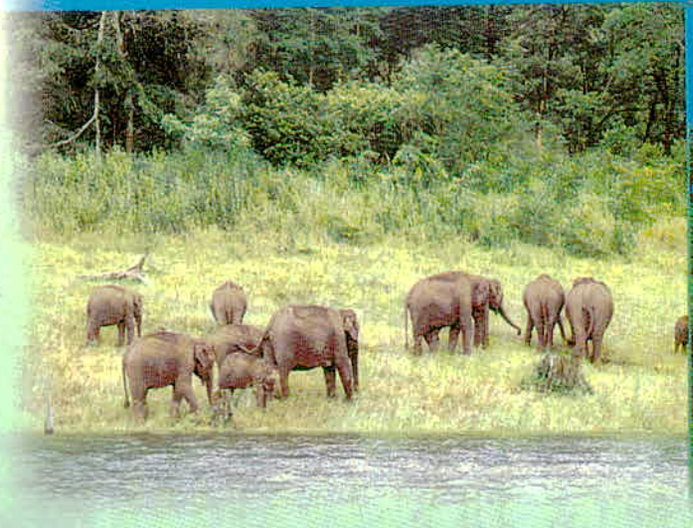
COMPENDIUM OF ENVIRONMENT STATISTICS INDIA 2003



सत्यमेव जयते

Government of India
Ministry of Statistics and Programme Implementation
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COMPENDIUM OF ENVIRONMENT STATISTICS

INDIA

2003

CENTRAL STATISTICAL ORGANISATION
MINISTRY OF STATISTICS AND PROGRAMME IMPLEMENTATION
GOVERNMENT OF INDIA
NEW DELHI
WEBSITE: WWW.MOSPI.NIC.IN

PREFACE

The Central Statistical Organisation (CSO) has been bringing out annually a Compendium of Environment Statistics since 1997 to meet the needs of policy makers, planners and the public. The present issue is the seventh in the series and it provides a sound data base on bio-diversity, atmosphere, land/soil, water and human settlements.

The publication has been useful in understanding various aspects of environment and its impact on sustainable development. The CSO also has been endeavouring to improve the coverage, content and presentation of the publication in each issue. Graphics and extracts from environment related legislations have been included in this publication to make it more user friendly.

I express my deep gratitude to all the data source agencies for their active cooperation, contributions and willing support, without which it would not have been possible for the CSO to bring out this publication in its present form. We hope to get the continued support of all the agencies in the future also.

This Compendium has been prepared in the Environment Statistics Unit of the CSO under the overall guidance of Dr. G. Raveendran, Additional Director General and Shri J.Dash, Deputy Director General both of whom deserve my sincere thanks for the keen interest taken by them in enlarging the coverage of the publication. I compliment Shri S. K. Gupta, Director and his team comprising Sarvashri R. C. Aggarwal, Joint Director; M. C. Sharma, Assistant Director and Satyender Kumar, Computor in preparing the manuscript of the publication with accurate data and charts.

Comments and suggestions from the users for further improvement of the publication would be most welcome.

(P. S. RANA)
Secretary
Ministry of Statistics and Programme Implementation
New Delhi

May, 2005

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OVERVIEW

The Compendium has been prepared under the broad Framework for Development of Environment Statistics provided by the United Nations Statistics Division and adopted by the Steering Committee on Environment Statistics for the 1997 issue. The five dimensions of the framework, namely, biodiversity, atmosphere, land/soil, water, and human settlements have been used in this compendium. There are seven chapters, further divided into sections, the details of which are given below. An attempt has been made, wherever possible, to elaborate the data in the tables with the help of boxes under the table and suitable graphs and charts for easy comprehension.

The first chapter on Environment and Environment degradation gives a general introduction of the concept of environment; development versus environment degradation; impact of development activities on environment; emissions, discharges and their sources; some major pollutants, their sources and related health hazards.

The second chapter on Development of Environment Statistics in India summarises the activities undertaken by the Ministry of Statistics and Programme Implementation for the development of environment statistics.

The third chapter on Biodiversity is divided into three sections: Flora; Forests and Fauna. The section on Flora contains some statistics on plant species found in India, species which are rare, vulnerable, endangered and extinct. It also gives some statistics on preservation measure of flora like Biosphere reserves, Botanical gardens and gene banks in India, including information on agro biodiversity. The section on Forests contains statistics on Indian forests. It gives information on percentage of forest area to total geographic area (state-wise), wastelands and external aids received for social forestry. The section on Fauna gives the major bio-geographic habitats in India, estimated number of species, national parks and wildlife sanctuaries, tiger reserves, livestock population in India, fish production and bovine population affected by drought.

The fourth chapter on Atmosphere is divided into five sections: Air and Transport; Energy; Industry, Greenhouse Gases and Noise. The section on Air and Transport gives the composition of the troposphere; ambient air quality standards and state of ambient air quality in some cities and towns. Ambient air quality in Delhi has also been given. The section on Energy gives information on installed capacity of utilities; electricity generation and actual power supply position, different fuels used for cooking; coal resources in India as well as its production; and renewable energy resources. The section on Greenhouse Gases gives information on the key greenhouse gases and the effect of global warming. The section on Industries gives information on the number of registered industrial establishments in India and the status of pollution control in 17 categories of industries. The section on Noise gives information on the ambient noise standards; average noise levels in various metropolitan cities and effects of noise pollution on human health.

The fifth chapter on Land/Soil is divided into four sections: Land Uses, Agriculture, Natural disasters and Mining. The section on Land Uses contains land classification in India, and different land use patterns. The section on Agriculture contains information on area under principal crops; performance of crop production; use of agricultural inputs; consumption of pesticides statewise and their effect on soil. The section on Natural Disasters contains information on frequently

occurring natural disasters; recent natural disasters in India; major earthquakes; number of drought-prone districts and damages due to droughts and supercyclonic storm. The section on Mining gives data on number of mines, production of minerals, status of afforestation, mining machinery and consumption of explosives in mining.

The sixth chapter on Water is divided into two sections: Ground Water and Marine Water. The section on Ground Water contains information on rainfall performance during the last 20 years; water flow in streams and ground water resources; water quality criteria and distribution of water monitoring stations. The section on Marine Water contains information on coastline of India; main activities along the coastal zones; industrial and sewage discharges to coastal waters; pollutants and their impacts on marine environment and potential hot spots along the Indian coasts.

The seventh chapter on Human Settlements is divided into three sections: Population and Poverty; Housing, Slums and Basic Facilities; and Waste Management. Human development is adversely affected by the environmental degradation. Safe drinking water and sanitation are closely linked with two of the very important human development indicators viz. infant mortality and life expectancy. Under the section on 'Population and Poverty' information on population totals, infant mortality rate, expectation of life at birth and population below the poverty line have been given. The section on Housing, Slums and Basic Facilities contains estimates of population in India, number of households, their size, number of rooms per housing unit, water supply system and toilet installation by rural/urban, homeless population, urbanization trends in India, slum population, housing shortage projected, percentage of population below poverty line, medical facilities under allopathy and Indian System of Medicine & Homeopathy.

1. Based upon Survey of India Map with the permission of the Surveyor General of India.
2. The territorial waters of India extend into the sea to a distance of twelve miles measured form the appropriate base line.
3. The interstate boundaries between Arunachal Pradesh, Assam and Meghalaya shown on this map are as interpreted form the North-Eastern Areas (recognisation) act, 1971. but have yet to be verified.
4. The administrative head quarters of Chandigarh, Haryana and Punjab are at Chandigarh.
5. The responsibility for the Correctness of internal details rests with the publisher.
6. "The state boundaries between Uttaranchal & Uttar Pradesh, Bihar & Jharkhand and Chhattisgarh & Madhya Pradesh have not been verified by Governements concerned."

CHAPTER ONE

ENVIRONMENT AND ENVIRONMENT DEGRADATION

1.1 INTRODUCTION

The Environment can be defined as the physical surrounding of man of which he is a part and on which he is dependent for his activities like physiological functioning, production and consumption. His physical environment stretches from air, water and land to natural resources like energy carriers, soil and plants, animals and ecosystems. The relationship between physical environment and the well being of individuals and societies is multi-fold and multi-faceted with a qualitative as well as a quantitative aspect to it. The availability and use of natural resources have a bearing on the outcome and the pace of development process. For an urbanized society, a large part of environment is man made. But, even then, the artificial environments (building, roads) and implements (clothes, automobiles) are based on an input of both labour and natural resources. Commonly, the term 'Environment' is restricted to ambient environment. In that view, the indoor environment (home, work place) is regarded as isolated piece of environment to be treated on its own terms.

The indoor environment usually is under the jurisdiction of the Public Health authorities. Health risks are mainly linked to space heating, cooking and lighting: low grade fuels, insufficient ventilation, and low or non-existing chimneys are often the main problems. Additionally, there may be problems connected with moist, light, incidence, hazardous substances from building materials, lacquers and paints. Problems with drinking water, sewage and waste are not linked to the dwelling as such, but rather due to lack of appropriate infrastructure. Statistics on indoor environment may be regarded as a subset of statistics on human settlements and the urban environment.

1.2 DEVELOPMENT VERSUS ENVIRONMENT DEGRADATION

Development activities are measured in terms of national products, which in turn are defined as production of goods and services during accounting period. However, certain environmental functions, which are crucial for economic performance and generation of human welfare such as provision of natural resources to production and consumption activities, waste absorption by environmental media and environmental services of life support and other human amenities, are taken into account only partly in conventional accounts. The scarcities of natural resources now threaten the sustained productivity of the economy and economic production and consumption activities. These activities impair environmental quality by over loading natural sinks with wastes and pollutants. The environmental consequence of development tends to offset many benefits that may be accruing to individuals and societies on account of rising incomes. There are direct costs on the health of individuals, their longevity and on quality of life on account of deterioration in environmental quality to mention a few. More importantly, the environmental damage can also undermine future attainments and productivity, if the factors of production are adversely affected. Therefore, the private and social costs of the use of the natural resources and the degradation of the environment may be taken into account for the *sustainable development* in the conventional accounts.

1.3 ENVIRONMENTAL INDICATORS

List of environmental and related socio-economic indicators

The United Nations Statistical Division (UNSD) developed a list of environmental indicators in collaboration with the Inter-governmental Working Group on the Advancement of Environment

Statistics. The fourth meeting of the Working Group (Stockholm, 6 - 10 February 1995) agreed on the List of environmental and related socioeconomic indicators given below. The Statistical Commission, at its twenty-eighth session (New York, 27 February - 3 March 1995), approved this list for international compilation by UNSD. The indicators that are bolded in the list were intended for short-term compilation directly from national statistical services or from other international organizations or specialized agencies.

	Framework for Development of Environment Statistics (FDES) Information categories			
Agenda 21 Issues (clusters)	**A. Socioeconomic activities, events**	**B. Impacts and effects**	**C. Responses to impacts**	**D. Inventories, stocks, background conditions**
ECONOMIC ISSUES	Real GDP per capita growth rate	EDP/EVA per capita	Environmental protection expenditure as % of GDP	Produced capital stock
	Production and consumption patterns	Capital accumulation (environmentally adjusted)	Environmental taxes and subsidies as % of government revenue	
	Investment share in GDP			
SOCIAL/DEMO-GRAPHIC ISSUES	Population growth rate	% of urban population exposed to concentrations of SO_2, particulates, ozone, CO and Pb		Population living in absolute poverty
	Population density			Adult literacy rate
	Urban/rural migration rate			Combined primary and secondary school enrollment ratio
	Calorie supply per capita	Infant mortality rate		Life expectancy at birth
		Incidence of environmentally related diseases		Females per 100 males in secondary school
AIR/CLIMATE	Emissions of CO_2, SO_2 and NO_x	Ambient concentrations of CO, SO_2, NO_x, O_3 and TSP in urban areas	Expenditure on air pollution abatement	Weather and climate conditions
	Consumption of ozone depleting substances	Air quality index	Reduction in consumption of substances and emissions	
LAND/SOIL	Land use change	Area affected by soil erosion	Protected area as % of total land area	Arable land per capita

Framework for Development of Environment Statistics (FDES) Information categories-contd.				
Agenda 21 Issues (clusters)	**A. Socioeconomic activities, events**	**B. Impacts and effects**	**C. Responses to impacts**	**D. Inventories, stocks, background conditions**
	Livestock per km^2 of arid and semi-arid lands	Land affected by desertification		
	Use of fertilizers	Area affected by salinization and water logging		
	Use of agricultural pesticides			
WATER Fresh water resources	Industrial, agricultural and municipal discharges directly into freshwater bodies	Concentration of lead, cadmium, mercury and pesticides in fresh water bodies	Waste water treatment, total and by type of treatment (% of population served)	Groundwater reserves
	Annual withdrawals of ground and surface water	Concentration of fecal coliform in fresh water bodies	Access to safe drinking water (% of population served)	
	Domestic consumption of water per capita	Acidification of fresh water bodies		
	Industrial, agricultural water use per GDP	BOD and COD in fresh water bodies		
		Water quality index by fresh water bodies		
Marine water resources	Industrial, agricultural and municipal discharges directly into marine water bodies	Deviation in stock from maximum sustainable yield of marine species		
	Discharges of oil into coastal waters	Loading of N and P in coastal waters		
OTHER NATURAL RESOURCES				
Biological resources	Annual roundwood production Fuelwood consumption per capita	Deforestation rate	Reforestation rate	Forest inventory
	Catches of marine species	Threatened, extinct species	Protected forest area as % of total land area	Ecosystems inventory Fauna and flora inventory Fish stocks
Mineral (incl. energy) resources	Annual energy consumption per capita	Depletion of mineral resources (% of proven reserves)		Proven mineral reserves
	Extraction of other mineral resources	Lifetime of proven reserves		Proven energy reserves

and mining wastes account for the major part of the discharges of heavy metals into water. Besides, Cadmium depositions originate from commercial fertilizers containing phosphorus.

TABLE 1.3 : SOME MAJOR POLLUTANTS AND THEIR SOURCES

Pollutant	Source
Carbon monoxide	Incomplete fuel combustion (e.g. two/four stroke engines)
Sulphur dioxide	Burning of sulphur containing fuel like coal in Power Plants and emission by vehicles
Suspended particulate matter	Smoke from domestic, industrial and vehicular sources.
Oxides of nitrogen	Fuel combustion of motor vehicles, emission from power stations and industrial furnaces
Volatile hydrocarbons	Partial combustion of carbonaceous fuels (two stroke engines, industrial processes, disposal of solid wastes).
Oxidants and ozone	Emissions from motor vehicles, photochemical reactions of nitrogen oxides and reactive hydrocarbons
Lead	Emissions from motor vehicles

TABLE 1.4 : POLLUTANTS AND THEIR RELATED HEALTH HAZARDS

Pollutants	Health Effects
Carbon Monoxide (from gasoline cars, 2-wheelers, 3-wheelers)	Fatal in case of large dose: aggravates heart disorders; effects central nervous system; impairs oxygen carrying capacity of blood
Nitrogen Oxides (NO_x) (from diesel vehicles)	Irritation of respiratory tract
Ozone	Eye, nose and throat irritation; risk asthmatics, children and those involved in heavy exercise
Lead (from petrol vehicles)	Extremely toxic: effects nervous system and blood; can impair mental development of children, causes hypertension
Hydrocarbons (mainly from 2-wheelers and 3-wheelers)	Drowsiness, eye irritation, coughing
Benzene	Carcinogenic
Aldehydes	Irritation of eyes, nose and throat, sneezing, coughing, nausea, breathing difficulties; carcinogenic in animals
Polycyclic Aromatic Hydrocarbons PAH (from diesel vehicles)	Carcinogenic

1.4.7 Health Aspects of Water Quality

Water borne diseases are single most important factor responsible for nearly 80% of human mortality in India. Children are worst affected, especially in rural areas and urban slums. Typical water born diseases and their causative factors are summarised in the Table I.5

TABLE 1.5 : WATER BORN DISEASES AND THEIR CAUSATIVE FACTORS

Name of the Disease	Causative Organism
1. Water-borne diseases Bacterial	
➢ Typhoid	Salmonella typhi
➢ Gastroenteritis	Vibrio cholerae
➢ Paratyphoid	Slmondlla parayphi
➢ Cholera	Enterotoxigenic Escherichia coli
➢ Bacterial dysentery	Variety of Escherichia coli
Viral	
➢ Infectious hepatitis	Hepatitis-A-virus
➢ Pliomycetis	Polio-virus
➢ Diarrhea Diseases	Rota-virus, Norwalk agent,
➢ Other symptoms of enteric diseases	Other virus Echono-virus, Coxsackie-virus
Protozoan	
➢ Amoebic dysentery	Entamoeba hystolitica
2. Water-washed diseases	
➢ Scabies	Various skin fungus species
➢ Trachoma	Trachoma infecting eyes
➢ Bacillary dysentery	E. coli
3. Water-based diseases	
➢ Schistosomiasis	Schistosoma sp.
➢ Guinea worm	Guinea worm
4. Infecton through water related insect vectors	
➢ Sleeping sickness	Trapanosoma through testse fly
➢ Malaria	Plasmodium through Anaphelis
5. Infection primarily due to defective sanitation	
➢ Hookworm	Hook worm, Ascaris

CHAPTER TWO

Development of Environment Statistics in India

CHAPTER TWO

DEVELOPMENT OF ENVIRONMENT STATISTICS IN INDIA

2.1 INTRODUCTION

The whole world has now realized the threat to its precious environment due to depletion of natural resources and the growing pace of degradation of the environment. Environmental issues, which have been for a long time part of Indian thought and social processes, are reflected in the Constitution of the Republic of India adopted in 1950. The Directive Principles of State policy, an integral and significant element of constitution of India, contain provisions, which reflect the commitment of the State to protect the environment with regard to forests and wildlife and which join upon the citizens of India the special responsibility to protect and improve the environment. The foundation of the present day institutional framework for environmental programmes in India goes back to the 1970s with the establishment of the National Committee of Environmental Planning and Coordination immediately after the historic Stockholm Conference on Environment held in 1972. The Committee was gradually upgraded into a Department of Environment in 1980 and five years later to a full-fledged Ministry of Environment and Forests (MOEF) of the Government of India (GOI). The State Governments also followed this example by establishing their own Departments of Environment to address the rapidly increasing policy initiatives and programmes in the environment and forests sectors.

