroves	
Department of Botany Andhra University, Waltair.	Biogeochemical Investigation on the Mangroves of Krishna Delta.

Institution	Title of the project
Wetlands	
Department of Biosciences University of Jammu, Jammu.	Ecology of Lake Mansar with emphasis on conserving associated fish and wildlife population endangered by creation of recreation, tourist and other human interferences in the area.
Department of Botany, Utkal University, Bhubaneswar.	Mapping and characterisation of the of the Wetlands along the Eastern Coast of Orissa.
College of Technology and Agricultural Enginnering, Rajasthan Agricultural University, Udaipur.	Sedimentation Studies of Fateh Sagar and Pichola Lake.
Post Graduate Department of Zoology, University of Kashmir, Srinagar.	Fish conservation in Wular lake with special reference to fish mortality and human health due to helminth infatation.

ANNEXURE—III

LIST OF PROJECTS COMPLETED DURING 1988-89

Institution	Title of the project	Institution	Title of the project
Environment Research/Man and Biosphere			
—St. Joseph's College, Tiruchirapalli.	Further illustrations on the flora of the Tamil Nadu Carnatic.	—Shriram Institute of Industrial Research, Delhi.	Air pollutants effect on marble and sandstone.
—University of Patna, Patna.	Collection, assessment and conservation of Cucurbit Germplasm.	Himalayan Region	
—Centre for Earth Science Studies, Trivandrum.	Long term conservation potential of natural forests in the Southern Western Ghats of Kerala.	—Department of Zoology, University of Kashmir, Srinagar.	Survey and conservation of wildlife in Telbal Dachigam Catchment.
—Calcutta University, Calcutta.	Genetic toxicology in the assessment of effects of industrialisation on genetical systems in the West Bengal.	—Department of Agronomy, HPKV, Palampur.	Improvement of manurial value of pine needles.
—A.V.V.M. Sri Pushpam College, Poondi (Tamil Nadu)	Sea turtle research and conservation.	—Department of Soil Sciences, HPKV, Palampur.	Drying up of Hill springs and Geomorphological Hydrological studies of springs for their conservation.
—School of Planning and Architecture, New Delhi.	Management of urban eco-system in hot desert Biome, Churu and Nagaour, Rajasthan.	—Department of Bio-sciences, H.P. University, Simla.	Pollination ecology of apple orchards in Narkanda Temperate zone.
—Zoological Survey of India, Calcutta.	Qualitative analysis of fungal resources.	—Department of Bio-sciences, H.P. University, Simla.	Seed eco-physiology of trees/shrub species with reference to afforestation.
—Jodhpur University, Jodhpur.	Ecological effects of human activities on the sand-dune ecosystem of the Indian Desert.	—Department of Bio-sciences, H.P. University, Simla.	Study of fungi associated with decay in the living commercial trees.
—University of Kerala, Trivandrum.	Algal resources of Kerala coast and their economic utilisation.	—Department of Bio-sciences, H.P. University, Simla.	Ethnobotanical studies and other facts of socio-economic aspects of two watersheds.
—Govt. P.G. College, Chhindwara, M.P.	Impact of Sarni and Koradi Thermal Power Station on the aquatic eco-system.	—Central Building Research Institute, Roorkee.	Eco-development in Garhwal Kumaun Himalayas with particular reference to landslides and development of innovative control measures.
—Industrial Toxicology Research Centre, Lucknow.	Effect of biomembrane as models for exploring activity of potentially toxic chemicals.	—Department of Geology, Kumaun University, Nainital.	Geohydrological investigation of the Gaula catchment.
—Bharathidasan University, Trichy.	Search and development of pest control agents of plant origin to control environmental pollution.	—Department of Botany, Kumaun University, Nainital.	An integrated approach for eco-development of catchment of river Gaula.
—University of Calcutta, Calcutta.	Physico-chemical studies of soil plant relationship under coastal eco-system.	—Department of Forest, Kumaun University, Nainital.	Recovery of damaged forests eco-system in Kumaun Himalaya.
—National Botanical Research Institute, Lucknow.	Studies on environmental aspects of fungal and farm spores.	—Tripura University, Agartala.	Integrated watershed management of Gumti river valley.
—Annamalai University, Annamalai Nagar.	Environmental studies in the fertility of waters.	Western Ghats Region	
—Roorkee University, Roorkee.	Hydrological aspects of waste disposal of upper Hindon basin.	—Department of Botany, Karnataka University, Dharwad.	Inter-disciplinary coordinated investigations of biotic and abiotic ecosystem of selected areas of utara Kannada district of Karnataka State.
—Banaras Hindu University, Varanasi	Endocrine and neuro-endocrine physiology of fish with special reference to reproduction under normal and altered environmental conditions.		
—Maharashtra Association for Cultivation of Science, Pune.	Studies on the microbial degradation of alcohol distillary wastes.		

