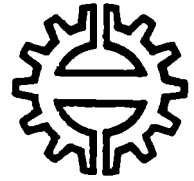


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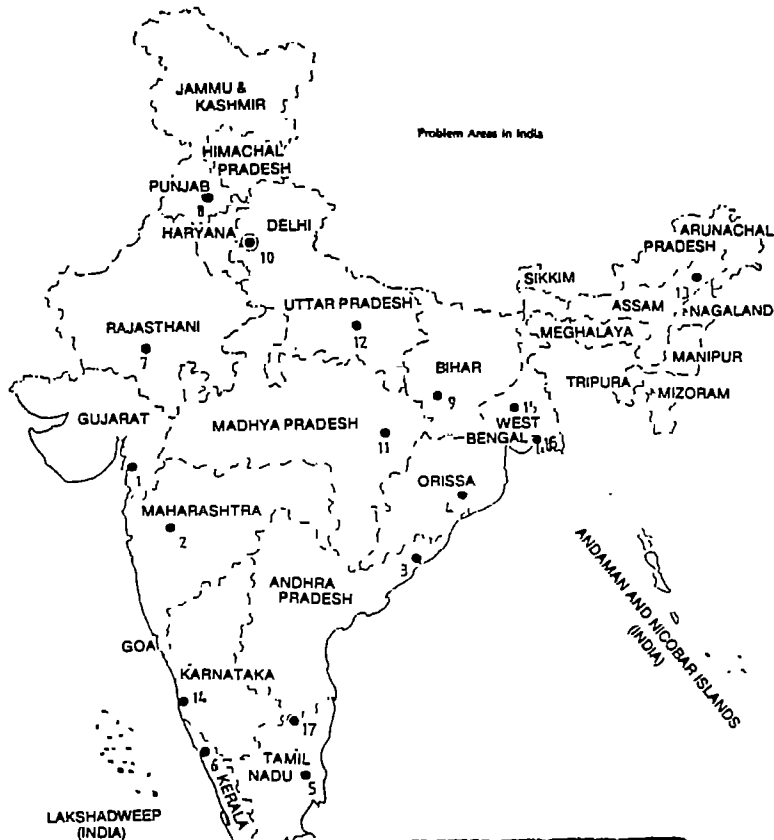


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ENVIRONMENTAL MANAGEMENT IN INDIA - A BASELINE STUDY

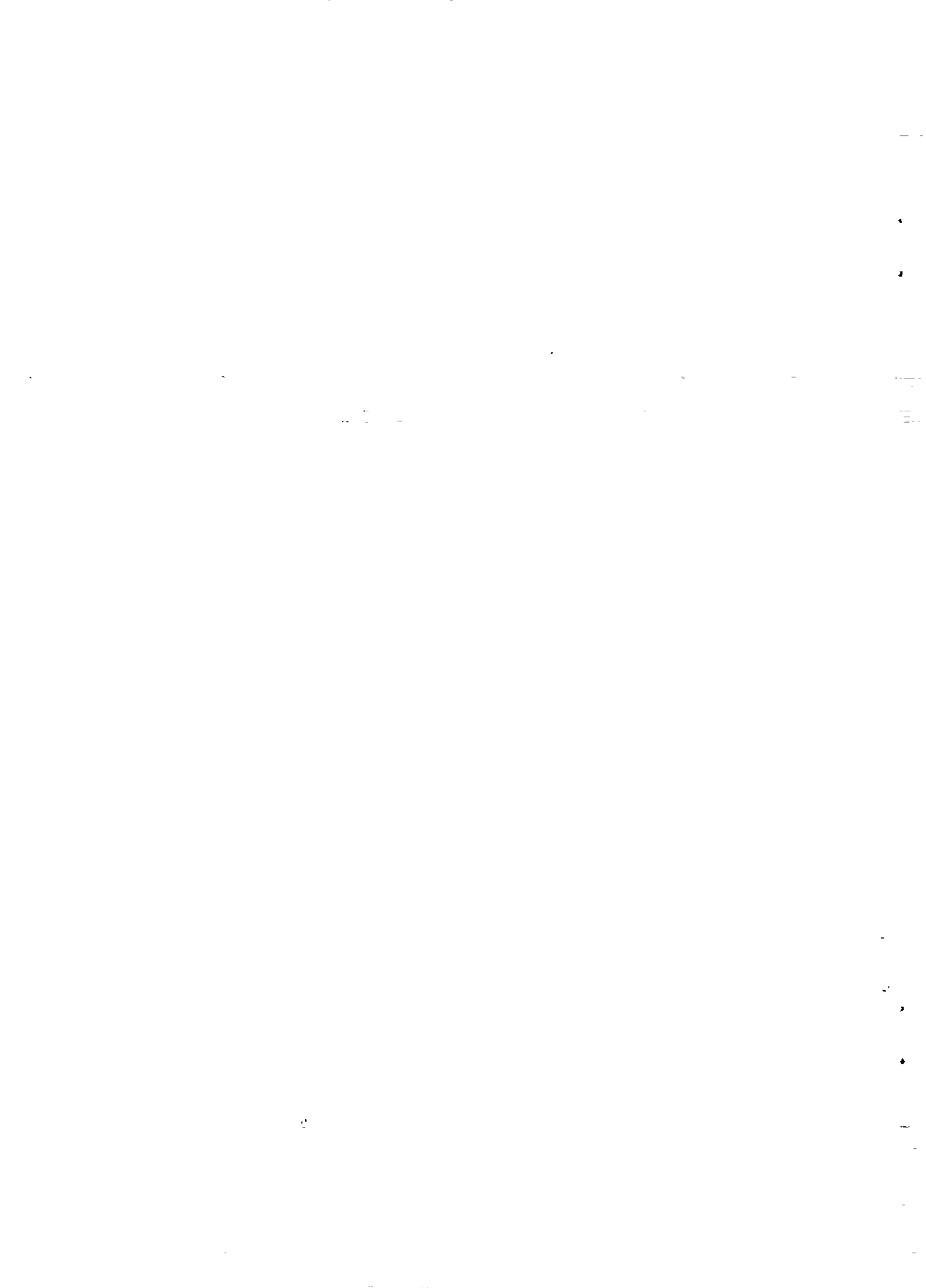


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FOREWORD

This is a paper prepared by Tampere University of Technology, Institute of Water and Environmental Engineering (TUT/IWEE), Finland. This baseline study is based exclusively on the literature and documentation review, and on informal discussions with the professionals in the environmental sector in India. The study will be available only in English.

The paper has been written particularly for the development of the cooperation between India and Finland in the sector. The views and interpretations are those of the author, and should not be attributed to Tampere University of Technology or to any of its departments or institutes, or to any individual acting on their behalf. Finally, the author wish to express his gratitude to the colleagues both in India and in Finland, whose help and comments have greatly improved this paper.

Tampere, 15 October 1992

Jarmo Hukka
MScTech., Senior Researcher

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ABBREVIATIONS AND ACRONYMS

ADB	—	Asian Development Bank
AIIH&PH	—	All Indian Institute of Hygiene & Public Health
A&N	—	Andaman & Nicobar
AP	—	Andhra Pradesh
AUD	—	Australian dollar (1 AUD = 19.37 INR, 17 April 1992)
BOD	—	Biological Oxygen Demand
CAD	—	Canadian dollar (1 CAD = 21.34 INR, 17 April 1992)
Cal	—	calorie
CCEA	—	Cabinet Committee on Economic Affairs
CCU	—	Civil Construction Unit
CESE	—	Centre for Science and Environment
CETP	—	Common Effluent Treatment Plant
CFC	—	Chlorofluorocarbon
CG	—	Central Government
CGA	—	Central Ganga Authority
CGB	—	Central Groundwater Board
CIDA	—	Canadian International Development Agency
c.i.f.	—	cost, insurance, freight
CIFRI	—	Central Inland Fisheries Research Institute
CIP	—	Commodity Import Program
CIS	—	Commonwealth of Independent States
CITES	—	Convention on International Trade in Endangered Species
CP	—	Country Programme
CPCB	—	Central Pollution Control Board
CSSRI	—	Central Soil Salinity Research Institute
CWC	—	Central Water Commission
DAC	—	Development Assistance Committee
DANIDA	—	Danish International Development Agency
DEM	—	German mark (1 DEM = 15.16 INR, 17 April 1992)
DKK	—	Danish krone (1 DKK = 3.92 INR, 17 April 1992)
DO	—	Dissolved Oxygen
EAC	—	Environmental Appraisal Committee
EEC	—	European Economic Community
EIA	—	Environmental Impact Assessment
EIS	—	Environmental Impact Statement
EMP	—	Environmental Management Plan
ENVIS	—	Environmental Information System
EPA	—	Environment Protection Act
EST	—	Environmentally Positive Services and Technology
ETP	—	Effluent Treatment Plant
FAO	—	Food and Agricultural Organization
FICCI	—	Federation of Indian Chambers of Commerce & Industry
FIM	—	Finnish mark (1 FIM = 5.56 INR, 17 April 1992)

FINNIDA	—	Finnish International Development Agency
FRI	—	Forest Research Institute
FSI	—	Forest Survey of India
G	—	giga (10 ⁹)
GAP	—	Ganga Action Plan
GBP	—	British pound (1 GBP = 44.23 INR, 17 April 1992)
GDP	—	Gross Domestic Product
GEMS	—	Global Environmental Monitoring System
GNP	—	Gross National Product
GOG	—	Government of Germany
GOI	—	Government of India
GPD	—	Ganga Project Directorate
ha	—	hectare (10 ⁴ m ²)
HEAL	—	Human Exposure Assessment Location
HP	—	Himachal Pradesh
HRD	—	Human Resources Development
IARI	—	Indian Agricultural Research Institute
IBRD	—	International Bank for Reconstruction and Development
IC	—	International Cooperation
ICB	—	Indian Commerce Bank
ICFRE	—	Indian Council of Forestry Research and Education
ICICI	—	Industrial Credit and Investment Corporation India
ICIMOD	—	International Centre for Integrated Mountain Development
ICMR	—	Indian Council of Medical Research
IDA	—	International Development Association
IDBI	—	Industrial Development Bank of India
i.e.	—	that is
IFCI	—	Industrial Finance Corporation of India
IFFCO	—	Indian Farmers Fertilizer Cooperative
IIFM	—	Indian Institute of Forest Management
IIT	—	Indian Institute of Technology
IMF	—	International Monetary Fund
IMWG	—	Inter-Ministerial Working Group
INR	—	Indian rupee (= 100 paise, 1 USD = 25.17 INR, 17 April 1992)
IPCC	—	Intergovernmental Panel on Climate Change
IREDA	—	Indian Renewable Energy Development Agency
ITRC	—	Industrial Toxicology Research Centre
IUCN	—	International Union for Conservation of Nature and Natural Resources
IWEE	—	Institute of Water and Environmental Engineering
JICA	—	Japanese International Cooperation Agency
JPY	—	yen (1 JPY = 0.19 INR, 17 April 1992)
JS(P&IC)	—	Joint Secretary (Planning & International Cooperation)
JWC	—	Joint Working Committee
km	—	kilometre
KTM	—	Ministry of Trade and Industry, Finland

lpd	—	litres per day
m	—	metre
mm	—	millimetre (10 ⁻³ m)
M	—	million (10 ⁶)
MINARS	—	Monitoring of Indian National Aquatic Resources
Mld	—	million litres per day
MOEF	—	Ministry of Environment & Forests
MOI	—	Ministry of Industry
MOU	—	Memorandum of Understanding
MOWR	—	Ministry of Water Resources
MOST	—	Ministry of Surface Transport
MP	—	Madhya Pradesh
MWR	—	Ministry of Water Resources
NAAQMP	—	National Ambient Air Quality Monitoring Programme
NCERT	—	National Council for Educational Research and Training
NDDB	—	National Dairy Development Board
NDF	—	Nordic Development Fund
NEERI	—	National Environmental Engineering Research Institute
NEFCO	—	Nordic Environment Finance Corporation
NFDMC	—	National Forest Data Management Centre
NFP	—	National Focal Point
NGO	—	Non governmental organisation
NIB	—	Nordic Investment Bank
NLG	—	Guilder (1 NLG = 13.47 INR, 17 April 1992)
NLUPO	—	National Land Use and Policy Outline
NLWC	—	National Land Use and Wastelands Development Council
NMNH	—	National Museum of Natural History
NNRMS	—	National Natural Resources Management System
NOK	—	Norwegian krone (1 NOK = 3.88 INR, 17 April 1992)
NOPEF	—	Nordic Project Fund
NORAD	—	Norwegian Agency for International Development
NPC	—	National Productivity Council
NRAP	—	National River Action Plan
NRSA	—	National Remote Sensing Agency
NWDB	—	National Wasteland Development Board
NWP	—	National Water Policy
OECD	—	Organization for Economic Co-operation and Development
OECF	—	Overseas Economic Cooperation Fund
ODA	—	Overseas Development Agency
PACT	—	Program for Advancement of Commercial Technology
PCB	—	Pollution Control Board
PCP	—	Penta Chloro Phenol
PIB	—	Public Investment Board
PPP	—	purchasing power parity
PU	—	polyurethane

R&D	—	Research & Development
RSD	—	Regional Service Centre
RWGS	—	Regional Water and Sanitation Group
SACEP	—	South Asia Cooperative Environment Programme
SAARC	—	South Asian Association of Regional Cooperation
SEK	—	Swedish krona (1 SEK = 4.2 INR, 17 April 1992)
SIDA	—	Swedish International Development Authority
SIDO	—	Small Industries Development Organization
SLUB	—	State Land Use Board
SP	—	Science Park
SPCB	—	State Pollution Control Board
SSI	—	Small Scale Industry
STP	—	Sewage Treatment Plant
T	—	tera (10^{12})
TA	—	Technical Assistance
TEST	—	Trade in Environmental Services and Technologies
TUT	—	Tampere University of Technology
TDIC	—	Technology Development and Information Company Ltd.
UASB	—	Upflow Anaerobic Sludge Blanket
UK	—	United Kingdom
UKP	—	Pound sterling (1 UKP = 45.9031 INR, 30 November 1991)
UNDP	—	United Nations Development Programme
UNEP	—	United Nations Environment Programme
UP	—	Uttar Pradesh
US	—	United States of America (USA)
USAID	—	United States Agency for International Development
USD	—	United States dollar
UT	—	Union Territories
WAB	—	Wildlife Advisory Board
WB	—	World Bank
w.e.f.	—	with effect from
WHO	—	World Health Organization
WMO	—	World Meteorological Organization
ZSI	—	Zoological Survey of India

GLOSSARY

ad hoc	—	not prearranged
ad valorem	—	in proportion of to the estimated value of the goods
crore	—	$10^7 = 10$ million
lakh	—	$10^5 = 0.1$ million
padyatras	—	marches
Panchayati Raj	—	representative body of elected village leaders
village panchayats	—	village councils

EXECUTIVE SUMMARY

Economic Outlook

Agriculture dominates the economy of India accounting for over 60 percent of employment. The industrial growth has not been rapid enough to give employment opportunities for the population of about 850 million in 1990. The population growth is about two percent per year. The gradual evolution of India's economic policies having focus on greater efficiency, productivity and competitiveness has resulted an average 5.8 percent GNP growth during the Seventh Five Year Plan (1985/86-1989/90). Yet, the public sector current spending has exceeded the revenues in spite of the efforts to raise revenue, and the deficit has been on an average 10.1 percent of GDP in 1985-90. The trade balance has recorded deficits averaging USD 8100 million a year during the same period. The total debt stock was USD 63000 million in March 1990. The balance of payments, large budget deficits, and the high inflation rate have been putting a very high pressure on the Indian economy over the past few years.

The current foreign investment policy is trying to encourage the participation of foreign companies in the industrial development, especially in high and sophisticated technologies and in production for substantial export. Although there have been several procedural simplifications in recent years, there still exist obstacles in practice. Therefore the outlook of both the economy and the new industrial policy is not quite favourable for foreign investors.

Environmental Problems

The estimates of degraded lands are varying from about 20 percent to around 60 percent. The annual soil loss is estimated to be about 5300 tons. The actual forest cover was estimated to be about 20 percent of the area in mid-1980s, and about 10 percent of this forest area is degraded. The per capita forest area is only about 0.1 ha, whereas the world average is about 1.0 ha. The annual rate of deforestation has come down from 1.3 Mha in the 1970s to 0.05 Mha in the 1980s. The depletion of forests has seriously affected the biomass based economy of the poor, and created water scarcity and droughts in some areas. It has also increased floods in some regions.

Lands classified as permanent pastures constitute some of the most degraded lands in the country. These lands, mostly under the control of the village panchayats (village councils), are so small that despite of all laws and restrictions domestic animals continue to graze in revenue and forest lands and on private fallow lands. The protected wildlife habitats presenting three percent of country's total area are facing considerable human pressure and threats from development projects.

It is estimated that by the year 2025 almost all the total utilisable water resources (about 1.0 Tm³) will be in use for irrigation (0.86 Tm³) and for the urban-domestic sector (0.11 Tm³). The 1985 level of groundwater abstraction was about 50 percent of the utilisable aquifers. A strict control for further exploitation was needed for 12 percent of the groundwater aquifers in 1986. The groundwater

resources are also becoming increasingly polluted. Most of the available surface water is also polluted in India. The domestic waste presents nearly 80 percent of the pollution load. Out of India's 3245 towns and cities only 21 have partial or full sewerage and sewage treatment facilities. Less than 5 percent of the total wastewater generated (1.3 Mm³/d) in Class II towns (241) is collected and only about 2 percent is treated.

By the year 2000 India will have nearly 350 million people (32 percent of the population) living in urban settlements, and by the year 2020 about 685 million (50 percent of the population). The urban growth combined with the limited resources of civic authorities are causing serious environmental problems in urban areas — water scarcity and pollution, transport congestion, air pollution, unhygienic living environment due to lack of sanitation and shortage of housing. The industry is also polluting heavily the environment in many urban areas.

The problems causing environmental degradation in India are the highly sectoral and centralised planning of natural resources development and management, and the inappropriate knowledge and educational base in the country. Although the Ministry of Environment & Forests (MOEF) has taken steps towards planning of activities in fragile ecosystems and to control development projects, the implementation of environmental impact assessments (EIA) has been slow. The reasons are mainly the lack of an accurate data base at micro level, and scientific and technical expertise to prepare impact assessment as well as management plans. In number of cases the conditions laid down in the clearances have not been complied with. Additionally the procedure of the EIAs is such that there is no provision to ensure the involvement of the local population affected by development projects.

At the macro level the environmental policy of the Government of India (GOI) is fairly well-established, but at the implementation level the policy presents numerous obstacles and does not offer enough incentives for the private sector. In addition high transactions costs obstruct the access to services and technology. One factor hampering progress on reforming high transaction costs is the shortage of foreign exchange necessary for importing. This shortage especially hampers would-be importers of "non-essential" goods and services — a category in which eco-technologies, such as productivity-enhancing biotechnologies, pollution abatement and energy efficient production processes, currently belong.

Some universities have now introduced environmental education at graduate and postgraduate levels. Jawaharlal Nehru University started the first postgraduate degree in its School of Environmental Sciences in New Delhi. The Wildlife Institute of India has also developed graduate and postgraduate courses in wildlife management. There are no areas in which systematic professional training in environmental management is given except in public health engineering.

Institutional Capacities, Policies and Legislation

India is a federal country, where the central and state governments own, control and develop almost all the country's forests, ports, roads, mines and a large portion of its industrial structure. The government is increasingly aware of the environmental problems, and several new laws have been

introduced and older ones revised in recent years. Currently India has a fairly well developed institutional framework for environmental management. Yet, this infrastructure is centralised and bureaucratic. Even the lowest level — the Panchayati Raj institutions, which are meant to enable local participation in developmental projects, are too big to be effective in environmental management at village level. Intersectoral coordination is almost non-existent, because the role of the Ministry of Environment & Forests and related ministries at state level has been more to safeguard or to police the environment. The development of resources has usually been the responsibility of other ministries.

In 1976, when the Indian Constitution was amended for the 42nd time, the lawmakers incorporated several environmental provisions for the first time. The Constitution charges now the state as well as citizens with the duty to protect and improve the environment. The legislation is divided into three lists for environmental protection: State; Central; and Concurrent. Yet, the parliament always has unlimited power under which it can make any law, even if it is covered under the State list. Hence, the matters related to controlling of environmental degradation will be legislated from the parliament.

India does not have an explicit national environmental policy. Instead, most natural resources and their management are governed by separate national policies each administered by different ministries and departments.

The objective of the National Land Use and Policy Outline (NLUPO) is to meet the needs of the growing population by increasing productivity, to prevent any further deterioration of the land resource through appropriate preventive measures, and to restore the productivity of the degraded lands through an appropriate package of policies.

The Industrial Policy Statement of 1980 recognized the need to preserve ecological balance and improve living conditions in urban centres. The basic criteria for the proper siting of industry have been formulated by the government based on it.

The objectives of the Forest Policy in 1988 include environmental stability, conservation of genetic resources, afforestation of barren lands, meeting the requirements of fuelwood, fodder, minor forest products and small timber of the rural, especially of the tribal population, and increasing the productivity of forests to meet essential needs.

The National Water Policy in 1987 has fixed the following priorities for the allocation of available water: (a) drinking water; (b) irrigation; (c) hydropower; (d) navigation; and (e) industrial and other uses. The policy also lists measures to be introduced for the development of water resources in an environmentally sound manner, with due regard to conservation, efficient use, recycling, and optimum use of groundwater.

There are today more than 200 central and state laws that can be interpreted to protect the environment. The legislation including environmental conservation objectives has brought into effect after 1972: the Wildlife (Protection) Act, 1972; the Water (Prevention and Control of Pollution) Act, 1974; the Forest Conservation Act of 1980; the Air (Prevention and Control of

Pollution) Act of 1981; and the Environment (Protection) Act of 1986.

Management of Environment

In the 1980s the government paid attention to the incorporation of environmental concerns in the planning of major development activities. Environmental Impact Assessment (EIA) procedures are now applied to the following categories of projects:

- i) All major development projects in the public sector before final clearances; and
- ii) A list of 22 types of hazardous industries as identified by the Ministry of Environment before licensing or registration.

A set of rules has been prepared to regulate the handling of hazardous chemicals, hazardous micro-organisms/genetically engineered organisms and wastes. National and Zonal Task Forces have been constituted for the implementation of standards in the industries like fertilizer, iron and steel, thermal power plants, cement, pulp and paper and oil refineries. These Task Forces interact with the concerned industry representatives and the State Pollution Control Boards (SPCBs), inspect pollution control systems installed at source, and monitor the progress of implementation of standards.

On 31 December 1990 the number of cases filed by the Pollution Control Board under the Water Act and Air Act was 4429. Out of these, 1408 cases have been decided, 2880 are pending and 141 were dismissed. In 325 cases, convictions were obtained and in 229 cases, court passed restraint orders. Action against more than 110 polluting industries identified under the Ganga Action Plan (GAP) has been initiated under the Environment (Protection) Act, 1986. These include 31 industries discharging their effluents directly into the river Ganga.

A draft policy statement for abatement of pollution has been prepared in consultation with the sectoral ministries, state governments, major industrial associations and some non-governmental organisations. The consensus is that the focus should be on prevention of pollution through the adoption of low or non-waste technology. Small scale industries have been identified as priority areas.

The Central Pollution Control Board (CPCB) is conducting studies on major river basins to assess the impact of pollution causing activities in these basins.

The MOEF has asked the Ministry of Industry to issue instructions to all the vehicle manufacturers to make necessary changes in the design of vehicles for compliance of prescribed standards.

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

The Central Ganga Authority (CGA) was constituted in February 1985 to guide and oversee the implementation of a programme to restore the quality of the river Ganga. The main objectives of the Ganga Action Plan is to improve the river water quality of the river Ganga by reducing the pollution load on the river and by establishing self-sustaining sewage treatment plant systems. Firstly, out of the nearly 1400 million litres per day (Mld) of sewage generated in 25 Class-I towns along the river, 870 Mld is proposed to be intercepted, diverted and treated. By March 1991, 370 Mld of waste water has been diverted. The achievements of the Ganga Action Plan would be considered, when the National River Action Plan (NRAP) is formulated, wherein some of the major rivers of the country are included.

The national research institutes and universities are implementing under the Ganga Action Plan ten research projects on water quality monitoring, modelling, pollution monitoring, resource recovery from sewage, eco-restoration and productivity improvement, and impact assessment of GAP schemes.

The National Natural Resource Management System (NNRMS) involves utilisation of remote sensing technology for accurate inventory of resources such as land, water, forests, minerals, oceans etc., and to utilise this information for monitoring changes in ecological systems.

The energy consumption in India is high because of the low price of energy, obsolete technologies, and protected markets causing inefficient energy utilization. Although the Seventh Five Year Plan (1985/86-89/90) identified energy conservation including inter-fuel substitution as one of the main elements of the future energy strategy, there has been no separate budget allocation for energy conservation. There have neither been programmes nor projects for conservation.

There are several incentives for environment protection: generation of energy from non conventional services; for renewable energy development; for modernising all types of industries; for financing effluent treatment facilities of distilleries; for controlling pollution in villages and the small scale sector; and direct tax exemptions for pollution control purposes and for conservation of natural resources.

Cooperation with External Support Agencies

The main sources of external assistance in the forestry and environment sector are the World Bank, SIDA, the Netherlands, ODA, Japan, USAID, CIDA, DANIDA, UNDP, Germany, ADB, Australia, and EEC. In addition, the Ministry has Memorandum of Understanding or Protocol for cooperation in the environment sector with countries like New Zealand, CIS, and France.

The gross disbursement of all the external assistance increased from INR 2162 crores in 1980-81 to INR 5802 crores in 1989-90. The composition of external assistance shows that roughly 60 percent is multilateral aid and 40 percent is bilateral aid. The share of the external assistance of the Union Government expenditure (Civil) was about 12 percent in 1988-89.

The external assistance in the environment and forestry sector has been mainly for the Wasteland Development Board (NWDB) and for the Ganga Action Plan (GAP). Discussions have been initiated with various countries for assistance in the environment sector and a large number of projects are in progress for implementation. The cooperation activities regarding afforestation programmes and Ganga Action Plan are being independently dealt with in NWDB and in the Ganga Project Directorate (GPD) respectively.

The proposed Trade in Environmental Services and Technologies (TEST) programme under USAID will target specific policies affecting both environmental and transactional costs in order to improve private sector incentives and access to environmental services and technology. The proposed World Bank project on industrial pollution control has the specific goals:

- 1) to promote effective enforcement of existing legislation on environmental production regarding industrial sources;
- 2) to support efforts by industry to comply with existing environmental regulations, including a special effort designed to reach the small scale sector through the setting up of common treatment facilities;
- 3) to support assessments and research in pollution abatement in industry as well as the preparation of environmental studies for location of future industrial sites.

The Nordic involvement in this project has also been proposed. It can basically take place within all the project components: Institution Building; Investment; and Technical Assistance.

Action Framework for Finnish Cooperation Activities

The recommendations for the possible cooperation in environmental sector between Finland and India are as follows:

Overall Strategy

The strategy at this stage should have focus on feasibility studies and on the preparation on more detailed project documents in collaboration with the relevant Indian authorities.

It is also recommended that Finnish International Development Agency (FINNIDA) would consider including India as a target country in environment sector after mid-1990s, especially starting with R&D activities in forestry, urban and industrial development and agriculture.

A. Urban Environment

A1. Water supply and sanitation

Problems: Only 21 towns and cities out of 3245 have partial or full sewerage and sewage treatment facilities.

38 % of urban population has access to sanitation services.

79 % of urban population has access to water services.

Rapid urbanization: population size 240 millions in 1990 and 685 millions in 2020.

Lack of finance.

Activity: Preparation of a feasibility report on the management options for urban water supply and sanitation.

Output: Options for the development and management of urban water and sanitation services (Private institutions. Municipality-owned institutions. Government-owned institutions. Built-Operate-Transfer. Built-Operate-Own.) including economic, financial, technical, social and environmental aspects.

B. Strengthening of R&D capacities

B1. Environmental engineering and environmentally sound production technology

Problems: There are requirements for both low- and high tech, e.g. urban sanitation coverage is low and needs at least partially low-cost solutions. There is a need for high tech solutions for industrial pollution control, but especially for small scale industry also low tech options can be developed. In addition to end-of-the-pipe technologies also clean production, recycling and reuse technologies has to be developed.

Activity: Preparation of a feasibility report on the establishment of R&D cooperation between the appropriate institutions. This could be implemented in cooperation with the preparation of a feasibility report on establishment of a Science Park.

Output: A feasibility report on the cooperation possibilities in R&D in environmental engineering and environmentally sound production technology development.

B2. Science Park

Activity: Preparation of a feasibility report on the establishment of a Science Park in the field of environmental engineering and environmentally sound production technology (e.g. in forestry, agroindustry, energy, small scale industry like paper and pulp).

Output: A feasibility report on the possibilities for the establishment of the Science Park in India including the options for collaborative parties including the private sector entrepreneurs. The prospects for joint ventures with the assistance of the Park.