Ministry of Environment and Forests has engaged itself in the task of managing country's environment by focussing on the development of important administrative tools and techniques, impact assessment, research and collection and dissemination of environmental information. However, environment being a multi-disciplinary subject involving complex subjects like Bio-diversity, Atmosphere, Water, Land and Soil and Human Settlements, it seemed difficult to collect and analyse data on these surveys relationships among them. It, therefore, became necessary to develop an efficient statistical system on environment that could meet the growing demand of data on various aspects of environment by the various governmental agencies, environmentalists and general public.

2.2 SETTING UP OF ENVIRONMENT STATISTICAL UNIT IN CENTRAL STATISTICAL ORGANISATION

Recognising the importance of Environment Statistics as an emerging area, the subject was first discussed in the fifth Conference of Central and State Statistical Organisation (COCSSO) held at New Delhi in 1981. The Conference recommended the need for developing an appropriate environment statistical system in the country. The subject was again discussed in the Sixth and Seventh Conference of Central and State Statistical Organisation. On the recommendation of the Seventh Conference of Central and State Statistical Organisation held in 1985, a multidisciplinary working group comprising Department of Environment, Central Statistical Organisation (CSO), State Directorates of Economics and Statistics, and other concerned Central and State organisations and research institutions involved in the related subjects, was set up in CSO under the Chairmanship of its Director General in July, 1986. The Working Group in its Report submitted in 1990 suggested a provisional list of variables for Framework for Development of Environment Statistics. The group also suggested a few variables on which data needed to be collected on priority basis.

During the second half of 1996, a Steering Committee on Environment Statistics under the chairmanship of Director General, Central Statistical organization was constituted. In its first meeting held in January 1997, a draft framework for the development of environment statistics was discussed along with the table formats to be used for preparing the compendium. The data source agencies were identified and it was decided to hold a workshop cum second meeting of the Steering Committee to discuss draft compendium of environment statistics. The workshop cum second meeting was held at Pune in March 1997. As per the recommendations of the second meeting, the said draft compendium was modified and finally got approved in the third meeting of the Steering Committee held in August 1997.

2.3 COMPENDIUM OF ENVIRONMENT STATISTICS

The Central Statistical Organisation brought out six issues of the publication entitled "Compendium of Environment Statistics" for the years 1997, 1998, 1999, 2000, 2001 and 2002 presenting available data relating to environment of the country. It is an effort to collect Statistics related to different factors that are affecting our environment. Although, the present coverage of information in the compendium may not be exhaustive with respect to entire domain of Environment, it does however provide a glimpse of the present scenario of the environmental degradation, its causes and the reasons for concern. It provides the necessary base to bring out the magnitude of the problem. The compendium consists of seven chapters. The first two chapters give a general introduction to environment, its degradation through different sources and their impact on human health and the development of environment statistics in India. The remaining five chapters are on Biodiversity, Atmosphere, Land/soil, Water and Human Settlements. Besides, statistical tables depicting environment data, suitable graphs and charts have also been added to make the publication more user friendly.

2.4 NATIONAL WORKSHOP ON ENVIRONMENT STATISTICS

To disseminate information on the development of environment statistics in India and provide a forum for interaction between users and producers, four National Workshops on Environment Statistics have been organised. The first one was organized in Goa in January 1998, the second one was held at Hyderabad during April, 2000, the third one in February, 2001 at Thirurananthapuram and the fourth one was held in April, 2003 at Shillong. All the workshops were attended by academicians, data users, and data producing agencies. The technical sessions focussed on different aspects of the environment such as environment statistics, population and human health, status of databases on different types of pollution, status of data bases on human settlements and impacts on other aspects of the environment; status of data base on land and soil and degradation; and natural resource accounting. Proceedings of all the National Workshops have been brought out in the form of a book. The workshops made several recommendations some of which are indicated below:

i) Conducting similar workshops at the regional level by involving State departments of environment, forests, pollution control boards and other local level organisation for database development.

ii) Continued publication of the Compendium on Environment Statistics at regular intervals, increased interaction between data producers and users to improve the coverage of the publication and production of similar publications at the State level.

iii) Strengthening of the Environment Statistics Unit and expansion of membership of the

Steering Committee on Environment Statistics to include other data source agencies and academic users, and establishment of linkages with the Environmental Information System (ENVIS) of the Ministry of Environment and Forests (MOFF) for database development and maintenance.

iv) Development of sound statistical methodologies for estimation of generic, specific, and ecosystem biodiversities.

v) More frequent interactions (in the form of training courses and seminars/workshops) between statisticians and environmental scientists to clarify concepts and definitions as well as methodologies used in environment statistics and formation of small technical committees within CSO composed of representatives of the offices dealing with environment and statistics to identify new data to be included in the Compendium, standardize concepts and definitions of terms, etc.

vi) Some additional data from the Network of ENVIS may be included in the compendium.

vii) The data on areas of Wetlands, Biosphere Reserves, Joint Forest Management Committees set up by various State Governments and Eco Villages and Cities and medicinal plants and data about 15 major thrust areas of the Ministry of Environment and Forests may be included in the compendium.

viii) It was decided that a small Committee under the chairmanship of DDG, CSO and the representations of data source agencies as members may be formed to review the contents of the compendium.

ix) Soft copy of the compendium in CDs may be prepared in addition to printing hard copies.

x) State Government may also bring out State Compendium on Environment Statistics on the lines of CSO Compendium.

xi) All the Ministries/Organisations implementing projects, which have impact on environment, should be well equipped with statistical personnel trained in environmental sciences to enable them to carry out impact studies.

xii) More data on pollution load by classification of industries is required to be generated. The data on pollution being collected once by CSO through Annual Survey of Industries should be continued on a regular basis and help of the Ministry of Environment and Forests may be obtained, if necessary.

xiii) There should be linkages between organizations dealing with coastal management and Central Water Commission and All India Soil and Land Use Survey as water shed management plans need to have an over all integrated assessment of carrying capacities.

xiv) There is an urgent need for establishing a system for collection of Solid Waste Data on all India basis especially from towns and cities. The computer programmes developed for disposal of solid wastes, especially, bio-medical wastes, available with Prof. Rama Rao may be used by CSO.

xv) The requirement of well-equipped information system was felt for mitigating suffering of the people affected by the natural disasters. The provision and availability of relief material including the

equipment required for convalescing the people trapped inside debris or under water may be ensured with the concerned district and local authorities.

xvi) Various research institutions working in the area of environment should have closer interaction with official data producers for preparing a uniform environmental database. Need for development of environmental information system (EIS) at the lowest level of administration was also felt.

xvii) An expert group might be constituted in CSO to look at the various suggestions emerged in the two-day workshop and examine the indicators presently being compiled in the Compendium, to suggest about their periodicity, inclusion or exclusion, spatial level of desegregation, etc. The weakness of the data may be indicated whenever necessary.

xviii) The State DES should be entrusted with the task of computing state NRA. CSO may provide necessary technical and financial assistance for the same.

xix) Need for preparation of Directory of Organisation/ institutions in the country involved in Environmental research /study / training including development of database of Environment Statistics.

xx) The role of remote sensing data may be explored in creation of database of environment statistics

xxi) Organization of workshops/seminars on various specific subjects/ sectors so that subject/sector wise specific guidelines/ standard methodologies may be firmed up.

2.5 TRAINING ON ENVIRONMENT STATISTICS

Environment statistics being a multi disciplinary subject, the Statisticians working both at the Centre as well as State Governments are not fully familiar with the relevant terminologies and concepts. To fulfil this need, the Ministry of Statistcs & PI has organized two week International Training Programme on Environment Statistics with financial support from Asian Development Bank. Twenty-two participants from South and South East Asia, including nine from India, participated in this programme. The second such training programme has been organized at Hyderabad during December, 2000 and the third one again at Hyderabad during April, 2001. The fourth training was organised at Jadavpur University in 2002. Two training programmes on Environment Statistics were organised in the year 2003 at EPTRI, Hyderabad and at NEHU, Shillong. Some short duration training courses of say 1 to 2 weeks are needed to familiarise with the subject and CSO can associate specialised research institutions/universities in this effort. In addition, some specialised courses of medium duration say one to three months duration as well as exposure to international scenario may also be needed to develop expertise in these areas.

2.6 NATURAL RESOURCE ACCOUNTING

The economy draws inputs from the environment. These consist of natural resources, both non-renewable and renewable including mineral resources, timber and non-timber forest produce, aquatic resources, and also the ecosystem services *viz.* recycling of nutrients and supply of clean air and water necessary for sustaining life. Besides, economy also uses the environment as a sink for dumping unwanted wastes generated in industrial and other anthropogenic activities.

The conventional accounting [System of National Accounting (SNA)] though operates in natural environment, hardly takes into account the environmental components and the goods and services they contribute to the economic development. Rather, it is entirely based on monetary considerations, which if dealt in isolation may prove disastrous, both to the economy as well as to the environment. Hence, links between economy and environment have to be properly understood and appreciated in order to achieve sustainable development of the society. There is an urgent need to generate data on environmental goods and services and their valuation in economic terms, so that information generated can be used for proper policy formulation to achieve overall sustainable development of the society.

As a result, concept of Integrated Environmental and Economic Accounting (IEEA) has emerged on the initiative of the United Nations. The main objectives of integrated environmental accounting are segregation and elaboration of all environmental and economic accounts, linkages of physical resource accounts with monetary environmental accounts and balance sheets, assessments of environmental costs, benefits and accounting for the maintenance of the tangible wealth. It is, thus, a complete accounting procedure for environmental assets. The IEEA later revised and termed by London Group as System for Environment and Economic Accounting (SEEA-2000) takes into consideration the contributions of the environment to the economy or the impacts of the economy on the environment. However, data on environmental components and the goods and services rendered by them, and their valuation in economic terms required for Environmental Accounting are lacking in various areas like Land, Water, Air, Energy, Agriculture, Forest, Mining, Industry etc. At present, in the fast changing environmental and economic scenario, data pertaining to various natural resources are highly desirable for proper policy formulation for sustainable development.

2.7 NATURAL RESOURCE ACCOUNTING IN INDIA

The field of Environmental Accounting of Natural Resources in India is in preliminary stage. Some work done by different groups on methodology of generating data and adding values to it (Chopra and Kakekodi, 1997; Parikh and Parikh, 1997; Kakekodi, 2002) has given impetus for development of the area. **The entire process of Environmental Accounting of Natural Resources involves three steps viz. Physical accounting; Monetary valuation; and Integration with national income accounts.** Physical accounting determines the state of the resource- types and extent (qualitative and quantitative) in spatial and temporal terms. Once the physical account of resources is available, monetary valuation is done to its all-tangible and intangible components. Thereafter, the net change in natural resources in monetary terms is integrated into the Gross Domestic Product in order to reach the value of Green GDP of a nation/ state/region. The process does not require any change in the core system of SNA, rather it is achieved by establishing linkages between the two.

A pilot project on Natural Resource Accounting in Goa was initiated. A Technical working Group on Natural Resource Accounting constituted in the Ministry of Statistics & Programme Implementation held its first meeting in November 1997. Following the deliberations, a concept paper was got developed which was considered by the Technical Working Group in its meeting held in September 1998. The Group recommended that scope of study would be to cover all sectors of the economy. However, major emphasis would be given to Forests and Biodiversity, Minerals, Marine Resources, Tourism and Energy. In the first phase,

CHAPTER THREE

BIODIVERSITY

3.1 The term 'biodiversity' encompasses the variety of life on Earth. It is defined as the variability among living organisms and the ecological complexes of which they are part, including diversity within and between species and ecosystems. Biodiversity manifests at species genetic and ecosystem levels. Biodiversity has direct consumptive value in food, agriculture, medicine, industry, etc. It also has aesthetic and recreational value.

3.2 India is one of the 12 mega-biodiversity countries of the world. From about 70% of the total geographical area surveyed so far, 46,000 plant species and 81,000 animal species representing about 7% of the worlds flora and 6.5% of the world's fauna, respectively, have been described. Out of the total twelve biodiversity hot spots in the world, India has two, one is the north east region and other the western ghats.

3.3 Plant biodiversity as a national and global resource is extremely valuable but is poorly understood, inadequately documented and often wasted. The preservation of biodiversity is both a matter of investment and insurance to a) sustain and improve agricultural, forestry and fisheries production, b) act as a buffer against harmful environmental changes, c) provide raw materials for scientific and industrial innovations, and d) safe guard transferring biological richness to future generations.

3.4 Biodiversity the world over is in peril because the habitats are threatened due to such development programmes as creation of reservoirs, mining, forest clearing, laying of transport and communication networks, etc. It is estimated that in the world wide perspective, slightly over 1000 animal species and sub-species are threatened with an extinction rate of one per year, while 20,000 flowering plants are thought to be at risk.

CONSERVATION MEASURES

Biospheres:

3.5 Areas rich in biodiversity and encompassing unique and representative ecosystems are identified and designated as Biosphere Reserves. The goal is to facilitate conservation of representative landscape and India's immense biological diversity as described above. Till date, 13 Biosphere Reserves have been set up, the last one was set up on 12.11.2001 at Agastthyamalai in Kerala.

Project Tiger

3.6 As per the recommendations of a special task-force of the Indian Board of Wildlife, Project Tiger was launched in 1973 with the following objectives:-

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

3.7 At present, there are 27 Tiger Reserves spreading over in 14 states and covering an area of about 37,761 sq. kms. The population of tigers is estimated through tiger census conducted once in 4 to 6 years. The last such census was conducted in 2001-02.

NATIONAL PARKS AND WILD LIFE SANCTUARIES

The wild life Act provided for setting up National parks and sanctuaries for wild life. The basic idea in trying to encourage wild life .is that human welfare is initially linked with it. The Government of India has pledged for all out efforts to conserve which not only seeks to protect and preserve what remains of wild fauna and flora but also seeks to augment this priceless national heritage.

3.8 Multipronged pressures on forests come from population, cattle grazing, fuel and fodder collection, industry and forest fires, etc. The remaining good forest cover is, therefore, estimated to be just 11% against the desirable 33% of the total land area as per the National Forest Policy. Up to the late seventies, forest land was a prime target for diversion for resettlement, agriculture and industrialization, and this trend was contained only by the Forest (Conservation) Act, 1980.

3.9 A two pronged strategy to increase forest cover essentially comprises of

- Improving canopy cover in the forest land; and
- Undertaking afforestation in non-forest and degraded lands, preferably contiguous to forest blocks.

3.10 Realising the role of forests in controlling soil erosion, moderation of floods, recharging of ground aquifers, as habitat for wildlife, conservation of bio-diversity and gene pool, etc., programmes were launched as early as the Second Five Year Plan for extensive Watershed Management followed later by establishment of a Protected Areas Network, under the Wildlife (Protection) Act, 1972, comprising of Biosphere Reserves, National Parks and Sanctuaries- both terrestrial and aquatic. This Network in 1999 comprised of 13 Biosphere Reserves, 89 National Parks, 484 Sanctuaries, along with such dedicated conservation programmes as Project Tiger, Crocodile Rehabilitation and Project Elephant. The Central Zoo Authority caters to the ex-situ conservation of wildlife through 275 zoos, deer parks, safari parks and aquaria, etc. India is a also signatory to several International Conventions like CITES, International Whaling Convention (IWC); Convention on Migratory Species (CMS), World Heritage Convention (WHC), etc. India has recently taken the lead in the formation of the Global Tiger Forum.