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LIST OF PROJECTS COMPLETED DURING 1988-89—Continued

Institution	Title of the project
—Department of Geology, University of Mysore, Mysore.	Environmental study of the Kaladi and Kolloru river basins of Karnataka.
—St. Aloysius College, Mangalore.	A comparative ecological study of the soil, climate micro-organisms, epiphytes and weeds of deforested and afforested areas of the Dakshina Kannada area of the Western Ghats region.
—Department of Marine Geology, University of Mangalore, Mangalore.	A study of physical determinants of the natural environment and their impact on land use in Nethravathi and Gurpur river basins of the Western Ghats region.
—Department of Geology, Karnataka University, Dharwad.	Study of the natural environment in Gangavati river basins of Uttara Kannada district, Karnataka, constituting a part of the Western Ghats.
—Department of Zoology, Karnataka University, Dharwad.	The role of fungi and insects (with special reference to ants and termites) in the ecosystem in the Western Ghats.
—Centre for Earth Sciences, Trivandrum.	A comparative study of land use pattern in two selected river basins of Western Ghats of Kerala in relation to integrated drainage basin management planning.
—Centre for Water Resources Development and management, Kozhibad.	Impact of deforestation on hydrological parameters in the Western Ghats region of Kerala.
—Department of Law, University of Cochin, Cochin.	Legislative and administrative aspects of environmental control in Western Ghats.
—Centre for Water Resources Development and Management, Kozhikode.	Studies on sediment yields from watersheds of Western Ghats region.
—School of Biological Sciences, Madurai University, Madurai.	An environmental impact assessment of human activities and conservation action models on natural and semi-natural ecosystems in Western Ghats region in Tamil Nadu.
—Department of Agricultural Extension, Tamil Nadu Agricultural University, Coimbatore.	Environmental education and awareness in the Western Ghats region.

Institute	Title of the project
—Department of Biology, Dhempe College, Goa.	Studies on the ecodevelopment of Western Ghats region of Goa, Part I —Effect of mining on the ecosystem of Sanguem, Bicholim, Sattari and Quepem Talukas, Goa.
Eastern Ghats Region	
—P. G. Department of Marine Sciences, Berhampur University, Berhampur.	Studies on the Hydrobiological features of Chilka Lake, Orissa.
—Zoological Survey of India, Marine Biological Station, 41, Santhome High Road, Madras.	Survey and ecology of the insect communities of Eastern Ghats.
—Department of Zoology, Utkal University, Bhubaneswar.	A study of ecology breeding patterns, development and Karyotype patterns of the Olive Ridley.
—Department of Botany, Andhra University, Waltair, Visakhapatnam.	A project on environmental aspects of pollination and seeding in some timber plant species of Eastern Ghats.
Mangroves	
School of Studies in Botany, Vikram University, Ujjain.	Ecology Studies of Mangrove Forest Ecosystems of Andaman Islands
Central Marine Fisheries Research Institute, Cochin	Studies on the Effects of Environmental Pollution on some Benthic animals in the Cochin Backwater.
Centre of Advance Study in Marine Biology, Annamalai University, Parangipettai, Tamil Nadu	Studies on the littoralfauna with special reference to molluscan fauna of Vellar Estuary and Pichavaram Mangroves
Wetlands	
—Department of Biosciences, Himachal Pradesh, University, Simla.	Analysis of some lake ecosystems of Himachal Pradesh with special reference to their conservation and management.
—Department of Botany, University of Sagar, Sagar, Madhya Pradesh.	Eutraphication and fish production in some aquatic environment of Central India.
—Zoological Survey of India, Southern Regional Station, Madras.	Ecology distribution and documentation of fresh water gastropods of Tamil Nadu and their cercarial fauna.