C. Commercial Export of Environmentally Positive Services and Technologies

Without the financial support from external sources it is difficult to export environmentally positive services and technologies due to the current economic situation and existing importation policy in India. To support the export activities and simultaneously the World Bank project in industrial pollution control, the Government of Finland should consider the following activities related to project components:

Enforcement Component: Training programme in technical and managerial skills

Activity: Provide the personnel of the State and Pollution Control Board with scholarships to participate in the training courses in water and environmental management in Finland. Other options are to accommodate the personnel in other available courses or to organise tailor-made courses jointly in India.

Technical Assistance Component: R&D, Feasibility studies, Studies for location of future industrial sites.

Activity: Finance for e.g., B1 and B2.

The activities related to other subcomponents and Investment Component could be financed through the appropriate institutions e.g., Finnfund, NDF, NIB, NEFCO, and NOPEF.

1. INTRODUCTION

The objective of this report was to identify and assess the possible cooperation in the field of environmental management between Finland and India. The focus is especially on technology transfer between these two countries. In order to accomplish this objective, a field mission to India was done by Mr Jarmo J. Hukka, MScCivEng., Institute of Water and Environmental Engineering, Tampere University of Technology from 25 November 1991 through 14 December 1991. The field mission programme was as follows (New Delhi, if not stated otherwise):

27.11	Embassy of Finland	Dr M. Ramadhyani Commercial Adviser
	Swedish Embassy Office of Science and Technology	Mr Tommy Ahlenbäck Counsellor for Science and Technology
2.12	Swedish Embassy	NOPEF (Nordic Project Fund) Business Tour: Nordic Environmental Technology
3.12	Federation of Indian Chambers of Commerce & Industry	NOPEF (Nordic Project Fund) Business Tour: Nordic Environmental Technology
4.12	Royal Danish Embassy Danida	Mr Bent Dahl-Olsen Counsellor
5.12	Central Pulp & Paper Research Institute, Saharanpur, Uttar Pradesh	Dr Rajesh Pant Director Dr Ing Abanish Panda National Consultant, UNDP Mr Shahidul Islam
9.12	Ministry of Environment & Forests	Mr B.S. Parsheera Director, International Cooperation
	Royal Norwegian Embassy	Mr Anders Tunold Programme Officer
	Swedish Embassy Development Cooperation Office (SIDA)	Mr Per Björkman First Secretary, Forestry and Environment Ms Eva Berger-Smitt First Secretary

Ministry of Environment & Forests
Central Pollution Control Board

Dr K.R. Raganathan
Member Secretary

- | | | |
|-------|--|--|
| 10.12 | UNDP/World Bank Water and Sanitation Program
Regional Water and Sanitation Group —
South Asia (RWSG) | Mr L. Panneer Selvam
Environmental Engineer
Mr V.R. Iyer
Consultant |
| 11.12 | Ministry of Environment & Forests
Ganga Project Directorate | Mr J.P. Gupta
Director |
| 12.12 | UNDP/World Bank Water and Sanitation Program
Regional Water and Sanitation Group —
South Asia (RWGS) | Mr Tauno K. Skyttä
Manager
Mr Digby Davies
HRD Specialist |

2. COUNTRY BACKGROUND

2.1 Economic Situation

Policy adjustments and recent developments

India is the seventh largest country in area and, with a population of about 850 million in 1990, the second most populous in the world. It is also among the poorest of nations, with an average per capita income of about USD 340 in 1988. Agriculture dominates the economy giving employment for over 60 percent of the population. The large population, which is growing about two percent annually, has put increasing pressure on natural resources and caused significant environmental degradation. Industrial growth, although increasing recently, has not been rapid enough to absorb the labour force and to bring higher per capita income levels (World Bank 1990b).

Overall GDP growth was low through the mid-1970s, averaging only about 3.5 percent annually (1.4 percent per capita). This was not sufficient to have a significant impact on reducing poverty, and by the mid-1970s almost half of India's population still lived below the poverty line. The low growth, in spite of high levels of saving and investment, indicated inefficiency in the allocation and use of resources. The effort to develop indigenous production and technology through heavy protection and state intervention widened the gap between India's and other nations' efficiency levels and technological capabilities.

According to the World Bank (1990b) the policy since the late 1970s has gradually evolved to focus more on achieving greater efficiency, productivity and competitiveness in the economy. The efficiency and willingness to experiment with new institutional structures based on private decision making is replacing the reliance on massive capital formation to achieve economic growth. The important changes in the economic policy framework were an relieving of industrial licensing requirements, an acceleration of trade liberalisation, and a promotion of exports through flexible management of the exchange rate. An increasing emphasis is given to human capital formation and direct interventions to boost the incomes of the poor.

The changes in India's economic policies have strengthened the key aspects of performance. The GDP growth during the Seventh Plan period (1985/86-1989/90) averaged 5.8 percent. This growth was sustained even without higher inflation. The wholesale price index rose by an annual average of 6.4 percent during 1985-90, compared to 9.4 percent a year in 1980-85. Management of food reserves and imports to ensure ample availability of basic commodities combined with continued import liberalisation and the reform of indirect taxes were the key factors limiting inflation. It is estimated that the growth of GDP in real terms during 1990-91 was about 5 percent (GOI 1991b). The annual inflation rate was 11.6 percent in 1990-91 (Consumer Price Index for Industrial Workers).

The overall industrial production increased at an average rate of 8.5 percent during the Seventh

Five Year Plan (1985/86-89/90). The industrial production in 1990-91 is estimated to increase 8.4 percent. The annual average growth in agricultural production was 4.1 percent during the Seventh Five Year Plan.

Despite an impressive revenue raising effort, the government (centre and states) current spending has exceeded revenues. The government being earlier a net saver is now a dissaver, and its overall deficit has risen from about 5 percent of GDP at the end of the 1970s to an average of 10.1 percent of GDP in 1985-90. The burden of expenditure constraint has fallen on capital expenditures, which fell from 8.2 percent of GDP in 1986/87 to 6.3 percent in 1989/90. The considerable risk is that public sector deficits will increase the prices and destabilise the balance of payments.

Export performance has been very good during the Seventh Plan. Merchandise exports have grown (in real terms) by over 10 percent a year since 1986/87. Yet, investment demand, rapidly increasing government consumption and defence expenditures combined created excess demand that spilled over into the trade account. During the period 1985-90 India's merchandise trade balance recorded deficits averaging USD 8100 million a year.

The large current account deficits in recent years have resulted a rapid accumulation of external debt. Total medium- and long-term debt (including private nonguaranteed debt) rose from USD 26600 million in March 1985 to an estimated USD 57300 million in March 1990. Including short-term debt and obligations to the IMF, the total debt stock in March 1990 was USD 63000 million. The government has affirmed its commitment to reduce the fiscal deficit and to promote exports. The central government budget for 1990/91 envisages a significant reduction of the fiscal deficit (from 8.4 percent to 7.0 percent of GDP) during 1990/91. This will be based on additional revenues (0.5 percent of GDP), and restraint of current expenditures (0.4 percent of GDP, including an absolute reduction in subsidy outlays) and capital spending (0.5 percent of GDP).

The economy is going through a very difficult stage due to continued pressures on balance of payments, large budget deficits and high inflation. Due to the shortage of foreign exchange, the GOI had to impose certain restrictions on imports of capital goods, raw materials and components to the industry.

External assistance

External assistance is the most important component of external capital flows. Gross disbursement of external assistance rose from INR 2162 crores in 1980-81 to INR 5802 crores in 1989-90. The annual average growth rate was 17.4 percent. The composition of external assistance shows that roughly 60 percent is multilateral aid and 40 percent is bilateral aid. The share of the external assistance of the Union Government expenditure (civil) was about 12 percent in 1988-89.

Foreign Investment

Foreign investment in India has had only a minor role as a source of external finance. In recent years there has been a greater emphasis to increase the technology transfer from abroad and more equity participation by foreign companies. Under the existing policy foreign investments are generally welcome in high and sophisticated technologies and in production creating substantial export. During 1985-90 more than 5000 foreign collaborations were approved (GOI 1991b).

The disincentive for foreign and domestic private companies investing in India is the great bureaucracy at the central government and state level (Finnfund 1990). A number of procedural simplifications have been introduced in recent years. These include e.g., industrial licensing, procedures for collaboration approvals, appointment of directors and technicians, visa requirements, custom procedures and repatriation of funds. Yet, there are some essential obstacles. Raha (1991) assessed the reforms in the new industrial policy as follows:

“A primary objective of the new policy is claimed to be to attract foreign investment. Intentionally or otherwise, the arithmetic will have a limiting influence on the type of industry which can actually invest. Assuming a normal 2:1 debt-to-equity ratio and a foreign equity holding of 51 percent, the extent of imported capital equipment thus permitted is only 17 percent of the total project cost. Compare this with the 30 percent of capital goods normally needed for high-technology areas, and it is clear that the advantage of this new regime can flow only to relatively low-technology areas.

A second obstacle is the continuing obstruction in India to reasonable protection of intellectual property, namely enforceable patent rights. Any debate on this issue has tended to be sidetracked into socialistic philosophy, often a cover for the industrial lobby. As a consequence, it has failed to address the market truth that corporations will not risk the fruits of expensive research to wanton piracy.

Associated discrimination exists in areas like the policy on seeds, where foreign companies are forced to go through a process of certification which takes several years and testing, which in effect means licensing is under the control of the government.”

2.2 Demographic, Socioeconomic and Sociocultural Profile

Basic facts and development indicators

Tables 2.21, 2.22, 2.23 and 2.24 show some basic facts and development indicators about India.

Table 2.21 Basic facts about India (CESE 1991).

Area (1991, Mha)	328.73
Population	
Population (1991, M)	843.93
Population increase (1981-91, %)	23.49
Population density (1991, persons/ha)	2.57
Urban settlements	
Urban population (1981, M)	159.73
Urban population as of total population (1981, %)	23.38
Urban population in class 1 cities (1981)	94.29
% of total population in class 1 cities (1981)	13.80
Urban population in class 1 cities (1991)	138.49
% of total population in class 1 cities (1991)	16.41
No of class 1 cities (1981)	216
No of class 1 cities (1991)	296
Rural settlements	
No of villages (1981)	557137
Average no of persons/village (1981)	943
Quality of life	
Literacy	
% of total population (above 7 years) literate (1991)	52.11
% of male population (above 7 years) literate (1991)	63.86
% of female population (above 7 years) literate (1991)	39.42
Health	
Infant mortality (1988, deaths/1000 live births)	94
Life expectancy (1979-80, years)	54.4
No. of hospital beds per 1000 population (1987)	0.91
Drinking Water	
Problem villages (end 1984-5)	161722
Problem villages (end 1988-89)	20866
% of total villages	3.75
Income	
% of population below poverty line (1987-88)	29.2
Forests	
Notified forest area (Mha)	75.18
% of total area	22.8
Actual forest cover (1985-87, Mha)	64.01
of which dense forest cover (1985-87, Mha)	37.85
Open forest cover (1985-87, Mha)	25.74
Actual forest cover (1981-83, Mha)	64.20
Difference in forest cover (1985-87 to 1981-83, Mha)	-0.19

Table 2.22 Development indicators (WB 1990a).

Basic indicators

Population (millions, mid-1988)	815.6
Area (thousands of square kilometres)	3288
GNP per capita (USD, 1988)	340
GNP per capita (average annual growth rate %, 1965-88)	1.8
Average annual rate of inflation (% , 1965-80)	7.5
Average annual rate of inflation (% , 1980-88)	7.4
Life expectancy at birth (years, 1988)	58
Adult illiteracy (% , female, 1985)	71
Adult illiteracy (% , total, 1985)	57

Population growth and projections

Average annual growth of population (%)	
1965-80	2.3
1980-88	2.2
1988-2000	1.8
Population (millions)	
1988	816
2000	1007
2025	1350
Hypothetical size of stationary population (millions)	1862
Age structure of population (%)	
0-14 years (1988)	37.2
0-14 years (2025)	24.0
15-64 years (1988)	58.4
15-64 years (2025)	67.3

Table 2.23 How much poverty is there in the developing countries? The situation in 1985 (WB 1990a).

Region	Extremely poor			Poor (including extremely poor)			Social Indicators		
	Number (millions)	Headcount index (percent)	Poverty gap	Number (millions)	Headcount index (percent)	Poverty gap	Under 5 mortality (per thousand)	Life Expectancy (years)	Net primary enrollment rate (percent)
Sub-Saharan Africa	120	30	4	180	47	11	198	50	56
East Asia	120	9	0.4	280	20	1	96	67	96
China	80	8	1	210	20	3	58	69	93
South Asia	300	29	3	520	51	10	172	56	74
India	250	33	4	420	55	12	199	57	81
Eastern Europe	3	4	0.2	6	8	0.5	23	71	90
Middle East and North Africa	40	21	1	60	31	2	148	61	75
Latin America and the Caribbean	50	12	1	70	19	1	75	66	92
All developing countries	633	18	1	1116	33	3	121	62	83

Source World Bank 1990a

Note. The poverty line in 1985 PPP dollars is USD 275 per capita a year for the extremely poor and USD 370 per capita a year for the poor.

The headcount index is defined as the percentage of the population below the poverty line. The 95 percent confidence intervals around the point estimates for the headcount indices are Sub-Saharan Africa, 19, 76; East Asia, 21, 22; South Asia, 50, 53; Eastern Europe, 7, 10; Middle East and North Africa, 13, 51; Latin America and the Caribbean, 14, 30; and all developing countries, 28, 39.

The poverty gap is defined as the aggregate income shortfall of the poor as a percentage of aggregate consumption. Under 5 mortality rates are for 1980-85, except for China and South Asia, where the period is 1975-80.

Table 2.24 Levels of water supply and sanitation service in India, 1988 (Population in millions, WHO 1990) .

Population			Population with services					
			Drinking water			Sanitation		
Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural
818	221	597	610	174	436	104	83	21
			(75%)	(79%)	(73%)	(13%)	(38%)	(3.5%)

Land use

India has an extraordinary diversity of ecosystems. Within its border e.g., there is the hot desert of Rajasthan as well as the cold desert of Ladakh; areas with extremely low rainfall, where it rains usually less than 200 mm per annum and some of the highest rainfall regions of the world, situated in the Northeast and Kerala; and the subtemperate and temperate high mountains of Himalaya, and the tropical high mountains of Palni and Nilgiri in Tamil Nadu. There are also the Indo-Gangetic plains, whose potential productivity is possibly unmatched in the world (CESE 1991).

India has a total geographical area of 329 million hectares (Mha). The land use statistics are available for roughly 93 percent (304 Mha) of this area (Table 2.25). Land has been categorised within a nine-fold land use classification system. In 1984-85 there was about 13 percent of the land area under rocks, glaciers and urban and rural settlements. The remaining 87 percent of the land generates biomass in the form of crops, grasses and trees — 22 percent is under forests, 46 percent is under crops, 8 percent lies fallow and the remaining 10 percent includes pastures, plantations and groves. The total cultivated land, which includes the net sown area and the fallow lands, was estimated to be 165 Mha or about 54 percent of the total land area.

Since independence the total net sown area has increased from 118.75 Mha to 140.72 Mha in 1984. The maximum expansion has taken place in the first two decades after independence. Foodgrain production has increased from 70 million tons in 1965-66 to an estimated 172 million tons in 1988-89, most of the increase coming from the irrigated regions of the country (30 percent of the net sown area). Indian agriculture has acquired considerable resilience and stability. In spite of the droughts during the 1980s, foodgrain production has kept pace with the growing population (CESE 1991).

Grazing lands

The total land area classified as permanent pastures is only 12 Mha or about 4 percent of the land area and is decreasing steadily. About the same land area is reserved for wild animals in the form of sanctuaries and national parks that is "legally" available for grazing an enormous herd of domestic animals. Lands classified as permanent pastures constitute some of the most degraded lands in the country. These lands, mostly under the control of the village panchayats (village councils), are

so small that despite of all laws and restrictions domestic animals continue to graze in revenue and forest lands and on private fallow lands.

Table 2.25 Land use in India 1984-85 (CESE 1991).

Land use	Area (Mha)	Percentage of Reporting Area
Geographical Area	3 29	
Reporting Area	304.34	
Area not available for biomass production	40.48	13.3
of which		
Area under settlements	20.41	6.7
Area under rocks, glaciers etc.	20.07	6.6
Area available for biomass production	263.86	86.7
of which		
Forest Area	67.16	22.1
Culturable Wastes	15.74	5.2
Permanent Pastures	11.93	3.9
Area under miscellaneous	3.39	1.1
Tree Crops and Groves		
Fallow Lands	24.92	8.2
Net Sown Area	140.72	46.2

Animals play a very important role in the economy of the Indian village. Indian farmers are not merely practitioners of agriculture but of agriculture, animal care and silviculture. Animals provide the critical energy and manure inputs for croplands. They also give stability to the village economy during drought periods. The livestock population in the country has increased from 292 million in 1951 to 416 million in 1982. While cattle increased by only 7 percent between 1972 and 1982, goats increased by over 40 percent. The increase of goat and sheep is often considered an indicator of the ecological degradation of an ecosystem. As an ecosystem degrades, people tend to keep more goats and sheep.

The Indian livestock population is clearly underfed. Various estimates have been made of the fodder requirements in the country. The latest official reports estimate that in 1985 the country needed 780 million tons of dry fodder and 932 million tons of green fodder to meet the needs of its animal population. The dry fodder production was only 441 million tons, roughly half of the requirement, and green fodder production was only 250 million tons, only one fourth of the required quantity (CESE 1991).

3. ENVIRONMENTAL PROBLEMS

3.1 Land Degradation and Soil Erosion

Land degradation and soil erosion are serious problems in India. There are various estimates of the extent of degraded lands in the country. The National Commission on Agriculture in 1976 estimated the area of 175 Mha — around 60 percent of the country's land area. In 1984-85 the area was estimated to be 173 Mha. The estimates by the Society for the Promotion of Wasteland Development gave the figure of 129 Mha, and by the National Remote Sensing Agency (NRSA) of 55 Mha. The last is considered a gross underestimate. It is estimated that on an average 16 tons of soil is lost every year from every hectare of the country's land. The annual soil loss is thus 5334 million tons. Some 29 percent of this soil is carried away by rivers to the sea and 10 percent is settling in surface reservoirs reducing their storage capacity. The rest 61 percent is shifted about, much of it settling in river beds increasing consequently flooding (CESE 1991).

3.2 Alienated Commons

Wastelands are an outcome of management and ownership problems. In India the land is divided into three main categories of owners — private, government and community. About 55 percent is private land under groves and plantations, agricultural fields or fallows. About 28 percent is under the control of the government — 22 percent under the forest departments and 6 percent under the revenue authorities. A large part of the revenue land is already encroached and has become private property.

The ratio between private and common land differs sharply in different ecosystems of the country. In the densely populated humid plains or irrigated areas most land is privatised. E.g., in the Murshidabad district of the Bihar plains 98 percent of the land available for biomass production is private land, and 2 percent is common land. In hill and mountain regions and in unirrigated areas the proportion of the common lands to private land is far greater. In some districts like Chamoli in the Himalaya the total common land is as much as 87 percent. A big problem is that village communities have lost interest in the management or protection of their common lands (CESE 1991)

3.3 Forest Depletion

In 1987 forest departments of various state and union territories owned an aggregate of 75.18 million hectares (Mha), which is equal to about 22 percent of the total geographical area of the country. But a lot of this "forest area" does not have any trees. The actual "forest cover" in 1980-82 was estimated by the National Remote Sensing Agency (NRSA) to be about 46.34 Mha or about 14.1 percent of the geographical area of India. The Forest Survey of India (FSI) has conducted another survey of the country's forest cover, and it has concluded that in the mid-1980s the forest cover was 64.86 Mha or about 19.7 percent of the country land area. According to the FSI the

annual rate of deforestation has come down from the 1.3 million ha — estimated by NRSA for the 1970s — to 47500 ha in the 1980s. The FSI also admits that of the actual forest cover only 37.85 Mha or 11 percent can be categorised as closed i.e., it has a crown density of 40 percent and above. The remaining forest area is open forest and in most cases degraded.

The spatial distribution of the country's forest area is extremely uneven. Nearly one-fifth of the country's forest cover is in Madhya Pradesh, and another quarter is in the seven states of the Northeast. The per capita forests area of India is slightly more than 0.1 ha, which is far less than the world average of about 1.0 ha. Deforestation has seriously affected the biomass based subsistence economy of the poor as firewood, fodder, wood for artisan crafts and water are now increasingly difficult to obtain (CESE 1991).

3.4 Desertification

The arid zone of India — a region most vulnerable to desertification — extends over an area of 443 Mha. Of this 31.7 Mha fall into the category of hot deserts — with the Thar desert in Rajasthan and Gujarat constituting 90 percent — and the remaining 12.6 Mha under cold deserts in the trans-Himalayan region of Jammu and Kashmir and Himachal Pradesh. In the early 1980s the Central Arid Zone Research Institute in Jodhpur had estimated that 4.35 percent of the Thar desert in Western Rajasthan had already been affected by desertification, and categorised a further 76.15 percent as highly to moderately vulnerable. Yet, obviously land degradation and loss of productivity affects far greater areas of the country (CESE 1991).

3.5 Water Use and Pollution

India's average annual rainfall is 1077 mm making altogether about 400 million hectare metres (Mham) in the form of rain and snow. The biggest problem is that the rainfall varies greatly over both time and space. Nearly three quarters of the rain comes down during the four monsoon months from June to September. The rest of the year the country remains relatively dry. While Cherapunji in Meghalaya gets as high as 10000 mm of annual rainfall, parts of Western Rajasthan receive only 100 mm a year. About 35 percent of the land receives rainfall less than 750 mm, and it is classified as drought-prone.

According to an estimate by the Central Water Commission (CWC) the total utilisable water resources of India are 110 Mham. For macro level planning the total water availability is estimated to be about 100 Mham, of which approximately 40 percent is groundwater. In 1985 India used almost 50 percent of the total utilisable water corresponding with about 13 percent of the total annual rainfall. Irrigation used 97 percent (50.48 Mham) of the consumed water. The urban-domestic sector accounted for only 1.34 Mham. By 2025 the water demand for irrigation will increase to 85.54 Mham, and the urban-domestic sector demand will increase almost eight-fold. If most of the water used by this sector will be discharged untreated to the natural drainage systems as today, there will be enormous pollution problems in the future.

Groundwater use has increased considerably during the last three decades. The proportion of the area irrigated by tubewells increased from 0.6 percent in 1960-61 to 26.9 percent in 1984-85. The 1985 level of groundwater use is estimated to be about 17 Mham, which is about 49 percent of the utilisable groundwater. In 1986 the Central Groundwater Board (CGB) identified 645 blocks out of a total of 5272, where further groundwater exploitation needs to be strictly controlled. As many as 42 of these blocks are in drought-prone and in desert areas (CESE 1991).

The mismanagement of the resource base has increased the country's susceptibility to both floods and droughts. Large tracts of forests, which would hold back rainwater and release it slowly, have been destroyed over time. Groundwater aquifers, which stored rainwater for the dry periods, are suffering from heavy overabstraction. At the same time the traditional systems of storage like tanks and ponds have been neglected. Also the ecologically unsound management of the country's flood plains — areas with the maximum population density and intense inequality and poverty — has increased floods in these regions. Meteorological data shows that there have been unexceptionally many droughts in the 1960s, 1970s and 1980s. The 1987 drought was one of the worse droughts in this century.

Most of the surface water in India is polluted. Wastes are simply discharged untreated into the water courses. Out of India's 3245 towns and cities only 21 have partial or full sewerage and sewage treatment facilities. The domestic waste accounts for nearly 80 percent of the pollution load. A study of 29 Indian rivers showed that with the exception of the Ganga at Garhmukteshwar and the Teesta at Jalpaiguri, river water was not suitable for human consumption without proper treatment. Although groundwater is generally far less polluted than surface water it is becoming increasingly affected (CESE 1991).

In the year 1979-80 the Central Pollution Control Board had prepared a document on the water supply and wastewater collection, treatment and disposal in Class II towns of India. An assessment has been made regarding domestic water supply, wastewater generation, collection, and treatment in 241 Class II towns in 1988-1989. The situation in the States is presented in Table 3.51.

The States of Jammu and Kashmir, Meghalaya, Manipur, Nagaland, Sikkim and Tripura do not have any Class II towns. Although the population of Class II towns has increased about 70 percent during the period 1979-88, the water supply increased only 5.8 percent. Thus the per capita water supply that was 125 litres per day (lpd) in 1978, was only 78 lpd in 1988. Though the volume of wastewater from Class II towns has not increased significantly, the concentration of organic matter and the pollution load reaching the receiving water bodies has increased. The estimated quantity of wastewater from these towns is 1298 Mld. Less than 5 percent of the total wastewater generated is collected and only about 2 percent is treated.

Table 3.51 Position of water supply, wastewater generation, collection and treatment in Class II towns in 1988 (CPCB 1990).

State/Union Territory	Total No. of towns	Population 1981 Census	Total Water Supply (Mld)	Per Capita Water Supply (lpd)	Wastewater (Mld)		Wastewater treatment capacity (Mld)	
					Generated	Collected	Primary only	Primary and Secondary
Andhra Pradesh	26	1713475	111.03	49	88.46	1.00	0.00	0.00
Bihar	10	648643	43.11	49	34.46	0.00	0.00	0.00
Gujarat	23	1542683	151.56	79	121.23	8.65	4.50	20.25
Goa	2	122760	13.00	82	10.60	1.00	0.00	0.00
Himachal Pradesh	1	70604	23.61	282	18.88	0.00	0.00	—
Haryana	6	395243	39.74	77	31.78	9.37	0.00	0.00
Karnataka	12	808375	64.37	62	51.49	0.00	0.00	0.00
Kerala	7	456275	88.74	182	70.98	0.00	0.00	0.00
Maharashtra	22	1491042	191.82	101	153.46	10.00	—	1.40
Madhya Pradesh	23	1553516	162.84	82	130.27	5.82	0.00	0.00
Mizoram	1	74493	2.17	16	1.74	0.00	0.00	0.00
Orissa	5	320383	35.09	73	28.07	0.00	0.00	0.00
Punjab	10	665318	112.49	129	90.01	16.33	0.00	0.00
Rajasthan	10	660790	44.80	51	35.87	0.00	0.00	0.00
Tamil Nadu	39	2611397	200.91	64	160.74	3.20	—	0.00
Uttar Pradesh	27	1891631	239.73	99	191.75	6.60	0.00	0.00
West Bengal	17	1306780	97.14	64	77.73	0.00	0.00	0.00
Total	241	16333408	1622.15	(78)	1297.52	61.97	4.50	21.65

Figures in parenthesis shall not be read as total.

3.6 Erosion of Wildlife Habitats

About 15000 species of plants (out of the world total of 250000) and 75000 animal species (out of the world total of 1.5 million) have been discovered in India. Around five percent of the known living organisms on earth exists on two percent of the world's land mass in India.

Over the last decade a comprehensive legislation has been enacted, and action programmes have been initiated to preserve wildlife. There are now 45 national parks and 211 sanctuaries in the country. They cover over nine million hectares (3 percent of the country's total land area and 12 percent of the area controlled by the forest departments). These protected habitats face considerable human pressure and threats from development projects. The other growing problem is the hostility of local populations to these areas that increases their degradation.

3.7 Urban and Industrial Environmental Problems

The majority of India's population (76 percent) was living in rural areas in 1981. The urban population has been growing rapidly — from 11 percent of the total population in 1901 to 24 percent in 1981. It is estimated that nearly 350 million people (32 percent of the total population) will be living in towns and cities by the year 2000. This would be the world's largest urban population. Between 1981 and the year 2000 roughly 54 percent of the total population increase will be in urban areas. By the year 2020 about 685 million (50 percent of the population) is estimated to be urban (UN 1989).

The severe overcrowding combined with the failure of civic authorities to provide basic services has led to serious and growing environmental problems in Indian cities. Water scarcity and pollution, transport congestion, lack of sanitation, and increasing shortages of housing are common. In several urban projects the concept of slum demolition and resettlement has been replaced with slum upgrading. Many slum upgradation schemes have been launched in major cities like Madras, Calcutta and Hyderabad. Though these schemes have tended to reach lower income groups among the urban poor, many governments have not been able to restructure land tenure within the slums.

Laws for pollution control have been enacted, but have not yet brought tangible improvements in air and water quality of urban areas. The Bhopal disaster demonstrated the hazards of toxic substances, but there have been several relatively minor disasters even before. Regular reports of fish kills in estuaries, rivers and other water bodies, and of the death of cattle due to toxic substances such as arsenic, heavy metals and acids indicate that such occurrences are frequent. The major centres of industries producing potentially toxic wastes such as pesticides, dyes and pigments, organic chemicals, fertilisers, non-ferrous metals, steel and chloralkali are Delhi, Udaipur, Kanpur, Chandigarh, Bokaro, Jamshedpur, Rourkela, Calcutta, Raipur and Ahmedabad (CESE 1991).