Agro Biodiversity

3.11 The National Bureau of Plant Genetic Resources (NBGR) established in 1976 as an institution under Indian Council of Agricultural Research (ICAR) emerged as an important organization dealing with various establishments of plant genetic resources. The organization is entrusted with the vital responsibility of germ plasm, exchange with appropriate quarantine measures, survey exploration, their organization, planning and coordination, comprising evaluation, documentation and conservation of diverse plant genetic resources. The National Gene Bank has also been established within the complex. Within

the new trade related intellectual property rights (TRIPS) within World Trade Organisation related agreements, documentation of our genetic resources is very important. Similarly, the documentation of fish genetic resources is the responsibility of National Bureau of Fish Genetic Resource, Lucknow also an institution under ICAR. Similarly, the National Bureau of Animal Genetic Resources located at Karnal maintains the germ plasm of Indian Cattle and Buffalo breeds. This organization is also an institution of ICAR umbrella.

TABLE 3.1.1 : NUMBER AND STATUS OF PLANT SPECIES IN INDIA

Sl. No.	Type	No. of Known Species in the World	No. of Known Species in India	Percentage of Occurrence in India	No. of Species Endemic	No. of Species Endangered	No. of Species Extinct
1	2	3	4	5	6	7	8
I	**Flowering Plants**						
1	Gymnosperm	650	48	7.38	8*	7*	Not Known
2	Angiosperm	250000	17672	7.00	5725*	1700*	28
II	**Non-flowering Plants**						
1	Fern & Fernallics	10000	1135	11.35	193*	113*	Not Known
2	Algae	40000	6500	16.25	1100*	120*	Not Known
3	Fungi	70000	14500	20.71	3500*	140*	Not Known
4	Lichens	13500	2021	14.97	417*	400*	Not Known
5	Liverworts	7500	852	11.26	260*	100*	Not Known
6	Mosses	7000	2000	28.6	608*	115	Not Known

Source : Botanical Survey of India, Kolkata.

* *: Approximate*

India has a rich heritage of species and genetic strains of flora. Overall about six percent of world species are found in India. It is estimated that India is tenth among the plant rich countries of the world and sixth among the centres of diversity and origin of agrodiversity. Out of the total twelve biodiversity hot-spots in the world, India has two, one is the north east region and other is western ghats (Khoshoo, T.N., 1995). The growing urbanization and industrialization causes the decrease of Natural habitats, which further results in the loss to biological diversity. Biodiversity, once lost cannot be recovered.

TABLE 3.1.2 : RARE AND THREATENED SPECIES (VASCULAR PLANTS)

Sl. No.	Category	Approximate Number
1	2	3
1	Rare	287
2	Vulnerable	167
3	Endangered	1366
4	Possibly Extinct	40
5	Extinct	28

Source : Botanical Survey of India, Kolkata.

CHART 1 : RARE AND THREATENED PLANT SPECIES

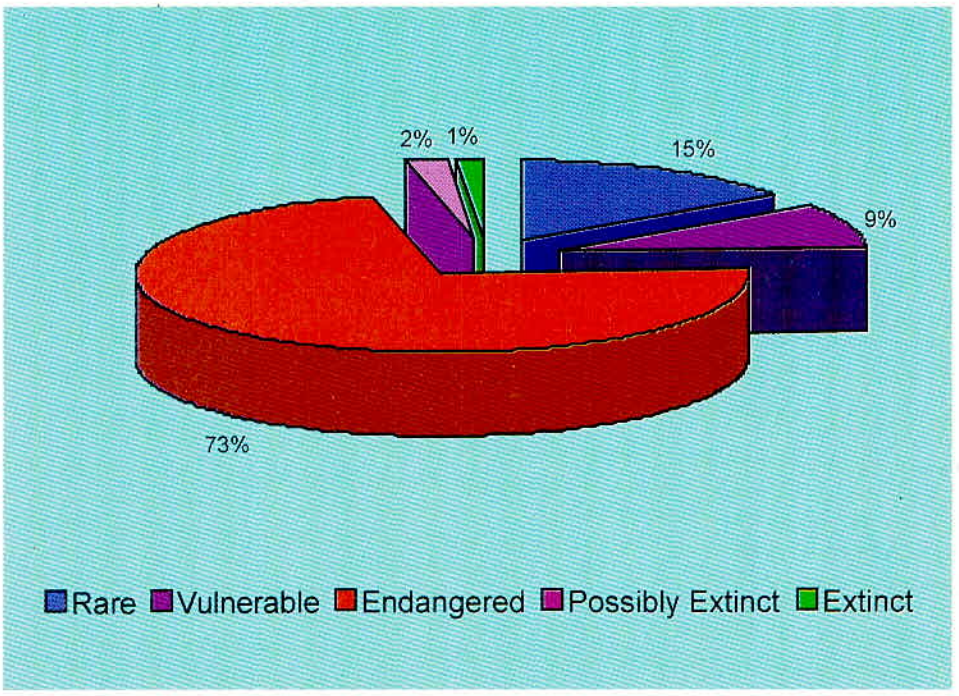


TABLE 3.1.3 : REFERENCE COLLECTIONS OF FLORA

Sl. No.	Category	Total Number	Total Holdings of Collections and Specimens
1	2	3	4
1	Herbarium	51	4594795
2	Museums	18	60100

Source : Botanical Survey of India, Kolkata.

TABLE 3.1.4 : CONSERVATION MEASURES

Sl. No.	Category	Number	Total Geographical Area (Sq. Km.)
1	2	3	4
I	**Within Habitats (insitu)**		
1	Biosphere Reserves	13	53849
2	National Parks	89	40631
3	Sanctuaries	484	115374
4	Reserve Forests	NA	416547
5	Protected Forests	19	223321
II	**Outside Habitats (ex situ)**		
1	Botanical Gardens	120	26.24
2	Gene Banks	NA	NA

Source : Botanical Survey of India, Kolkata.

TABLE 3.1.5 : BIOSPHERE RESERVES SETUP IN INDIA

Sl. No.	Name of Biosphere Reserve	Area (in sq.km.)	Date of Notification	Location (State) and Bio-Geographic Zones
1	2	3	4	5
1	Nilgiri	5520.00	01.08.1986	Part of Wynad, Nagarhole, Bandipur and Mudumalai, Nilambur, Silent Valley and Siruvani hills (Tamil Nadu, Kerala and Karnataka)-Western Ghats
2	Nanda Devi	5860.69	18.01.1988	Part of Chamoli, Pithoragarh & Almora Districts (Uttranchal)-West Himalayas
3	Nokrek	820.00	01.09.1988	Part of Garo Hills (Meghalaya)-East Himalayas
4	Manas	2837.00	14.03.1989	Part of Kokrajhar, Bongaigaon, Barpeta, Nalbari, Kamrup and Darang districts (Assam)-East Himalayas
5	Sunderbans	9630.00	29.03.1989	Part of Delta of Ganges & Barahamaputra river system (West Bengal)-Gigantic Delta
6	Gulf of Mannar	10500.00	18.02.1989	Indian part of Gulf of Mannar between India and Sri Lanka (Tamil Nadu)-Coasts
7	Great Nicobar	885.00	06.01.1989	Southern Most Islands of Andaman and Nicobar (A&N Islands)-Islands
8	Similipal	4374.00	21.06.1994	Part of Mayurbhanj district (Orissa)-Deccan Peninsula
9	Dibru-Saikhowa	765.00	28.07.1997	Part of Dibrugarh and Tinsukhia districts (Assam)-East Himalayas
10	Dehang Debang	5112.00	02.09.1998	Part of Siang and Debang Valley in Arunachal Pradesh-East Himalayas
11	Pachmarhi	4926.28	03.03.1999	Part of Betul, Hoshangabad and Chindwara Districts of Madhya Pradesh-Semi-Arid-Gujarat Rajputana
12	Kanchanjunga	2619.92	07.02.2000	Parts of Kanchanjunga Hills in Sikkim-East Himalayas
13	Agasthyamalai	1701.00	12.11.2001	Neyyar, Peppara and Shenduruny Wildlife Sanctuaries and Their Adjoining Areas in Kerala

Source: Ministry of Environment and Forests

TABLE 3.1.8 : STATUS OF GERMPLASM AT NATIONAL CRYOBANK

(As on 31st December, 2003)

Sl. No.	Category	No. of Species	No. of Accessions
1	2	3	4
I	**Intermediate & Recalcitrant**	**131**	**2856**
1	Fruits & Nuts	105	1071
2	Spices & Condiments	9	56
3	Plantation Crops	2	19
4	Agroforestry Sp.	15	1710
II	**Orthodox**	**371**	**2386**
1	Cereals	4	191
2	Millets and Forages	11	245
3	Pseudo-cereals	17	63
4	Grain Legumes	20	552
5	Oilseeds	8	271
6	Fibre Crops	5	40
7	Vegetables	55	389
8	Medicinal & Aromatic Plants	249	602
9	Narcotics	2	33
	Total	**1004**	**10484**

Source : National Bureau of Plant Genetic Resources

TABLE 3.1.9 : STATUS OF CRYOPRESERVATION OF POLLEN

(As on 31st December, 2003)

Sl. No.	Plant Species	No. of Accession
1	2	3
1	Brassica spp. (oleracea, napus, campestris, carinata, juncea, nigra)	43
2	Camellia sinensis	1
3	Cicer microphyllum	1
4	Citrus spp.	5
5	Eruca species	2
6	Garcinia spp.	4
7	Mangifera indica	30
8	Poncirus trifoliata	1
9	Raphanus sativus	4
10	Sesamum spp.	1
11	Zea mays & allied genera	9
	Total	**101**

Source : National Bureau of Plant Genetic Resources

TABLE 3.2.1 : STATE/UT WISE FOREST AREA

(Sq.km)

Sl. No.	State/UT	Geographic Area	Reserved Forest	Protected Forest	Unclassed Forest	Recorded Forest	% OF Forest to Geographic Area
1	2	3	4	5	6	7	8
1	Andhra Pradesh	275069	50479	12365	970	63814	23.20
2	Arunachal Pradesh	83743	19880		31660	51540	61.55
3	Assam	78438	18060		8958	27018	34.45
4	Bihar	94163	693	5384	1	6078	6.45
5	Chhattisgarh	135191	23966	31107	4212	59285	43.85
6	Delhi	1483	78	7		85	5.73
7	Goa	3702	236		988	1224	33.07
8	Gujarat	196022	13904	396	4699	18999	9.69
9	Haryana	44212	249	1155	147	1551	3.51
10	Himachal Pradesh	55673	1896	33043	2094	37033	66.52
11	Jammu & Kashmir	222236	20230			20230	9.10
12	Jharkhand	79714	4387	19185	33	23605	29.61
13	Karnataka	191791	28611	3932	6181	38724	20.19
14	Kerala	38863	11038	183		11221	28.87
15	Madhya Pradesh	308245	58734	35587	900	95221	30.89
16	Maharashtra	307713	49217	8196	4526	61939	20.13
17	Manipur	22327	1467	4171	11780	17418	78.01
18	Meghalaya	22429	1112	12	8372	9496	42.34
19	Mizoram	21081	7127	3568	5240	15935	75.59
20	Nagaland	16579	308	508	7813	8629	52.05
21	Orissa	155707	26329	15524	16282	58135	37.34
22	Punjab	50362	44	1112	1903	3059	6.07
23	Rajasthan	342239	11860	17658	2976	32494	9.49
24	Sikkim	7096	5376	285	104	5765	81.24
25	Tamil Nadu	130058	19325	2240	1306	22871	17.59
26	Tripura	10486	3588	509	2196	6293	60.01
27	Uttar Pradesh	240928	11078	2425	3323	16826	6.98
28	Uttaranchal	53483	23827	10673	162	34662	64.81
29	West Bengal	88752	7054	3772	1053	11879	13.38
30	Union Territories	9478	3158	4248	2	7407	157.36
	Total	**3287263**	**423311**	**217245**	**127881**	**768436**	**23.38**

Source : State of Forest Report 2001

India has76.84 million hectares of recorded forest area in March 1999. This accounts for 23.38% of total geographic area. Per Capita availability of forests in India is 0.07 ha which is much lower than the world average of 0.8 ha.

TABLE 3.2.3(a) : FOREST AREA BY OWNERSHIP(AS ON 31-3-2000)

(Sq.km)

Sl. No.	State/ Union	Forest Department					Others		
		Reserved	Protected	Unclassed	Total	Area Under Sanctioned Working Plans	Revenue Department	Corporate Bodies Forest/ Forests Community Ownership	Private Forest
1	2	3	4	5	6	7	8	9	10
1	Andhra Pradesh	50479.00	12365.00	975.00	63819.00	Nil	Nil	Nil	Nil
2	Arunachal Pradesh	9552.32	7.80	31771.52	41331.64	9247.84	1544.17	Nil	N.A.
3	Assam	17421.94	2814.63	5893.99	26130.56	N.A.		N.A.	N.A.
4	Bihar	5051.43	25019.51	7.09	30078.03	30078.00	12200.00	10160.00	Nil
5	Delhi							N.A.	N.A.
6	Goa			319.84	319.84	1224.00		N.A.	200.00
7	Gujarat	13741.25	395.62	4641.13	18778.00	14083.58		N.A.	N.A.
8	Haryana	249.00	1154.00	21.00	1424.00	427.91		N.A.	127.00
9	Himachal Pradesh	1896.00	33043.00	976.00	35915.00	24535.00		42.00	1076.00
10	Jammu & Kashmir		20230.00		20230.00	20194.00		N.A.	N.A.
11	Karnataka	28689.96	3930.72	5231.00	37851.68	17102.01	124.20	N.A.	308.42
12	Kerala	9371.30	1752.94		11124.23	1028.39		N.A.	N.A.
13	Madhya Pradesh	82700.13	66693.79	5112.48	154506.40	1545506.40		N.A.	N.A.
14	Maharashtra	43898.00	8025.00	3455	55378.00	41045.00	2422.00	3559.00	558.00
15	Manipur	1467.00	4141.00	11780.00	17418.00			N.A.	N.A.
16	Meghalaya	712.74	12.39	399.48	1124.61	294.41		N.A.	N.A.
17	Mizoram	6798.00	1045.00		7843.00	Nil	Nil	2622.00	Nil
18	Nagaland	85.83	507.56	192.47	785.86	Nil	Nil	N.A.	7621.09
19	Orissa	26329.12	15524.46	20.55	41874.13	30281.45	16261.34	N.A.	12.29
20	Punjab	43.36	1111.67	196.55	1351.58	1349.22		873.35	831.15
21	Rajasthan	11780.66	17604.03	2924.45	32309.14			N.A.	N.A.
22	Sikkim	5652.50		6760.25	12412.75			N.A.	N.A.
23	Tripura	35188.18	509.02	2195.47	6292.68	459.60		N.A.	N.A.
24	Uttar Pradesh							N.A.	N.A.
25	West Bengal	7054.00	3772.00	1053.00	11879.00	11381.00		N.A.	N.A.
26	A&N Islands	2928.76	4241.93	Nil	7170.69	5628.62	Nil	Nil	Nil
27	D&N Haveli	198.76	4.82		209.58	198.76		N.A.	N.A.
28	Daman & Diu							N.A.	N.A.
29	Chandigarh							N.A.	N.A.
30	Lakshadweep							N.A.	N.A.
31	Pondicherry							N.A.	N.A.
	Total	**361289.24**	**223905.89**	**83926.27**	**669121.40**	**1754065.19**	**32551.71**	**17256.35**	**10733.95**

Source : Forestry Statistics India, 2001

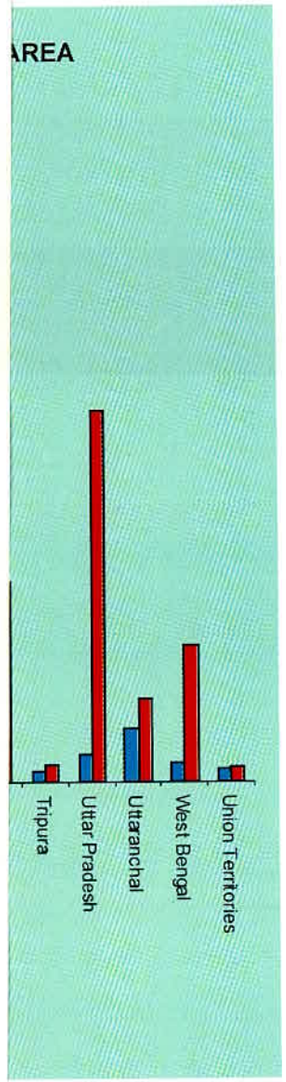


TABLE 3.2.3(b) : FOREST AREA BY COMPOSITION (AS ON 31-3-2000)

(sq.km)