3.8 Pollution Sources

The Central Government in consultation with the States have elaborated an action plan for controlling pollution from the heavily polluting industries, critical areas and control of critical pollutants. The critical areas have been identified as follows:

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

During the year 1990-91 the identified problem areas have been surveyed and scheduled action plans are being framed out in consultation with the respective State Boards. The heavily polluting

industries that have been identified in the action plan are as follows:

Air Pollution Control:	<ul style="list-style-type: none"> Cement Thermal Power Plants Iron & Steel Fertilizer Zinc Smelter Copper Smelter Aluminium Smelter Oil Refinery
Water Pollution Control:	<ul style="list-style-type: none"> Distillery (i.e. Fermentation) Fertilizer Pulp & Paper (Large & Small) Basic Drugs Dyes & Dye Intermediates Pesticide Manufacturing Oil Refinery Petrochemicals Clusters of Tanneries Sugar and Pharmaceuticals

The critical pollutants which have been identified are as follows:

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

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

3.9 Assessment of Causes of Environmental Degradation

There has been almost two decades of institutional and legislative growth in the field of environment in India. Finance, though still inadequate, has also seen increased as well as the influence of the Ministry of Environment & Forests. In spite of these efforts the achievements in the field are limited. There are numerous causes of environmental degradation. The biggest

causes are not those related to technology, money or programmes. The CESE report (1991) states that the real causes are the nature of governance, the lack of micro level planning, and the lack of institutional capacity.

According to CESE (1991) the major problem in India is the highly sectoral and centralised planning. The governmental programmes are geared to protect the environment partly from development projects, but mainly from people themselves. Still there has been little effort to modify the development process itself considering the needs of the people and the long-term needs of ecological security. The central and state Environment & Forests departments largely remain bystanders in the planning of natural resource use, because they get involved only in the project evaluation stage. The planning is also done on *ad hoc* basis, and it is fragmented. The resource management would call for holistic and ecosystem-specific planning that would consider different forms of land and water use — forests, grazing lands, croplands livestock, water systems, and also the social development of human settlements.

One factor contributing to environmental degradation is the lack of people's involvement in decision making. The institutional framework of the governance is based on centralisation, and this is increasing especially in environmental management. E.g, the Forest Conservation Act of 1980, which also controls deforestation, states that decisions must be made by the central ministry regarding the transfer of any single piece of forest land. Similarly the Environment Protection Act of 1986 centralises the pollution control and environmental management by giving the Centre enhanced power to take action.

Efforts to authorise decentralised institutions to manage natural resources are limited. The perhaps most effective level to manage natural resources is the district. Even this level is too far from the village level to encourage good resource management. Two to three districts together would have the population equal to a Scandinavian country's population. The elected panchayats are the recognised units at the village level. They have never been given adequate powers, and their own record in development administration has been either poor or counterproductive. There has been no effort to develop participatory village institutions. The overburdened judicial system, though largely sympathetic to environmental causes, is also not able to deliver judgments speedily. As a result the cases are delayed for years while the people are suffering from the effects of pollution.

Other major problems are the inappropriate data base and the educational system in the country. Practically too little effort has been made to develop ecologically and socially sound approaches for environmental solutions (CESE 1991).

4. INSTITUTIONAL CAPACITIES, POLICIES, AND LEGISLATION FOR ENVIRONMENTAL MANAGEMENT

4.1 Institutional Capacity

India is a federal country, where the central and state governments are colossal entities. They own, manage and develop almost all the country's forests, ports, roads, mines and an overwhelming large portion of its industrial structure. The government of India has become increasingly conscious of the environmental crisis in recent years. Several new laws have been enacted and some older ones revised. A new Department of Environment has been set up in 1980, and a special significance has been attached to environment issues in the Sixth and Seventh Five Year Plans. The last few years have been used for institution building, and several states have also set up their own departments of environment (CESE 1991).

According to CESE (1991) India has a fairly well developed institutional framework for environmental management. Yet, the national institutional framework for environment has centralised and bureaucratic. It is highly developed at the central level and less so at the state level. The institutional infrastructure at the village or settlement level is weak or non-existent. The lowest institutional tier is the panchayat — or the representative body of elected village leaders. The Panchayati Raj institutions are hypothetically meant to enable local involvement in development projects. But these institutions have been emasculated due to lack of power, financial resources and responsibility. These institutions are too far from the village level to be effective agents of good natural resource management. A single panchayat covers several villages and their hamlets. On an average there are roughly three villages per panchayat in India. In less densely populated regions the number of villages in a panchayat may be greater. As a result the panchayats are too big to become an effective forum for village level environmental management.

Although the approach to the environmental management should be multi-sectoral, there is no intersectoral agency both in central and state governments. While the Ministry of Environment & Forests at the Centre, and related ministries in the states are the nodal institutions for environment, their role has been more to safeguard or to police the environment. Development of resources is usually under separate ministries, and the intersectoral coordination is almost non-existent.

4.2 Policies for Environmental Management

Environment policy

In 1976, when the Indian Constitution was amended for the 42nd time, the lawmakers incorporated several environmental provisions for the first time. Article 48A was added to the Directive Principles of State Policy stating: "The State shall endeavour to protect and improve the natural environment and safeguard the forests and wildlife in the country". The word environment covers the aggregate

of all the external conditions and influences affecting life and development of all organs of human beings, animals and plants. Article 49 provides the protection of monuments and places and objects of national importance from being spoiled by pollution of all kinds (Devi 1990). In the Chapter on Fundamental Duties, Article 51 A (g) provided: "It shall be the duty of every citizen of India to protect and improve the natural environment including forests, lakes, rivers and wildlife and to have compassion for living creatures". Therefore the Constitution charges the state as well as citizens with the duty to protect and improve the environment (CESE 1991).

Yet, the country does not have an explicit national environmental policy. Instead, most natural resources and their management are governed by separate national policies each administered by different ministries and departments. Although the most of the policies exist at the Central level the resources are generally managed at the state level or are on the concurrent list of the Constitution e.g., forests, and both the Centre and states having the jurisdiction. The state governments usually adopt or implicitly follow the central policy.

Land use and development policy

Land is a state subject with the Centre playing a guiding and supportive role. The National Land Use and Policy Outline (NLUPO) has been formulated and adopted by the National Land Use and Wastelands Development Council (NLWC). The objective of the policy outline is to meet the consumption needs of the growing population by increasing productivity, to prevent any further deterioration of the land resource through appropriate preventive measures, and to restore the productivity of the degraded lands through appropriate policies. The government proposes to implement action plans drawn up on the basis of the policy outline through the State Land Use Boards (SLUB), which have the chairpersonship of chief ministers and senior ministers in the states.

The Industrial Policy Statement of 1980 recognized the need to preserve ecological balance and to improve living conditions in urban centres. Based on this statement there have been formulated the basic criteria for the proper siting of industry by the GOI (Geethkrishnan 1989). Permissions must be obtained from the Pollution Control Boards before industries are located. The Ministry of Industry (MOI) has developed a general list of polluting industries (Annex I), and a list of 20 highly polluting industries (Annex I). An entrepreneur has to submit a comprehensive Environmental Impact Assessment (EIA) Report and Environmental Management Plans (EMP) for large projects. Certain environmental guidelines, supplementing the procedures laid down by the MOI, have been recommended by the Ministry of Environment & Forests.

Forest policy

The first forest policy was formulated in the country as early as in 1884. This was revised in 1952. The forest policy of 1952 recognised the protective functions of forests and stipulated that the country as a whole should aim at maintaining an average of one-third of its total land area under

forests. The Government of India formulated a new forest policy in 1988. The policy objectives now include environmental stability, conservation of genetic resources, afforestation of barren lands, meeting the requirements for fuelwood, fodder, minor forest products and small timber of the rural, especially of the tribal population, and increasing the productivity of forests to meet essential needs.

Water policy

The National Water Policy (NWP) adopted in 1987 has given the following priorities for the allocation of available water: (a) drinking water; (b) irrigation; (c) hydropower; (d) navigation; and (e) industrial and other uses. The policy also lists measures to be taken for the development of water resources in an environmentally sound manner, with due regard to conservation, efficient use, recycling, and optimum use of groundwater.

The National Water Policy recognises that, although water is a state subject under the Constitution, it is nevertheless a subject of paramount national concern. The Central Ministry of Water Resources (MWR) is the highest supervisory and decision making body in the country for the development and management of water resources.

4.3 Legislation

Environmental laws

According to CESE (1991) there are more than 200 central and state laws today that can be interpreted to protect the environment. The earliest of them is the Shore Nuisance (Bombay & Kolaba) Act, 1953. Yet, the laws enacted with the specific intention of controlling environmental degradation have been introduced quite recently. The enacting of the Wildlife (Protection) Act, 1972 and the Water (Prevention and Control of Pollution) Act, 1974 created a new environmental era. Three more acts were to follow: the Forest Conservation Act of 1980, the Air (Prevention and Control of Pollution) Act of 1981, and the Environment (Protection) Act of 1986. This legislation has environmental conservation objectives, whereas the legislation brought into force prior to 1972 always had mainly other objectives than environmental protection.

These other enactments have naturally specific aspects. E.g., the Factories Act of 1948 has provisions for ensuring industrial safety and the control of effluents and emissions. The handling of toxic insecticides and pesticides is regulated by separate acts. The Explosives Act, Boilers Act, Motor Vehicles Act, and Drugs and Cosmetics Act have provisions, which include the environmental considerations. In 1976, when the Constitution was amended for the 42nd time, the "Environmental Protection" was included in it. The legislation in the country has been divided into 3 lists for this purpose (Table 4.31) as follows:

Table 4.31 Legislation in three lists (Panneer Selvam 1991b).

List	Power to make legislation
State	Only the States can make legislation on topics covered here.
Central	Only the Centre can make legislation on topics covered here.
Concurrent	Both the States and the Centre can make legislation on topics covered here.

Note: The parliament (Centre) always has unlimited power under which it can make any law, even if it is covered under the State list. Hence, matters relating to controlling environmental degradation will be legislated from the Centre.

The six most important Acts are as follows:

- 1) The Water (Prevention and Control of Pollution) Act, 1974;
- 2) The Water (Prevention and Control of Pollution) Cess Act, 1977;
- 3) The Air (Prevention and Control of Pollution) Act, 1981;
- 4) The Environment (Protection) Act, 1986;
- 5) Hazardous Wastes (Management and Handling) Rules, 1989; and
- 6) Public Liability Insurance Act, 1991.

Water (Prevention and Control of Pollution) Act, 1974

The Prevention of Water Pollution bill was passed by the Parliament in 1974, and subsequently the Water (Prevention and Control of Pollution) Act became effective. The Act has been amended in 1978 and in 1988.

The Act is defined to provide the prevention and control of water pollution and to maintain or restore the wholesomeness of water, to establish, with a view to carrying out the aforesaid purposes, Boards, and to confer and assign to such Boards necessary powers and functions

The Act includes areas dealing with pollution, sewage and trade effluents. The Act makes provision for the composition of Central and State boards. These boards are autonomous and they can sue and be sued. A provision has been made to represent the interests of agriculture, fishery, industry, trade and also of companies or corporations owned, controlled or managed by the central and state governments.

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

The Water (Prevention and Control of Pollution) Act, 1974 expressly conferred powers and defined functions of the Boards, but left the funds to the Governments. Because the State Boards could not function effectively, the Government made provision of funds through the Water (Prevention and Control of Pollution) Cess Act, 1977.

The cess is levied upon every person carrying specified industry in Schedule I (Table 4.32), and every local authority supplying water. Industries listed in Schedule II (Table 4.33) are levied based on the potential pollution of industry. The Act outlines the installation of standard meters for recording consumption of water by persons carrying on specified industries, and by local authorities. The cess is levied on the basis of metering. The Act allows for a rebate of 70 percent of the cess payable on installation of an effluent treatment plant.

Table 4.32 Industries — Schedule I (Panneer Selvam 1991b).

Ferrous metallurgical
Non-ferrous metallurgical
Mining
Ore processing
Petroleum
Petrochemical
Chemical
Ceramic
Cement
Textile
Paper
Fertilizer
Coal
Power
Processing of animal or vegetable products

Table 4.33 Levy on water consumption — Schedule II (Panneer Selvam 1991b).

Water consumption	Maximum rate
Industrial cooling, spraying in mine pits or boiler feed	0.75 paise/kilolitre
Domestic purposes	1 paise/kilolitre
Processing whereby water gets polluted and pollutants are easily biodegradable	2 paise/kilolitre
Processing whereby water gets polluted and pollutants are not easily biodegradable and are toxic	2.5 paise/kilolitre

Amendments to the Water (Presentation and Control of Pollution) Cess Act, 1977 have been finalised with a view to augment the resources of Pollution Control Boards.

Cess Rules, 1978

The Cess Act, 1977 conferred the powers to make rules to the Central Government. In exercise of this power, the Central Government made Cess Rules in 1978. These rules lay the standards of meters and places where they are to be affixed. The rules also lays the time limit for furnishing of returns, and point the modalities under which rebate is applicable. The rebate is applicable 15 days after commissioning of an effluent treatment plant, and remains as long as the plant runs

successfully.

Air (Prevention and Control of Pollution) Act, 1981

Even though no attempt was made till recently to enact comprehensive legislation for prevention and control of air pollution, India has had laws on air pollution for the last 79 years. The Bengal Smoke Nuisance Act was introduced in 1905, and Bombay and Kanpur followed in 1912 and 1958 correspondingly. These acts were mainly concerned with smoke coming out of industries, but they were largely ineffective. In 1981 the Air (Prevention and Control of Pollution) Act was passed by the Central legislature, and the State Pollution Control Boards were given responsibility for its implementation.

There also exist laws dealing with automobile emissions. The Motor Vehicles Act, 1939 confers legal powers on state governments to make rules regarding "emission of smoke, visible vapour, sparks, ashes, grit or oil". This provision did not help improve the situation because of the absence of criteria and standards regarding exhaust fumes and noxious gases, of monitoring and surveillance, and of an enforcement agency. The act has been amended in 1990 to overcome the earlier shortcomings.

The Air Act is defined as an act to provide for the prevention, control and abatement of air pollution, for the establishment, with a view to carrying out the aforesaid purposes, of Boards, for conferring on and assigning to such Boards powers and functions relating thereto and for matters connected therewith.

Environment (Protection) Act, 1986

The Environment (Protection) Act, 1986 was created to meet the need for an authority, which could assume the leading role in studying, planning, and implementing long term requirements of environmental safety, and to direct and coordinate a system of speedy and adequate responses to various situations threatening the environment. This Act applies to the whole of India and empowers the Central Government to take measures to both protect and improve the environment. This Act was legislated in 1986, mainly prompted by the Bhopal disaster, which made the government realise that it did not possess a strong legislative base to regulate the production and use of hazardous products.

The new act is an omnibus. Its definition of 'environment' includes air, water, land, and the inter-relationship, which exists between these and "human beings, other living creatures, plants, microorganisms and property". Despite of this comprehensive definition the act focuses on environmental pollution, hazardous substances and processes, which are harmful to the environment. The legislation enables the Central Government to constitute an authority called the Environment Protection Authority for the administration of the act. It also provides for more stringent punishment of violators than the earlier Water and Air Acts. A precedent setting inclusion

in the act is that it gives citizens the right to file cases against erring industries.

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

The Act has also placed responsibility on the Central Government for laying down procedures and safeguards for handling hazardous substances and prevention of accidents. Rules have been notified by the Ministry under this Act for regulating hazardous chemicals at all stages of manufacture, import, storage, transport, use and disposal. Amendments to the Act are under process with a view to rationalise the scope, coverage and penal provisions of the Act, and to meet the merging concerns.

Environment Protection Rules, 1986

The Environment Protection Rules, 1986 are setting the standards for emission or discharge of environmental pollutants as specified in the Schedule. The Rules also define the prohibition and restriction on the location of industries, and on processes and operations in different areas. The Rules empower the Central Government to make rules regarding:

- Standard of meter and fixing;
- Filing of returns, period and authority to be furnished with such returns;
- Manner and time the cess is to be paid;
- Authorising person for imposing penalty or interest or both; and
- Manner and fees for appeal and authorising person to hear appeal.

Hazardous Wastes (Management and Handling) Rules, 1989

These rules shall apply to hazardous wastes as specified in Schedule and shall not apply to:

- Wastewater and exhaust gases as covered under the provisions of the Water (Prevention and Control of Pollution) Act, 1974, and the Air (Prevention and Control of Pollution) Act, 1981, and rules made thereunder;
- Wastes arising out of the operation from ships beyond five kilometres as covered under the provision of the Merchant Shipping Act, 1958, and the rules made thereunder; and
- Radio-active wastes as covered under the provisions of the Atomic Energy Act, 1962,

and rules made thereunder.

Public Liability Insurance Act, 1991

The Parliament passed the Public Liability Insurance Act in 1991. The purpose of this Act is to provide the mandatory public liability insurance for providing immediate relief to the persons affected by accident occurring while handling any hazardous substance, and for matters connected therewith or incidental thereto.

Public Interest Litigation

Judicial activism at the level of the Supreme Court has provided voluntary groups with an important opportunity to fight for the protection of the environment, especially during the 1980s. The Supreme Court has directly entertained several petitions seeking redress from environmental damage. The Court has also interpreted the Fundamental Rights of Indian citizens. The 'right to life' has been extended to include the right to a healthy environment. Several petitions have appealed to the court pleading infringement of this fundamental right.

Public Interest Litigation has successfully demonstrated that non-governmental organisations (NGOs) and public spirited individuals can put a significant pressure on polluters to adopt abatement measures. This commitment and expertise is being encouraged, and their practical work supported.

Forest (Conservation) Act, 1980

The Indian Forest Act dates back to 1927. As forests were exclusively a state subject still a decade ago, the Act has been considerably amended and modified at the state level. The Central Government now proposes to amend the act to bring it in conformity with the National Forest Policy of 1988. A draft act has been circulated to state governments for their comments.

The Forest (Conservation) Act, 1980 stipulates that no forest land or any portion thereof may be used for non forest purposes without the permission of the Central Government. Prior to the Act the average diversion rate of forest land for non-forestry purposes was roughly 0.15 million hectares annually. Strict implementation of the Act has brought down the rate to an average of 17000 ha per year between 1980 and 1989. In spite of its obvious success in curtailing deforestation the act has led to increased social tensions in forested regions. The main problem lies with the excessive centralisation in its implementation that entangles small and large projects in the same bureaucratic stranglehold. As a result village schools, electricity connections and bridges for vital communication are held up for necessary clearances. The Act is also resented by state governments that see it as a violation of their authority over the development of their resources, and as an obstacle to development projects in the state. The Act also provides for compensatory

afforestation. It stipulates that to compensate for the forest land diverted for 'non forestry purposes', equivalent non forest land must be identified and afforested. Yet, the Central Ministry is unhappy about the tardy progress made by state governments to fulfil commitments for compensatory afforestation.

Wildlife (Protection) Act, 1972

The Wildlife (Protection) Act, 1972 provides for the constitution of a Wildlife Advisory Board (WAB), regulation of hunting of wild animals and birds, laying down procedures for declaring areas as sanctuaries and national parks, and regulation of trade in wild animals. The Board consisting of officials as well as non-official members is an advisory body. Because its chairperson is the Prime Minister its advice is generally attended.

Environment Courts — civil liability

A legislation on Civil Liability and setting up of Environment Courts at National and State level for dealing with payment of compensation for injury/damage suffered as a result of industrial activities, particularly from hazardous industries, is under consideration. It is also proposed that an Environment Commission will be set up from time to time.

Prohibition of smoking in public places

A proposal regarding imposition of a ban on smoking in public places was examined in the Ministry of Environment & Forests. The necessary instructions/guidelines have since been issued by the Cabinet Secretariat for banning smoking in selected public places in the MOEF.

Development and enforcement of standards and guidelines

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

Minimal National Standards and air emission standards are evolved by the Central Pollution Control Board for major categories of water and air polluting industries. These standards refer to the maximum limit of effluents and emission that a industry may discharge into any water body or in the atmosphere. The State Pollution Control Boards, while issuing their consent to the industries, can stipulate the same or more stringent standards for effluent and air emission discharges. The MOEF has notified the standards for the categories of industries shown in Table 4.34.

An entrepreneur has to submit a comprehensive Environmental Impact Assessment (EIA) Report and Environmental Management Plans for large industrial projects. The environmental guidelines supplementing the procedures laid down by the MOI have been issued by the Ministry of Environment & Forests in 1988 (Annex I). The Industrial Licensing Procedure ensures that the site of the project has been approved by the State Government, and the Pollution Control Boards have given clearance before siting. The State Pollution Control Board has also to certify that the equipment installed for prevention and control of pollution is adequate and appropriate.

Table 4.34 Standards for industries (GOI 1991a).

Standards for Liquid Effluent	Standards for Gaseous Emission
Bullion Refining Industry	Aluminium Industry
Caustic Soda Industry	Asbestos Product Industry
Dye & Dye Intermediate Industry	Boiler (Small)
Fermentation Industry	Calcium Carbide Industry
Fertilizer Industry	Carbon Black Industry
Integrated Iron & Steel Industry	Caustic Soda Industry
Inorganic Chemical Industry	Cement Industry
Man Made Fibre Industry	Copper, Lead Mix and Zinc
Oil Refinery	Molding Industry
Paint	Fertiliser Industry
Pesticides	Foundries
Petrochemical	Furnaces
Pharmaceuticals	Integrated Iron & Steel
Pulp and Paper	Nitric Acid Plant
Small Scale Industry	Oil Refineries
Sugar Industry	Pulp & Paper
Cotton Textile	Stone Crushing Units
Composite Woollen	Sulphuric Acid Plants
Large Pulp & Paper	Thermal Power Plants
Thermal Power Plant	Glass Industry
Glass Industry	Lime Kiln
Slaughterhouses	
Jute Processing	
Food and Fruit Processing	

5. ENVIRONMENT SECTOR ORGANISATIONS AND INSTITUTIONS

5.1 Ministry of Environment & Forests

Central Ministry Organisation

The organisational structure of the Ministry of Environment & Forests is given in Figure 5.51. The Central Ministry of Environment & Forests is divided into three main wings as follows:

- (i) The Ganga Project Directorate;
- (ii) The National Wasteland Development Board; and
- (iii) The Divisional Wing.

National Wastelands Development Board

The National Wastelands Development Board (NWDB) was created in 1985 after Prime Minister Rajiv Gandhi announced India's major afforestation programme based on the people's movement with an annual tree planting target of five million hectares. The work of the NWDB is overseen by a National Land Use and Wastelands Development Council (NLWC), the members of which include senior Central ministers and chief ministers of the States. The NLWC is chaired by the Prime Minister. The NWDB coordinates the afforestation work in the country and sets policies for afforestation programmes that are carried out by the state forest departments. The NWDB also has a major programme to finance voluntary agencies to undertake afforestation activities.

Ganga Project Directorate

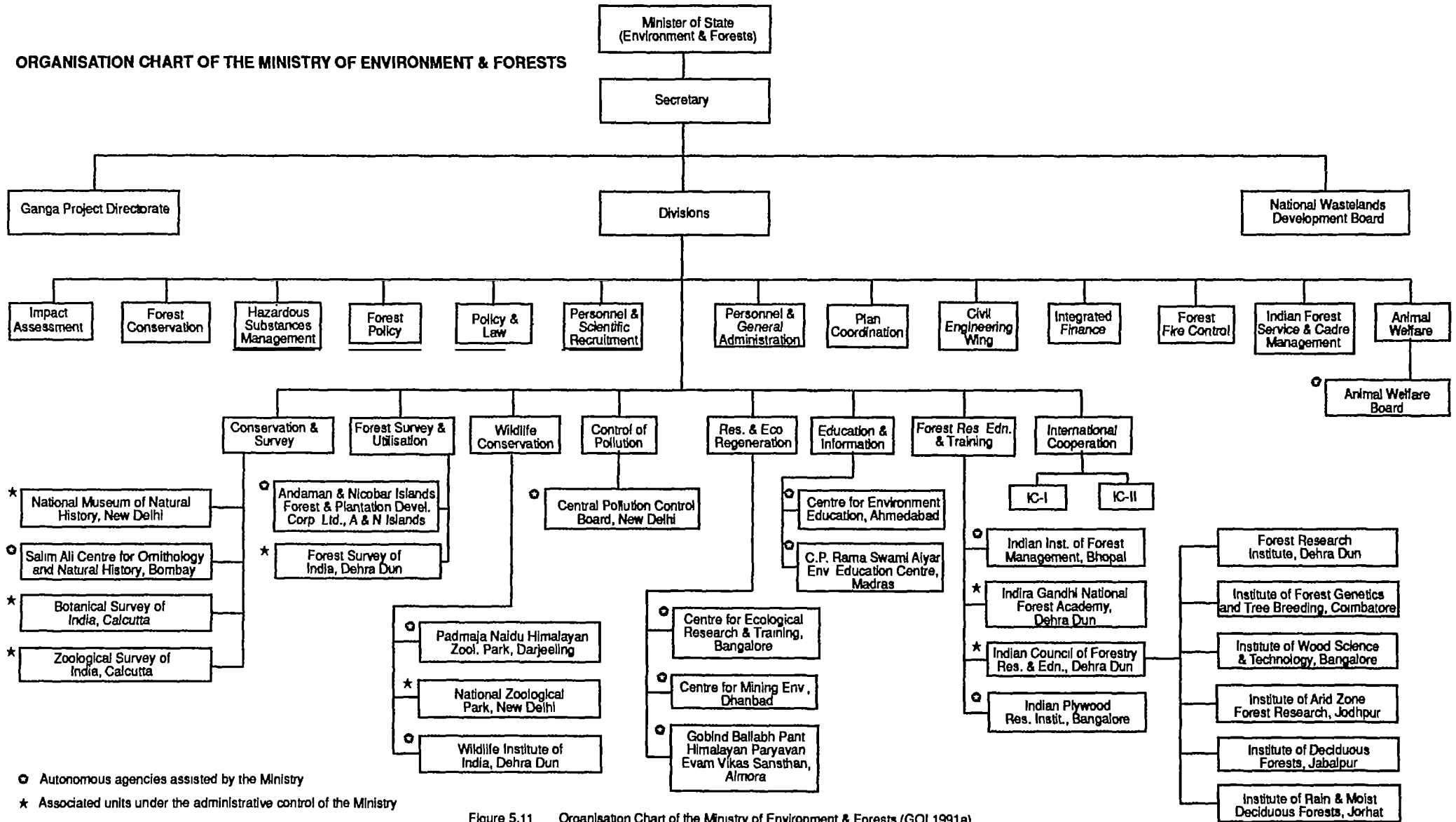
The directorate was set up in 1985 to oversee the programme to clean up the pollution in the Ganga river. This was launched by the Prime Minister Rajiv Gandhi. The resulting Ganga Action Plan (GAP) is coordinated by this directorate, and its work is overseen by the Central Ganga Authority (CGA) chaired by the Prime Minister. The members of the CGA include the chief ministers of the states through which the river flows: Uttar Pradesh, Bihar and West Bengal.

Divisional Wing

Major units and their activities are listed below:

- The Conservation and Survey Division oversees the work of the Botanical Survey of India, Zoological Survey of India, and the Fragile Area Schemes covering wetlands and mangrove ecosystems;

ORGANISATION CHART OF THE MINISTRY OF ENVIRONMENT & FORESTS



- ⊙ Autonomous agencies assisted by the Ministry
- ★ Associated units under the administrative control of the Ministry

Figure 5.11 Organisation Chart of the Ministry of Environment & Forests (GOI 1991a).

- The Pollution Control Division oversees the work of the Central Board for Prevention and Control of Pollution. This board implements the air, water and environment protection acts in the Union Territories and coordinates the work of the State Pollution Control Boards;
- The Impact Assessment Division evaluates all projects that require environmental clearance from the Central government. According to government directives, all industrial projects that need an industrial license must be submitted for environment clearance. All private sector projects with an investment of over INR 20 crore must seek an industrial license. Similarly, all irrigation and power projects have to be evaluated;
- The Education and Information Division mainly oversees the development of the National Environment Information System and the National Environment Awareness Campaign. As a part of this campaign, the Ministry finances voluntary agencies across the country to organise meetings, public rallies, *padyatras* (marches), street hoardings, public banners and billboards, posters and pamphlets to increase public awareness of environmental issues. The campaign lasts throughout the year, but it is peaking out during the National Environment Month (from November 19 through December 18);
- The International Cooperation Division deals with relations with international agencies and foreign countries, and increasingly with international negotiations in the field of environment;
- The Forest Survey and Utilisation Division oversees the forest survey work undertaken by the Forest Survey of India (FSI), and takes decisions regarding the pricing of forest based products though exploitation of forests is entirely in the hands of state forest departments;
- The Forest Research, Education and Training Division supports the Forest Research Institute and the Indira Gandhi Forest Academy, both based in Dehra Dun, and provides grants for forest education to nodal agencies in the States.
- The Wildlife Conservation Division coordinates the implementation of the Wildlife Act, which is actually undertaken by the state chief wildlife wardens. The division is also responsible for the Convention on International Trade in Endangered Species (CITES).

Responsibilities

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

The following scope of responsibilities have been allocated to the Ministry of Environment & Forests:

- Environment and ecology, including environment in coastal waters, mangroves and coral reefs, but excluding marine environment on the high seas;
- Botanical Survey of India;
- Zoological Survey in India;
- National Museum of Natural History;
- The Water (Prevention & Control of Pollution) Act, 1974;
- The Water (Prevention & Control of Pollution) Cess Act, 1977;
- The Air (Prevention & Control of Pollution) Act, 1981;
- The Environment (Protection) Act, 1986;
- Biosphere Reserve Programme;
- National Forest Policy and Forestry Development in the country, including Social Forestry;
- Forest Policy and all matters relating to forest and forest administration in so far as the Andaman and Nicobar Islands are concerned;
- Indian Forest Service;
- Wildlife Preservation and Protection of wild birds and animals;
- Fundamental research including coordination thereof and higher education of forestry;
- Padmaja Naidu Himalayan Zoological Park;
- National Land Use and Wastelands Development Council;
- National Wastelands Development Board;
- National Assistance to Forestry Development Schemes;
- Central Ganga Authority;
- Prevention of cruelty to animals; and
- Indian Plywood Industries Research Institute, Bangalore.

Institutional Support

Assistance to State Pollution Control Boards

The State Pollution Control Boards are being strengthened through upgrading laboratories, setting up of mobile laboratories, recruitment of technical personnel etc. Eighteen State Pollution Control Boards have so far been provided financial assistance for this purpose. One hundred and twenty two laboratory staff and 228 field staff have been sanctioned to the State Boards to carry out the programmes. An amount of INR 79.45 lakhs was disbursed to the State Boards during the year 1990-91 for equipment, and scientific and technical staff for laboratories and field.

Assistance to State/Union Territory/Department of Environment

The scheme of providing assistance to the State/UT's Department of Environment for setting up Technical Cells with technical/non-technical staff to deal with environmental problems in the State/UT and to function as a coordinating agency in concerned State/UT was continued during

the year 1990-91. Financial assistance over INR 21 lakhs has been provided to the Department of Environment for strengthening their technical set up in 1990-91.

Assistance to environmental laboratories other than State Pollution Control Boards

During the year 1990-91 there were recognised three qualified analysts as Government Analysts under Section 12 of Environment (Protection) Act, 1986. They were working in the previously recognised Environmental Laboratories. A total of 84 laboratories have so far been recognised as Environmental Laboratories, and one more laboratory has also been identified for recognition in 1990-91.

5.2 Central Pollution Control Board

The Central Pollution Control Board (CPCB) was constituted in September 1974 under the Water (Prevention and Control of Pollution) Act, 1974, which became effective on 23 March 1974. Twenty three States of the Union have already adopted the Act, and the respective State Pollution Control Boards have been constituted. These twenty three States are: Andhra Pradesh, Assam, Bihar, Goa, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Manipur, Mizoram, Orissa, Punjab, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh, and West Bengal. Among these States, the State Boards of Manipur, Mizoram and Sikkim were constituted during the year 1989-90. Arunachal Pradesh has adopted the Act, but is not yet constituted a Board. Nagaland is yet to adopt the Act, and constitute a Board. Since May 1981 the CPCB and the State Pollution Control Boards have been entrusted with the added responsibility of air pollution control under the provisions of the Air (Prevention and Control of Pollution) Act, 1981. Enactment of the Environment (Protection) Act, 1986, which is the umbrella legislation for enforcement or measures for protection of the environment has further widened the scope of activities of the Boards.

Constitution of Central Pollution Control Board

The Central Pollution Control Board consists of seventeen members nominated by the Central Government. The Board comprises a full time Chairman, Member Secretary, five officers nominated to represent the Central Government, five officers nominated from among the members of the State Pollution Control Boards, three non-officials to represent the interests of agriculture, fisheries, industry, trade or any other interest, and two members to represent companies or corporations owned, managed or controlled by the Central Government.

Functions of Central Pollution Control Board

The main functions of the Central Pollution Control Board as defined in the Water (Prevention and Control of Pollution) Act, 1974, and in the Air (Prevention and Control of Pollution) Act, 1981 are:

- (i) to promote cleanliness of wells and streams in different areas of the states by prevention and control of water pollution; and
- (ii) to improve the quality of air and to prevent, control or abate air pollution in the country.

The Central Pollution Control Board carries out the above functions at two different levels:

1. as Central Board at the national level; and
2. as State Board for the Union Territories.

Functions of the Central Pollution Control Board at the national level are as follows:

- Advise the Central Government on any matter concerning the prevention and control of water and air pollution and the improvement of the quality of air;
- Plan and execute a nationwide programme for the prevention, control or abatement of water and air pollution;
- Coordinate the activities of the State Boards and resolve disputes among them; provide technical assistance and guidance to the State Boards, carry out and sponsor investigation and research relating to problems of water and air pollution and for their prevention, control or abatement;
- Plan and organise training of persons engaged in programmes on the prevention, control or abatement of water and air pollution;
- Organise through mass media, a comprehensive mass awareness programme on the prevention, control or abatement of water and air pollution;
- Collect, compile and publish technical and statistical data relating to water and air pollution and the measures devised for their effective prevention, control or abatement; prepare manuals, codes and guides relating to treatment and disposal of sewage and trade effluents as well as for stack gas cleaning devices and stacks and ducts;
- Disseminate information in respect of matters relating to water and air pollution and their prevention and control;
- Lay down, modify or annul, in consultation with the State Governments concerned, the standards for stream or well and lay down standards for the quality of air;
- Perform such other functions as may be prescribed by the Government of India;

As State Board for the Union Territories, the Central Board is to perform the following functions:

- Advise the Governments of Union Territories with respect to the suitability of any

premises or location for carrying on any industry which is likely to pollute a stream or well or cause air pollution;

- Lay down standards for treatment of sewage and trade effluents and for emissions from automobiles, industrial plants, and any other polluting source;
- Evolve efficient methods for disposal of sewage and trade effluent on land;
- Develop reliable and economically viable methods of treatment of sewage, trade effluent and air pollution control equipment;
- Identify any area or areas within Union Territories as air pollution control areas or area to be notified under the Air (Prevention and Control of Pollution) Act, 1981;
- Assess the quality of environmental water and ambient air and inspect wastewater treatment installations, air pollution control equipments, industrial plants or manufacturing processes to evaluate their performance and to take steps for the prevention, control and abatement of air and water pollution.

Objectives and approach of Central Pollution Control Board

The functions listed in the preceding paragraphs are directed towards the objective of securing effective control of water and air pollution in order to maintain and restore, wherever necessary the wholesomeness of water for various designated best use, and to preserve the quality of air as per the requirements of ambient air quality. The Central Board aims to achieve these objectives through an operational approach. Key working areas have been identified for speedy implementation of the pollution control programmes. The working areas have been grouped under three major heads of operation listed below:

(i) Pollution assessment

Assessment of pollution is to be done through survey and monitoring. Survey includes the following:

- Inventory of pollution sources; and
- Assessment of pollution potential of river basins and subbasins, and effects of polluting activities.

Monitoring includes the following:

- Monitoring of air, inland waters and coastal waters at national level;
- Monitoring of emissions and effluents from large and medium industries; and
- Data interpretation and quality assurance of data.

(ii) Pollution Control

Pollution control has to be done through planning and implementation of control programmes. Planning includes the following:

- Planning for long and short term pollution control, coordination with State Boards, Ministries and Government departments, and personnel Planning and Training.

Implementation of pollution control programmes is to be done through:

- Setting/updating of standards and their implementation at the national level in collaboration with the State Pollution Control Boards;
- Enforcement through legal action; and
- Assisting the Government in environmental impact assessment/environmental appraisal for project clearance.

(iii) Infrastructure

Infrastructure of CPCB comprises the following:

- Scientific support for pollution assessment and control activities through laboratory services;
- Administration; and
- Finance and accounts.

Management and organisation of Central Pollution Control Board

The Central Pollution Control Board is the national apex body for prevention and control of water and air pollution. The policies and decisions of the Board are implemented by the Secretariat of the Board through divisions organised according to the functional requirements. Organisational Chart of the secretariat is given in Figure 5.21. The Board coordinates the activities of the 22 State Pollution Control Boards in a nationwide programme of air and water pollution control. The Board has set up six Zonal Offices. The location of these Zonal Offices and the States and the Union Territories covered by the offices are shown in Annex II. The CPCB staff strength in 1975-90 is shown in Figure 5.22.

Delegation of powers of Central Pollution Control Board

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

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

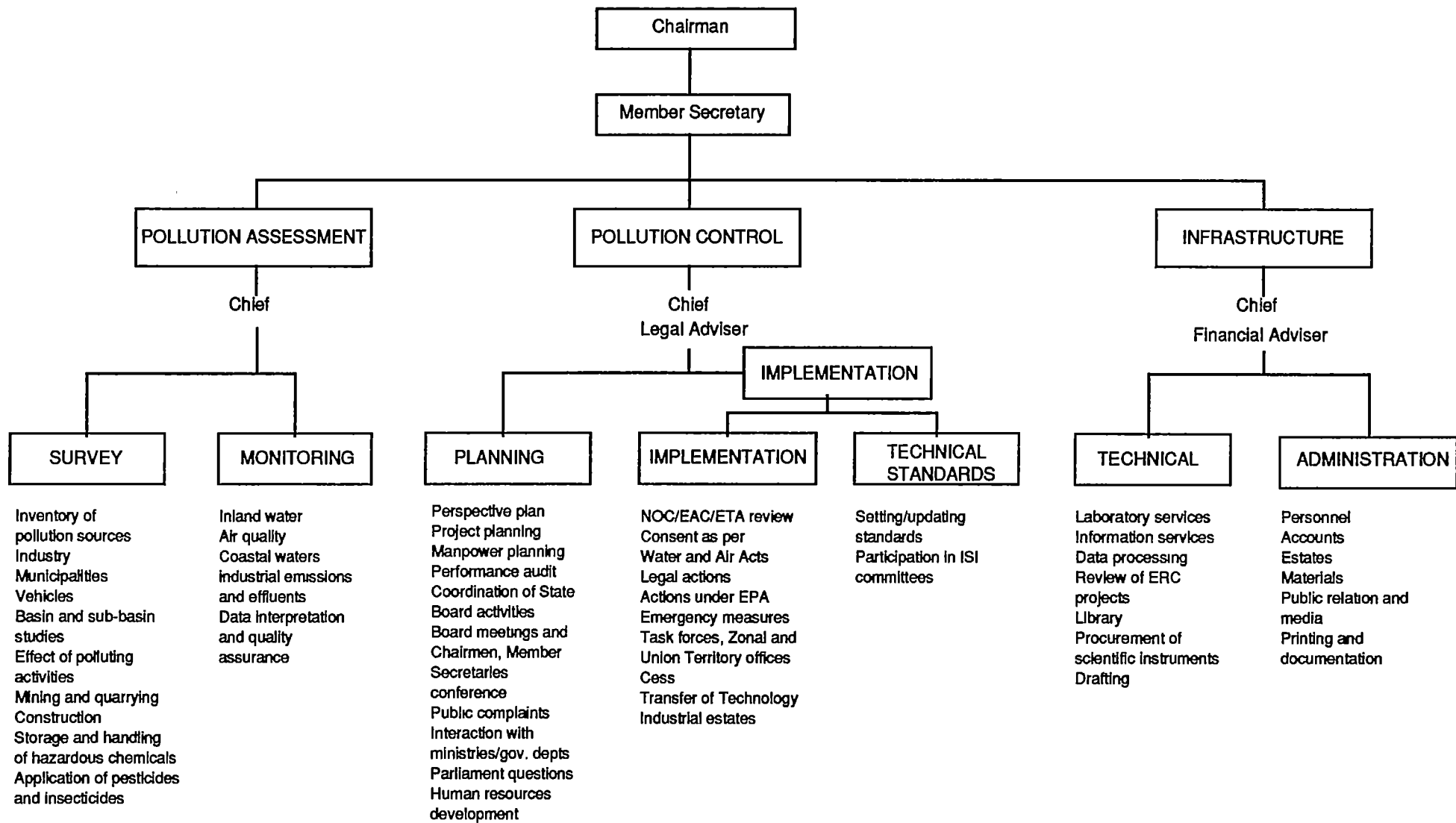


Figure 5.21 Organisation Chart of Central Pollution Control Board (CPCB 1990).

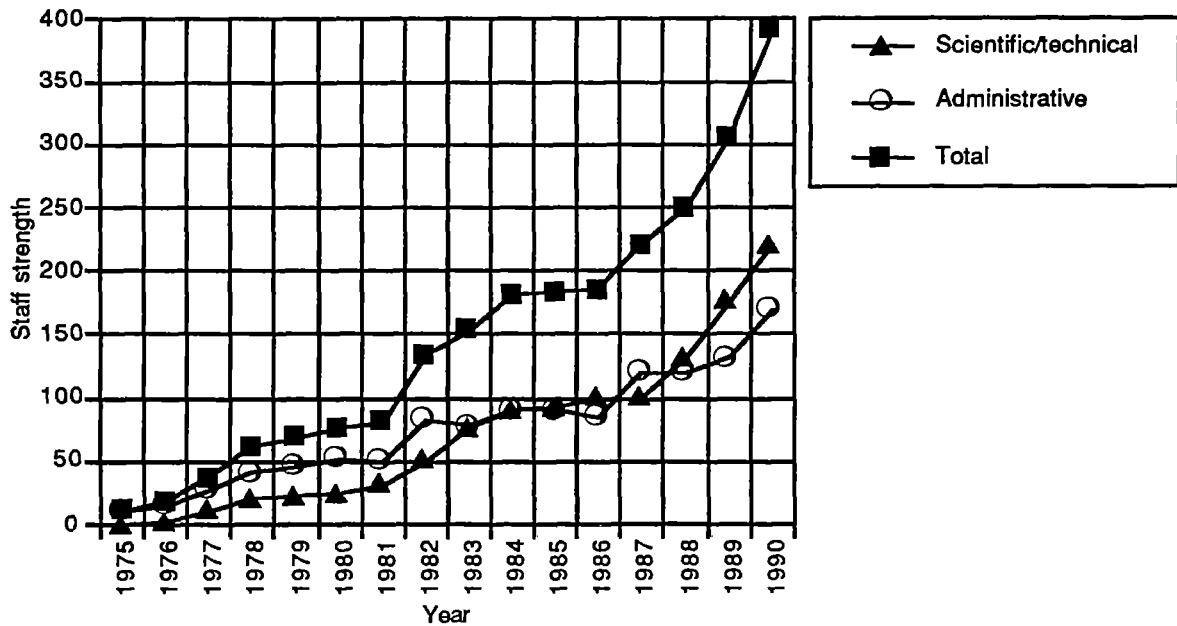


Figure 5.22 CPCB staff strength in 1975-90 (as on 31 March, CPCB 1990).

5.3 State Environment Protection Courts

All State Governments have been advised to set up State Environment Protection Courts. The Uttar Pradesh Government has already set up a special court to deal with matters related to air and water pollution, and to implement the relevant acts in the state (Devi 1990). The Government has also established a special court of metropolitan magistrates in relation to the metropolitan area of Kanpur to enquire into the cases under Water Act and Air Act.

5.4 Computerisation

Necessary software compatible with various computer terminals has been developed by the Central Pollution Control Board for the transfer of data between the Ministry and the Central and State Boards. Thirteen State Boards have developed computer facilities. State Boards of Assam, Rajasthan, Madhya Pradesh, Punjab, Orissa, Kerala, Bihar and Andhra Pradesh have now started sending the ambient air and water quality data on floppy disks.

During the year 1990-91 there have been updated various existing data bases for analysis and interpretation. Water and air quality data upto December 1989 have been analysed, interpreted, and published.

5.5 Education and Training

Formal education in environment has been slow over the last ten years (CESE 1991). The New Education Policy adopted by India in 1986 stressed the need for environmental education.

Following the national policy the National Council for Educational Research and Training (NCERT), a nodal agency in charge of development of school curriculum, has developed a National Curriculum Framework, which includes environmental studies as one of the subject areas. The MOEF has also established two autonomous institutes: the Centre for Environment Education, Ahmedabad; and the C.P. Ramaswami Aiyar Environmental Education Centre in Madras to develop high quality educational materials.

At the graduate and postgraduate level the environmental education has now been introduced by a few universities. The first postgraduate degree was started by the Jawaharlal Nehru University in its School of Environmental Sciences in New Delhi. The Wildlife Institute of India, an autonomous institute supported by the MOEF, has also developed graduate and postgraduate courses in wildlife management. As a whole professional training remains neglected. Apart from public health engineering there are no areas, where systematic professional training is given.

5.6 Voluntary Action

The number of voluntary groups in India actively interested or involved in environmental issues today is possibly larger than in any other Third World country, and probably matches the numbers in Western countries. Most voluntary groups, especially those working in rural areas, may be divided into four major groups: charity and relief groups, development groups, action groups — some more openly political than others — and support groups — e.g., lawyers' collectives, alternative professional associations, groups publishing journals, documentation centres, theatre groups etc. (CESE 1991).

Government agencies have been showing increasing interest in involving voluntary agencies in development programmes. The Planning Commission in its Seventh Plan report recognised that voluntary agencies have a crucial role to play — not just in traditional areas of social welfare like disaster relief and child care — but also in professional areas like forestry, agricultural research and education, rural development, alternative sources of energy, science and technology, and environment and ecology.

5.7 Training and Awareness

A two week WHO sponsored training programme on Environmental Impact Assessment was organised at the Management Development Institute, Gurgaon from 21 January through 3 February, 1990. 20 participants from Central and State Pollution Control Boards attended the course. During the year 1990-91 the CPCB organised a few mass awareness activities as follows:

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

6. FINANCIAL ASPECTS

6.1 National Economy

Tables 6.11 and 6.12 show statistical information on the economy of India.

Table 6.11 Development indicators (WB 1990a).

Growth of production (Average annual growth rate, %)	
GDP (1965-80)	3.6
GDP (1980-88)	5.2
Agriculture (1965-80)	2.5
Agriculture (1980-88)	2.3
Industry (1965-80)	4.2
Industry (1980-88)	7.6
Manufacturing (1965-80)	4.5
Manufacturing (1980-88)	8.3
Services, etc. (1965-80)	4.4
Services, etc. (1980-88)	6.1
Structure of production	
GDP (USD, millions, 1965)	50530
GDP (USD, millions, 1988)	237930
Distribution of gross domestic product (%)	
Agriculture (1965)	44
Agriculture (1988)	32
Industry (1965)	22
Industry (1988)	30
Manufacturing (1965)	16
Manufacturing (1988)	19
Services, etc. (1965)	34
Services, etc. (1988)	38
Structure of manufacturing	
Value added in manufacturing (current USD, millions, 1970)	7928
Value added in manufacturing (current USD, millions, 1987)	43331
Distribution of manufacturing value added (% , current prices)	
Food, beverages, and tobacco (1970)	13
Food, beverages, and tobacco (1987)	12
Textiles and clothing (1970)	21
Textiles and clothing (1987)	15
Machinery and transport equipment (1970)	20
Machinery and transport equipment (1987)	26
Chemicals (1970)	14
Chemicals (1987)	15
Other (1970)	32
Other (1987)	32
Total external public and private debt and debt service ratios	
Total long-term debt outstanding and disbursed (USD, millions, 1970)	7938
Total long-term debt outstanding and disbursed (USD, millions, 1988)	51168
Total long-term debt outstanding and disbursed (% of GNP, 1970)	13.9
Total long-term debt outstanding and disbursed (% of GNP, 1988)	19.3
Total interest payments on long-term debt (USD, millions, 1970)	193
Total interest payments on long-term debt (USD, millions, 1988)	2554
Total long-term debt service as percentage of	
GNP (1970)	0.9
GNP (1988)	1.8
Exports of goods and services (1970)	23.7
Exports of goods and services (1988)	24.9

Table 6.12 Statistical information (WB 1990a).

Total aid receipts as a percentage of GNP (1987)	0.7
Aid receipts from DAC countries as a percentage of exports to OECD markets (1987)	11.8
Gross domestic investment (% of GNP, 1965-73)	17.2
Gross domestic investment (% of GNP, 1973-80)	21.3
Gross domestic investment (% of GNP, 1980-88)	24.0
Gross national saving (% of GNP, 1965-73)	14.0
Gross national saving (% of GNP, 1973-80)	21.0
Gross national saving (% of GNP, 1980-88)	21.7
Balance of payments: current account balance before official transfers (% of GNP, 1965-73)	-3.3
Balance of payments: current account balance before official transfers (% of GNP, 1973-80)	-0.3
Balance of payments: current account balance before official transfers (% of GNP, 1980-88)	-2.2
Debt from official sources (% of total long-term debt, 1970-72)	95.1
Debt from official sources (% of total long-term debt, 1980-82)	83.9
Debt from official sources (% of total long-term debt, 1988)	60.7
Debt from private sources (% of total long-term debt, 1970-72)	4.9
Debt from private sources (% of total long-term debt, 1980-82)	16.1
Debt from private sources (% of total long-term debt, 1988)	39.3
Debt at floating rate (% of total long-term debt, 1970-72)	0.0
Debt at floating rate (% of total long-term debt, 1980-82)	3.0
Debt at floating rate (% of total long-term debt, 1988)	15.1

6.2 Budget of the Ministry of Environment & Forests

The total allocation for the MOEF for the fiscal year 1990-91 was INR 237 crores, which was revised to INR 209.26 crores in the Revised Estimates (RE) mainly to effect economy. The expenditure is estimated as INR 207.17 crores giving 99% utilisation. The allocation provided for the MOEF in the Annual Plan 1991-92 is INR 300.44 crores, which is 26.8 percent higher than that provided in 1990-91 and 43.6 percent higher than the Revised Estimates for 1990-91. This increase in the allocation is indicating the importance of the work assigned to the MOEF. Sectoral breakdown of the allocations is given in Table 6.21.

Table 6.21 Budget allocations in 1990-91 and 1991-92, the Ministry of Environment & Forests (INR in crores, GOI 1991a).

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

The share of the MOEF expenditure (civil) in Union Government Budget was about 0.5 percent (INR 1874.4 M of INR 412261.1 M) in the fiscal year 1988-89.

7. NATIONAL ENVIRONMENT MANAGEMENT AND DEVELOPMENT

7.1 Environmental Impact Assessments

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

- Economic Impact;
- Environmental Impact; and
- Social Impact.

Coverage of projects

In the 1980s the government paid attention to the incorporation of environmental concerns in the planning of major development activities. Environmental Impact Assessment (EIA) procedures are now applied to the following categories of projects (CESE 1991):

- i) All major development projects in the public sector before final clearances; and
- ii) A list of 22 types of hazardous industries as identified by the Ministry of Environment before licensing or registration.

Forest clearance is needed for any activity, which seeks to divert forest land to non forest purposes. The EIA is in addition to the statutory clearances and permissions, which are required under various Central and state laws dealing with specific subjects such as air or water pollution, town and country planning and industrial safety. The MOEF has drawn up guidelines for EIAs of projects in the following sectors:

- a) river valley development;
- b) thermal power;
- c) mining;
- d) siting of industries;
- e) ports and harbours; and
- f) development of beaches.

The guidelines broadly deal with environmental aspects that need to be considered during planning and implementation of the projects, and provide an indicative list of ecologically or otherwise sensitive areas, which should be avoided for siting of industries.

The MOEF has taken steps towards planning of activities in fragile ecosystems and to control development projects. Yet, in spite of these efforts EIAs have been sluggish. The reasons are: Firstly, the lack of an accurate data base at the microlevel and scientific and technical expertise to prepare impact assessment as well as management plans; secondly, in a number of cases the conditions laid down in the clearances have not been complied with, and thus the Centre is considering stringent steps to ensure compliance of the conditions; and thirdly, the procedure of the EIAs is such that there is no provision to ensure the participation of the local population affected by development projects.

7.2 Environmental Impact Statement

The following components are considered in preparation of the Environmental Impact Statement (EIS):

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

Coverage of projects

The procedures have been instituted for environmental (including forestry) clearance of development projects before approval for investment. This is to ensure the integration of the environmental considerations already at the planning stage. At present the following categories of projects are assessed by the MOEF:

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

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

7.3 Procedure for Environmental Impact Assessment

The MOEF has developed guidelines and questionnaires/check-lists for appraisal of projects in different sectors. The project authorities are required to provide the relevant information as per prescribed questionnaire/check-list along with the Feasibility/Detailed Project Reports and Environmental Impact Statement/Environmental Management Plans. A multidisciplinary staff complement in the MOEF that is responsible for environmental appraisal of development projects carries out the preliminary scrutiny of the project proposals. Project proposals including the essential environmental data, are placed before the Environmental Appraisal Committees in respective areas. During the meetings of the Environmental Appraisal Committees the project authorities are also invited for discussion, and wherever necessary, site visits are made for on-the-spot assessment of environmental aspects. Based on their examination the Appraisal Committees make their recommendations for approval or rejection of a particular project.

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

The MOEF has constituted the following Environmental Appraisal Committees so far:

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

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

Stages of environmental clearance

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

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

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

7.4 Management of Hazardous Substances

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

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

The rules are being amended to make them more comprehensive.

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

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

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

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

A centrally sponsored scheme is being implemented with the aim of creating infrastructure in the State Pollution Control Boards to regulate the management of hazardous substances handled by hazardous industries. Eighteen States/Union Territories have been assisted so far. Financial assistance for creation of such structures was continued during the year 1990-91.

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

During the year 1990-91 a number of studies were carried out to prevent and avert accidents and to improve safety in handling of hazardous substances and wastes. These are as follows:

- Vulnerability analysis of some extremely hazardous chemicals like hydrogen cyanide, carbon disulphide, thionyl chloride, phosgene, ammonia and chloride by Indian Institute of Technology (IIT), Delhi;
- Guidelines on siting of hazardous waste treatment disposal facilities and identification and assessment of abandoned hazardous waste sites by National Environmental Engineering Research Institute (NEERI), Nagpur ;
- Guidelines for Management of Hazardous Wastes by National Productivity Council (NPC); and
- Guidebook for the preparation of off-site plan by Microcon Ltd.

The following detailed reports have also been prepared:

- Asbestos;
- Pentachloro Phenol (PCP); and
- A Guide of the Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989.

The MOEF took over the work of the "Scientific Commission on Continuing Studies on the Effects of Bhopal Gas Leakage of Life-system and Environment" from the Cabinet Secretariat. The executive summaries of the various completed projects have been compiled in 1990-91.

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

The MOEF is actively associated with the Department of Atomic Energy and the Atomic Energy Regulatory Board in prescribing procedures and safeguards for nuclear installations. The MOEF is

also a member of the Advisory Committee on Project Safety Review of the Atomic Energy Regulatory Board and the National Emergency Response Committee of the Department of Atomic Energy constituted to review safety of nuclear projects and emergency preparedness. The following nuclear power corporation projects referred to this Ministry were reviewed for environmental clearance from the safety point of view:

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

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

The MOEF is taking up with concerned Departments to maximise utilisation of flyash to minimise environmental hazards and degradation.

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

7.5 Implementation of Standards

National and Zonal Task Forces have been constituted for the implementation of standards in the industries like fertilizer, iron and steel, thermal power plants, cement, pulp and paper and oil refineries. These Task Forces interact with the concerned industry representatives and SPCBs. They also take up inspection of pollution control systems installed at sources, and monitor the progress of implementation of standards. During the year 1990-91 the Task Forces have been constituted for distilleries and producers of non-ferrous metals, petrochemicals, caustic soda and man-made fibres. The status of implementation of standards regarding some major industries are given in Table 7.51.

Table 7.51 Implementation of standards in industry (GOI 1991a).

	Cement	Thermal Power	Pulp & Paper	Fertilizer	Oil Refineries	Sugar	Distilleries
Units complying with emission standards	62	23	—	44	6	—	—
Units complying with effluent standards	—	—	118	62	6	180	74
Units committed to a time-bound programme/have partial treatment	21	42	99	—	—	95	70
Units defaulting	5	—	100	14	—	88	63
Units closed	6	3	—	3	—	3	4

7.6 Monitoring

National Water Quality Monitoring Programme

Under the United Nations Global Environmental Monitoring Systems (GEMS) and the Monitoring of Indian National Aquatic Resources (MINARS) 50 new stations have been added during the year 1990-91. This makes the total number of water quality monitoring stations to 450 all over the country. The present network comprises 372 stations under MINARS Programme, 51 stations under GEMS, and 27 stations under Ganga Action Plan (GAP) covering all the 14 major, 7 medium and 11 minor rivers. Polluted river stretches of six major rivers have been described in Table 7.61 and in Figure 7.61. These stretches have been identified on the basis of considerable water quality deviations from the desired class. They also require immediate action for restoring the river water quality.