Sl. No.	State/ Union Territory	Coniferous forest				Broad Leaved Forest			Mixed Coniferous/ Broad leaved	Total
		Chir	Deodar	Others Conifers	Sal	Teak	Mixed Forest Leaved	Mangrove		
1	2	3	4	5	6	7	8	9	10	11
1	Andhra Pradesh	Nil	Nil	Nil	47.00	9145.00	54103.00	519.00		
2	Arunachal Pradesh									
3	Assam									
4	Bihar	Nil	Nil	Nil	22378.00	8.91	7691.12	Nil	Nil	30078.03
5	Delhi									
6	Goa					92.08	1130.14	1.78		1224.00
7	Gujarat						6430.00	3979.00		10409.00
8	Haryana	23.00			30.00		1371.00			1424.00
9	Himachal Pradesh	1436.00	811.00	6685.00	183.00		1079.00		5880.00	16074.00
10	Jammu & Kashmir	1825.00	1075.00	5369.00			1885.00		10076.00	20230.00
11	Karnataka						38224.28	60.00		38284.28
12	Kerala					4100.00	7024.23			11124.23
13	Madhya Pradesh	Nil	Nil	Nil						
14	Maharashtra					9161.00	31776.00	108.00		41045.00
15	Manipur	Nil	Nil	2442.77	Nil	610.74	9444.00	Nil	4886.49	17384.00
16	Meghalaya			145.14			732.94			878.08
17	Mizoram									
18	Nagaland	Nil	Nil	277.50	Nil	Nil	2269.00	Nil	Nil	2546.50
19	Orissa			3.99	16938.25	2030.64	21024.34	215.00	N.A.	40212.22
20	Punjab	121.75					2907.74		26.59	3056.08
21	Rajasthan									
22	Sikkim			903.45	80.57		1799.71			2783.73
23	Tamil Nadu							21.00	19294.00	19315.00
24	Tripura				270.31	1510.15	4163.56			5944.02
25	Uttar Pradesh									
26	West Bengal			89.00				2109.00	9681.00	11879.00
27	A&N Islands						6204.69	966.00		7170.69
28	D&N Haveli						203.58		203.58	407.16
29	Daman & Diu									
30	Chandigarh								32.43	32.43
31	Lakshadweep									
32	Pondicherry									
	Total	**3405.75**	**1886.00**	**15915.85**	**39927.13**	**26658.52**	**199463.33**	**7978.78**	**50080.09**	**345315.45**

Source : Forestry Statistics India, 2001
Note: Blank cell indicates information is not available

TABLE 3.2.13 (a) : STATE/UT WISE MANGROVE COVER ASSESSMENT

(Sq. km)

Sl No.	State/UT	Assessment Year						
		1987	1989	1991	1993	1995	1997	1999
1	2	3	4	5	6	7	8	9
1	Andhra Pradesh	495	405	399	378	383	383	397
2	Goa		3	3	3	3	5	5
3	Gujarat	427	412	397	419	689	901	1031
4	Karnataka					2	3	3
5	Maharashtra	140	114	113	155	155	124	108
6	Orissa	199	192	195	195	195	211	215
7	Tamil Nadu	23	47	47	21	21	21	21
8	West Bengal	2976	2109	2119	2119	2119	2123	2125
9	Andaman & Nicobar	686	973	971	966	966	966	966
Total		**4946**	**4255**	**4244**	**4256**	**4533**	**4737**	**4871**

Source: State of Forest Report 2001

TABLE 3.2.13 (b) : STATE/UT WISE MANGROVE COVER

(Sq. km)

Sl No.	State/UT	Dense Forest	Open Forest	Total Forest	Percent
1	2	3	4	5	6
1	Andhra Pradesh	14	319	333	0.120
2	Goa	5		5	0.140
3	Gujarat	184	727	911	0.460
4	Karnataka	2		2	0.001
5	Maharashtra	90	28	118	0.040
6	Orissa	194	25	219	1.390
7	Tamil Nadu	10	13	23	0.020
8	West Bengal	1651	430	2081	2.340
9	Andaman & Nicobar	709	80	789	9.560
10	Pondicherry		1	1	0.210
	Total	2859	1623	4482	0.140

Source: State of Forest Report 2001

TABLE 3.2.13 (c) : STATE-WISE LIST OF MANGROVE AREAS

Sl No.	State/UT	Mangrove Area
1	2	3
1	West Bengal	Sunderbans
2	Orissa	Bhaitarkanika, Mahanadi, Subernarekha, Devi, Dhamra, MGRC, Chilka
3	Andhra Pradesh	Coringa, East Godavari, Krishna
4	Tamil Nadu	Pichavram, Muthupet, Ramnad, Pulicat, Kazhuveli,
5	Andman & Nicobar	North Andamans, Nicobar
6	Kerala	Vembanad
7	Karnataka	Coondapur, Dakshin Kannada/Honnavar
8	Goa	Karwar
9	Maharashra	Achra-Rantnagiri, Devgarh-Vijay Dur, Veldur, Kundalika-Ravdana, Mumbara-Diva, Vikroli, Shreevardhan, Vaitarna, Vasasi-Manori, Malvan
10	Gujarat	Gulf of Kutchh, Gulf of Khambat

Source : Annual Report 2003-2004, Ministry of Environment & Forests

TABLE 3.2.3(b) : FOREST AREA BY COMPOSITION (AS ON 31-3-2000)

(sq.km)

Sl. No.	State/ Union Territory	Coniferous forest				Broad Leaved Forest			Mixed Coniferous/ Broad leaved	Total
		Chir	Deodar	Others Conifers	Sal	Teak	Mixed Forest Leaved	Mangrove		
1	2	3	4	5	6	7	8	9	10	11
1	Andhra Pradesh	Nil	Nil	Nil	47.00	9145.00	54103.00	519.00		
2	Arunachal Pradesh									
3	Assam									
4	Bihar	Nil	Nil	Nil	22378.00	8.91	7691.12	Nil	Nil	30078.03
5	Delhi									
6	Goa					92.08	1130.14	1.78		1224.00
7	Gujarat						6430.00	3979.00		10409.00
8	Haryana	23.00			30.00		1371.00			1424.00
9	Himachal Pradesh	1436.00	811.00	6685.00	183.00		1079.00		5880.00	16074.00
10	Jammu & Kashmir	1825.00	1075.00	5369.00			1885.00		10076.00	20230.00
11	Karnataka						38224.28	60.00		38284.28
12	Kerala					4100.00	7024.23			11124.23
13	Madhya Pradesh	Nil	Nil	Nil						
14	Maharashtra					9161.00	31776.00	108.00		41045.00
15	Manipur	Nil	Nil	2442.77	Nil	610.74	9444.00	Nil	4886.49	17384.00
16	Meghalaya			145.14			732.94			878.08
17	Mizoram									
18	Nagaland	Nil	Nil	277.50	Nil	Nil	2269.00	Nil	Nil	2546.50
19	Orissa			3.99	16938.25	2030.64	21024.34	215.00	N.A.	40212.22
20	Punjab	121.75					2907.74		26.59	3056.08
21	Rajasthan									
22	Sikkim			903.45	80.57		1799.71			2783.73
23	Tamil Nadu							21.00	19294.00	19315.00
24	Tripura				270.31	1510.15	4163.56			5944.02
25	Uttar Pradesh									
26	West Bengal			89.00				2109.00	9681.00	11879.00
27	A&N Islands						6204.69	966.00		7170.69
28	D&N Haveli						203.58		203.58	407.16
29	Daman & Diu									
30	Chandigarh								32.43	32.43
31	Lakshadweep									
32	Pondicherry									
	Total	**3405.75**	**1886.00**	**15915.85**	**39927.13**	**26658.52**	**199463.33**	**7978.78**	**50080.09**	**345315.45**

Source : Forestry Statistics India, 2001
Note: Blank cell indicates information is not available

TABLE 3.2.4 : CUMULATIVE AREA OF FOREST PLANTATIONS BY ALL AGENCIES IN THE STATES/UT'S FROM 1951 TO 1999

('000 ha)

Sl. No.	State/UT's	Total Cumulative Plantation Area	Area of Block Plantation	Area Converted from Seedlings Distributed
1	2	3	4	5
1	Andhra Pradesh	2496.56	1260.30	1236.26
2	Arunachal Pradesh	160.95	155.73	5.22
3	Assam	451.78	433.58	18.20
4	Bihar	1326.23	942.12	384.11
5	Delhi	44.05	20.18	23.87
6	Goa	65.60	46.04	19.56
7	Gujarat	2981.08	1293.95	1687.13
8	Haryana	742.74	597.02	145.72
9	Himachal Pradesh	719.44	665.84	53.60
10	Jammu & Kashmir	382.43	323.04	59.39
11	Karnataka	2163.22	1573.19	590.03
12	Kerala	688.12	483.63	204.49
13	Madhya Pradesh	3364.13	2848.52	515.61
14	Maharashtra	2965.07	2130.39	834.68
15	Manipur	154.76	139.69	15.07
16	Meghalaya	164.48	130.67	33.81
17	Mizoram	308.55	255.73	52.82
18	Nagaland	174.20	116.43	57.77
19	Orissa	1827.41	1458.49	368.92
20	Punjab	512.38	417.60	94.78
21	Rajasthan	1410.10	1150.79	259.31
22	Sikkim	119.23	107.53	11.70
23	Tamil Nadu	2268.18	1616.18	652.00
24	Tripura	246.64	215.61	31.03
25	Uttar Pradesh	4185.77	1844.36	2341.41
26	West Bengal	1157.73	610.93	546.80
27	A. & N. Islands	88.14	83.13	5.01
28	Chandigarh	10.07	9.85	0.22
29	Dadra & Nagar Haveli	18.36	11.01	7.35
30	Daman & Diu	1.39	0.85	0.54
31	Lakshadweep	2.50	0.57	1.93
32	Pondicherry	7.88	1.91	5.97
	Total	**31209.17**	**20944.86**	**10264.31***

Source : *State of Forest Report, 1999*

* : *The area has been estimated by FSI using 1990-1999 figures of NAEB MOEF where breakup of block plantation and seedlings distributed are available.*

TABLE 3.2.5(a) : COMPARATIVE SITUATION OF FOREST COVER IN INDIA

(Sq. Km.)

Sl. No.	States/Uts	2001 Assessment	1999 Assessment	1997 Assessment	Change in 2001 (3-4)	Change in 1999 (4-5)
1	2	3	4	5	6	7
1	Andhra Pradesh	44637	44229	43290	+408	+939
2	Arunachal Pradesh	68045	68847	68602	-802	+245
3	Assam	27714	23688	23824	+4026	-136
4	Bihar	5720	4830	4832	+890	-2
5	Chhatisgarh	56448	56693	56435	-245	+258
6	Delhi	111	88	26	+23	+62
7	Goa	2095	1251	1252	+844	-1
8	Gujarat	15152	12965	12578	+2187	+387
9	Haryana	1754	964	604	+790	+360
10	Himachal Pradesh	14360	13082	12521	+1278	+561
11	Jammu & Kashmir	21237	20441	20440	+796	+1
12	Jharkhand	22637	21644	21692	+993	-48
13	Karnataka	36991	32467	32403	+4524	+64
14	Kerala	15560	10323	10334	+5237	-11
15	Madhya Pradesh	77265	75137	74760	+2128	+377
16	Maharashtra	47482	46672	46143	+810	+529
17	Manipur	16926	17384	17418	-458	-34
18	Meghalaya	15584	15633	15657	-49	-24
19	Mizoram	17494	18338	18775	-844	-437
20	Nagaland	13345	14164	14221	-819	-57
21	Orissa	48838	47033	46941	+1805	+92
22	Punjab	2432	1412	1387	+1020	+25
23	Rajasthan	16367	13871	13353	+2496	+518
24	Sikkim	3193	3118	3129	+75	-11
25	Tamil Nadu	21482	17078	17064	+4404	+14
26	Tripura	7065	5745	5546	+1320	+199
27	Uttar Pradesh	13746	10756	10751	+2990	+5
28	Uttaranchal	23938	23260	23243	+678	+17
29	West Bengal	10693	8362	8349	+2331	+13
30	A. & N. Islands	6930	7606	7613	-676	-7
31	Chandigarh	9	7	7	+2	
32	Dadra & Nagar Haveli	219	202	204	+17	-2
33	Daman & Diu	6	3	3	+3	
34	Lakshadweep	27			+27	
35	Pondicherry	36			+36	
	Total	675538	637293	633397	+38245	+3896

Source : State of Forest Report, 2001

In the year 2001, as compared to 1999, the total forest cover had increased by 38245 Sq. Kms. The states which have shown significant decrease in the forest covers are Arunachal Pradesh, Manipur, Mizoram, Nagaland, A & N Islands. Whereas the states of Assam, Bihar, Himachal Pradesh, Karnataka, Tamil Nadu, Gujarat, Maharashtra, Mizoram, Punjab, West Bengal and Rajasthan have shown an increase in forest cover. However, it has increased in 1999 by 3896 Sq. Kms. as compared to 1997.

TABLE 3.2.5(b) : CHANGE IN FOREST COVER OF THE NORTH-EASTERN REGION DURING 1990s

(Sq. Km.)

Sl. No.	State	Forest Cover 2001 Assessment	Change during different assessments			
			1993-95	1995-97	1997-99	1999-2001
1	2	3	5	6	7	8
1	Arunachal Pradesh	68045	- 40	- 19	+ 245	- 802
2	Assam	27714	- 447	- 237	- 136	+ 4026
3	Manipur	16926	- 63	- 140	- 34	- 458
4	Meghalaya	15584	- 55	- 57	- 24	- 49
5	Mizoram	17494	- 121	+ 199	- 437	- 844
6	Nagaland	13345	- 57	- 70	- 57	- 819
7	Tripura	7065		+ 8	+ 199	+ 1320
	Total	**166173**	**- 783**	**- 316**	**- 244**	**+ 2374**

Source : State of Forest Report, 2001

The forest cover in the North-Eastern Region (NER) is about 64% of the Geographical Area.

The forest cover decrease in the NER was maximum during the year 1993-95. However, there has been significant increase in the forest cover in 2001 over the year 1999 by 2374 sq. km. mainly due to increase in the forest area cover in Assam and Tripura while other NE States have shown decrease in forest cover in the same period.

TABLE: 3.2.6: FOREST PRODUCTS OF INDIA

('000 cum)

Sl. No.	Forest Produce		1991	1992	1993	1994	1995
1	2		3	4	5	6	7
1	Roundwood	C	10055	10200	10345	10489	10636
		NC	256732	261427	266123	270818	275615
2	Fuelwood	C	7286	7429	7572	7715	7860
		NC	235000	239600	244200	248800	253500
3	Industrial Roundwood	C	2769	2771	2773	2774	2776
		NC	21732	21827	21923	22018	22115
4	Pulp wood	C	145	145	145	145	145
		NC	1063	1063	1063	1063	1063
5	Sawnwood	C	2500	2500	2500	2500	2500
		NC	14960	14960	14960	14960	14960
6	Wood based Pannels		378	357	348	348	348
7	Veneer Sheets		24	18	7	7	7
8	Plywood		250	231	245	245	245
9	Particle Board		59	60	60	60	60
10	Fibre Board		45	48	36	36	36
11	Wood Pulp		986	987	1147	1196	1205
12	News Print		300	320	320	350	400
13	Printing & Writing Paper		990	1060	1085	1112	1150

Source : Forestry Statistics India, 2000
C : Coniferous
NC : Non Coniferous

TABLE 3.2.7 : STATE-WISE PRODUCTION OF FOREST PRODUCE

Sl. No.	State/Union Territory	Timber (Cu. Metre)		Poles (Cu. Metre)		Pulp & Matchwood (Cu. Metre)		Fuelwood (Cu. Metre)	
		1998-99	1999-2000	1998-99	1999-2000	1998-99	1999-2000	1998-99	1999-2000
1	2	3	4	5	6	7	8	9	10
1	Andhra Pradesh	43663.00	42838.00			54602.00	61633.00	1000975.00	105099.00
2	Arunachal Pradesh	61586.64	44705.79	27.60	20.39			11138.00	5292.00
3	Assam								
4	Bihar	17008.00	8034.00	4621.00	2154.00	Nil	Nil	840000.00	392000.00
5	Delhi								
6	Goa	13.32	5.70	2.00					23.40
7	Gujarat	34402.00	22654.00					19187.00	21775.00
8	Haryana								
9	Himachal Pradesh	411999.00						5432.00	
10	Jammu & Kashmir	217120.00	165030.00					1101.00	1306.00
11	Karnataka	65036.00	58705.00	1145.00	2059.00	269031.00	216312.00	1248863.00	1288322.00
12	Kerala	26664.00	44519.26	8252.00	13662.00	162304.00	128094.36	64484.00	49669.00
13	Madhya Pradesh	391517.00	159019.00			Nil	Nil	781977.00	328979.00
14	Maharashtra		75300.00						749648.00
15	Manipur	3503.97	149.51					29780.53	26477.00
16	Meghalaya	607.08	N.A.	Nil		Nil		Nil	
17	Mizoram	560.66	661.61	144.00	20.00	Nil	Nil	14193.00	22684.00
18	Nagaland	45924.00	20842.00					32766.00	2810.00
19	Orissa	33134.48	N.A.	83.25				17509.58	
20	Punjab	78592.00	164824.00	N.A.				2119.00	5984.00
21	Rajasthan	574.60	4874.00	Nil	Nil	Nil	Nil	51394.00	37500.00
22	Sikkim								
23	Tamil Nadu								
24	Tripura								
25	Uttar Pradesh	476480.00	N.R.				N.R.	38482.50	N.R.
26	West Bengal	43487.00	76875.00	42833.00	67941.00	6917.00	54501.00	512162.00	858470.00
27	A & N Islands	52342.00	42426.00	6637.20	6505.11	10291.00	5208.00	107261.00	81420.50
28	D. & N. Haveli	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
29	Chandigarh	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
30	Lakshadweep	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
31	Pondicherry	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Total		**2004214.75**	**931462.87**	**63745.05**	**92361.50**	**503145.00**	**465748.36**	**4778824.61**	**3977458.90**

Note: Blank cell indicates information is not available

TABLE 3.2.7 :STATE-WISE PRODUCTION OF FOREST PRODUCE –Contd.