Coastal monitoring

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

Air quality monitoring

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

Under Indo-EEC bilateral programme the CPCB has established three continuous ambient air quality monitoring stations in Delhi. Besides these stationary stations two mobile vans for continuous air quality monitoring have also been procured under Indo-German bilateral programme. One mobile van is working at Eastern Zonal Office, Calcutta and the other van is in Delhi. Oxides of nitrogen, nitrogen oxide and carbon monoxide are being monitored by these automatic monitoring stations regularly on 24 hours basis.

Table 7.61 List of polluted river stretches (GOI 1991a).

River	Polluted stretch	Desired Class	Existing Class	Critical Parameters	Possible Sources of Pollution
Sabarmati	Immediate upstream of Ahmedabad city upto Sabarmati Ashram	B	E	DO, BOD, Coliforms	Domestic and industrial waste from Ahmedabad
	Sabatamati Ashram to Vautha	D	E	—do—	—do—
Subernarekha	Hata Dam to Bahargoa	C	Partly C and E	DO, Coliforms, BOD	Domestic and industrial waste from Ranchi and Jamshedpur
Godavan	D/S of Nasik to Naded	C	Partly D and E	BOD	Waste from sugar, distillery and food processing Industries
	City limit of Nasik and Nanded	B	—do—	—do—	—do—
Krishna	Karad to Sangli	C	Partly D and E	BOD	Waste from sugar and distillery industries
Indus (Inbutanes Sutie)	D/S of Ludhiana to Hrke	C	Partly D and E	DO, BOD	Industrial waste from hosieries, tanneries, electroplating and eng. industries and domestic waste from Ludhiana and Julundur
	D/S of Nangal to Anandpur	C	E	Ammonia	Waste from fertiliser, Chlor Ajkali and paper mills from Nangal
Ganga (Tributaries)					
Yamuna	Delhi to Confluence with Chambal	C	Partly D and E	DO, BOD, Coliforms	Domestic and industrial waste from Delhi, Mathura and Agra
	In the city limits of Delhi, Mathura & Agra	B	—do—	—do—	—do—
Hindon	Saharanpur to Confluence with Yamuna	D	E	DO, BOD, Toxic	Industrial and domestic waste from Saharanpur and Ghaziabad
Chambal	D/S of Nagda and D/S Kota appr. 45 km at both phases)	C	Partly D and E	BOD, DO	Domestic and industrial waste from Nagota and Kota respectively
Damodar	D/S of Dhanbad of Haldia	C	Partly D and E	BOD, Toxic	Industrial waste from Dhanbad Durgapur, Asansol, Haldia and Bumpur
Gomti	Lucknow to Confluence with Ganga	C	Partly D and E	DO, BOD, Coliforms	Industr waste from distilleries and domestic waste from Lucknow
Kali	D/S Modragar to Confluence with Ganga	C	Partly D and E	BOD, Coliforms	Industrial and domestic waste from Modinagar

Note See the next page for stream classification (Figure 7.61).

standards.

7.8 Legal Action Against Polluting Industries

The Central and the State Pollution Control boards (SPCBs) are responsible for carrying out the functions entrusted to them under the provisions of the Water (Prevention & Control of Pollution) Act, 1974 and the Air (Prevention & Control of pollution) Act, 1981 respectively. Legal action under these two Acts is taken by the respective State Boards. The information regarding the number of cases filed by the Central & State Boards is compiled on quarterly basis and analysed. By the 30th of June 1990 there were 3189 cases filed under the Water Act, and 365 cases under the Air Act. Out of 1040 cases decided under the Water Act there were 720 cases in favour of the Board and 320 against. Under the Air Act out of 286 cases decided there were 235 cases in favour of the Board and 51 against. By the 31st of December 1990 the number of cases filed by the Pollution Control Board under the Water Act and Air Act was 4429. Out of these, 1408 cases have been decided, 2880 are pending and 141 were dismissed. In 325 cases convictions were obtained, and in 229 cases the court passed restraint orders.

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

The MOEF is pursuing with Supreme Court to expedite the hearing to transfer of 30 writ petitions pending in various High Courts, where certain provisions of the Environment (Protection) Act, 1986 have been challenged. In order to dispute effectively in the cases regarding pollution matters, particularly in public interest cases, a separate panel of lawyers is proposed to be established.

7.9 Control of Water, Air and Noise Pollution

A draft policy statement for abatement of pollution has been prepared in consultation with the sectoral ministries, State Governments, major industrial associations, and some non-governmental organisations. The consensus is that the focus should be **on prevention of pollution through the adoption of low or non-waste technology. Small scale Industries have been identified as priority areas.** Steps have been taken to integrate the environmental and economic aspects in development planning, stress preventive aspects in pollution abatement, promote technological inputs for reducing industrial pollutants, and rely on public cooperation in securing a clean environment.

Waste exchange

The MOEF is making effort to control of pollution arising from disposal of the waste by conversion of this waste into raw material for various industrial uses. Most of industrial solid wastes is from thermal power plants, which produce annually 30 M tons of coal ash, integrated iron and steel mills producing blast furnace slag and steel milling slag (35 M tons), nonferrous industries like aluminium, zinc and copper producing Red Mud entailing (3 M tons), sugar industries generating Press Mud (3 M tons), and fertilizers and allied industries producing gypsum (4.5 M tons). The MOEF is trying to link the suppliers and possible users of these wastes.

River basin studies

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

Vehicular pollution

The MOEF has asked the Ministry of Industry to issue instructions to all the vehicle manufacturers to make the necessary changes in the design of vehicles for compliance of prescribed standards. It has also been suggested that the policy decision has to be made to regulate the number of vehicles using two-stroke engines (scooters, motor-cycles, etc.) in areas of heavy traffic density.

A project has been initiated with the Indian Institute of Petroleum, Dehra Dun for preparing a state-of-the art report on the status of vehicular pollution in the country. The report will deal with emission characteristics, standards, control technology and strategy for reducing emission from vehicles. The suitability of fixing catalytic convertors to the existing and new vehicles to reduce pollution is also being examined by the GOI.

Noise pollution

The Central Board has conducted ambient noise monitoring studies for assessment of noise pollution in industrial areas of Delhi. Ambient noise levels have also been measured in other cities like Calcutta, Hyderabad, Madras, Bangalore, Kanpur and Jaipur. Transportation noise was found to be the main cause for high ambient noise levels. During the year 1990-91 the standards have been notified for ambient noise, industrial noise, vehicular noise and noise generated by domestic appliances.

Smoking in public places

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

Assistance for adoption of clean technology by small scale Industries

Environmental policy for industry has focussed mainly on pollution control through "end-of-the-pipe" treatment technologies, which allow the wasteful use of resources. The future raw material and energy scenarios warrant a comprehensive strategy to deal with environmental and economic problems in the country. The impact of the industry and its products on the natural resources and on the environment will be considered. The necessary push will be given to industrial growth in the country by improving manufacturing methods that require less raw material and energy allowing simultaneously equal or better output in production.

The GOI is implementing a scheme for providing assistance to promote combined facilities for treatment of effluent and solid waste generated in clusters of Small Scale Industries (SSIs). A subsidy of INR 25 lakhs or 25 percent, whichever is less is given to clusters of SSIs for setting up Common Effluent Treatment Plants (CETPs). This will be subject to the State Government's matching contribution. For 1990-91 a total amount of INR 4.91 crores was disbursed as the GOI share.

Environmentally friendly products

Households make a large number of relatively small individual contributions, the cumulative effect of which is considerable. A system of certification of goods that are "environmentally friendly" has been initiated to encourage the environmental conscious behaviour of consumers through proper information.

Awards for prevention and control of pollution

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

7.10 Ganga Action Plan

The river Ganga is 2525 km long, starting from Gangotri in the Himalayas and flowing to the sea at Ganga Sagar in the Bay of Bengal. It passes 27 class I cities (population over 100000 based on 1981 census), 23 class II cities (population between 50000 and 100000) and about 48 towns having less population than 50000 in Uttar Pradesh, Bihar and West Bengal. Several major pilgrim

centres have existed on its banks for centuries, and millions of people from all over India come to bathe in the river during many religious festivals and holy days. The river serves as the source of water supply for most of the towns. The Ganga basin has nearly 40 percent of India's population and about 43 percent of the total irrigated area in the country. The Ganga is one of the more polluted rivers of India.

The main sources of pollution are urban and industrial wastes from the towns located along its banks. In the towns, where there is no sewerage systems or the coverage is only partial, the wastewater flows through open drains into the river. Even in some sewered towns there is a similar situation, when the pumping stations are non-functional due to lack of maintenance or lack of power supply.

The Central Ganga Authority (CGA) was constituted in February 1985 to guide and oversee the implementation of a programme for restoring the quality of the river Ganga. During the year 1990-91 the overall progress of the Ganga Action Plan (GAP) was reviewed, and the Monitoring Committee monitored the progress of engineering and scientific aspects. The Steering Committee met several times during the year to review the progress of sanctions and executions of various schemes and utilisation of funds under GAP. The Ganga Project Directorate (GPD) of the Ministry continued to coordinate the implementation

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

Objectives of Ganga Action Plan

The main objectives of the Ganga Action Plan is to improve the river water quality of the river Ganga by reducing the pollution load e.g., by establishing self-sustaining sewage treatment plant systems. In the first phase out of the nearly 1400 million litres per day (Mld) of sewage generated in 25 class I towns 870 Mld is proposed to be intercepted, diverted and treated. By March 1991 about 370 Mld of wastewater has been diverted. The achievements of the Ganga Action Plan would be assessed, when the National River Action Plan will be formulated. In this plan some of the major rivers of the country are proposed to be made pollution free.

The activities within the Ganga Action Plan are to intercept and divert effluent sewage flowing currently into the river, to treat the sewage and convert that into a resource for pisciculture, irrigation, and into methane gas production for energy generation. It was also planned to conserve the biotic diversity of the river to increase its productivity, particularly the fish resources. The pollution from industrial and other sources was also to be addressed. Since the self-purification and hence the level of actual river pollution also depends on the degree of dilution and velocity of the flow of water, it is necessary to maintain a minimum discharge in the river. This is especially critical at

the points e.g., near urban settlements and large industrial units producing substantial quantities of toxic or strong liquid wastes. The Ganga Action Plan was also to precede other such River Action Plans in the country. Details of the National River Action Plan are being worked out.

Organisational structure

The organisational structure for the Ganga Action Plan is shown in Figure 7.101.

Sanctioned schemes

A total number of 261 schemes necessary for completion of the plan have been sanctioned and the status of them is shown in Table 7.101. Schemes sanctioned under the Ganga Action Plan can be broadly divided into 6 categories as shown in Table 7.111.

Table 7.101 Sanctioned schemes under Ganga Action Plan (GOI 1991a).

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

Table 7.111 Sanctioned schemes in categories under Ganga Action Plan (INR in lakhs, GOI 1991a).

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

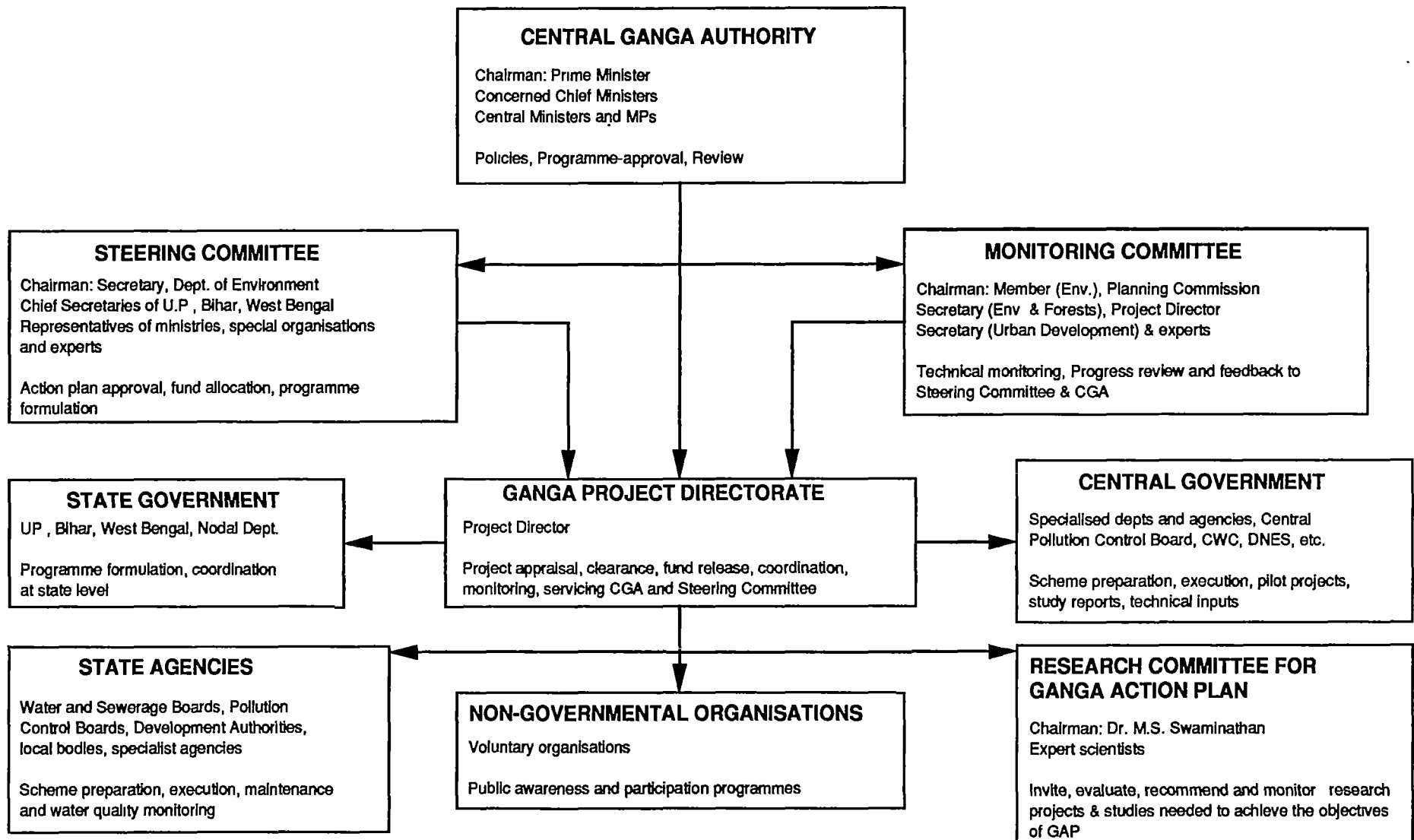


Figure 7.101 Organisational Structure for the Ganga Action Plan (GOI 1991c).

Progress of schemes

The total number of 172 schemes have been completed, out of which 25 were completed during the year 1991. The remaining schemes are at various stages of completion. The physical progress of these schemes is shown in Table 7.112.

Table 7.112 Physical progress of schemes implemented under Ganga Action Plan (GOI 1991a).

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

Seven sewage treatment plants (STP) have become operational out of the total 35 sewage treatment plants to be established. Of these 2 have been commissioned in 1990-91. The STPs at Banaras and the treatment plant at Kanpur have been completed. The plant generates methane to supply about five hours of its energy requirements during the peak hours. The sewage treatment works at Lakkar Ghat, Rishikesh have been renovated and expanded. In West Bengal an existing STP at Howrah has been renovated and recommissioned. Two STPs in Bihar (Beur and Saidpur) and two STPs in West Bengal (Bhatpara and Titagarh) have been renovated and commissioned, and further augmentation of these plants is in progress.

The schemes for sewage interception and diversion have been accorded priority under the Ganga Action Plan. Altogether 88 schemes have been sanctioned in the three States involving laying of 340 km of sewers (including pumping mains) and installation/renovation of 130 sewage pumping stations. There were 6 schemes completed out of the total of 52 completed schemes during the year 1990-1991. Thus 370 Mld of waste water flowing into the river has been diverted, and out of that 116 Mld is taken to the sewage treatment plants for treatment. When the GAP will be completed, a total of 873 Mld of wastewater will be intercepted, diverted and treated.

Under the low cost sanitation programme 43 schemes have been taken up in three States. There have been completed 39 schemes involving construction of 2732 public toilet complexes and 41228 individual pour flush latrines. In 1990-91 there have been completed eight community toilets and 407 individual toilets. As a result of the execution of low cost sanitation programme the tourists and the people living near the river bank are now able to use these toilets instead of defecating on the river bank.

There have been completed 19 schemes involving construction of 22 electric crematoria out of the

28 schemes. Six schemes involving eight electric crematoria have been completed in 1990-91. The pollution of the river caused by dumping of unburnt and half-burnt bodies has been reduced due to the construction of these crematoria.

A programme for construction and development of ghats, renovation of kunds/talabs, improvement of lanes/bye-lanes leading to the ghats, traffic regulation of road segments and re-allocation of dhobi ghats have been taken up under Ganga Action Plan. There have been completed 30 schemes involving 92 ghats out of the total 35 river front development schemes with 122 ghats. Seven schemes consisting of 34 ghats have been completed in 1990-91.

Table 7.113 Actual expenditure on Ganga Action Plan (INR in Lakhs, GOI 1991d).

Year	Uttar Pradesh	Bihar	West Bengal	Total
7th Five Year Plan				
1985-86	82.69	0.00	31.34	114.03
1986-87	1087.25	201.31	601.55	1890.11
1987-88	2134.41	689.04	1637.58	4461.03
1988-89	1653.29	1082.43	2539.52	5275.24
1989-90	1773.46	756.22	2335.00	4864.68
8th Five Year Plan				
1990-91	1827.01	474.58	1912.17	4213.76
1991-92 (10/91)	704.70	206.70	840.89	1752.29
Total 1985-10/91	9262.81	3410.28	9898.05	22571.14

Table 7.114 Expenditure on Ganga Action Plan during the Eight Five Year Plan (INR in crores, GOI 1991d).

Year	Central share
1992-93	108.00
1993-94	135.00
1994-95	140.00
1995-96	150.00
1996-97	167.00
Total	700.00

Industrial pollution

Based on the Expert Committee report there have been identified 68 polluting industrial units. The 43 units, which did not have effluent treatment plants at the beginning of the Ganga Action Plan have been persuaded to build them. As a result of legal and administrative measures taken under the provisions of the Environment Act, 1986 and the Water Act, 1974 the number of industries, which have set up Effluent Treatment Plants (ETPs) or are in the process of setting up them has

increased to 50. It is also planned to reinvent industrial pollution load in the Ganga Basin based on the revised norms covering the polluting units on the major tributaries.

Table 7.115 Eight Five Year Plan Projections (INR in crores, GOI 1991d).

Activity	Total cost	Central share
A. On-going schemes which are likely to spill over into the 8th Five Year Plan	63.00	63.00
B. GAP Phase II		
i) Additional pollution abatement schemes in 25 Class I towns already chosen under Phase I of GAP	80.00	40.00
ii) Additional schemes in Class I towns of Kanpur and Mirzapur to be financed by Dutch assistance (grants)	115.00	115.00
iii) Pollution abatement schemes in Class II & III towns on the main stream of river Ganga	30.00	15.00
iv) Pollution abatement schemes on tributaries on river Ganga	390.00	195.00
C. Schemes under Phase I of National River Action Plan	500.00	250.00
D. Research & Development, Publicity, Establishment	22.00	22.00
Total	1200.00	700.00

Innovations under Ganga Action Plan

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

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

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

Automatic water quality monitoring stations have been installed at 9 locations. The instruments have been manufactured in India. Imported components are presenting only about 8 percent of

the value of the stations.

A chrome recovery plant has been set up in a pilot tannery in Jajmau area of Kanpur with the assistance of the Dutch Government. This would not only stop the chromium from going to the river, but it will also recycle the chromium to the tannery. The cost of this plant is estimated to be recovered in 1.5 years.

It is proposed to set up improved wood crematoria under the Ganga Action Plan. They require only half of the amount of wood required in the conventional crematory. In addition to reducing the pollution of the river they would also save fuelwood.

Research activities under Ganga Action Plan

Under the Ganga Action Plan 48 there have been started University Research Projects by the 14 Universities in 1985-86, and they were completed in 1989-90.

The Ganga Action Plan (GAP) Research Committee has identified priority areas for applied research in order to achieve the overall objective of the Ganga Action Plan. Ten research projects are implemented by national research institutes and universities on water quality monitoring, modelling, pollution monitoring, resource recovery from sewage, ecorestoration and productivity improvement, and impact assessment of GAP schemes.

The pollution of the Ganga is monitored for physicochemical and bacteriological parameters by the Pollution Control Boards, and for heavy metals and pesticides by Industrial Toxicology Research Centre (ITRC), Lucknow. A review of the water quality data for the last four years reveals tangible improvement at towns like Hardwar and Allahabad, where majority of the diversion and treatment plants have been commissioned. In general the water quality is not yet meeting the bathing water criteria by Indian Council of Medical Research (ICMR), especially the microbiological criteria. The physicochemical and biological profile, and the baseline data have been completed and published.

In some places the amount of pesticides far exceeds the permissible limits. A research project by Indian Agricultural Research Institute (IARI) has been initiated regarding the pesticides application and intensity, and irrigation and cropping pattern. The objective is to optimise the use of these chemicals to minimise the environmental hazards and the residues in ground and river waters.

The national institutes like Central Soil Salinity Research Institute (CSSRI), Karnal and Indian Agricultural Research Centre (IARI), Pusa, Central Inland Fisheries Research Institute (CIFRI), Barrackpore and Madurai Kamaraj University, Madurai are taking up research projects such as recovery of nutrients from treated and raw sewage by growing fodder, fibre and pisciculture. The guidelines for design and operational criteria of these systems are developed simultaneously to safeguard the worker, consumer and the micro-environment.

An environmental impact assessment study for quantifying the benefit of the Ganga Action Plan

schemes at two important towns Varanasi and Nabadwip has been taken up by NEERI, Nagpur and All India Institute of Hygiene & Public Health (AIIPH), Calcutta. This project is co-sponsored by ICMR for the inputs on health consequences in addition to engineering aspects and cost analysis.

In the water quality modelling there have been developed four models by experts through sponsored projects from IIT, Bombay and Thames Water International, UK. They are applied at macro level and micro level in the fresh water stretch, and at macro level in the estuaries. The estuarine model is being calibrated through field studies. The predictions are made for water quality changes with the implementation of GAP schemes by using these models.

7.11 National Natural Resource Management System

The scheme of National Natural Resource Management System (NNRMS) involves utilisation of remote sensing technology for accurate inventory of resources such as land, water, forests, minerals, and oceans. This information will also be used for monitoring changes in ecological systems. Eleven projects have been sanctioned under this programme, and two projects have been completed.

The MOEF has constituted a Standing Committee on Bioresources and Environment with the following objectives:

- Examine and identify the key issues in the management of (including information systems) bio-resources and environment;
- Study the national requirements and identify the potential user/users for remote sensing technology;
- Identify improved methods for management of resources by integrating conventional surveys and remote sensing techniques and generate specific national programmes/projects for achieving the above;
- Identify the data sources required for NNRMS especially bringing out the requirement of remote sensing data; and
- Identify supporting research, training programmes, joint experiments and technology development/transfer for the above.

7.12 Research and Development

The national investment on research and development (R&D) activities attained a level of INR 3471.81 crores during 1988-89 (1% of GNP), and the estimate for 1989-90 is INR 4003.79 crores (GOI 1990a). The R&D in the field of environmental protection was 4.3 percent of the total R&D expenditure in 1988-89 (Table 7.121).

Table 7.121 Research and development expenditure by objectives for 1988-89 (GOI 1990a).

Objective	Percentage
Defence	20.6
Promotion of industrial development	16.8
Development of agriculture, forestry and fishing	15.4
Space	12.5
General advancement of knowledge	8.1
Production, conservation and distribution of energy	8.1
Development of health services	4.5
Protection of environment	4.3
Development of transport and communication	4.7
Others (Exploration and assessment of earth, seas, atmosphere; Development of education services; Social development and other socioeconomic services; Other aims)	5.0

7.13 Energy Conservation

According to Pachauri (1990) the Sixth Five Year Plan provided some impetus to energy conservation by giving it a priority. The energy consumption in India is higher than in many other countries e.g., because of the low price, obsolete technologies, and sheltered markets for inefficient energy utilization.

The Sixth Plan initiated measures for the development of energy consumption norms, conducting awareness programmes, and evaluating technologies on the basis of energy efficiency. It also recommended fiscal incentives for the capital investment needed to achieve higher energy efficiency and inter-fuel substitution. This was based on the recommendations of the Inter-Ministerial Working Group on Energy Conservation in 1981-82.

The recommendations of IMWG included setting up an apex organization for coordinating various energy conservation programmes, evolving energy conservation technology plans, initiating R&D activities in key areas, and creating a revolving fund for financing energy conservation activities. In the transport sector it suggested upgrading the quality of highways, training drivers, setting up model depot, and using better tyre technology. The Seventh Five Year Plan also emphasized the implementation of rectification programmes for agricultural pumpsets to achieve energy conservation in the agricultural sector.

Though the Seventh Five Year Plan identified energy conservation including inter-fuel substitution as one of the main elements of the country's future energy strategy, there has been no separate budget allocation in the plan for energy conservation nor there have been programmes or projects for conservation.

The Mid-Term Review of the Seventh Five Year Plan stated that energy conservation efforts had been marginal during the first half of the Plan. Although it did not incorporate any concrete programmes and policies for energy conservation, some concrete energy conservation measures have been taken at the national level in India (Table 7.131).

Table 7.131 Some energy conservation measures taken at the national level in India (Pachauri 1990).

Railways	Strengthening of institutional arrangements, regular training programmes and computerised monitoring of performance of individual locomotives. Accelerated phasing out of steam traction and procurement of fuel efficient kits, installation of capacitor banks at traction sub-stations. Regular energy audits, maintenance of locomotives and lowering of idling feature. Design modifications to reduce coach weight.
Road transport	A series of measures including operation control, proper stock accounting, upgrading drivers' skills, training programmes to create fuel conservation consciousness and proper use of clutches, reduction of body weight, speed restrictions and improved overhauling practices.
Steel	Specific energy consumption is being progressively reduced from 11.25 G Cal/tons of crude steel in 1986-87 to 10.14 in 1988-89 through a series of operational and equipment improvements. The industry envisages efforts to reach an energy consumption level of 7-8 G Cal/tons and 6-7 G Cal/tons in the years 1994-95 and 1999-2000 respectively.
Coal	Energy conservation is being undertaken through long wall mining, gallery blasting methods, pillars extraction, stowing and controlling mine fires.
Small-scale industries	Energy saving awareness among entrepreneurs is being provided by the Small Industries Development Organization (SIDO). SIDO has also installed a demonstration kiln for the ceramics industry.
Agricultural pumping	Efforts are being made to popularise monoblock pumpsets and the rectification of existing pumpsets.
Air conditioning and refrigeration	PU foam insulation is being taken up by the manufacturers.
Lighting industry	Fluorescent and sodium vapour lamps are being promoted.
Power Engineers Training Society	Training of engineers on efficient power plant operation and energy conservation.
Bureau of Indian Standards	Establishment of a multidisciplinary coordination cell for intensified interaction on energy conservation. Selected mandatory certification and marking of efficiency parameters.

7.14 Fiscal Incentives for Environment Protection

Subsidies for non-conventional energy

The Department of Non Conventional Energy Sources has a separate and extensive scheme of incentives. These incentives are limited to those schemes that are for generation of energy from non-conventional services, like solar energy, wind energy, biogas, etc. Another similar energy scheme is implemented by IREDA (Indian Renewable Energy Development Agency). The available benefits are briefly listed as follows:

- 100% Depreciation Allowance or written down value of energy saving devices;
- 30% Depreciation Allowance on written down value of devices used for promotion of renewable energy sources;

- Total exemption from Excise Duty;
- Total exemption from Customs Duty for energy generation equipment;
- Subsidies ranging from 100% to 33.33%; and
- Soft loan upto INR 25 lakhs from IREDA.

Modernisation assistance scheme

Financial institutions introduced a soft loan scheme for providing assistance to five selected industries (cotton, jute, sugar, cement and engineering) in their modernisation plans in 1976. Now this scheme extends to deserving units in all types of industries. This assistance is primarily for modernisation aimed at:

- Upgrading;
- Export orientation;
- Import substitution;
- Energy Saving;
- Anti-pollution measures:
- Conservation/substitution of materials and recycling/recovery of wastes;
- Improvement in capacity utilisation; and
- Improvement in material handling.

To be eligible the industrial enterprises should have been registered and been in operation for at least 10 years. In special cases a period under 10 years can also be considered. There is no specified maximum or minimum loan amount. Yet, the concessive rate of interest of 11.5 percent per annum is available only upto INR 40 million. An even lower rate of interest of 10 percent per annum is available for financially weak units. There is a flexible approach to the Debt Equity Ratio, and a reasonable contribution is expected from the industry concerned. These loans are disbursed by the following finance institutions:

- IDBI (Industrial Development Bank of India);
- IFCI (Industrial Finance Corporation of India); and
- ICICI (Industrial Credit and Investment Corporation of India).