Sl. No.	State/Union Territory	Sal Seed (M. Tonne)		Tendu/Kendu/Biddi Leaves (M. Tonne)		Gums (Metric Tonne)		Resin (Metric Tonne)	
		1998-99	1999-2000	1998-99	1999-2000	1998-99	1999-2000	1998-99	1999-2000
1	2	11	12	3	4	5	6	7	8
1	Andhra Pradesh	Nil	Nil	50761.92	51246.72	655.61	669.10	Nil	Nil
2	Arunachal Pradesh					Nil	Nil	433376 blaze	13851 blaze
3	Assam								
4	Bihar	7500.00	840.00	52900.00	53500.00	Nil	Nil	Nil	Nil
5	Delhi								
6	Goa								
7	Gujarat			12695.70	12899.15	350.80	190.20		
8	Haryana								
9	Himachal Pradesh							7201.00	
10	Jammu & Kashmir							110.20	107.98
11	Karnataka			862.00	742.00	11.00	3.00		
12	Kerala	Nil	Nil	Nil	Nil			Nil	
13	Madhya Pradesh	44179.00	77635.00	224000.00	246000.00	567.20	808.30		
14	Maharashtra	Nil	Nil		33018.00		753.10		Nil
15	Manipur							9.40	14.40
16	Meghalaya								
17	Mizoram	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
18	Nagaland	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
19	Orissa	6100.72		39000.00		395.95			
20	Punjab	Nil	Nil	Nil	Nil	Nil	Nil	827.00	819.00
21	Rajasthan	Nil	Nil	2475.00	2835.00	N.A.	N.A.	Nil	Nil
22	Sikkim	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
23	Tamil Nadu	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
24	Tripura								
25	Uttar Pradesh			2092.00		163.50		5766.50	
26	West Bengal	Nil	264.68	159.00	569.00	Nil	Nil	Nil	Nil
27	A & N Islands	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
28	D. & N. Haveli	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
29	Chandigarh	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
30	Lakshadweep					Nil	Nil	Nil	Nil
31	Pondicherry								
	Total	**57779.72**	**78739.68**	**384945.62**	**400809.87**	**2144.06**	**2423.70**	**13914.10**	**941.38**

Note: Blank cell indicates information is not available

TABLE 3.2.7 :STATE-WISE PRODUCTION OF FOREST PRODUCE –Concld.

Sl. No.	State/Union Territory	Canes /Rattans		Bamboo		Grass & Fodder (Metric Tonne)		Lac (Metric Tonne)	
		1998-99	1999-2000	1998-99	1999-2000	1998-99	1999-2000	1998-99	1999-2000
1	2	9	10	11	12	13	14	15	16
1	Andhra Pradesh	Nil	Nil	60042 Mt	65663 Mt	1294.00	1372	Nil	Nil
2	Arunachal Pradesh	20853504 RM	2203704 RM	33165 Nos.	73436 Nos.	Nil	Nil	Nil	Nil
3	Assam								
4	Bihar	Nil	Nil	Nil	Nil	Nil	Nil	23.20	10.80
5	Delhi								
6	Goa								
7	Gujarat	1.1 Mt.	1.7 Mt.	114000 Mt	99700 Mt	12434.00	11071		
8	Haryana			1877615 Nos.					
9	Himachal Pradesh					511			
10	Jammu & Kashmir					2.50	2.05		
11	Karnataka	578891 Nos.	112353 Nos.	83867 Mt	105293 Mt	1400	1673		
12	Kerala	Nil	Nil	208911 Mt	88708 Mt	30.88		Nil	
13	Madhya Pradesh			201223 N.T.	137797 N.T.				
14	Maharashtra		Nil		236725		11908.00	—	301.80
15	Manipur	165200 Nos.	212500 Nos.	700222 Nos.	940015 Nos.				
16	Meghalaya								
17	Mizoram	48664 RM	300 RM	18118613 Nos.	19173928 Nos.				
18	Nagaland			5907150 Nos.	256550 Nos.	Nil	Nil	Nil	Nil
19	Orissa	3463086 Nos.		134454 N.T.		311.90		1.42	
20	Punjab	Nil	Nil	419285	435331	193930.00	197574.00	Nil	Nil
21	Rajasthan	Nil	Nil	2055000 Nos.	2057000Nos.				
22	Sikkim	Nil	Nil			Nil	Nil	Nil	Nil
23	Tamil Nadu	Nil	Nil	Nil	Nil				
24	Tripura			52600000 Nos.	68900000 Nos.				
25	Uttar Pradesh	205 Bundle		3414520 Nos.		3940.30			
26	West Bengal	Nil	Nil	2500 Nos.	2750 Nos.	Nil	Nil	Nil	Nil
27	A & N Islands	586410 RM	382254 RM	1200275 Nos.	1243139Nos.	Nil	Nil	Nil	Nil
28	D. & N. Haveli	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
29	Chandigarh	Nil	Nil	Nil	Nil			Nil	Nil
30	Lakshadweep								
31	Pondicherry								

Source: Forestry Statistics India 2001.RM: Running Metre
Note: Blank cell indicates information is not available

TABLE 3.2.8 : PHYSIOGRAPHIC ZONE WISE TREE COVER ESTIMATES
(FROM TREES OUTSIDE FOREST)

Sl. No.	Physiographic Zone	Geographic Area (Km^2)	CNFA (Km^2)	Trees per ha	Number of Trees (000)	Tree Cover		
						Area (Km^2)	% of Geog. Area	% of CNFA
1	2	3	4	5	6	7	8	9
1	W. Himalayas	338556	94004	14.70	138462	3069	0.91	3.26
2	E. Himalayas	65317	10390	9.80	10224	392	0.60	3.77
3	North East Ranges	123138	30013	14.10	42291	642	0.52	2.14
4	Northern Plains	307489	277818	15.60	434517	10098	3.28	3.63
5	Eastern Plains	234215	163730	15.30	250607	8323	3.55	5.08
6	Western Plains	319098	302495	2.60	77821	3875	1.21	1.28
7	Central Highlands	366706	282029	8.00	226749	7077	1.93	2.51
8	North Deccan	355988	260951	9.40	246593	6905	1.94	2.65
9	East Deccan	331525	200006	9.00	179637	9760	2.94	4.88
10	South Deccan	292416	232236	11.40	265327	11468	3.92	4.94
11	Western Ghats	69703	38260	23.50	90078	3957	5.68	10.34
12	Eastern Ghats	191698	129856	5.60	72801	1788	0.93	1.38
13	West Coast	123921	91603	18.20	166406	3699	2.98	4.04
14	East Coast	167493	132042	19.70	260081	10419	6.22	7.89
Total		**3287263**	**2245431**	**11.0**	**2461593**	**81472**	**2.48**	**3.63**

Source : State of Forest Report, 2001

CNFA : Culturable Non Forest Area

TABLE 3.2.9 : STATE/UT WISE TREE COVER ESTIMATES

Sl. No.	State/UT	Geographic Area (Km²)	CNFA (Km²)	Trees per ha	Number of Trees (000)	Tree Cover		
						Area (Km²)	% of Geog. Area	Area % of CNFA
1	2	3	4	5	6	7	8	9
1	Andhra Pradesh	275069	205673	11.2	230923	9011	3.28	4.38
2	Arunachal Pradesh	83743	14792	11.1	16432	478	0.57	3.23
3	Assam	78438	40827	15.1	61804	1942	2.48	4.76
4	Bihar	94163	73556	14.8	109004	3693	3.92	5.02
5	Chhattisgarh	135191	73464	8.8	64981	3535	2.62	4.81
6	Delhi	1483	1353	12.5	1688	40	2.69	2.95
7	Goa	3702	1559	18.0	2801	62	1.68	3.98
8	Gujarat	196022	172915	8.1	139396	4036	2.06	2.33
9	Haryana	44212	42049	15.6	65598	1526	3.45	3.63
10	Himachal Pradesh	55673	12091	14.8	17850	397	0.71	3.28
11	Jammu & Kashmir	222236	68258	14.7	100287	2217	1.00	3.25
12	Jharkhand	79714	54339	9.1	49669	2694	3.38	4.96
13	Karnataka	191791	147993	11.8	174997	7446	3.88	5.03
14	Kerala	38863	22731	18.8	42652	1146	2.95	5.04
15	Madhya Pradesh	308245	208981	8.6	179304	5751	1.87	2.75
16	Maharashtra	307713	236441	11.4	269356	8269	2.69	3.50
17	Manipur	22327	4517	14.1	6365	95	0.43	2.11
18	Meghalaya	22429	6756	14.1	9523	140	0.62	2.07
19	Mizoram	21081	3576	14.1	5030	95	0.45	2.66
20	Nagaland	16579	3214	14.1	4529	70	0.42	2.19
21	Orissa	155707	94359	10.5	98873	4364	2.80	4.62
22	Punjab	50362	45204	15.6	70402	1634	3.24	3.61
23	Rajasthan	342239	306523	4.6	140446	5286	1.54	1.72
24	Sikkim	7096	443	14.7	651	14	0.20	3.25
25	Tamil Nadu	130058	103768	15.2	157418	6054	4.65	5.83
26	Tripura	10486	3376	14.1	4759	68	0.65	2.03
27	Uttar Pradesh	240928	216864	14.6	317561	7545	3.13	3.48
28	Uttaranchal	53483	13180	15.0	19798	448	0.84	3.40
29	West Bengal	88752	64690	14.8	95723	3264	3.68	5.05
30	A. & N. Islands	8249	1060	19.7	2092	83	1.01	7.87
31	Chandigarh	114	81	9.4	76	2	1.63	2.29
32	Dadra & Nagar Haveli	491	261	24.2	631	27	5.54	10.42
33	Daman & Diu	112	105	13.4	141	4	3.29	3.50
34	Lakshadweep	32	3	13.5	4	0	0.27	2.76
35	Pondicherry	480	431	19.3	830	35	7.19	8.01
Total		**3287263**	**2245431**	**11.0**	**2461594**	**81471**	**2.48**	**3.63**

Source : State of Forest Report, 2001
CNFA : Culturable Non Forest Area

TABLE 3.2.10 : FOREST COVER IN STATES/UTs IN INDIA

(Sq. km)

Sl. No.	State/UT	Geographic Area	Forest Cover Area				Scrub
			Dense Forest	Open Forest	Total Forest	Percent	
1	2	3	4	5	6	7	8
1	Andhra Pradesh	275069	25827	18810	44637	16.23	9907
2	Arunachal Pradesh	83743	53932	14113	68045	81.25	141
3	Assam	78438	15830	11884	27714	35.33	224
4	Bihar	94163	3372	2348	5720	6.07	122
5	Chhattisgarh	135191	37880	18568	56448	41.75	200
6	Delhi	1483	38	73	111	7.48	4
7	Goa	3702	1785	310	2095	56.59	
8	Gujarat	196022	8673	6479	15152	7.73	2408
9	Haryana	44212	1139	615	1754	3.97	88
10	Himachal Pradesh	55673	10429	3931	14360	25.79	566
11	Jammu & Kashmir	222236	11848	9389	21237	9.56	3087
12	Jharkhand	79714	11787	10850	22637	28.40	976
13	Karnataka	191791	26156	10835	36991	19.29	3245
14	Kerala	38863	11772	3788	15560	40.04	71
15	Madhya Pradesh	308245	44384	32881	77265	25.07	3452
16	Maharashtra	307713	30894	16588	47482	15.43	6137
17	Manipur	22327	5710	11216	16926	75.81	190
18	Meghalaya	22429	5681	9903	15584	69.48	259
19	Mizoram	21081	8936	8558	17494	82.98	467
20	Nagaland	16579	5393	7952	13345	80.49	47
21	Orissa	155707	27972	20866	48838	31.37	5782
22	Punjab	50362	1549	883	2432	4.83	30
23	Rajasthan	342239	6322	10045	16367	4.78	4925
24	Sikkim	7096	2391	802	3193	45.00	341
25	Tamil Nadu	130058	12499	8983	21482	16.52	3180
26	Tripura	10486	3463	3602	7065	67.38	44
27	Uttar Pradesh	240928	8965	4781	13746	5.71	678
28	Uttaranchal	53483	19023	4915	23938	44.76	598
29	West Bengal	88752	6346	4347	10693	12.05	149
30	A. & N. Islands	8249	6593	337	6930	84.01	
31	Chandigarh	114	5	4	9	7.89	
32	Dadra & Nagar Haveli	491	151	68	219	44.60	
33	Daman & Diu	112	2	4	6	5.36	
34	Lakshadweep	32	27		27	84.38	
35	Pondicherry	480	35	1	36	7.50	
Total		3287263	416809	258729	675538	20.55	47318

Source: State of Forest Report 2001

TABLE 3.2.11 : STATE/UT WISE FOREST COVER IN HILL DISTRICTS

(Sq. km)

Sl. No.	Name of State/UT	Number of Hill Districts	Geographic Area in Hill Districts	Forest Cover Area			
				Densel Forest	Open Forest	Total Forest	Percent
1	2	3	4	5	6	7	8
1	Arunachal Pradesh	13	83743	53932	14113	68045	81.25
2	Assam	3	19153	7175	5849	13024	68.00
3	Himachal Pradesh	12	55673	10429	3931	14360	25.79
4	Jammu & Kashmir	14	222236	11850	9389	21239	9.56
5	Karnataka	6	48046	19100	4953	24053	50.06
6	Kerala	10	29572	9830	3141	12971	43.86
7	Maharashtra	7	69905	7886	4126	12012	17.18
8	Manipur	9	22327	5710	11216	16926	75.81
9	Meghalaya	7	22429	5681	9903	15584	69.48
10	Mizoram	8	21081	8936	8558	17494	82.98
11	Nagaland	8	16579	5393	7952	13345	80.49
12	Sikkim	4	7096	2391	802	3193	45.00
13	Tamil Nadu	5	22789	3555	2328	5883	25.82
14	Tripura	3	10486	3502	3563	7065	67.38
15	Uttaranchal	13	53483	19023	4915	23938	44.76
16	West Bengal	1	3149	1417	779	2196	69.74
Total		**123**	**707747**	**175810**	**95518**	**271328**	**38.34**

Source: State of Forest Report, 2001

TABLE 3.2.12 : STATE/UT WISE FOREST COVER IN TRIBAL DISTRICTS

(Sq. km)

Sl.	State/UT	Number of Tribal Districts	Geographic Area	Forest Cover Area			
				Dense Forest	Open Forest	Total Forest	Percent
1	2	3	4	5	6	7	8
1	Andhra Pradesh	8	87090	17062	8339	25401	29.17
2	Arunachal Pradesh	13	83743	53932	14113	68045	81.25
3	Assam	16	50137	7233	5073	12306	24.54
4	Chhattisgarh	9	90134	27852	13322	41174	45.68
5	Gujarat	8	48650	5085	2486	7571	15.56
6	Himachal Pradesh	3	26764	2120	1023	3143	11.74
7	Jharkhand	8	44413	7826	5803	13629	30.69
8	Karnataka	5	26597	10009	2419	12428	46.73
9	Kerala	9	27228	9274	3042	12316	45.23
10	Madhya Pradesh	18	139448	27883	13935	41818	29.99
11	Maharashtra	11	138272	18656	10126	28782	20.82
12	Manipur	9	22327	5710	11217	16927	75.81
13	Meghalaya	7	22429	5681	9903	15584	69.48
14	Mizoram	8	21081	8936	8558	17494	82.98
15	Nagaland	8	16579	5393	7952	13345	80.49
16	Orissa	12	86124	19008	13832	32840	38.13
17	Rajasthan	5	38218	2343	3709	6052	15.84
18	Sikkim	4	7096	2391	802	3193	45.00
19	Tamil Nadu	6	30720	3198	2807	6005	19.55
20	Tripura	3	10486	3502	3563	7065	67.38
21	Uttar Pradesh	1	7680	1113	350	1463	19.05
22	West Bengal	11	69403	6108	4220	10328	14.88
23	A. & N. Islands	2	8249	6593	337	6930	84.01
24	Dadra & Nagar Haveli	1	491	151	68	219	44.60
25	Daman & Diu	1	72	1	2	3	4.17
26	Lakshadweep	1	32	27		27	84.38
Total		**187**	**1103463**	**257087**	**147001**	**404088**	**36.62**