Financial packages for effluent treatment schemes

ICICI has packages to finance effluent treatment facilities through two special schemes (PACT and TDIC). These schemes are focusing on effluent treatment of distilleries. PACT or Program for Advancement of Commercial Technology is a program, under which the preproduction R&D costs of innovative products/process like setting up a pilot plant are financed. The funds for PACT have been provided by USAID (United States Agency for International Development). Because the focus is on technology development, mere technology transfer does not qualify for assistance

under PACT.

The project should be below USD 1 million and the PACT contribution will be upto 50 percent of the project cost or USD 0.5 million, whichever is lower. If R&D is successful, a negotiated percentage of royalty is payable subject to a maximum of 200 percent of the PACT share in the project. In case of failure of the project there will be no obligation to repay the amount.

TDIC or Technology Development and Information Company Ltd. was promoted as a venture capital company by ICICI. It is providing finance for indigenous technology promotional ventures such as development and commercialisation of products/processes/systems and guidance and support services to entrepreneurs. Under this scheme the financial assistance is extended to projects involving development and/or commercialisation of new technologies, for which the promoters may not find funds from traditional sources due to high risks. The risk finance is available for:

- Commercial R&D involving development of a new technology or an innovative project;
- Implementation of a indigenously developed technology on a commercial scale; and
- Implementation of an innovative technology imported/transferred from an external source.

The initial aggregate investment in a typical project may not exceed INR 20 million. TDIC gives financial assistance by subscription to equity share capital and conditional loans. After successful completion of the project or after some time TDIC will sell its equity share with preference to the promoters. The conditional loans carry a charge limited to a level of sales generated by project after commercialisation. The extent of payment will depend on the success level of the project and is repayable after commercialisation. ICICI has been allocating its limited resources to several competing demands, like modernisation, energy conservation, productivity improvement, technology upgrading, anti-pollution measures etc. Therefore it was considered better to develop cost effective and efficient technologies for pollution control than simply to finance effluent treatment plants.

IFCI scheme for controlling pollution in villages and the small scale sector

Under this scheme consultancy fees are payable to a consultancy organisation for the preparation and implementation of a pollution control scheme in a village or small sector.

- INR 5000 or 50% of the fees, whichever is less, for consultancy only; and
- INR 7500 or 75% (whichever is less) for consultancy and implementation.

State Incentives

Gujarat State has an incentive, which is available only to the Small Scale Sector. The office of the Industries Commissioner gives a loan of 30 percent of the project costs or INR 40000, whichever is less. In addition a sum of 2 percent of the project cost is available as maintenance subsidy for a period of 5 years.

The Industries Department of the State Government of Tamil Nadu provides the following subsidies for the installation of effluent treatment plants for individual units:

- INR 25000 for civil contribution;
- INR 25000 for equipments; and
- INR 150/head/month for 2 persons for maintenance.

The State Government of Maharashtra provides incentives to industries set up outside the Bombay municipal region by exempting them from Sales Tax for one year, if pollution control equipment is installed.

Direct tax exemptions

Excise exemption

According to Panneer Selvam (1991a) in the Union Budget 1990-91 there was announced that the goods covered in the Schedule I (Annex IV) will only be liable to pay an excise of 5 percent ad valorem. This is subject to the condition that an officer not below the rank of Deputy Secretary in the Ministry of Environment & Forests certifies in each case that the goods manufactured are intended for Pollution Control purposes.

Exemption from income tax

The amount paid by a tax payer to any association or institution for programmes of conservation of natural resources will be allowed as deduction in the computation of taxable income. This is under Section 35 CCB, which has been added from June 1, 1982 to the Income Tax Act of 1961. Yet, this deduction is subject to the approval by the Department of Environment.

Depreciation allowance

Under the Budget of 1990-91 a Depreciation Allowance of 50 percent on devices and systems (Schedule II, Annex V) installed by industrial units for minimising environmental pollution, or for conservation of natural resources is permitted.

Exemption from capital gains tax

To encourage industries to shift from urban areas thereby reducing pollution, capital gains arising from transfer of buildings and from lands used for the purpose of business are exempt from tax, if these are used for acquiring lands or constructing buildings for the purpose of business at the new place. This provision also covers capital gains arising from transfer of machinery and plant.

Custom duty exemption

Under Section 25 of the Customs Act 1962 the Central Government exempts the goods specified in Schedule III (Annex VI) from any customs duty above 40 percent, and from all additional duty, when these goods are important for the purposes of safety in chemical industries or for the purposes of environmental pollution control. A certification for this exemption is required from the Department of Chemicals and Petrochemicals or from the Ministry of Environment & Forests.

Scheme for promotion of common treatment plants for small scale Industrial clusters**Objectives**

Industrial estates or other clusters of small scale industrial (SSI) units are polluting the environment, because some of them are unable to afford installation of pollution control equipment. In order to encourage the use of new technologies for Common Effluent Treatment Plants (CETPs) for existing SSI clusters there has been formulated a scheme for financial assistance for a period of five years from 1990-91 through 1995-96.

Criteria for consideration for assistance

- (i) Ordinarily, in an industrial estate or cluster of SSIs, one CETP will be promoted.
- (ii) Central assistance will be available only for clusters of SSIs set up prior to 1.1.1990.
- (iii) Projects for assistance will be prioritised on the basis of:
 - a) Toxicity of pollutants;
 - b) Pollution load treated; and
 - c) Number of units covered;
- (iv) The CETPs are to be set up and managed by the State Industrial Infrastructure Corporation (by whatever name known) or through an appropriate institution including a cooperative body of the concerned units as decided by the State Governments concerned;
- (v) The project should be self-financing for servicing of the loan and meeting operation and maintenance costs;
- (vi) The project must formulate adequate institutional arrangements for cost sharing, recovery

of dues and management and ensure observance of prescribed standards; and
 (vii) The scheme must have the technical recommendation of the State Pollution Control Boards.

Pattern of financial assistance

Central assistance of upto 25 percent of the total cost of the CETP would be provided as a grant to the Common Effluent Treatment Plants on the condition that the State Government gives a matching contribution. The remaining cost should be met with equity contribution by the industries and loans from financial institutions.

Central assistance will be provided only for the capital costs. No assistance will be provided for recurring costs. The assistance will be released in three equal instalments. The first instalment of 25 percent of the assistance will be released, when a body has been identified for the purpose of implementing the project, financial arrangements have been tied up, institutional arrangements have been finalised, consent has been obtained from the State Pollution Control Board and the State Government has committed its contribution. The second instalment of 50 percent and the last instalment of 25 percent will be released after utilisation of the previous money released and adequate progress of work subject to release of their proportionate shares by the State Governments. The second and last instalments will be released only when utilisation certificates for the previous instalments have been submitted and duly verified by the State Pollution Control Boards.

Central assistance will generally be limited to 25 percent of the capital cost of the project or to INR 25 lakhs, whichever is less. Yet, the assistance upto INR 50 lakhs can be considered subject to other conditions such as a matching grant of the State Government. When some components of the CETP are combined with the municipal systems, the municipalities have to pay their share of the cost.

Procedure

The project proposal will be submitted to SPCB, which will give the recommendation to the MOEF after examining it and after obtaining commitment from the State Government regarding its contribution. The technical, financial and institutional aspects of each project will be examined, and the Central and State Pollution Control Boards will monitor the progress of the schemes.

7.15 Trade In Environmental Services and Technologies (TEST) programme — USAID

The Trade in Environmental Services and Technologies (TEST) programme will target specific policies affecting both environmental and transactional costs in order to improve private sector

incentives and access to environmental services and technology.

While at the macro level the Government of India (GOI) environmental policy is fairly well founded and improving, at the implementation and enforcement level, the policies present numerous obstacles and a lack of incentives for the private sector. E.g., the current penalty regime for industrial waste emissions imposes full penalties for even minor violations. Since there is no penalty gradient (an approach, which has proven successful in attracting industry participation in other countries), there is no incentive for good faith attempts to comply with regulations and for partial success. In addition to environmental policies, high transactions costs impede access to services and technology. Transaction costs are those which, in addition to price, must be paid to benefit from a purchase. They include e.g., tariffs, time, effort, uneconomical restriction on use, and high collateral requirements.

In India one factor hampering progress on reforming high transaction costs is the acute shortage of foreign exchange necessary for importing. This shortage especially hampers would-be importers of "non-essential" goods and services — a category, in which eco-technologies such as productivity-enhancing biotechnologies, pollution abatement and energy efficient production processes currently belong. TEST will provide some immediate relief from the foreign exchange crisis facing environmentally-concerned private entrepreneurs.

The purpose of TEST is to facilitate the acquisition and use of environmentally positive services and technologies. Environmentally positive services and technologies (ESTs) respond to the need for environmentally safe and cost-effective ways to achieve growth targets in industry, agribusiness, natural resources management, health and other rapidly evolving sectors of the Indian economy. TEST is aimed at bridging the eco-technology gap existing in India by facilitating commercial linkages between U.S. providers and Indian entrepreneurs wishing to procure ESTs. It will help create a more positive regulatory environment by encouraging the formulation of market-oriented standards for compliance, which stress economic incentives rather than punitive action.

As part of this process TEST will work with the GOI to identify and reform policies that impede access by private firms to the growing array of commercially viable eco-technologies and services available in the U.S. These reforms might include a more progressive, incentive-oriented regulatory structure for business and industry, modelled after that in the U.S., or a revision of the tariff structure on ESTs, which currently fall into the heavily taxed, "non-essential" category for imports.

Expected accomplishment

TEST represents a new approach to merging USAID multiple objectives of sound environment, increased private sector involvement in development and expanded U.S. trade, to address issues of immediate host country and global concern. TEST will advance the Agency's commitment to environmentally sustainable development by responding to India's growing need for environmentally friendly-technologies that reduce the threat of ecological disaster while promoting economic growth. TEST will encourage Indo-US. trade in an area of potentially high consumer

demand and growing U.S. capability. The USAID will be examining, how it can adjust its standard practices to reflect commitment to doing business in new areas. This will take place by putting into practice a creative approach for modifying the Commodity Import Program (CIP) mechanism to include environmental services and to reduce USAID's role in implementation.

TEST programme procedure

TEST will operate as a grant-funded programme with three components:

1. USAID grant of USD 24 million to India, disbursed as the GOI undertakes necessary reforms to promote acquisition and use of ESTs;
2. Indian private sector entrepreneurs' purchase of dollars with rupees; rupees are deposited in a special GOI-owned programme account and allocated by mutual GOI/USAID agreement to Indian programmes, which support TEST objectives; and
3. Indian private sector entrepreneurs' expenditure of dollars for EST imports from the U.S.

In addition it is likely that TEST will have a relatively small project component to facilitate achievement of the programme objectives. USAID will release the USD 24 million grant for EST imports in probably two or three allocations, disbursing the funds to either the Reserve Bank of India or to the Indian institution implementing the programme as the GOI identifies, in collaboration with USAID, and then undertakes a process of policy reform concerning the importation and use of ESTs.

Importation of environmentally positive services and technology

By using dollars purchased with rupees the entrepreneurs will import discrete environmental services or technologies from private vendors in the U.S. The entrepreneurs will choose eligible ESTs based on their own needs. Identification of ESTs eligible under the programme will start with the market analysis and continue during the programme design. The eligible list could be expanded or revised as implementation proceeds. To support the chances for sustainable adoption by the entrepreneurs, the design will emphasize identification of ESTs, which demonstrate high short-term profitability such as material recycling and energy conservation systems design. The preferred target group for the programme, tentatively identified as medium-scale entrepreneurs, will be examined by the market analysis and confirmed during the programme design.

Generation and programming of local currency

Once the dollars are disbursed to India, they will be purchased by Indian entrepreneurs with rupees, which will in turn be deposited into a special programme account. Upon GOI/USAID mutual agreement these rupees will be programmed for activities or programmes to support TEST

objectives.

Project component

To support implementation of TEST there will probably be a relatively small project component (tentatively budgeted at USD 6 million) to do one or more of the following: heighten consumer awareness about the benefits of ESTs available from the U.S.; develop and update a list of eligible ESTs for financing under the programme, promote Indo-US. linkages for procurement of ESTs, provide technical support to the implementing agency for managing the programme, contract for a TEST programme manager in USAID, conduct policy studies and dialogue, and/or establish a USAID-administered trust fund.

Implementing agency

It is quite likely that one of India's development finance institutions or commercial banks, with experience in technology acquisition, will implement the import side of the programme. The Ministry of Environment & Forests will likely play a role in TEST's policy reform aspects. If necessary, technical assistance will be provided to the financial institution to facilitate procurement. Indian and U.S. private firms or voluntary organizations could be called upon to help promote ESTs.

Monitoring and evaluation

In addition to implementation performance TEST will be monitored and evaluated on such criteria as:

- 1) policy and regulatory changes;
- 2) reduced transaction costs for the acquisition of ESTs;
- 3) the pace of introduction of ESTs into the Indian marketplace; and
- 4) improvements in compliance with government standards for air and water quality or waste management.

Policy and project issues

TEST will involve selected policy issues related to EST import impediments, programming of the rupee funds generated from the purchase of foreign exchange, and the possibility of some concession in the procurement of ESTs. The Ministry of Environment & Forests, as an advocate for reduced import restrictions on select ESTs and for the reformulation of policies and regulations, will be crucial in determining the programme success. Ultimately, the key issue is the receptivity of the GOI to undertaking, with USAID, a process for reforming policies and regulations concerning ESTs. Another issue in the design of TEST will be consumer demand for ESTs in India — both current

and anticipated — and the ability and willingness of private U.S. firms to supply them.

7.16 Industrial Pollution Control — The World Bank Project

The project was negotiated in March 1991 and will become effective by the end of 1991 (NOPEF 1991).

Project objectives

The specific goals of the project are:

- 1) to promote effective enforcement of existing legislation on environmental production regarding industrial sources;
- 2) to support efforts by industry to comply with existing environmental regulations, including a special effort designed to reach the small scale sector through the setting up of common treatment facilities; and
- 3) to support assessments and research in pollution abatement in industry as well as the preparation of environmental studies for location of future industrial sites.

Project description

The project will focus on the chemical and related industries including: fertilizer, leather tanning, dyes, pesticides and insecticides, pharmaceuticals, petrochemicals, pulp and distilleries.

Many industries have already installed facilities for pretreatment, typically settling tanks. Yet, in most cases the units fail to operate properly due to improper management and maintenance of the facilities. MOEF has estimated that 45 percent of all plants in the sector have yet to comply with the environmental regulations. The Indian industry is to a large extent grouped in industrial estates of variable size. The largest estates were established 20 to 30 years ago, and are generally located in the western and southern states of India. The number of industrial units at these estates varies from 10 to 20 large units, and up to more than one thousand small and medium scale industrial units at each estate.

The location of many of the small industries in clusters suggests that an economical treatment can be obtained through the construction of common effluent treatment plants (CETP's). Special funds are thus earmarked for construction and operation of CETP's. The CEPT seems to be most pervasive in industries such as pulp and paper, leather tanneries, pesticides and sugar-distilleries while the remaining industries most likely will be object to individual effluent treatment plants. Yet, due to a very "unstructured" location of the industrial units within the estates, and due to the fact that a major part of the effluents contain hazardous elements, pretreatment and separation facilities will have to be installed. At least one hazardous waste treatment facility will have to be constructed

in order to treat the separated hazardous elements. Thus a hazardous waste treatment plant will be the nucleus of a new project: Industrial Pollution Control II, which will be implemented parallel to this project.

Executing agencies

- Ministry of Environment and Forests;
- Central Pollution Control Board of India;
- Pollution Control Boards of Gujarat, Maharashtra, Tamil Nadu and Uttar Pradesh;
- Industrial Credit and Investment Corporation of India (ICICI); and
- Industrial Development Bank of India (IDBI).

The Ministry of Environment and Forests has the overall responsibility of the project. ICICI and IDBI will be disbursing loans for subprojects in the four states.

Project cost

Total project cost: USD 260 M

Total World Bank participation: USD 155.6 M

Total foreign cost: USD 56.1 M

Project components

The project comprises three components:

- A) Enforcement Component;
- B) Investment Component; and
- C) Technical Assistance.

A) Enforcement Component (Institutional Building)

Aim: to strengthen the Central and State Pollution Control Boards.

Estimated Cost: total USD 18 M, foreign USD 9.1 M

The component will finance:

- training programme in technical and managerial skills;
- acquisition of analytical and monitoring equipment designed to meet the minimum

workloads of the Boards; and

- various facilities: remote sensing stations, mobile stations, monitoring network, measures to ensure adequate environmental control inside laboratories, and refurbishing specialised rooms.

This part of the project is focusing on four states with intentions of replicating the project in other parts of India. The four target states are: Gujarat, Maharashtra, Tamil Nadu, Uttar Pradesh.

The cost of laboratory equipment is expected to be USD 24 M, of which the bulk is expected to be procured under ICB subject to a proposed minimum threshold of USD 200000. Below this amount the procurement is expected to follow commercial practices acceptable to the bank. For contracts below USD 50000 the procurement agent would have to evaluate quotations from at least three qualified suppliers. The responsibility for procurement under this component will be an implementation unit and the IDBI.

B) Investment Component (Term Lending)

Aim: to support efforts in industry to comply with environmental regulation, including support of common effluent treatment plants.

Estimated costs: total USD 237 M, foreign USD 43 M.

The Investment Component covers:

B1. Common Effluent Treatment Facilities

Total costs: USD 60 M (local USD 54 M, foreign USD 6 M)

B2. Individual Plant Treatment and Control Facilities

Total costs: USD 167 M (local USD 134, foreign USD 33 M)

B3. Special Projects and Demonstration Projects

Total costs: USD 10 M (local USD 6 M, foreign USD 4 M)

Contracts exceeding USD 8 M will follow ICB procedures. Other contracts will follow internal procedures accepted by the the World Bank. This practice requires that subproject sponsors solicit three quotations. For all contracts, where ICB is required a 15 percent preference on the c.i.f. price of imported goods will be given to local suppliers.

C) Technical Assistance Component

Aim: to assist the executing agencies in evaluation of environmental problems.

Estimated costs: total USD 5 M, foreign USD 4 M.

The component will finance: pilot plants, R&D, feasibility studies, studies for location of future industrial sites. The procurement will follow mainly ICB procedures.

Implementation and disbursements

The loan will become effective by the end of 1991, and the estimated disbursements are shown in Figure 7.161.

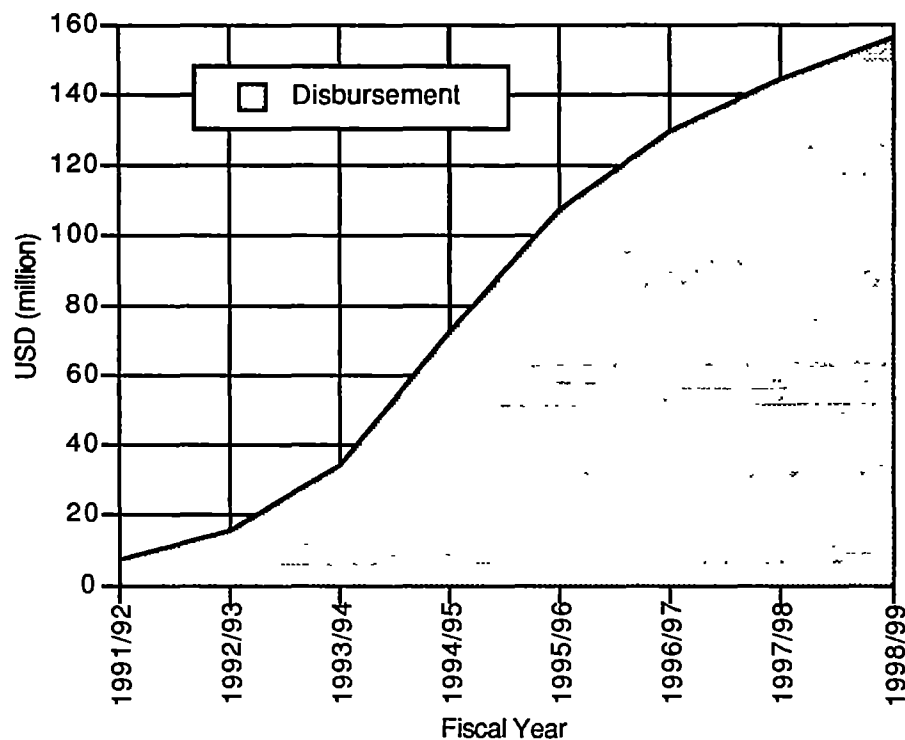


Figure 7.161 The World Bank loan disbursement 1991/92-1998/99 (NOPEF 1991).

The World Bank loan will be disbursed as follows (Figure 7.162):

The total World Bank involvement is USD 155.6 M, which consists of a standard IBRD loan at USD 124 M and an IDA credit at USD 31.6 M. The funds will be transferred to the Government of India, which will forward the funds to the three parties involved:

- Central Pollution Control Board, which will be in charge of USD 12.6 M, set aside for the upgrading of the Central and State Pollution Control Boards;
- IDBI, which will be in charge of USD 16 M, allocated for common effluent treatment plants and special projects. IDBI will also disburse USD 74 M for the individual plant treatment facilities and USD 1.5 M for Technical Assistance; and
- ICICI, which will disburse USD 50 M for individual plant treatment facilities.

The above mentioned organizations will be approving the subprojects and loans for individual and common projects. The National Energy and Environmental Institute (NEERI) will also be approving larger subprojects.

Possible Nordic Involvement

The Nordic involvement in this project can take place within all components. Yet, the following areas are the most obvious for participation for the Nordic industry:

Enforcement Component:

- analytical and monitoring equipment for the Pollution Control Boards and training in relation to the delivered items.

Investment Component (primarily Individual Treatment Plants and Special Projects):

- equipment for individual treatment plants (air & water);
- equipment for pretreatment, especially oil separation, sludge, heavy metal separation;
- equipment for pretreatment at small plants with less than 10 m³ of wastewater a day (not necessarily biological);
- testing and control equipment.

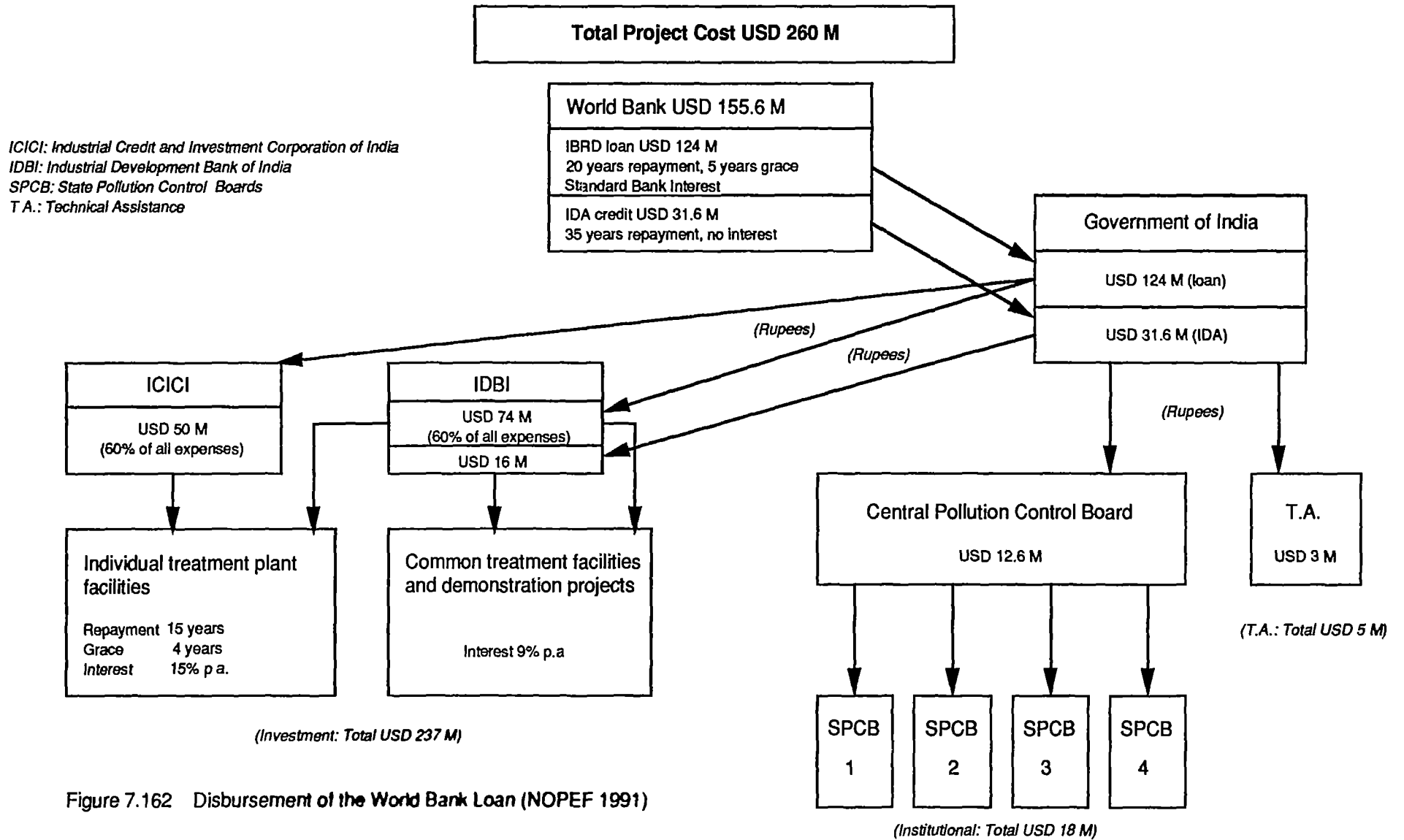


Figure 7.162 Disbursement of the World Bank Loan (NOPEF 1991)

8. COOPERATION WITH EXTERNAL SUPPORT AGENCIES

8.1 Externally Supported Projects In the Environment and Forestry Sector

The main sources of external assistance in the forestry and environment sector are the World Bank, SIDA, The Netherlands, ODA, Japan, USAID, CIDA, Danida, UNDP, Germany, ADB, and EEC. In addition the Ministry has MOU/Protocol for cooperation in the environment sector with countries like New Zealand, CIS, and France.

The external assistance in the environment and forestry sector has been limited mainly to Wasteland Development Board (NWDB) and to the Ganga Action Plan. Discussions have been initiated with various countries for assistance in the environment sector, and a large number of projects are in progress for implementation. It was observed that there have been avoidable delays in processing the proposals in the Ministry, and a detailed review was taken up by JS(P&IC). For preventing such delays the Establishment Division has issued an Office Order dated 24 October 1990 whereby the International Cooperation Division will restrict its activities to ascertain the views of the donor agencies, coordinating projects till they are finally agreed by the donor agencies and to monitor the progress in implementation for briefing the senior officers, and for annual aid consultations etc. International Cooperation activities with regard to afforestation programmes and the activities related to Ganga Action Plan are being independently dealt with in NWDB and in the Ganga Project Directorate (GPD) respectively.

The Ministry of Environment & Forests serves as the nodal agency in the country for the United Nations Environment Programme (UNEP), South Asia Cooperative Environment Programme (SACEP), International Centre for Integrated Mountain Development (ICIMOD), and the International Union for Conservation of Nature and Natural Resources (IUCN). Financial contributions are made to these organisations, and efforts are made through active participation to obtain adequate benefits. The Ministry and its agencies have undertaken projects with the collaboration of UNEP, the World Bank, European Economic Community (EEC), South Asian Association of Regional Cooperation (SAARC), Canada, United States of America (USA), Sweden, Norway, Denmark, United Kingdom (UK), the Netherlands and Germany. The Ministry has also signed Memorandum of Understanding (MOU)/protocol for cooperation in the environment sector with countries like New Zealand, France and CIS. The details of international co-operation are as follows:

8.2 Asian Development Bank

The Asian Development Bank (ADB), besides providing loans, also gives technical assistance. The ADB have agreed to support the project on Review of Environmental Laws in India. The ADB has agreed to consider funding the project on pollution control on the lines of the World Bank project regarding agrobased industries in consultation with IFCI.

The ADB has also shown interest in supporting project on Improvement of Environment Impact Assessment Capability, for which a proposal will have to be formulated. ADB is also considering a proposal for setting up an Institute of Land Management in U.P.

8.3 Australia

Australia has announced a Development Assistance Programme of AUD 35 million over a 3 year period starting from 1991. During the year 1990-91 an agreement under Indo-Australian Cooperation was signed for development assistance programme. The specific areas identified for assistance in the environment sector are as follows:

- Recycling technology;
- Chlorofluorocarbon (CFC) alternatives; and
- Industrial effluent treatment.

8.4 Canada

The Canadian (CIDA) assistance for one social forestry project in A.P. was INR 35.35 crores. This project was completed in March 1991. The Canadian High Commission has informed the GOI that although Canada is very keen on supporting projects in the environment sector, most of their grant assistance is tied up for major projects like hydropower.

The CIDA assistance for the Social Forestry Project in Andhra Pradesh continued during the year 1990-91. CIDA is also considering to support a project of Indian Farmers Fertilizer Cooperative Ltd. (IFFCO), and a project of National Dairy Development Board (NDDB). CIDA has also shown interest in supporting project on ecological restoration of Chilka lake in Orissa.