Source: State of Forest Report 2001

TABLE 3.2.13 (a) : STATE/UT WISE MANGROVE COVER ASSESSMENT

(Sq. km)

Sl No.	State/UT	Assessment Year						
		1987	1989	1991	1993	1995	1997	1999
1	2	3	4	5	6	7	8	9
1	Andhra Pradesh	495	405	399	378	383	383	397
2	Goa		3	3	3	3	5	5
3	Gujarat	427	412	397	419	689	901	1031
4	Karnataka					2	3	3
5	Maharashtra	140	114	113	155	155	124	108
6	Orissa	199	192	195	195	195	211	215
7	Tamil Nadu	23	47	47	21	21	21	21
8	West Bengal	2976	2109	2119	2119	2119	2123	2125
9	Andaman & Nicobar	686	973	971	966	966	966	966
Total		**4946**	**4255**	**4244**	**4256**	**4533**	**4737**	**4871**

Source: State of Forest Report 2001

TABLE 3.2.13 (b) : STATE/UT WISE MANGROVE COVER

(Sq. km)

Sl No.	State/UT	Dense Forest	Open Forest	Total Forest	Percent
1	2	3	4	5	6
1	Andhra Pradesh	14	319	333	0.120
2	Goa	5		5	0.140
3	Gujarat	184	727	911	0.460
4	Karnataka	2		2	0.001
5	Maharashtra	90	28	118	0.040
6	Orissa	194	25	219	1.390
7	Tamil Nadu	10	13	23	0.020
8	West Bengal	1651	430	2081	2.340
9	Andaman & Nicobar	709	80	789	9.560
10	Pondicherry		1	1	0.210
	Total	2859	1623	4482	0.140

Source: State of Forest Report 2001

TABLE 3.2.13 (c) : STATE-WISE LIST OF MANGROVE AREAS

Sl No.	State/UT	Mangrove Area
1	2	3
1	West Bengal	Sunderbans
2	Orissa	Bhaitarkanika, Mahanadi, Subernarekha, Devi, Dhamra, MGRC, Chilka
3	Andhra Pradesh	Coringa, East Godavari, Krishna
4	Tamil Nadu	Pichavram, Muthupet, Ramnad, Pulicat, Kazhuveli,
5	Andman & Nicobar	North Andamans, Nicobar
6	Kerala	Vembanad
7	Karnataka	Coondapur, Dakshin Kannada/Honnavar
8	Goa	Karwar
9	Maharashra	Achra-Ratnagiri, Devgarh-Vijay Dur, Veldur, Kundalika-Ravdana, Mumbara-Diva, Vikroli, Shreevardhan, Vaitarna, Vasasi-Manori, Malvan
10	Gujarat	Gulf of Kutchh, Gulf of Khambat

Source : Annual Report 2003-2004, Ministry of Environment & Forests

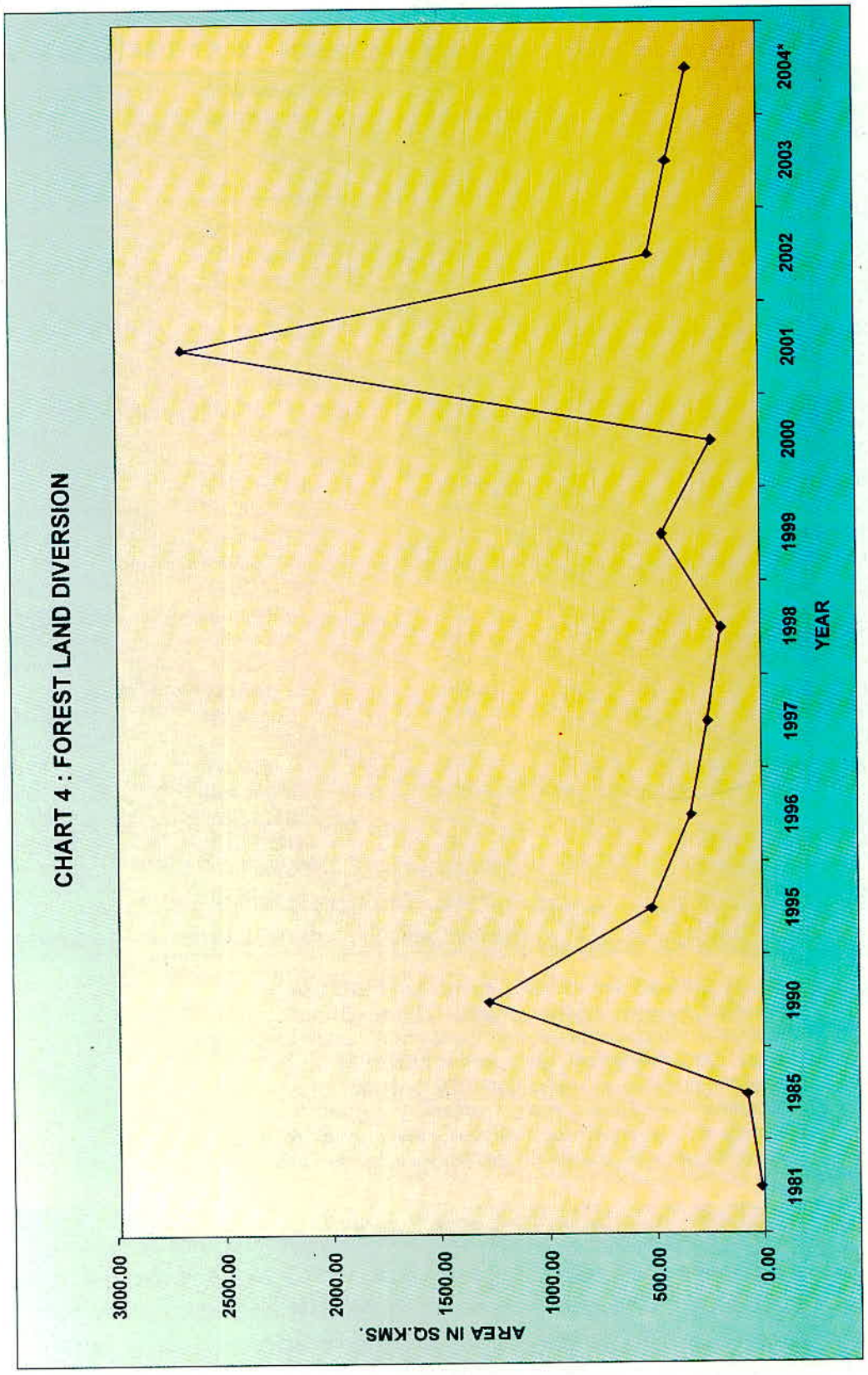


CHART 4 : FOREST LAND DIVERSION
AREA IN SQ.KMS.
3000.00
2500.00
2000.00
1500.00
1000.00
500.00
0.00
1981
1985
1990
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004*
YEAR

TABLE 3.3.1 : INDIA'S MAJOR BIOGEOGRAPHIC HABITATS

Sl. No.	Biogeographic Zone	Biotic Province	*Total Area (Sq.Km)*
1	2	3	*4*
1	Trans-Himalayan	Upper Regions	186200
2	Himalayan	North-Western	69000
		Western	72000
		Central	123000
		Eastern	83000
3	Desert	Kachchh	45000
		Thar	180000
		Ladakh (cold)	NA
4	Semi-Arid	Central India	107600
		Gujarat-Rajwara	400400
5	Western Ghats	Malabar Coast	59700
		Western Ghat Mountains	99300
6	Deccan Peninsula	Deccan South Plateau	378000
		Central Plateau	341000
		Eastern Plateau	198000
		Chhota Nagpur	217000
		Central Highlands	287000
7	Gangetic Plain	Upper Gangetic	206400
		Lower Gangetic	153000
8	North-East India	Brahmaputra Valley	65200
		North-Eastern Hills	106200
9	Islands	Andaman Islands	6397
		Nicobar Islands	1930
		Lakshadweep	180
10	Coasts	West Coast	6500
		East Coast	6500

Source : "Conserving our Biological Wealth", WWF for Nature-India (modified) and Zoological Survey of India

TABLE 3.3.2 : ESTIMATED NUMBER OF SPECIES

Sl. No.	Taxonomic Group	No. of Species		% In India
		India	World	
1	2	3	4	5
I	**PROTISTA**	**2577**	**31250**	**8.24**
1	Protozoa	2577	31250	8.24
II	**ANIMALIA**	**86808***	**1196903**	**7.25**
1	Mesozoa	10	71	14.08
2	Porifera	486	4562	10.65
3	Cnidaria	842	9916	8.49
4	Ctenophora	12	100	12.00
5	Platyhelminthes	1622	17500	9.27
6	Nemertinea	—	600	—
7	Rotifera	330	2500	13.20
8	Gastrotricha	100	3000	3.33
9	Kinorhyncha	10	100	10.00
10	Nematoda	2850	30000	9.50
11	Nematomorpha	—	250	—
12	Acanthocephala	229	800	2862.00
13	Sipuncula	35	145	24.14
14	Mollusca	5070	66535	7.62
15	Echiura	43	127	33.86
16	Annelida	840	12700	6.61
17	Onychophora	1	100	1.00
	Arthropoda	**68389**	**987949**	**6.90**
1	Crustacea	2934	35534	8.26
2	Insecta	59353	867391	6.83
3	Arachnida	5818	73440	7.90
4	Pycnogonida	16	600	2.67
5	Pauropoda	—	360	—
6	Chilopoda	100	3000	3.33
7	Diplopoda	162	7500	2.16
8	Symphyla	4	120	3.33
9	Merostomata	2	4	50.00
10	Phoronida	3	11	27.27
11	Bryozoa (Ectoprocta)	200	4000	5.00
12	Entoprocta	10	60	16.66
13	Brachiopoda	3	300	1.00
14	Pogonophora	—	80	—
15	Priapulida	—	8	—
16	Pentastomida	—	70	—
17	Chaetognatha	30	111	27.02
18	Tardigrada	30	514	5.83
19	Echinodermata	765	6223	12.29
20	Hemichordata	12	120	10.00
	Chordata	**4886***	**48451**	**10.07***
1	Protochordata (Cephalochordata +Urochordata)	119	2106	5.65
2	Pisces	2546	21723	11.72
3	Amphibia	209	5150	4.06
4	Reptilia	456	5817	7.84
5	Aves	1166*	9026	12.91*
6	Mammalia	390	4629	8.42
	Grand Total (Protista I + Animalia II)	**89385***	**1228153**	**7.28**

Source : Faunal Diversity in India (1998) with updated
(*) figures Zoological Survey of India

TABLE 3.3.3 (a): RARE AND THREATENED SPECIES (VERTEBRATES)

Sl. No.	Category	Approximate Number				
		Mammalia	Aves	Reptilia	Amphibia	Total
1	2	3	4	5	6	7
1	Rare	—	2	—	—	2
2	Vulnerable	28	22	4	—	54
3	Endangered	29	21	16	1	67
4	Critical*	3	8	—	—	11
5	Extinct**	1	2	—	—	3
6	Insufficiently Known	16	—	—	—	16
Total		**77**	**55**	**20**	**1**	**153**

Source : The Red Data Book of Indian Animals (1994), Zoological Survey of India.

* **Mammal** - Brow - Antlered Deer, Yak, Hispid Hare

Aves - Christmas Island Frigate Bird, Mrs. Hume's Bartailed Pheasant, Burmese Peafowl, Blacknecked Crane, Hooded Crane, Masked Finfoot, Jerdon's Courser, Forest Spotted Owlet.

** **Mammal** - Cheetah.
Aves - Pinkheaded Duck, Mountain Quail

A taxon is **Extinct**, when there is no reasonable doubt that the last Individual has died.

A taxon is **Critical** when it is facing an extremely high probability of extinction in the wild in the immediate future.

A taxon is **Endangered** when it is not critical but is facing a very high probability of extinction in the wild in the near future.

A taxon is **Vulnerable** when it is not critical or endangered but is facing a high probability of extinction in the wild in the medium-term future.

A taxon is **Rare** when its populations are small and at present not endangered or vulnerable but are at risk .

A taxon is **Insufficiently Known** when an evaluation has been made but the available data are inadequate to assign a category.

3.3.3b : RECENT ADDITION IN THE LIST OF THREATENED/ ENDANGERED SPECIES

As per the Gazette Notification number 1-4/95 WL dated 5th November, 2001, published in Part II Section 3, subsection (II), Extraordinary Gazette of India, the Central Government (Ministry of Environment and Forests) has made amendments in Schedule I and Schedule IV of the Subsection (1) of section 61 of the Wild Life (Protection) Act, 1972 and included the following species in the Schedules of Threatened and endangered species

1 **Schedule 1**

a) in Para II related to " Fishes" for serial number 2 and the entry relating thereto the following serial number and entries shall be substituted, namely

"2. Shark and Ray

(i) Anoxypristis cuspidate
(ii) Carcharhinus hemiodon
(iii) Glyphius gangeticus
(iv) Glyphius glyphius
(v) Himantura fluviatilis
(vi) Pristis microdon
(vii) Pristis zijsron
(viii) Rhynchobatus djiddensis
(ix) Urogymnus asperrimus

(b) for Part IVB, relating to Mollusca and the entries relating there to, the following Part IVB and the entries shall be substituted, namely:-

"Part IV B-Mollusca

1 Cassis cornuta
2 Charonia tritonis
3 Conus milmedwardsi4.
4 Cypraeassis rufa
5 Hippopus hippopu
6 Nautilus pompilus
7 Tridacna maxima
8 Tridacna squamosa
9 Tudicla spiralis".;

2 **In Schedule IV** to the said Act, after serial number 18 and the entries relating there to, the following serial numbers and entries shall be added, namely:-

"19. Mollusca

i. Cypraea limacine
ii. Cypraea mappa
iii. Cypraea talpa
iv. Fasciolaria trapezium
v. Harpulina arausica
vi. Lambis chiragra
vii. Lambis chiragraarthitica
viii. Lambis crocea
ix. Lambis millepeda
x. Lambis Scorpio
xi. Lambis truncata
xii. Placenta placenta
xiii. Strombus plicatus sibbaldi
xiv. Trochus niloticus
xv. Turbo marmoratus

Source : Zoological Survey of India.

TABLE 3.3.4 : ESTIMATED NUMBER/PERCENTAGE OF ENDEMIC SPECIES IN INDIA

Sl. No.	Taxon	Number of Species		Percentage
		Total	Endemic	
1	2	3	4	5
1	**Protozoa**			
	I Free living	1247	90	7.21
	II Parasitic	1330	550	41.33
2	**Mesozoa**	10	10	100.00
3	**Porifera**			
	I Freshwater	31	13	41.93
4	**Cnidaria**	842	10*	—
5	**Platyhelminthes**	1622	1160	71.88
6	**Rotifera**	330	23	7.00
7	**Gastroticha**	100	64	64.00
8	**Kinorhyncha**	10	7	70.00
9	**Nematoda**	2850	400*	—
10	**Acanthocephala**	229	203	88.64
11	**Mollusca**			
	I Terrestrial	1487	498	33.50
	II Freshwater	183	77	41.80
12	**Echiura**	43	12	28.00
13	**Annelida**			
	I Oligochaeta	473	368	77.80
	II Hirudinea	59	25	42.37
14	**Arthropoda**			
	I Crustacea	2934	501	17.07
	I Insecta	59353	20717	34.90
	III Arachnida	5818	2623	45.08
15	**Phoronida**	11	1	9.00
16	**Bryozoa**	4000	12*	—
17	**Entoprocta**	10	1	10.00
18	**Chaetognatha**	111	3	2.70
19	**Chordata**			
	I Pisces	2546	223	8.75
	II Amphibia	209	128	61.24
	III Reptilia	456	214	47.00
	IV Aves	1166**	50**	4.29**
	V Mammalia	390	42**	11.28

Source : Faunal Diversity in India (1998) with updated (**) figures, Zoological Survey of India.
** : Complete data not available, hence percentage not calculated*
*** : Rec. Zool. Survey of India, occasional paper no. 200 (2002)*
Rec. Zool. Survey of India, occasional paper no. 201 (2002)

TABLE 3.3.5 : NATIONAL PARKS AND WILDLIFE SANCTUARIES OF INDIA

(Sq. Km.)