8.5 Denmark

Denmark provides assistance to India in the form of soft loan, grant and technical assistance. The Danish Fact Finding Mission has visited India during September 1988, and identified certain areas for bilateral cooperation. DANIDA is keen on concentrating their activities in Karnataka and Tamil Nadu.

The projects proposed under Danish assistance are focused on studying specific problems. The Danish Mission has visited the States of Karnataka and Tamil Nadu in October 1990, and has identified specific proposals. The proposals are being taken up in consultation with the concerned State Governments.

8.6 European Economic Community

The European Economic Community (EEC) provides assistance under Financial and Technical Cooperation Agreement. Three ambient air quality monitoring stations have been set up with EEC assistance of INR 14 million. An agreement was signed between GOI and EEC in April 1989 for assistance to South Bhagirathi Integrated Watershed Management Project in Tehri district, U.P. The total cost of the project will be INR 28.71 crores, and it is expected to be completed within 7 years. The EEC contribution will be Rs 14.17 crores. Under the 1989 assistance EEC has approved a project on greening Aravali Hills in Haryana. This project involves afforestation of the common wastelands. The EEC contribution will be INR 40 crores.

A project on air quality monitoring with the EEC assistance in the Central Pollution Control Board continued during the year 1990-91, and three ambient air quality monitoring stations have been set up.

8.7 Germany

The Government of Germany provides about DEM 85 million annually under Capital Aid Programme for Rural Development and Environment sectors. It has been indicated, that DEM 15 million are earmarked for projects in forestry and environment sectors, and if suitable projects are available, more funds can be provided under Capital Aid Programme. There is considerable gap in the assistance available and the projects taken up with German assistance. The project on strengthening of laboratories of the Central and State Pollution Control Boards was launched in June 1985 with German assistance. The 2nd phase of this project was approved in November 1989 with German assistance of DEM 5.35 million till March 1992. The GOG has offered assistance for financing specific projects for adopting CFC substitutes.

The GOG also provides scholarship in the field of forestry and environment. A proposal for strengthening the PCBs on the lines World Bank projects is under consideration for German assistance. The assistance for strengthening of laboratories for Central and State Pollution Control Boards continued during the year 1990-91. An amount of DEM 10 million has been earmarked by the Government of Germany for an integrated project on development of Changar area in Himachal Pradesh under Indo-German Cooperation. The total project cost is estimated to be INR 18.71 crores.

8.8 Japan

Bilateral cooperation with Japan in the environment and forestry sector has been started recently. Japan offers assistance through loan (OECF, Overseas Economic Cooperation Fund), grant and technical assistance. The Japanese International Cooperation Agency (JICA) also undertakes feasibility studies on the request of the host country. For OECF loan the project has to have a minimum outlay of JPY 1000 million (INR 19 crores).

Japan has shown interest in undertaking studies on sugar factories, thermal plants etc. The concerned State Governments/Pollution Control Boards are to examine the offer and to submit suitable proposals.

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

8.9 Netherlands

The Projects under Indo-Dutch cooperation are related to: (a) pollution abatement; (b) pollution control; (c) industrial counselling; and (d) institutional strengthening. The Dutch grant to the GOI amounts to NLG 200 million, out of which 15 percent has been earmarked for environmental sector. A Joint Working Committee (JWC) as per Memorandum of Understanding (MOU) has been constituted for identification, coordination and implementation of the projects.

Nineteen schemes in Kanpur and Mirzapur under Ganga Action Plan were sanctioned with Dutch assistance, out of which 16 are functioning. Besides Ganga Action Plan three on-going projects viz.: (a) Environmental Impact Assessment Workshops; (b) Bio-monitoring of River Yamuna; and (c) Training on Eco-toxicology are being implemented.

In the context of the Ganga Action Plan the following four areas have been identified:

- integrated sanitation project for Jajmau area in Kanpur, U.P.;
- integrated sanitation project for Mirzapur, U.P.;
- study of the existing processes employed by major polluting industries such as pulp and paper, sugar, tanneries, petroleum, fertilizer, distilleries etc. to suggest changes in the manufacturing process, in plant water use and recycling of wastewater; and
- manpower development and organisational development of personnel.

During the year 1990-91 under Indo-Dutch cooperation there were being contemplated ten new projects mostly relating to industrial counselling in various industries like leather tanneries, fertilizers, textiles and fly-ash utilisation and disposal. It was recommended for the Indo-Dutch Programme (The Royal Netherlands Embassy 1990) that the introduction of clean technology in India would include four major components and various institutions:

- I. Economic assessment and financial implications (industries, Government departments);

- II. Demonstration by pilot plants and dissemination of successful results (industries, branch organizations, consultants, research and development institutes and pollution control boards);
- III. Modification of standards and legislative enforcement (pollution control boards); and
- IV. Human resource development by training (industries, consultants, pollution control boards);

An environmental programme has been developed based on the policies of the Governments of India and the Netherlands. The selection criteria for environmental projects are as follows:

- ecological relevance;
- priorities and needs as expressed by the Ministry of Environment & Forests of the Government of India and expertise available in the Netherlands for the proposed projects;
- concentration of activities in a limited number of states (Uttar Pradesh, Andhra Pradesh, Gujarat, Kerala and Karnataka) and preference for the integration with on-going activities in the other sectors of the bilateral Indo-Dutch Programme, which includes Water Transport, Drinking Water Supply & Sanitation, Irrigation and Women & Development; and
- avoidance of duplication with the activities of other international cooperation programmes in India.

Specific fields for environmental projects are related firstly to the projects dealing with water and soil pollution abatement, secondly to preventive actions and nature conservation, and thirdly to institutional strengthening:

1. Pollution abatement is concerned with monitoring and control of municipal and industrial pollution;
2. Preventive actions and nature conservation are intended to ensure sustainable development by the introduction of clean technology through industrial counselling projects and by strengthening the Indian planning strategies through Environmental Impact Assessment and Regional Integrated Environmental Action Programmes; and
3. Activities described under 1. and 2. have a common overall objective, which is to contribute to the autonomous development of India. This is sought to be realised by the transfer of technology and know-how to environmental institutes (e.g. Technical Institutes, Central and State Pollution Control Boards, Consultants and Environmental NGO's), either through specific projects (institutional strengthening projects) or as an integrated component of environmental projects.

8.10 Norway

The annual assistance of Norway to the environment sector has been indicated to be NOK 10

million for a period of 2-3 years from the total assistance of about NOK 70 million. After carrying out studies in many states NORAD in consultation with the MOEF has decided to concentrate its activities in Orissa. A NORAD Mission has also visited Bhopal in May 1990 for a feasibility study of assistance to Disaster Management Institute, Bhopal.

In 1983 India and Norway signed a Memorandum of Understanding agreeing to identify sectors for future environmental cooperation. The parties concluded that problems connected to industrial pollution would be the most suitable area of cooperation in the field of the environment. Considering the limited resources available NORAD has decided to concentrate a substantial part of the assistance to one or two Indian States. It was also decided to prolong the agreed policy to concentrate on environmental problems related to industrial activities.

A mission (NORAD 1990) was appointed to carry out a study to outline a strategy for environmental assistance from Norway to Orissa, and to identify potential projects relevant to industrial pollution problems. The mission proposed 4 outputs and related activities:

Output 1: The Government of Orissa made permanently capable of taking adequate actions to reduce the environmental problems assessed during the NORAD environmental programme and to deal with other relevant environmental issues.

Activities:

- a. Carry out the project "Strengthening of the State Pollution Control Board";
- b. Use the NGOs to arouse public awareness;
- c. Study the economic measures and incentives for investment in pollution control;
and
- d. Study pollution problems related to industrial estates.

Output 2: Professional resources competent to carry out environmental studies developed in such a way that pollution abatement is not prevented by lack of information on discharges or environmental impacts.

Activity:

- e. Carry out the project "Centre for Environmental Studies";

Output 3: Knowledge acquired on waste management, industrial discharges and impacts on the environment and human health in the Angul/Talcher area so that proper pollution abatement and waste handling action can be taken.

Activities:

- f. Carry out the project "Environmental Assessment of the Angul/Talcher Area"; and
- g. Carry out the project "Waste Management Plan for Angul/Talcher Area";

Output 4: Sufficient information acquired about discharges and impacts on the environment and human health connected to chromium-based industry and mining in Orissa in order to be able to compile systematic plan for pollution abatement.

Activity:

- h. Carry out the project "The Chromates Study".

The different elements of the strategy are partly interconnected, and would give the best results if implemented as a package with specific phasing. A common programme management will probably be necessary to co-ordinate the activities and to avoid duplication.

8.11 Sweden

The Swedish assistance in the forestry sector during the last decade has been around INR 370 crores, and the current commitments for various on-going/pipeline projects amount to INR 210 crores. The Swedish assistance has so far been the largest among the bilateral donors. SIDA is assisting the State Governments of Tamil Nadu, Orissa and Bihar in their social forestry projects. All three projects are in the 2nd phase and Swedish assistance amounts to SEK 330 million, SEK 150 million and SEK 157 million respectively.

The Swedish International Development Agency (SIDA) has also shown considerable interest in strengthening the forestry institutions in India. An agreement was signed in March 1989 for assistance of SEK 37 million for Indian Institute of Forest Management (IIFM), Bhopal. This amount was meant for training, curriculum development and improvement of the campus. The SIDA has, however, insisted that utilisation of this assistance could commence only after a full time Director is in position. So far the SIDA assistance has been only used for fellowship of the students. SIDA has also agreed to support seven seminars on Forestry Sector Administrative Development. These seminars will be coordinated by IIFM in consultation with the MOEF and the concerned institutions. The first seminar on 'People's Participation in Forestry Management' was held in Bhubaneswar from 21-23 January 1991.

In 1990-91 a project proposal for National Forest Data Management Centre (NFDMC) under SIDA assistance is being formulated. The areas identified in environment sector under Indo-Swedish Cooperation are as follows:

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

Formulation of the project proposals on these areas has been taken up. For pollution control training, the States of Andhra Pradesh, Maharashtra and Kerala were identified. A project document for support to the existing Centre in Hyderabad with an estimated Swedish assistance of INR 2.43 crores has been prepared, and the project was expected to commence in April 1991.

A Swedish Mission had visited 3 paper and pulp industries in India, and their report has been received. This project is expected to be ready for implementation in mid-1991. The strengthening of PCBs of Kerala and Maharashtra with Swedish assistance, and a project relating to hazardous waste management will be taken up for formulation after April 1991.

Up to 1990 India has received in total SEK 5000 million in development aid through SIDA (SIDA 1991). The sectoral composition and general direction has changed considerably during the 1980s. Commodity aid has gradually been replaced by project and programme support. The project support has increasingly been utilised for social programmes and for projects, which would improve the environment. All funds through SIDA are given on grant basis. The funds are not tied to procurement in Sweden, except for some projects in the energy sector, which were agreed before 1990. The Indo-Swedish cooperation is now concentrated on six major sectors:

- Social Forestry and Wastelands Development;
- Primary Health;
- Rural Drinking Water and Environmental Sanitation;
- Elementary and Non-Formal Education;
- Energy; and
- Pollution Control .

Pollution control is a new sector in the Swedish development cooperation with India. Funds will initially be utilised for improving the system for pollution control in the pulp and paper industry, for training of environment inspectors, and for research. SIDA also supports an export promotion project and provides direct support to Non-Governmental Organizations (NGOs), in particular those promoting women's development. Table 8.111 shows the sectoral distribution of the bilateral aid through SIDA during 1990.

Table 8.111 Sectoral distribution of the bilateral aid through SIDA during 1990 (SIDA 1991).

Sector	SEK (agreed amounts, million)	%
Social Forestry and Wastelands Development	656.5	28
Primary Health	566.6	24
Rural Drinking Water and Environmental Sanitation	261.0	11
Elementary and Non-Formal Education	52.0	2
Energy	770.9	33
Export Promotion	34.0	1.5
Consultancy Services and Short Term Training	14.0	0.5
Total	2 355.0	100

8.12 United Kingdom

Under Indo-UK Cooperation the British Government have announced an additional grant of USD 40 million over a five year period for environment and forestry projects in India. In forestry sector most of the projects supported by the ODA are concentrated in Karnataka. ODA is co-funding with the World Bank a social forestry project in Karnataka having the total cost of USD 56.6 million. This project was completed on 31 March 1991. A research project with assistance of USD 1.59 million on research into effects of Fast Growing Tree Species is going on in Karnataka and it has been agreed to extend the project upto 1991. The main objective of this project is to find out the effects of Fast Growing Tree Species, particularly eucalyptus on soil and water. ODA is also supporting a programme on raising captive plantations in an area of 1.4 lakh ha. for meeting the raw material needs of the Mysore Paper Mills. The ODA assistance to the project amounts to UKP 10.35 million.

As mentioned above, the British Government have announced an additional grant of UKP 40 million over a five year period for environment and forestry in India. Out of this grant INR 125 crores has been allocated for the Western Ghats Forestry Project in Karnataka. The project was completed by 1 February 1991. ODA has also proposed to take up environmental forestry projects in H.P. and U.P. hills within this grant. The British High Commission have also expressed its willingness to support the strengthening of recently started forestry research institutions under Indian Council of Forestry Research and Education (ICFRE). The ODA Missions have visited India and held discussions with the concerned authorities with regard to the following proposals: i) Wood Science and Technology Institute, Bangalore; ii) Forest Genetics and Tree Breeding, Coimbatore; iii) Establishment of Forestry Information and Record Service, at Forest Research Institute (FRI), Dehra Dun; and iv) Assistance to Forestry Training and Education.

In the environment sector the British consultants are assisting the Government of Tamil Nadu for formulating a detailed technical report for a project on cleaning of Cooum, Adyar, and Buckingham Canal Waterways in Madras. The project prepared by the National Chemical Laboratory, Pune for the development and testing of possible substitutes to CFCs is proposed to ODA for technical and financial assistance. Thames Water International is providing technical assistance for the implementation of schemes in the areas of water quality monitoring, sewerage & sewage treatment

systems and training. This assistance is being provided by ODA for the Ganga Action Plan.

British consultants are providing assistance to the Government of Tamil Nadu for formulating a detailed technical report on cleaning of waterways in Madras. ODA is also contemplating providing financial assistance for the project of development and testing of possible substitutes of chlorofluorocarbons (CFCs) prepared by the National Chemical Laboratory, Pune. Financial and technical assistance for implementation of schemes on water quality monitoring sewerage and sewage treatment systems and training under Ganga Action Plan is provided by ODA. The UK Government has also offered 90 slots for training under Colombo Plan in Forestry and Environment sector.

8.13 UNDP/FAO

Modern Forest Fire Control Project and assistance to Wildlife Institute of India undertaken with UNDP assistance under Country Programme (CP-III) have been completed during the year 1990-91. Under Country Programme (CP-IV) the following projects have been identified for UNDP assistance:

- Assistance to Indian Council of Forestry Research & Education (ICFRE);
- Assistance to Wastelands Development;
- Assistance to Wildlife Development; and
- Preparation of National Forestry Action Programme.

8.14 UNEP

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

8.15 United States of America

The bilateral cooperation with USA falls in two categories: (i) assistance under USAID; and (ii) assistance under US-India Rupee Fund. USAID is co-funding with the World Bank the National Social Forestry Projects in the States of H.P., U.P., Rajasthan and Gujarat. The USAID assistance for these projects amounts to USD 79 million over a 5 year period.

For US-India Rupee Fund there is a Indo-US Joint Commission having sub-commissions for different sectors. The 9th subcommission on Science and Technology has met in November 1987. Under this sub-commission there is a Working Group on Environment and Ecology, which

considers proposals in the field of environment. A number of research studies have been taken up by the Wildlife Institute of India and the Bombay Natural History Society in collaboration with the US Wildlife Conservation on the ecology of wildlife, endangered species and their habitats.

The Trade in Environmental Services and Technologies (TEST) programme will target specific policies affecting both environmental and transactional costs in order to improve private sector incentives and access to environmentally friendly services and technology (See: Chapter 7.15).

8.16 World Bank

The World Bank through the International Development Association (IDA) is assisting social forestry projects in collaboration with bilateral donors in five States with an outlay of USD 345 million. The World Bank has also offered assistance for forestry research, education and training, for which services of the World Bank a consultant has been requested to finalise the project. The WB is conducting sectoral studies on afforestation in Maharashtra and West Bengal. The WB has also offered assistance for industrial pollution control projects in Tamil Nadu, Gujarat, Maharashtra and U.P. with INR 280 crores.

The MOEF has also formulated a project proposal for World Bank assistance on industrial pollution control with the following components (See: Chapter 7.16):

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

The World Bank is also assisting Ganga Action Plan with INR 63 crores till 1996. Proposals to the extent of INR 40 crores have already been approved by the World Bank, and they are at various stages of execution in all the three states covered by the Ganga Action Plan.

9. CONCLUSIONS AND RECOMMENDATIONS

The current outlook of India's economy is not very promising. The balance of payments, large budget deficits, and double digit inflation has been putting a very high pressure on the economy over the past few years. Although the policy is to try to encourage the participation of foreign companies in the industrial development, especially in sophisticated technologies and substantial exports, and although there have been several procedural simplifications in recent years, there still exist some obstacles that are not favouring the foreign investors.

The environmental problems are tremendous in India: land degradation; soil loss; deforestation creating water scarcity and droughts in some areas, and also increased problems of floods; the fact that almost all the total utilisable water resources will be in use by the year 2025; increasing pollution of both surface water and groundwater resources; and several serious problems in urban areas — water scarcity and pollution, transport congestion, air pollution, unhygienic living environment due to lack of sanitation, and shortage of housing presents a huge challenge for the available resources.

Yet, the government is increasingly conscious of the environmental problems, and the last few years have been used for institution building in the sector. Currently India has a fairly well developed institutional framework for environmental management. Yet, it is excessively centralised and bureaucratic. India does not have an explicit national environmental policy. Instead most natural resources and their management are governed by separate national policies each administered by different ministries and departments. At the implementation and enforcement level these policies present numerous obstacles. There is also a lack of incentives for the private sector, and high transactions costs impede access to services and technology that should be imported.

One constraint regarding high transaction costs is the acute shortage of foreign exchange necessary for importing. This shortage especially hampers would-be importers of "non-essential" goods and services — such as environmentally sound production technologies, productivity-enhancing biotechnologies, pollution abatement and energy efficient production processes.

Environmental degradation in India can be partly attributed to the inappropriate knowledge and educational base in the country. Apart from public health engineering there are no areas, in which systematic professional training in environmental education is given.

Several new laws have been introduced and older ones revised in recent years. There are more than 200 central and state laws today that can be interpreted to protect the environment. The legislation that has environmental conservation objectives has brought into force after 1972: the Wildlife (Protection) Act, 1972; the Water (Prevention and Control of Pollution) Act, 1974; the Forest Conservation Act of 1980; the Air (Prevention and Control of Pollution) Act of 1981; and the Environment (Protection) Act of 1986.

The government has also paid attention to the incorporation of environmental concerns in the planning of major development activities. Environmental Impact Assessment (EIA) procedures are

now applied to all major development projects in the public sector, and to hazardous industries as identified by the Ministry of Environment.

The external assistance in the environment and forestry sector has been limited mainly to Wasteland Development Board and to the Ganga Action Plan. Discussions have been initiated with various countries for assistance in the environment sector, and a large number of projects are in progress for implementation. The main sources of external assistance in the forestry and environment sector are the World Bank, SIDA, the Netherlands, ODA, Japan, USAID, CIDA, DANIDA, UNDP, Germany, ADB, Australia, and EEC. In addition the Ministry of Environment & Forests has Memorandum of Understanding or Protocol for cooperation in the environment sector with e.g., New Zealand, CIS, and France.

The recommendations for the possible action framework for Finnish-Indian cooperation activities in environmental sector are as follows:

Overall Strategy

The strategy at this stage should have focus on feasibility studies and on the preparation on more detailed project documents in collaboration with the relevant Indian authorities. It is also recommended that Finnish International Development Agency (FINNIDA) would consider including India as a target country in environment sector after mid-1990s, especially starting with R&D activities in forestry, urban and industrial development and agriculture.

A. Urban Environment

A1. Water supply and sanitation

Problems: Only 21 towns and cities out of 3245 have partial or full sewerage and sewage treatment facilities.

38 % of urban population has access to sanitation services.

79 % of urban population has access to water services.

Rapid urbanization: population size 240 millions in 1990 and 685 millions in 2020.

Lack of finance.

Activity: Preparation of a feasibility report on the management options for urban water supply and sanitation.

Output: Options for the development and management of urban water and sanitation services (Private institutions. Municipality-owned institutions. Government-owned institutions. Built-Operate-Transfer. Built-Operate-Own.) including economic, financial, technical, social and environmental aspects.

B. Strengthening of R&D capacities

B1. Environmental engineering and environmentally sound production technology

Problems: There are requirements for both low- and high tech, e.g. urban sanitation coverage is low and needs at least partially low-cost solutions. There is a need for high tech solutions for industrial pollution control, but especially for small scale industry also low tech options can be developed. In addition to end-of-the-pipe technologies also clean production, recycling and reuse technologies has to be developed.

Activity: Preparation of a feasibility report on the establishment of R&D cooperation between the appropriate institutions. This could be implemented in cooperation with the preparation of a feasibility report on establishment of a Science Park.

Output: A feasibility report on the cooperation possibilities in R&D in environmental engineering and environmentally sound production technology development.

B2. Science Park

Activity: Preparation of a feasibility report on the establishment of a Science Park in the field of environmental engineering and environmentally sound production technology (e.g. in forestry, agroindustry, energy, small scale industry like paper and pulp).

Output: A feasibility report on the possibilities for the establishment of the Science Park in India including the options for collaborative parties including the private sector entrepreneurs. The prospects for joint ventures with the assistance of the Park.

C. Commercial Export of Environmentally Positive Services and Technologies

Without the financial support from external sources it is difficult to export environmentally positive services and technologies due to the current economic situation and existing importation policy in India. To support the export activities and simultaneously the World Bank project in industrial pollution control, the Government of Finland should consider the following activities related to project components:

Enforcement Component: Training programme in technical and managerial skills

Activity: Provide the personnel of the State and Pollution Control Board with scholarships to participate in the training courses in water and environmental management in Finland. Other options are to accommodate the personnel in other available courses or to organise tailor-made courses jointly in India.

Technical Assistance Component: R&D, Feasibility studies, Studies for location of future industrial sites.

Activity: Finance for e.g., B1 and B2.

The activities related to other subcomponents and Investment Component could be financed through the appropriate institutions e.g., Finnfund, NDF, NIB, NEFCO, and NOPEF.

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Ministry of Environment and Forests Guidelines for Siting Industries

(Geethkrishnan 1989)

Areas to be avoided

An industrial site shall maintain the following distances from the areas listed:

- (a) Ecologically and/or otherwise sensitive areas: at least 25 km; depending on the geoclimatic conditions the requisite distance shall have to be increased by the appropriate agency.
- (b) Coastal areas: at least one-half kilometre from high tide line.
- (c) Flood plain of the river systems: at least one-half kilometre from flood plain or modified flood plain affected by dam upstream or by flood control system.
- (d) Transport/communication system: at least one-half kilometre from highway and railway.
- (e) Major settlements (three million population): distance from settlements is difficult to maintain because of urban sprawl. At the time of siting of the industry, if any major settlement's notified limit is within 50 km the direction of growth of the settlement for at least a decade must be assessed and the industry sited at least 25 km from the projected growth boundary of the settlement.

Ecological and/or otherwise sensitive areas include:

- (i) religious and historic places;
- (ii) archaeological monuments (e.g., the identified zone around the Taj Mahal);
- (iii) scenic areas;
- (iv) hill resorts;
- (v) beach resorts;
- (vi) health resorts;
- (vii) coastal areas rich in corals, mangroves, breeding grounds of specific species;
- (viii) estuaries rich in mangroves, breeding grounds of specific species;
- (ix) national parks and sanctuaries;
- (x) natural lakes, swamps;
- (xi) seismic zones;
- (xii) tribal settlements;
- (xiii) areas of scientific and geological interest;
- (xiv) defence installations, especially those of security importance and those sensitive to

- pollution;
- (xv) border areas (international); and
- (xvi) airports.

State and Central Governments are required to identify such areas on a priority basis.

Siting criteria

At a selected site, the following factors must be recognized:

- (i) No forest land shall be converted to nonforest activity for the sustenance of the industry (Ref: Forest Conservation Act, 1980).
- (ii) No prime agricultural land shall be converted to an industrial site.
- (iii) Within the acquired site the industry must locate itself at the lowest location, to remain obscured from general sight.
- (iv) Land acquired shall be sufficiently large to provide space for appropriate treatment after maximum possible reuse and recycling. Reclaimed (treated) wastewater shall be used to water a green belt and to create a water body for aesthetic reasons, for recreation and, if possible, for aquaculture.
- (v) The green belt shall be one-half kilometre wide around the perimeter of the industry. For industry having an odour problem, it shall be one kilometre wide. The green belt between two adjoining large-scale industries shall be one kilometre.
- (vi) Enough space should be provided for storage of solid wastes so that these could be available for possible reuse.
- (vii) Layout and form of the industry must conform to the landscape of the area without affecting the scenic features.
- (viii) There must be a physical barrier between the industry and its associated township.
- (ix) Each industry is required to maintain three ambient air quality measuring stations within a 120-degree angle between stations.

Environmental Impact Assessment (EIA)

The projects which could be candidates for detailed Environmental Impact Assessment include the following:

- (i) Those which can significantly alter the landscape or land use pattern and lead to concentration of working and service population;
- (ii) Those which need upstream development activity, such as assured mineral and forest products supply or downstream industrial process development;
- (iii) Those involving manufacture, handling and use of hazardous materials;
- (iv) Those which are sited near ecologically sensitive areas, urban centres, hill resorts or places of scientific and religious importance; and

- (v) Industrial estates with constituent units of various types which could cumulatively cause significant environmental damage.

The Environmental Impact Assessment should be prepared on the basis of the existing background pollution levels vis-à-vis contributions of pollutants from the proposed plant. It should address some of the basic factors listed below:

- (a) Meteorology and air quality: Ambient levels of pollutants such as sulphur dioxide, oxides of nitrogen, carbon monoxide or suspended particulate matter should be determined at the centre and at three other locations at a radius of ten kilometres, with a 120 degree angle between stations. Additional contributions of pollutants at these locations are required to be predicted after taking into account the emission rates of the pollutants from the stacks of the proposed plant under the different meteorological conditions prevailing in the area;
- (b) Hydrology and water quality;
- (c) The site and its surroundings;
- (d) Occupational safety and health
- (e) Details of the treatment and disposal of effluents (liquid, air and solid) and the methods of alternative uses;
- (f) Transportation of raw material and details of material handling;
- (g) Impact on sensitive targets; and
- (h) Control equipment and measures proposed to be adopted.

Environmental aspects should be taken into account at various stages of a project:

- Conceptualisation: preliminary environmental assessment;
- Planning: detailed studies of environmental impacts and design of safeguards;
- Execution: implementation of environmental safety measures; and
- Operation: monitoring of effectiveness of built-in safeguards;

The management plans should be based on considerations of resource conservation and pollution abatement, some of which are enumerated as under:

Liquid effluents

- (i) Effluents from the industrial plants should be treated to the standards prescribed by the Central/State Water Pollution Control Boards;
- (ii) Soil permeability studies should be made prior to effluents being discharged into holding tanks or impoundments and steps taken to prevent percolation and groundwater contamination;

- (iii) Special precautions should be taken regarding flight patterns of birds in the area. Effluents containing toxic compounds, oil and grease have been known to cause extensive death of migratory birds. Location of plants should be prohibited in such type of sensitive areas;
- (iv) Deep well burial of toxic effluents should not be resorted to as it can result in resurfacing and groundwater contamination. Resurfacing has been known to cause extensive damage to crops and livestock; and
- (v) In all cases, efforts should be made to reuse and conserve water.

Air pollution

- (i) The emission levels of pollutants from the different stacks should conform to the pollution control standards prescribed by Central or State Boards;
- (ii) Adequate control equipment should be installed for minimising the emission of pollutants from the various stacks;
- (iii) In-plant control measures should be taken to contain the fugitive emissions;
- (iv) Infrastructural facilities should be provided for monitoring the stack emissions and measuring the ambient air quality including micro-meteorological data (wherever required) in the area;
- (v) Proper stack height as prescribed by the Central/State Pollution Control Board should be provided for better dispersion of pollutants over a wider area to minimize the effect of pollution; and
- (vi) Community buildings and townships should be built upwind of a plant, with a one-half to one kilometre greenbelt in addition to a physical barrier.

Solid wastes

- (i) The site for waste disposal should be checked to verify permeability so that no contaminants percolate into the groundwater or river/lake;
- (ii) Waste disposal areas should be planned downwind of villages and townships;
- (iii) Reactive materials should be disposed of by immobilisation with suitable additives;
- (iv) The pattern of filling a disposal site should be planned to create better landscaping, and should be approved by an appropriate agency. The appropriately pretreated solid wastes should be disposed of according to the approved plan; and
- (v) Intensive programmes of tree planting on disposal areas should be undertaken.

Noise and vibration

Adequate measures should be taken for control of noise and vibration in the industries.

Occupational safety and health

Proper precautionary measures for adopting occupational safety and health standards should be taken.

Prevention, maintenance and operation of environmental control systems

- (i) Adequate safety precautions should be taken during preventive maintenance and shutdown of the control systems; and
- (ii) A system of interlocking with the production equipment should be implemented where highly toxic compounds are involved.

Housekeeping

Proper housekeeping and cleanliness should be maintained both inside and outside the industry.

Human settlements

- (i) Residential colonies should be located away from the solid and liquid waste dumping areas. Meteorological and environmental conditions should be studied properly before selecting the site for residential areas in order to avoid air pollution problems; and
- (ii) Persons who are displaced or have lost agricultural lands as a result of locating the industries in the area should be properly rehabilitated.

Transport systems

- (i) Proper parking places should be provided for trucks and other vehicles by the industries to avoid any congestion or blocking of roads; and
- (ii) Siting of industries on the highways should be avoided, as it may cause road accidents because of the substantial increase in the movements of heavy vehicles and because of unauthorised shops and settlements. Spillage of chemicals/substances on roads inside the plant may lead to accidents. Proper road safety signs both inside and outside the plant should be displayed for avoiding road accidents;

Recovery-reuse of waste products

Efforts should be made to recycle or recover the waste materials to the extent possible. The treated liquid effluents can be conveniently and safely used for irrigation of lands, plants and fields for growing non-edible crops.

Vegetation cover

Industries should plant trees and ensure vegetation cover in their premises. This is particularly advisable for those industries having more than ten acres of land.

Disaster planning

Proper disaster planning should be done to meet any emergency situation arising due to fire, explosion, sudden leakage of gas, etc. Firefighting equipment and other safety equipment should be kept ready for use during disaster/emergency situations including natural calamities such as earthquakes and floods.

Environmental management cell

Each industry should identify and set up an environmental management cell for planning or implementation of the projects.

Polluting Industries

1) Ferrous metallurgy

- Integrated iron and steel (metal);
- Ferro-alloys;
- Special steels;
- Iron and steel castings and forging.

2) Non-ferrous metallurgy

- Primary metallurgical production industries, namely zinc, lead, copper and aluminium;
- Non-ferrous castings and forgings.

3) Mining

- Coal washeries;
- Hydraulic mining;
- Hydraulic transport.

4) Ores/mineral processing

- Beneficiation and/or pelletisation.

5) Coal (including coke)

- Coal, lignite, coke, etc.;
- Fuel gases (coal gas, producer gas, water gas and the like).

6) Power generation**7) Paper and pulp (including paper products)**

- Paper for writing, printing and wrapping (to include security paper);
- Newsprint;
- Paper board;
- Paper for packaging (corrugated papers, crafts paper, paper bags, paper containers and the like);
- Pulp — wood pulp, mechanical, chemical (including dissolving pulp);
- Sanitary paper;
- Cigarette paper;
- Insulation and other papers.

8) Fertilizer

- Nitrogenous;
- Phosphatic;
- Mixed;

9) Cement (including cement asbestos products)

- Portland cement (including slag cement, puzzolana cement and their products);
- Asbestos cement products.

10) Petroleum

- Oil production;
- Oil refining;
- Lubricating oils and greases;
- Oil exploration.

11) Petrochemicals**12) Drugs and pharmaceuticals**

- Narcotics, drugs and pharmaceuticals including vitamins (antibiotics and indigenous systems of medicines covered).

13) Fermentation

- Alcohol (industrial and potable).

14) Rubber (natural and synthetic) including rubber products

- Natural and synthetic rubber;
- Tyres and tubes;
- Surgical and medical products including prophylactics and latex products;
- Footwear;
- Other rubber goods.

15) Paints

16) Leather tanning

17) Electroplating

18) Chemicals

- Coke oven by-products and coal tar distillation products;
- Industrial gases (nitrogen, oxygen, acetylene, argon, carbon dioxide, hydrogen, sulphur dioxide, nitrous oxide, halogenated hydrocarbon, ozone, etc.);
- Industrial carbon;
- Alkalies;
- Electrochemicals (metallic sodium, potassium and magnesium, chlorates, perchlorates and peroxides);
- Electrothermal products (artificial abrasive, calcium carbide);
- Phosphorous and its compounds;
- Nitrogenous compounds (cyanides, cyanamides and other nitrogenous compounds);
- Halogens and halogenated compounds (chlorine, fluorine, bromide and iodine);
- Explosives (including industrial explosives, detonators and fuses).

19) Insecticides, fungicides, herbicides and other pesticides

20) Synthetic resin and plastics

21) Manmade fibre (cellulosic and non-cellulosic)

Polluting Industries Required To Obtain Environmental Clearance for Siting

- 1) Primary metallurgical industries, viz. zinc, lead, copper, aluminium, steel;
- 2) Paper, pulp and newsprint;

- 3) Pesticides/insecticides;
- 4) Refineries;
- 5) Fertilizers;
- 6) Paints;
- 7) Dyes;
- 8) Leather tanning;
- 9) Rayon;
- 10) Sodium/potassium/cyanide;
- 11) Basic drugs;
- 12) Foundry;
- 13) Storage batteries (lead acid type);
- 14) Acids/alkalies;
- 15) Elastics;
- 16) Rubber (synthetic);
- 17) Cement;
- 18) Asbestos;
- 19) Fermentation;
- 20) Electroplating.

DETAILS OF ZONAL OFFICES OF THE CENTRAL POLLUTION CONTROL BOARD

Zonal office location	States & Union Territories covered
Chandigarh (North Zone) SCO 2467-68 Sector 22-C Chandigarh	Jammu & Kashmir, Haryana Himachal Pradesh, Punjab and Union Territory of Chandigarh
Kanpur (Central Zone) 51, Q Block, Kaka Dev Sharda Nagar Kanpur-208025	Madhya Pradesh, Rajasthan and Uttar Pradesh
Calcutta (East Zone) 61, Prince Anwar Shah Road, 4th Floor Calcutta-700035	Bihar, Orissa, Sikkim West Bengal and Union Territory of Andaman & Nicobar Islands
Shillong (North East Zone) S.B.P & CWP Meghalaya Arden Moti Nagar Shillong-793114	Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram Nagaland and Tripura
Bangalore (South Zone) First Floor 6, West of Chord Road 11 Stage Rajaji Nagar Bangalore-560086	Andhra Pradesh, Goa, Karnataka, Kerala, Tamil Nadu and Union Territories of Pondicherry and Lakshadweep
Vadodara (West Zone) 46-B, Gautam Nagar Race Course Vadodara-390007	Gujarat, Maharashtra and Union Territories of Daman Diu and Dadra and Nagar Haveli

OVERVIEW OF MOEF ACTIVITIES DURING THE FISCAL YEAR 1990-91

Survey of Natural Resources

Flora

- Intensive floral survey in the priority areas of Andaman and Nicobar Islands, Jammu & Kashmir, Mizoram, Pondicherry, Sikkim, South Western Ghats, Nilgiri Biosphere Reserve and Uttar Pradesh were taken up by the Botanical Survey of India and more than 3650 plant specimens have been collected during the surveys. A critical study and description of about 3500 species collected from the states of Himachal Pradesh, Jammu & Kashmir, Mizoram, Nagaland, Manipur and Assam was completed.
- Volume IV of the Red Data Book of the Indian plants is being published.
- The 'Fascicle 20' of the Flora of India consisting of the families Barclayaceae, Nelumbonaceae, Nymphaeaceae, Sabiaceae, Rhamnaceae, Stachyuraceae, Tetracentraceae and Zygophyllaceae has been published.
- State Flora of Rajasthan Volume 11 and Madhya Pradesh Volume I are being published.
- Study on Mangroves of Goa and identification of plant specimens in the Indravati Tiger Reserve, M.P. have been completed.
- Geobotanical Study in Singhbhum and in the Khetri Copper Belts has been undertaken in collaboration with Geological Survey of India.
- A total of 64 surveys were conducted in 60 districts covering diverse ecosystems all over the country by the Zoological Survey of India (ZSI).
- Faunal Study of West Bengal, Chilka Lagoon, Andaman and Nicobar Islands, the West Coast; Meghalaya and Tripura, Uttar Pradesh and Western Himalayan ecosystems, were continued.
- During the year, the action plans of all the existing biosphere reserves except Manas, were further extended and strengthened through survey, protection, ecorestoration, education and awareness activities.

Wetlands, mangroves and coral reefs

- Sixteen wetlands have been identified by the National Wetlands Management Committee on priority basis for conservation and management of wetlands.
- During the year, management action plans have been sanctioned for Harike and Kanjali (Punjab) and Renuka (Himachal Pradesh) wetlands.
- A Directory of Wetlands of India containing information on location, area and ecological categorisation of wetlands in different parts of the country, has been published.
- Based on the recommendations of the National Mangrove Committee, 15 mangrove

areas have so far been identified for the purpose of conservation and research.

- During the year, management action plan for the Sunderbans Mangroves covering regeneration, has been sanctioned.
- Four coral reefs have been identified for conservation in Tamil Nadu, Andaman & Nicobar, Lakshdweep Islands and Gujarat. A project has been sanctioned for undertaking studies and preparing a status report on the corals of Andamans and Nicobar Islands and Gulf of Kutch in Gujarat.

National Strategy for Conservation and Sustainable Development

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

Environmental Impact Assessment

- Guidelines and questionnaires/check-lists for appraisal of projects in different sectors have been developed and published by the Ministry.
- Various Environmental Appraisal Committees like River Valley, Multipurpose Irrigation and Hydroelectric Projects, Mining Projects, Industrial Projects, Thermal Power Projects and Atomic Power and Nuclear Fuel Projects, have been constituted for environmental appraisal.
- Out of the 290 development projects appraised in various sectors during the year for environmental clearance, 108 projects were cleared and 97 were rejected. Additional information has been sought for the remaining 85 projects.
- An Environment Development Centre for preparing an integrated development plan for the Narmada Basin on the basis of carrying capacity, is being set up.
- A case study on environmental management of iron ore mine at Noamundi has been completed.
- In order to facilitate coastal zone management, the Environmental Management Plans commissioned by the Ministry for three coastal stretches viz., Puri-Konark in Orissa, Dwarka-Jodia in Gujarat and Digha in West Bengal have been completed.
- Chembur and central areas in Bombay have been selected as Indian Human Exposure Assessment Location Sites (HEAL) because of the concentration of industries and heavy traffic density and air pollution.
- Under the Indo-Dutch Programme, five workshops in sectors such as industrial siting, land use planning, ports and harbours and water resource management, were held during the year.

Control of Pollution

Control of water, air and noise pollution

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

Management of hazardous substances

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

for effective utilisation of industrial/urban/agricultural wastes.

- A scheme on "Environment Friendly" labelling of products with the objective of creating awareness among consumers regarding safety and pollution, has been formulated by the Ministry.

Regeneration and Development

Ganga Action Plan

- The main objective of the Ganga Action Plan is to improve the water quality of the river Ganga by reducing the pollution load on the river and by establishing self-sustaining sewage treatment plant systems. To that end, in the first phase, of the nearly 1400 million litres per day (Mld) of sewage generated in 25 Class I towns along the river, 870 Mld is proposed to be intercepted, diverted and treated. By March, 1991, 370 Mld of waste water has been diverted out of which 55 Mld has been diverted in the year 89-90.
- Out of the 261 schemes sanctioned at a total cost of INR 327.21 crores covering the States of Uttar Pradesh, Bihar and West Bengal, 172 schemes have been completed, out of which 25 were completed during this year.
- Out of the sanctioned 35 STPs, seven STPs have been commissioned so far and during the year two STPs were commissioned.
- Out of the 88 sanctioned Interception and Diversion Schemes, 52 have been completed by March, 1991 and of these six were completed this year.
- Under the low cost sanitation programme, out of 43 sanctioned schemes, 39 schemes involving construction of 2732 public toilet complexes and 41228 individual pour flush latrines have been completed. Out of this, 8 community toilets and 407 individual toilets were completed during this year.
- Out of 28 sanctioned schemes of electric crematoria, 19 schemes involving construction of 22 electric crematoria have been completed. Of these, six schemes involving 8 electric crematoria were completed this year.
- Out of 35 River Front Development Schemes, involving 122 ghats, 30 schemes involving 92 ghats have been completed, out of which 7 schemes involving 34 ghats were completed in the year.
- As a result of administrative action initiated, 43 industries have set up ETPs out of 68 gross polluting industries identified along the main stream of river Ganga.
- Bilateral, technical and financial assistance from ODA and Dutch Government was continued during the year. Multilateral assistance from the World Bank was also continued.
- Many innovative ideas/ schemes have been taken up under Ganga Action Plan e.g. Upflow Anaerobic Sludge Blanket Sewage Treatment, Chrome Recovery from Tannery waste, use of sewage water for agro forestry and improved wood crematoria.
- On the request of GAP, Central Water Commission has carried out studies in Minimum Water flows in Ganga and the Yamuna rivers

- Diverse public participation programmes, especially for the youth, students, pilgrims and school children have been organised under the Ganga Action Plan.

Wastelands development

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

Other activities for regeneration

Field demonstration projects

- During the year, one field demonstration project aimed at ecological improvement of Gopeshwar area of Chamoli District, Uttar Pradesh was completed.
- Other demonstration projects at Almora (U.P.) , Pathanjaliipur (Tamil Nadu), and Parbhani (Maharashtra) continued.

Task forces

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

Environmental research

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

Research on wetlands

- Research on various aspects of wetlands conservation was promoted through universities and other research institutions. In addition to the 19 on-going research

projects, one new project was sanctioned during the year.

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

Environmental Information

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

Legislation and Institutional Support

- Rules under the Environment (Protection) Act, 1986 (EPA) were notified for regulating hazardous chemicals at all stages of manufacture, import, storage, transport, use and disposal.
- Amendment of the EPA to make it more effective, is under consideration.
- Public Liability Insurance Bill has been enacted to provide immediate relief to the victims of accidents caused by hazardous chemical industries.

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

International Cooperation

- The year was marked by the beginning of international preparations for the 1992 Conference on Environment and Development to be held in Brazil. The United Nations General Assembly has established an Intergovernmental Preparatory Committee for this purpose and India is playing an important role among developing countries in putting forth their views and concerns in the preparatory process. The Ministry has established an Inter-Ministerial Group chaired by Secretary (MOEF) which consists of representatives from the concerned Ministries, to coordinate the preparations for the 1992 Conference acting in consent with Ministry of External Affairs.
- The MOEF is also the nodal agency for the Intergovernmental Panel on Climate Change (IPCC) which has been jointly established by UNEP and WMO to study the causes and impacts of climate change and response strategies required to deal with them. The IPCC work is of great importance in supporting for the intergovernmental negotiations on a global convention on climate change which have begun during the year. These negotiations will have very long term and wide-ranging implications on global industry and economies.
- Another international initiative is the move towards a global convention on the conservation of bio-diversity. As the nodal agency for this subject, this Ministry has, with wide scale consultation with Government agencies and experts begun to formulate Government of India's position about various aspects of the Convention.
- One of the most significant achievements during the year was the London Conference of the Parties to the Montreal Protocol, held in June, 1990. Far reaching amendments were adopted during this Conference as a result of the moves by India and other developing countries, so that we are assured of financial and technical assistance to cooperate in the global programme.
- The Ministry continued to play an important role in the UNEP and participated in the second special session of the Governing Council held in August, 1990.
- The Netherlands Government has made a substantive commitment of support the second phase of the Ganga Action Plan.
- The World Bank through International Development Agency (IDA) continued its

assistance in Social Forestry Projects in collaboration with other bilateral channels in five states of the country.

- Research studies on Wildlife Conservation and Ecology of endangered species and their habitat have been taken up under Indo-US Rupee Fund.
- The German assistance for strengthening of laboratories for Central and State Pollution Control Boards continued during the year.
- A National Forestry Action Programme is being prepared with assistance from UNDP/FAO for re-orienting the forestry practices in the country in accordance with the National Forest Policy of 1988.

Administration and Budget

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

Publications

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

- Comprehensive Document on Integrated Iron & Steel Plants; COINDS/27/1988-89.

- Comprehensive Document on Integrated Aluminium Industry (Emission Control); COINDS/28/1988-89.
- Comprehensive Document on Minimal National Standards Petrochemical Industries; COINDS/30/1988.
- Comprehensive Industry Document Series: Revised Minimal National Standards (Pesticide specific); COI NDS/3 3/1989-90.
- Comprehensive Industry Document Series: Minimal National Standards for Liquid Effluents-Paint Industry; COINDS/33/1990-91 .
- Status of Water supply and Wastewater collection Treatment and Disposal in Class 11 Towns - 1988; CUPS/31/1989-90.
- Maha Nagaron me Bahan Pradushan Ka Adhyan (Hindi); CUPS/32/1989-90.
- Specifications for sophisticated analytic instruments/system; LATA/8/1989-90.
- National Ambient Air Quality Statistics of India 1987-8; NAAQAMS/1/1990-91 .
- Monitoring of Indian National Aquatic Resource: Water Quality Statistic of India; MINARS/3/1989-90.
- Water Quality Status of Indian Aquatic Resources (Rivers and Wells); MINARS/4/1989-90.
- Pollution Control Acts & Rules with Amendments.
- Hindi Terminology.
- Annual Report 1989-90.

SCHEDULE I

Electrostatic precipitation systems including automatic spray nozzle, CO Analyser Emitting Electrode

Fo - filter systems including tube valve, filter bag

Dust collector systems

Scrubber - counter, cement/venturi/packed-bed/cyclonic scrubbers

Air Sampler (CO, SO₂, NO_x, H₂, SO₃)

Continuous analyser for CO, SO₂, NO_x

Halogen detector

Mechanical flocculators

Diffused air/surface aeration systems for activated sludge systems

Surface aeration system for aerated lagoon system

Biofilters rotating arms

Methane recovery anaerobic digester system

Air flotation system

Marine outfall systems

Centrifuge and vacuum filters for dewatering sludge

pH meter (digital as well as analog-type)

Conductivity meter

Mechanically skimmed oil and grease removal systems

Turbidity meter

Water pollution test kit

Water flow meter

BOD Incubator

Mercury Analyser

Spectrophotometers (UV-VIS and VIS-IR digital)

Continuous flow recorder with integrator

Continuous pH recorder.

Schedule II

Air Pollution Control Equipments

- Electrostatic precipitation systems
- Felt-filter systems
- Dust collector systems
- Scrubber-counter current/venturi/packed-bed/cyclonic scrubbers

Water Pollution Control Equipments

- Mechanical screen systems
- Aerated Detritus Chambers (including air compressors)
- Mechanically skimmed oil and grease removal systems
- Chemical feed systems and flash mixing equipment
- Mechanical flocculators and mechanical reactors
- Diffused Air/Mechanically aerated activated sludge systems
- Aerated lagoon systems
- Biofilters
- Methane recovery anaerobic digester systems
- Air flotation systems
- Air/steam stripping systems
- Ursa hydrolysis systems
- Marine outfall systems
- Centrifuge for dewatering sludge
- Rotating biological contactor or bio-disc

Solid Waste Control Equipments

Caustic/Lime/Chrome/Mineral/Cryolite Recovery Systems

Schedule III

Monitoring instruments of various ranges suitable for ambient air and stack monitoring for toxic/hazardous chemicals.

Gas detectors/alarms for measuring concentrations of toxic/hazardous gases.

Personal samples with rechargeable battery units.

Toxic gases monitoring kits containing personal samples, sampler with filter head, filter holders, membrane filter of different pore sizes, small cyclone for respirable dust monitoring and activated carbon tubes for collection of specified chemical pollutants.

Direct reading calorimetric indicator tubes with accessories for monitoring toxic gases/vapour.

Long term direct reading detector tubes with peristaltic pump for monitoring toxic gases/chemicals.

Direct reading instruments for monitoring and evaluation of airborne particles.

Direct reading instruments for airborne gases and vapours incorporating the principles of ultra-violet or infrared absorption, chromatography with flame ionisation detector or micro-processor control solid state circuitry.

Platinum based catalyst and systems to incinerate formaldehyde gaseous emissions.

Special incineration systems for various toxic gases/solids.

Condensing heat exchangers for reducing thermal pollution through stack gases.

Self contained and compressed air/blower based breathing apparatus

Full body protection suit for dealing with emergencies created due to leakage/spillage of highly toxic chemicals.

Hypalon suits for emergencies for hydrofluoric acid.

Ultrasonic or irradiation type thickness testers

Instruments for liquid effluent control namely:

- (a) Ion chromatograph for anions;

- (b) Atomic adsorption spectrosopes for metal analysis;
- (c) Differential pulse polarograph for metal analysis.

Plate type compact clarifiers.

Sulzer or equivalent high efficiency packing for distillation columns for pollution control.

Bag filter with special fabrics to withstand above 200°C temperatures and 100 micron or less size particle removal.

Special plastic media for fixed film technology used in anaerobic treatment of high strength organic waste effluents.

Automatic absorption spectro photometer.

Gas chromatograph.

Analysers for carbon monoxide and hydro carbon.

Auto analyser for phosphate and nitrogen.

Thermohydrograph.

Smokemeter.

Capacity meter.

Air sampling bags.

Resistivity measuring kits to analyse characteristics of fly ash.

Total organic carbon analyser.

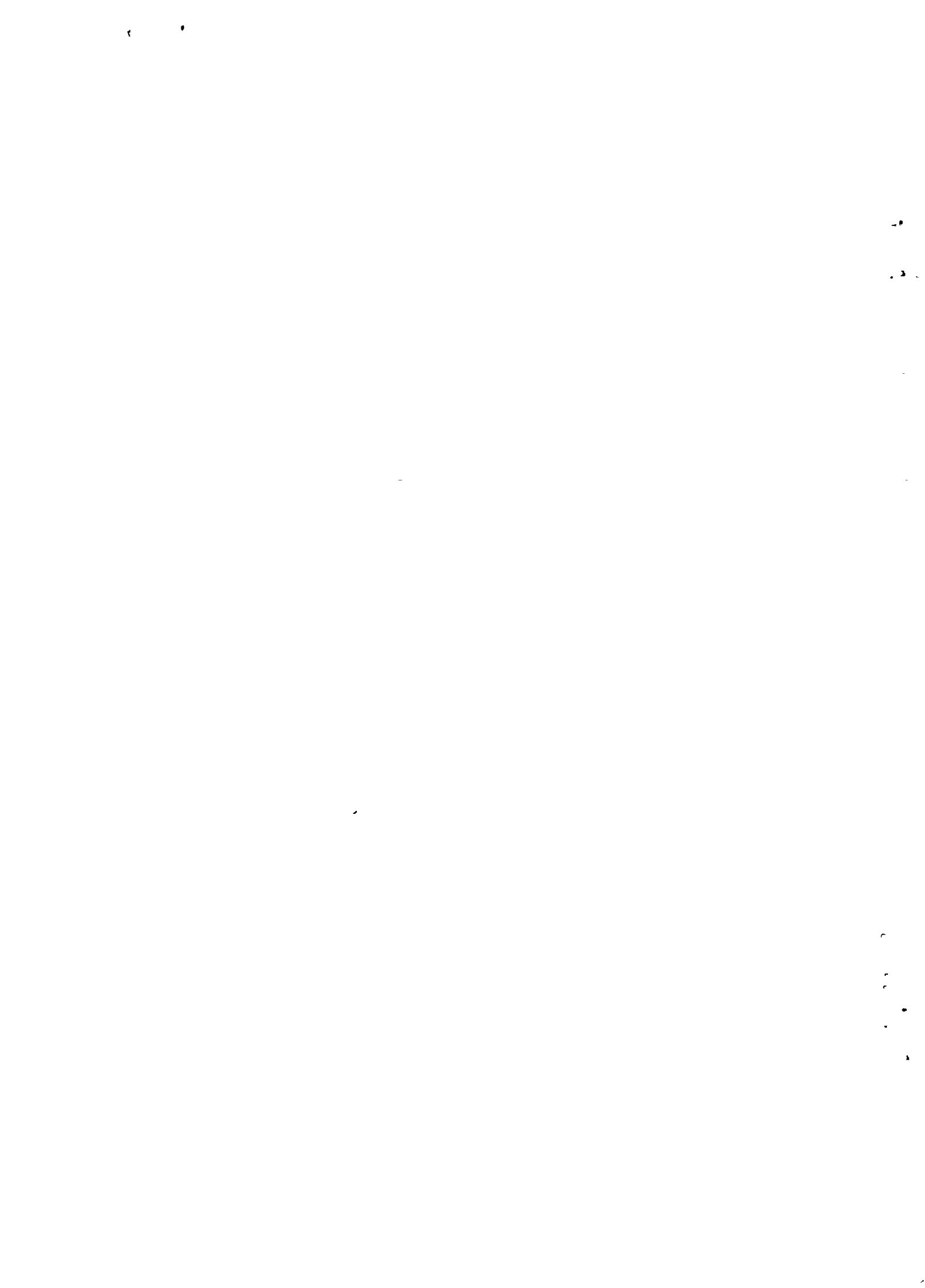
Fluorimeter.

Dissolved oxygen meter.

COD meter.

Niskim water sampler.

Sediment Sampler.



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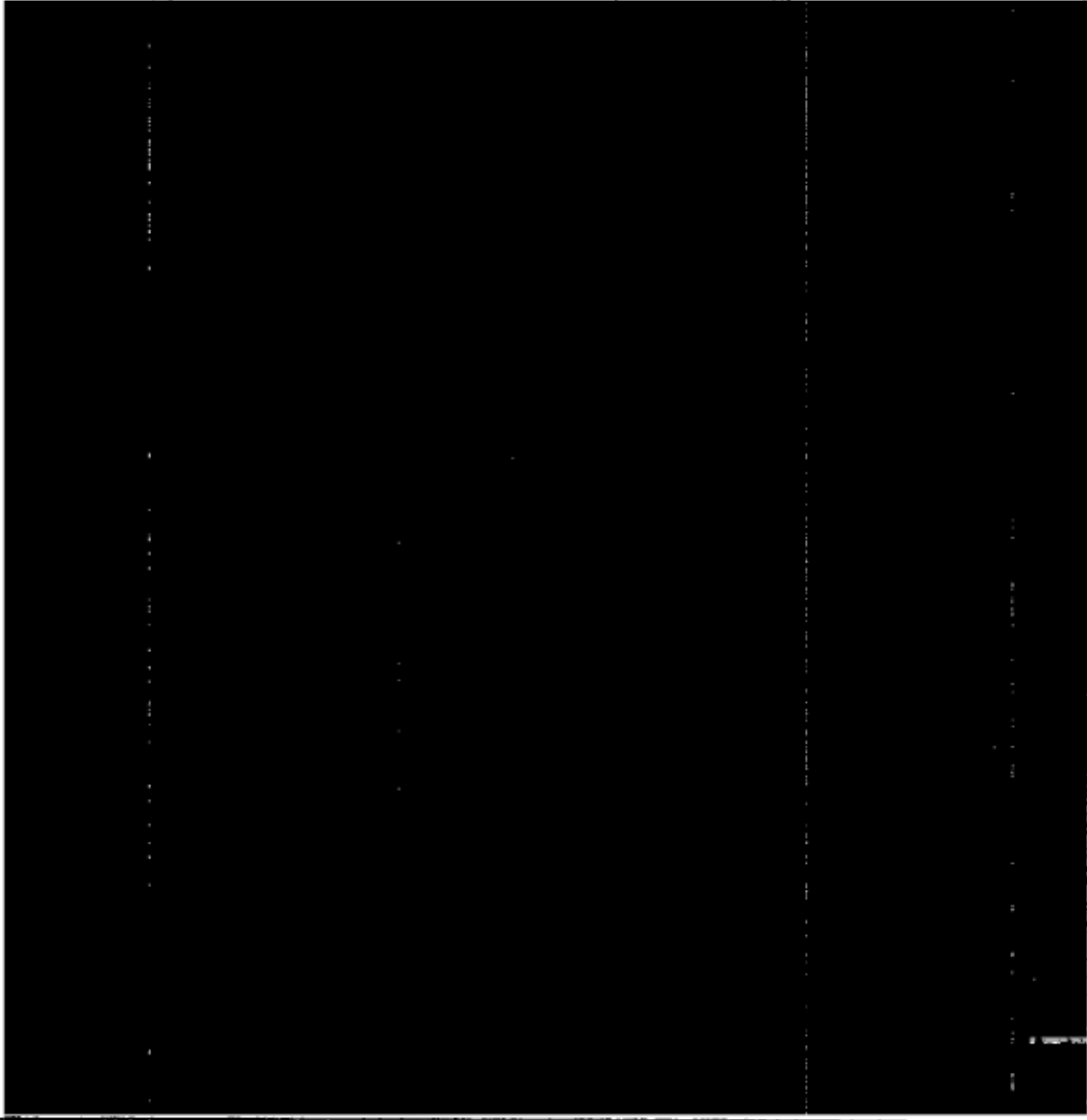
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