As on 31st July 2004

Sl. No.	State	National Parks		Wildlife Sanctuaries		Total Area
		Number	Area	Number	Area	
1	2	3	4	5	6	7
1	Andhra Pradesh	4	373.23	21	13096.23	13469.46
2	Arunachal Pradesh	2	2468.23	11	7606.37	10074.60
3	Assam	5	1977.79	16	888.22	2866.01
4	Bihar	1	335.60	11	2993.16	3328.76
5	Chhatisgarh	3	2929.50	10	3419.46	6348.96
6	Delhi	0	0.00	1	17.76	17.76
7	Goa	1	107.00	6	647.96	754.96
8	Gujarat	4	479.67	22	16602.61	17082.28
9	Haryana	2	46.98	9	287.32	334.30
10	Himachal Pradesh	2	1429.40	32	5665.92	7095.32
11	Jammu & Kashmir	4	3810.07	16	10163.67	13973.74
12	Jharkhand	1	231.67	10	1868.31	2099.98
13	Karnataka	5	2472.18	21	4231.44	6703.62
14	Kerala	3	536.52	12	1788.20	2324.72
15	Madhya Pradesh	9	3656.35	25	7199.52	10855.87
16	Maharashtra	5	955.93	36	14729.64	15685.57
17	Manipur	1	40.00	5	706.50	746.50
18	Meghalaya	2	267.48	3	34.21	301.69
19	Mizoram	2	200.00	5	775.00	975.00
20	Nagaland	1	202.02	3	20.35	222.37
21	Orissa	2	990.70	18	7961.94	8952.64
22	Punjab	0	0.00	10	316.71	316.71
23	Rajasthan	4	3859.37	24	5301.84	9161.21
24	Sikkim	1	1784.00	6	265.10	2049.10
25	Tamil Nadu	5	307.84	20	2997.57	3305.41
26	Tripura	0	0.00	4	603.08	603.08
27	Uttaranchal	6	4083.31	6	2868.00	6951.31
28	Uttar Pradesh	1	490.10	23	5185.90	5676.00
29	West Bengal	5	1692.65	15	1223.47	2916.12
30	Andaman & Nicobar Islands	9	1153.94	96	466.22	1620.16
31	Chandigarh	0	0.00	2	26.01	26.01
32	Dadra & Nagar Haveli	0	0.00	1	92.00	92.00
33	Daman & Diu	0	0.00	1	2.18	2.18
34	Lakshadweep	0	0.00	1	0.01	0.01
35	Pondicherry	0	0.00	0	0.00	0.00
	Total	**90**	**36881.53**	**502**	**120051.88**	**156933.41**

Source:Wildlife Division of MOE&F

The Wildlife (Protection) Act, 1972 provided for setting up National Parks and Sanctuaries for Wildlife. The basic idea of these National Parks and Sanctuaries is to provide natural habitats for the Wildlife. The aim is not only to protect and preserve what remains of wild fauna and flora but also to augment this price-less national heritage.

In India, at present there are 502 Wildlife Sanctuaries and 90 National Parks, covering an area of 156933.41 Sq. Km.

TABLE 3.3.6 : ALL INDIA TIGER POPULATION

Sl. No.	State	Years						
		1972	1979	1984	1989	1993	1997	2001-02**
1	2	3	4	5	6	7	8	9
1	Andhra Pradesh	35	148	164	235	197	171	192
2	Arunachal Pradesh	69	139	219	135	180	*	NR
3	Assam	147	300	376	376	325	458	354
4	Bihar	85	110	138	157	137	103	76
5	Chhattisgarh	—	—	—	—	—	—	227
6	Goa Daman & Diu	—	—	—	2	3	6	5
7	Gujarat	8	7	9	9	5	1	Nil
8	Jharkhand	—	—	—	—	—	—	34
9	Karnataka	102	156	202	257	305	350	401
10	Kerala	60	134	89	45	57	73	71
11	Madhya Pradesh	457	529	786	985	912	927	710
12	Maharashtra	160	174	301	417	276	257	238
13	Manipur	1	10	6	31	—	*	NR
14	Meghalaya	32	35	125	34	53	*	47
15	Mizoram	—	65	33	18	28	12	28
16	Nagaland	80	102	104	104	83	*	23
17	Orissa	142	173	202	243	226	194	173
18	Rajasthan	74	79	96	99	64	58	58
19	Sikkim	—	—	2	4	2	*	NR
20	Tamil Nadu	33	65	97	95	97	62	60
21	Uttar Pradesh	262	487	698	735	465	475	284
22	Uttaranchal	—	—	—	—	—	—	251
23	West Bengal	73	296	352	353	335	361	349
24	Haryana	—	—	1	—	—	—	—
25	Tripura	7	6	5	—	—	*	NR
Total		**1827**	**3015**	**4005**	**4334**	**3750**	**3508**	**3581**

Source : Project Tiger, Ministry of Environment & Forests

N.R. : Not Reported by States

* : *Tiger census was not carried out in North Eastern States in 1997.*

** : *under compilation/vetting*

TABLE 3.3.7 : AREA OF TIGER RESERVES IN TIGER RANGE STATES

Sl. No.	Year of Creation	Name of Tiger Reserve	State	Total Area in sq. Kms.
1	2	3	4	5
1	1973-74	Bandipur	Karnataka	866
	1999-2000	Nagarhole (extension)		643
2	1973-74	Corbett	Uttar Pradesh	1316
3	1973-74	Kanha	Madhya pradesh	1945
4	1973-74	Manas	Assam	2840
5	1973-74	Melghat	Maharashtra	1677
6	1973-74	Palamau	Bihar	1026
7	1973-74	Ranthambhore	Rajasthan	1334
8	1973-74	Similipal	Orissa	2750
9	1973-74	Sunderbans	West Bengal	2585
10	1978-79	Periyar	Kerala	777
11	1978-79	Sariska	Rajasthan	866
12	1982-83	Buxa	West Bengal	759
13	1982-83	Indravati	Madhya Pradesh	2799
14	1982-83	Nagarjunsagar	Andhra Pradesh	3568
15	1982-83	Namdapha	Arunachal Pradesh	1985
16	1987-88	Dudhwa	Uttar Pradesh	811
	1999-2000	Katerniaghat (extension)		551
17	1988-89	Kalakad- Mundanthurai	Tamil Nadu	800
18	1989-90	Valmiki	Bihar	840
19	1992-93	Pench	Madhya Pradesh	758
20	1993-94	Tadoba-Andheri	Maharashtra	620
21	1993-94	Bandhavgarh	Madhya Pradesh	1162
22	1994-95	Panna	Madhya Pradesh	542
23	1994-95	Dampha	Mizoram	500
24	1998-99	Bhadra	Karnataka	492
25	1998-99	Pench	Maharashtra	257
26	1999-2000	Pakhui-Nameri	Arunachal Pradesh-Assam	1206
27	1999-2000	Bori, Satpura, Panchmari	Madhya pradesh	1486
		Total		**37761**

Source : Annual Report, 2002-2003, Ministry of Environment and Forests

TABLE 3.3.8 : POPULATION OF TIGERS IN TIGER RESERVES

Sl. No.	Name of Tiger Reserve	Year of Creation	State	1979	1984	1989	1993	1995	1997	2001-02*
1	2	3	4	5	6	7	8	9	10	11
1	Bandhavgarh	1993-94	Madhya Pradesh	—	—	—	41	46	46	56
2	Bandipur	1973-74	Karnataka	39	53	50	66	74	75	82
3	Bhadra		Karnataka	—	—	—	—	—	—	35
4	Bori-Satpura-Pachmari		Madhya Pradesh	—	—	—	—	—	—	35
5	Buxa	1982-83	West Bengal	—	15	33	29	31	32	31
6	Corbett	1973-74	Uttranchal	84	90	91	123	128	138	137
7	Dampha	1994-95	Mizoram	—	—	—	7	4	5	4
8	Dudhwa	1987-88	Uttar Pradesh	—	—	90	94	98	104	76
9	Indravati	1982-83	Madhya Pradesh	—	38	28	18	15	15	29
10	Kalakad	1988-89	Tamilnadu	—	—	22	17	16	28	27
11	Kanha	1973-74	Madhya Pradesh	71	109	97	100	97	114	127
12	Manas	1973-74	Assam	69	123	92	81	94	125	65
13	Melghat	1973-74	Maharashtra	63	80	77	72	71	73	73
14	Nagarjunsagar	1982-83	Andhra Pradesh	—	65	94	44	34	39	67
15	Namdhapa	1982-83	Arunachal Pradesh	—	43	47	47	52	57	61
16	Pakhui-Nameri (Nameri)		Arunachal Pradesh	—	—	—	—	—	—	26
17	Palamau	1973-74	Jharkhand	37	62	55	44	47	44	32
18	Panna	1994-95	Madhya Pradesh	—	—	—	25	22	22	31
19	Pench	1992-93	Madhya Pradesh	—	—	—	39	27	29	40
20	Pench		Maharashtra	—	—	—	—	—	—	14
21	Periyar	1978-79	Kerala	34	44	45	30	39	40	36
22	Ranthambhore	1973-74	Rajasthan	25	38	44	36	38	32	35
23	Sariska	1978-79	Rajasthan	19	26	19	24	25	24	22
24	Similipal	1973-74	Orissa	65	71	93	95	97	98	99
25	Sunderbans	1973-74	West Bengal	205	264	269	251	242	263	245
26	Tadoba	1993-94	Maharashtra	—	—	—	34	36	42	38
27	Valmiki	1989-90	Bihar	—	—	81	49	NR	53	53
		Total		**711**	**1121**	**1327**	**1366**	**1333**	**1498**	**1576**

Source: Project Tiger, Ministry of Environment & Forests

NR : Not Reported by States

** : Under compilation/vetting*

The tiger reserves are the specially constituted reserves representing different habitat types with the aim of maintenance of available tiger population in India in its natural environment. One of the main achievements of Project tiger launched in 1973 is the excellent recovery of habitat and increase in the population of all species of wildlife in the Reserves. Tiger population in these reserves has increased from 711 in 1979 to 1576 in 2001-02.

TABLE 3.3.9: DESIGNATED ELEPHANT RESERVES IN INDIA
(Revised Network-2003)

Sl. No.	Elephant Range	Elephant Reserve	State	Date of Notification	Total Area (Sq. Km)	Population of Elephant
1	2	3	4	5	6	7
1	Eastern India (South West Bengal-Jharkhand-Orissa)	Mayurjharna	W. Bengal	24.10.2002	414	56
		Singhbhum	Jharkhand	26.09.2001	4530	300
		Mayurbhanj	Orissa	29.09.2001	3214	565
		Mahanadi	Orissa	19.06.2002	1038	179
		Sambalpur	Orissa	27.03.2002	427	257
		Total			**9623**	**1357**
2	North Brahamputra Arunachal - Assam)	Kameng	Ar. Pradesh	19.06.2002	1892	377
		Sonitpur	Assam	7.03.2003	1420	577
		Total			**3312**	**954**
3	South Brahamputra (Assam- Arunachal)	Dihing-Patkai	Assam	17.04.2003	937	457
		Deormali*	Ar. Pradesh		900+	150+
		Total			**1837+**	**600+**
4	Kaziranga (Assam-Nagaland)	Kaziranga-Karbi Anglong	Assam	17.04.2003	3270	1000
		Dhansiri-Lungding	Assam	19.04.2003	2740	430
		Intanki #	Nagaland		202	28
		Total			**6212**	**1458**
5	Eastern Dooars (Assam- \W. Bengal)	Chirang-Ripu	Assam	6.03.2003	2600	807
		E. Dooars	W. Bengal	28.08.2002	978	165
		Total			**3578**	**972**
6	Garo Hills (Meghalaya)	Garo Hills	Meghalaya	31.10.2001	**3500**	**878**
7	Nilgiri -Eastern Ghat (Karnataka- Kerala-Tamilnadu-Andhra)	Mysore	Karnataka	25.11.2002	6724	5838
		Wayanad	Kerala	2.04.2002	1200	961
		Nilgiri	Tamilnadu	15.10.2003	4663	1938
		Rayala #	A. Pradesh		3013	74
		Total			**15600**	**8811**
8	South Nilgiri (Kerala-Tamilnadu)	Nilambur	Kerala	2.04.2002	1419	886
		Coimbatore	Tamilnadu	15.10.2003	566	132
		Total			**1985**	**1018**
9	Western Ghat (Tamilnadu- Kerala)	Anamalai	Tamilnadu	15.10.2003	1457	680
		Anamudi	Kerala	2.04.2002	3728	750
		Total			**5185**	**1430**
10	Periyar (Kerala-Tamilnadu)	Periyar	Kerala	2.04.2002	3742	1268
		Srivilliputhur	Tamilnadu	15.10.2003	1249	223
		Total			**4991**	**1491**
11	Northern India (Uttaranchal)	Shivalik	Uttaranchal	28.10.2002	5405	1391
		TOTAL			**61200+**	**20150+**

Sorce : Project Elephant, Ministry of Environment and Forests

 # Approved by Govt. of India, but not yet notified by the Stale Government.

** Proposal under examination.*

TABLE 3.3.10: LOCATION OF MAJOR ZOOS

Sl. No	Name of Zoo	Location	State
1	2	3	4
1	Mini Zoo, Haddo	Port Blair	Andaman & Nicobar Islands
2	Indira Gandhi Zoological Park	visakhapatnam	Andhra Pradesh
3	Nehru Zoological Park	Hyderabad	Andhra Pradesh
4	Sri Venkateswara Zoological Park	Tirupati	Andhra Pradesh
5	Biological Park	Itanagar	Arunachal Pradesh
6	Assam State Zoo Cum Botanical Garden	Guwahati	Assam
7	Sanjay Gandhi Biological Park	Patna	Bihar
8	Maitri Baagh Zoo	Bhilai	Chattisgarh
9	National Zoological Park	Delhi	Delhi
10	Bondla Zoo	Usgao	Goa
11	Kamla Nehru Zoological Garden	Ahemdabad	Gujarat
12	Sakkarbaug Zoo	Junagarh	Gujarat
13	Indroda Nature Park	Gandhi Nagar	Gujarat
14	Sayaji Baug Zoo	Vadodara	Gujarat
15	Sundervan Nature Discovery Centre	Jodhpur tekra	Gujarat
16	Rohtak Zoo	Rohtak	Haryana
17	Himalayan Nature Park (Kufri)	Kufri	Himachal Pradesh
18	Bhagwan Birsa Biological Park	Ranchi	Jharkhand
19	Jawaharlal Nehru Biological Park	Bokaro	Jharkhand
20	Tata Steel Zoological Park	Jamshedpur	Jharkhand
21	National Park, Bannerghatta Zoological Garden	Bannerghatta	Karnataka
22	Sri Chamarajendra Zoological Gardens	Mysore	Karnataka
23	Tiger & Lion Safari, Thyyarekoppa	Shimoga	Karnataka
24	Thiruvananthapuram Zoo	Thiruvananthapuram	Kerala
25	State Museum & Zoo	Thrissur	Kerala
26	Gandhi Zoological Park	Gwalior	Madhya Pradesh
27	Van Vihar National Park	Bhopal	Madhya Pradesh
28	Kamla Nehru Prani Sanghrahalay Zoo	Indore	Madhya Pradesh
29	Rajiv Gandhi Zoological Park And Wildlife Research Centre	Pune	Maharashtra
30	Veermata Jijabai Bhosale Udyan & Zoo	Mumbai	Maharashtra
31	Aurangabad Municipal Zoo	Aurangabad	Maharashtra
32	Mahatma Gandhi Rashtriya Udyan Zoo	Solapur	Maharashtra
33	Nisargakavl Bahlnabai Choudhary Pranisansangahralay	Pune	Maharashtra
34	Manipur Zoological Garden	Imphal	Manipur
35	Lady Hydari Park Animal	Shillong	Meghalaya
36	Nandankanan Biological Park	Bhubaneswar	Orissa
37	Indira Gandhi Park Zoo & Deer Park	Rourkela	Orissa
38	Mahendra Chaudhury Zoological Park	Chhatbir	Punjab
39	Jaipur Zoo	Jaipur	Rajasthan
40	Bikaner Zoo	Bikaner	Rajasthan
41	Jodhpur Zoo	Jodhpur	Rajasthan

TABLE 3.3.10: LOCATION OF MAJOR ZOOS- Concld.

Sl. No	Name of Zoo	Location	State
1	2	3	4
42	Udaipur Zoo	Udaipur	Rajasthan
43	Arigna Anna Zoological Park	Vandalur	Tamil Nadu
44	Madras Crocodile Bank Trust/Centre For Herpetology	Mahabalipuram	Tamil Nadu
45	Chennai Snake Park Trust	Guindy	Tamil Nadu
46	Children's Corner	Guindy	Tamil Nadu
47	V.O.C. Park Mini Zoo	Coimbatore	Tamil Nadu
48	Sepahijala Zoological Park	Sepahijala	Tripura
49	Kanpur Zoological Park	Kanpur	Uttar Pradesh
50	Lucknow Prani Udyan	Lucknow	Uttar Pradesh
51	Pt Govind Ballabh Pant High Altitude Zoo	Nainital	Uttaranchal
52	Alipore Zoological Garden	Calcutta	West Bengal
53	Calcutta Snake Park	Badu	West Bengal
54	Marble Palace Zoo	Calcutta	West Bengal
55	Padmaja Naidu Himalayan Zoological Park	Darjeeling	West Bengal

Source : Central Zoo Authority, Ministry of Environment & Forests

TABLE 3.3.11 : INDIA'S LIVESTOCK POPULATION

(Thousand)

Sl. No.	Livestock	Number of Animals					
		1977	1982	1987	1992	1997	2003(p)
1	2	3	4	5	6	7	7
1	Cattle	180140	192453	199695	204584	198882	185181
2	Buffaloes	62019	69783	75967	84206	89918	97922
3	Sheep	40907	48765	45703	50783	57494	61469
4	Goats	75620	95255	110207	115279	122721	124358
5	Horses & Ponnies	916	900	797	817	826	751
6	Pigs	7647	10071	10626	12788	13291	13518
7	Mules	89	131	167	193	220	176
8	Donkeys	978	1024	958	967	881	650
9	Camels	1068	1078	1001	1031	911	632
II	**Other Livestock**						
1	Yaks	132	128	36	58	59	65
2	Mithuns	129	154	129	154	177	278
Total		**369645**	**419742**	**445286**	**470860**	**485379**	**485000**

Source : Live Stock Census, Ministry of Agriculture

The livestock population in the country increased from 292 million in 1951 to the current estimate of 485 million. Grazing by Livestock puts pressure on grasslands and forests. Because of excessive grazing, natural regeneration is either absent or inadequate in 52.8% of the forests in the country.

An analysis of forests vis-a-vis livestock indicates continued free access to the forest area which has resulted in high rates of growth of livestock population causing land degradation and arresting the development of markets for forage crops. Overgrazing impedes regeneration, retards growth of vegetation, and leads to extinction of good palatable grasses which are replaced by less palatable and inferior grasses. Extensive areas have been invaded by bushes which are not browsed, excessive trampling makes the soil compact and impervious and prevents circulation of air, water, thus exposing the soil to erosion by wind and water.

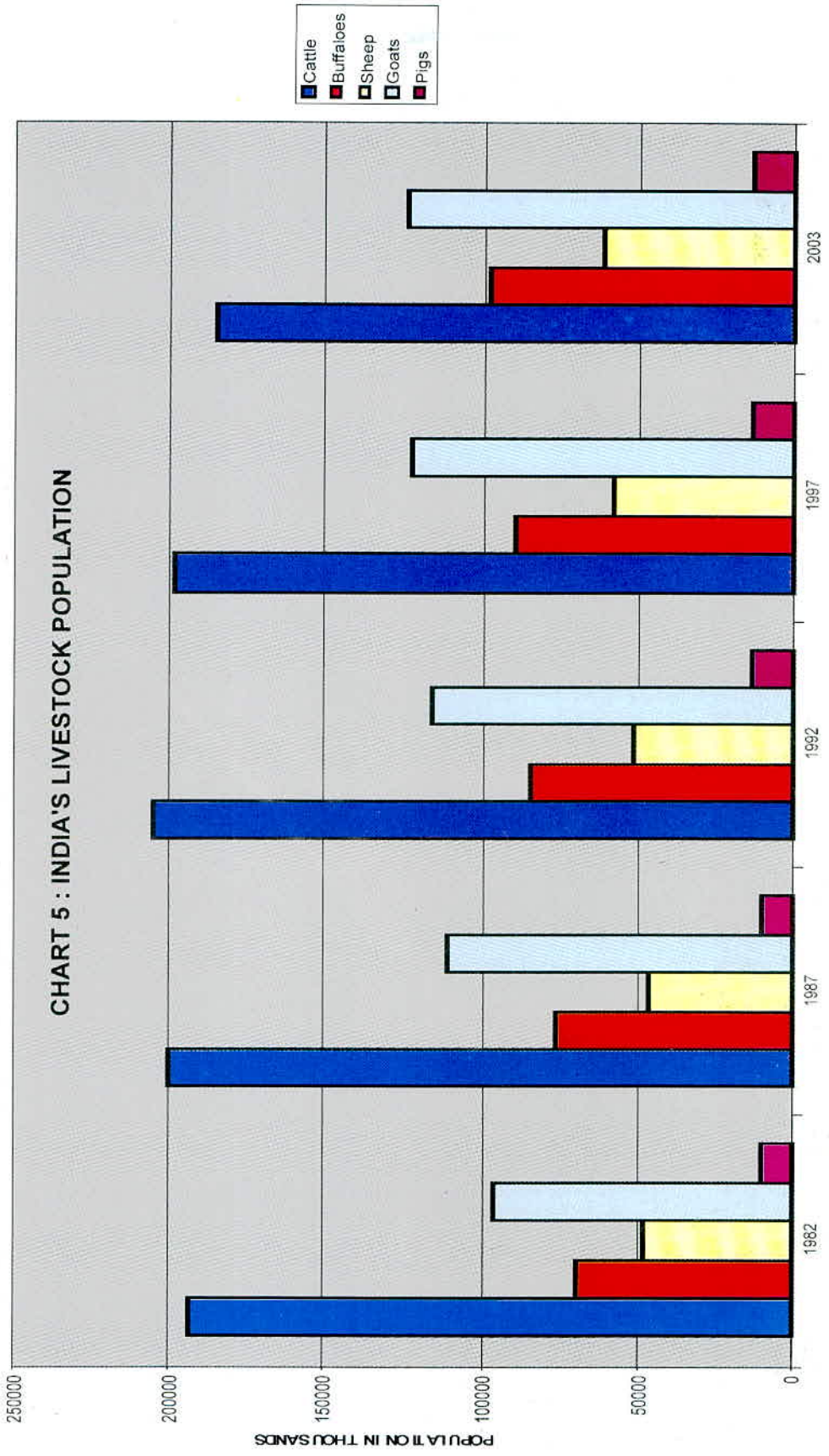


CHART 5 : INDIA'S LIVESTOCK POPULATION
Cattle
Buffaloes
Sheep
Goats
Pigs
POPULATION IN THOUSANDS
250000
200000
150000
100000
50000
0
1982
1987
1992
1997
2003

TABLE 3.3.12 : LIVESTOCK POPULATION AS PER 2003 CENSUS (Provisional)

(In Thouands)

Sr. No.	States/UTs	Cattle			Buffalos	Sheep	Goats	Pigs	Horses and ponies	Mules	Don-keys	Camel	Yaks	Mithun	Total Live-stock	Total Poultry
		Cross bred	Indigenous	Total												
1	Andhra Pradesh	1107	8193	9300	10630	21376	6277	570	9	-	33	-			38895	102278
2	Arunachal Pradesh	13	445	458	11	19	231	330	7				9	192	799	1743
3	Assam	440	7999	8440	678	170	2987	1543	12						5390	21664
4	Bihar*	1274	9455	10729	5743	382	9490	672	117	4	23	1			16432	13911
5	Chhatisgarh	253	8629	8882	1598	121	2336	552	4	-	-	-			4610	8181
6	Goa	12	63	76	37	-	11	87	-		-				136	566
7	Gujarat	639	6785	7424	7140	2062	4541	351	18	1	65	53			14231	8153
8	Haryana	573	967	1540	6035	633	460	120	25	14	8	50			7345	13619
9	Himachal Pradesh	677	1559	2236	774	926	1125	3	18	24	9	-	2		2881	767
10	Jammu & Kashmir	1320	1764	3084	1039	3411	2055	2	172	40	24	2	47	24	6816	5568
11	Jharkhand	145	7513	7659	1343	680	5031	1108	5	-	-	-			8167	14429
12	Karnataka	1602	7936	9539	3991	7256	4484	312	14	-	25	-			16082	25593
13	Kerala	1735	387	2122	65	4	1213	76	-	-	-				1358	12216
14	Madhya Pradesh	317	18595	18913	7575	546	8142	358	32	4	39	8			16704	11705
15	Maharashtra	2776	13527	16303	6145	3094	10684	439	40	1	57	-			20460	37968
16	Manipur	69	349	418	77	6	33	415	2					20	553	2941
17	Meghalaya	23	744	767	18	18	327	419	2						785	2821
18	Mizoram	9	27	36	6	1	17	218	2	-				2	245	1125
19	Nagaland	243	208	451	34	4	175	644	1	-				40	898	2789
20	Orissa	1063	12840	13903	1394	1620	5803	662	-	-	9	-			9489	17611
21	Punjab	1531	508	2039	5995	220	278	29	29	9	5	3			6568	10779
22	Rajasthan	464	10390	10854	10414	10054	16809	338	25	3	143	498	-		38284	6192
23	Sikkim	80	79	159	2	6	124	38	2				7		178	322
24	Tamilnadu	5140	4001	9141	1658	5593	8177	321	25		26	-			15800	86591
25	Tripura	57	702	759	14	3	472	209							698	3057
26	Uttar Pradesh	1634	16917	18551	22914	1437	12941	2284	154	52	182	16			39980	11718
27	Uttaranchal	228	1961	2188	1228	296	1158	33	17	22	1				2755	1984
28	West Bengal	1119	17794	18913	1086	1525	18774	1301	18	-	-				22704	60656
29	A& Nicobar	13	51	64	16		64	52			-				132	931
30	Chandigarh	5	1	6	23	-	1	-	-	-	-	-			24	152
31	D & Nagar Haveli	1	49	50	4	-	21	3	-			-			28	106
32	Daman & Diu		4	4	1	-	4	-	-			-			5	29
33	Delhi	58	34	92	231	3	17	28	1	1	1	-			282	459
34	Lakshadweep	2	2	4			47								47	146
35	Pondicherry	63	16	78	4	3	48	1	-		-				56	244
	All India	**24686**	**160495**	**185181**	**97922**	**61469**	[illegible]	**13518**	**751**	**176**	**650**	**632**	**65**	[illegible]	**485002**	[illegible]

*Note: *- Data from 2 districts are yet to be received from State Government.*
denotes less than 500.
Source: Department of Animal Husbandary and dairying

TABLE 3.3.13 : FISH PRODUCTION

(Lakh tonne)

Sl No.	Year	Marine	Inland	Total
1	2	3	4	5
1	1950-51	5.34	2.18	7.52
2	1960-61	8.80	2.80	11.60
3	1970-71	10.86	6.70	17.56
4	1980-81	15.55	8.87	24.42
5	1981-82	14.45	9.99	24.44
6	1982-83	14.27	9.40	23.67
7	1983-84	15.19	9.87	25.06
8	1984-85	16.98	11.03	28.01
9	1985-86	17.16	11.60	28.76
10	1986-87	17.13	12.29	29.42
11	1987-88	16.58	13.01	29.59
12	1988-89	18.17	13.35	31.52
13	1989-90	22.75	14.02	36.77
14	1990-91	23.00	15.36	38.36
15	1991-92	24.47	17.10	41.57
16	1992-93	25.76	17.89	43.65
17	1993-94	26.49	19.95	46.44
18	1994-95	26.92	20.97	47.89
19	1995-96	27.07	22.42	49.49
20	1996-97	29.67	23.81	53.48
21	1997-98	29.50	24.38	53.88
22	1998-99	26.96	26.02	52.98
23	1999-00	28.52	28.23	56.75
24	2000-01	28.11	28.45	56.56
25	2001-02	28.30	31.26	59.56
26	2002-03	29.90	32.10	62.00
27	2003-04	29.41	34.58	63.99

Source : *Deptt. of Animal Husbandry & Dairying, Ministry of Agriculture*

TABLE 3.3.14 : MARINE FISHERY RESOURCES OF INDIA

Sl. No.	State/Union Territory	Continental Shelf ('000 Sq Kms.)	Number of Landing Centres	Number of Fishing Villages	App. Length of Coast Line (Kms.)
1	Andhra Pradesh	33	508	508	974
2	Goa	10	88	72	104
3	Gujarat	184	286	851	1600
4	Karnataka	27	29	221	300
5	Kerala	40	226	222	590
6	Maharashtra	112	184	395	720
7	Orissa	26	63	329	480
8	Tamil Nadu	41	362	446	1076
9	West Bengal	17	65	652	158
10	Andaman & Nicobar Islands	35	57	45	1912
11	Daman & Diu	-	7	31	27
12	Lakshadweep	4	11	10	132
13	Pondicherry	1	28	45	45
	TOTAL	**530**	**1914**	**3827**	**8118**

Source: *Department of Animal Husbandry and Dairying, Ministry of Agriculture*

TABLE 3.3.15 : STATE-WISE FISH PRODUCTION

(Tonnes)

Sl. No.	States/UT's	2001-02			2002-2003			2003-2004		
		Marine	Inland	Total	Marine	Inland	Total	Marine	Inland	Total
1	2	3	4	5	6	7	8	9	10	11
1	Andhra Pradesh	204940	471165	676105	248495	579402	827897	263930	680710	944640
2	Arunachal Pradesh		2600	2600		2604	2604		2650	2650
3	Assam		161450	161450		165521	165521		181000	181000
4	Bihar		240400	240400		261000	261000		266490	266490
5	Goa	66550	3368	69918	72287	4247	76534	83760	3600	87360
6	Gujarat	650829	50774	701603	743638	34267	777905	609140	45480	654620
7	Haryana		34568	34568		35182	35182		39130	39130
8	Himachal Pradesh		7215	7215		7244	7244		6530	6530
9	Jammu & Kashmir		18850	18850		19750	19750		19750	19750
10	Karnataka	128415	121196	249611	180161	86263	266424	187000	70000	257000
11	Kerala	593783	78039	671822	603286	75036	678322	608520	76180	684700
12	Madhya Pradesh		47457	47457		42168	42168		50820	50820
13	Maharashtra	414268	122785	537053	386860	127236	514096	420010	125120	545130
14	Manipur		16450	16450		16600	16600		17600	17600
15	Meghalaya		4968	4968		5372	5372		5150	5150
16	Mizoram		3147	3147		3250	3250		3380	3380
17	Nagaland		5200	5200		5500	5500		5560	5560
18	Orissa	113893	168056	281949	115006	172527	287533	116880	190020	306900
19	Punjab		58000	58000		66000	66000		83650	83650
20	Rajasthan		14269	14269		25600	25600		14300	14300
21	Sikkim		140	140		140	140		140	140
22	Tamil Nadu	370998	114000	484998	371500	102000	473500	373000	101140	474140
23	Tripura		29450	29450		29515	29515		17980	17980
24	Uttar Pradesh		225371	225371		249837	249837		267000	267000
25	West Bengal	184300	915800	1100100	181500	938500	1120000	181600	988000	1169600
26	A & N Islands	27021	61	27082	28228	74	28302	31060	90	31150
27	Chandigarh		44	44		84	84		80	80
28	Dadar & Nagar Haveli		55	55		46	46		50	50
29	Daman & Diu	21524		21524	11258		11258	13770		13770
30	Delhi		3200	3200		2250	2250		2100	2100
31	Lakshadweep	13650		13650	7496		7496	10030		10030
32	Pondicherry	39600	4900	44500	40105	4910	45015	42800	5200	48000
33	Chattisgarh		95763	95763		99801	99801		111050	111050
34	Uttranchal		6422	6422		2552	2552		2560	2560
35	Jharkhand		101000	101000		45380	45380		75380	75380
36	Deep Sea Fishing Sector									
	Total	**2829771**	**3126163**	**5955934**	**2989820**	**3209858**	**6199678**	**2941500**	**3457890**	**6399390**

Source : Department of Animal Husbandary and Dairying, Ministry of Agriculture

TABLE 3.3.16 : INLAND FISHERY WATER RESOURCES OF INDIA

Sl. No.	State/UTs	Rivers & Canals (Kms.)	Reservoirs (Lakh Ha)	Tanks & Ponds (Lakh Ha)	Floodplain Lakes & Derelict Water (Lakh Ha)	Brackish Water (Lakh Ha)
1	2	3	4	5	6	7
1	Andhra Pradesh	11,514	2.34	5.17	-	0.60
2	Arunachal Pradesh	2,000	-	2.76	0.42	-
3	Assam	4,820	0.02	0.23	1.10	-
4	Bihar	3,200	0.60	0.95	0.05	-
5	Chhattisgarh	3,573	0.84	0.63	-	-
6	Goa	250	0.03	0.03	-	Neg.
7	Gujarat	3,865	2.43	0.71	0.12	1.00
8	Haryana	5,000	Neg.	0.1	0.10	-
9	Himachal Pradesh	3,000	0.42	0.01	-	-
10	Jammu & Kashmir	27,781	0.07	0.17	0.06	-
11	Jharkhand	4,200	0.94	0.29	-	-
12	Karnataka	9,000	2.11	2.9	-	1.00
13	Kerala	3,092	0.3	0.3	2.43	2.40
14	Madhya Pradesh	17,088	2.27	0.6	-	-
15	Maharashtra	16,000	2.79	0.59	-	0.1
16	Manipur	3,360	0.01	0.05	0.04	-
17	Meghalaya	5,600	0.08	0.02	Neg	-
18	Mizoram	1,395	-	0.02	-	-
19	Nagaland	1,600	0.17	0.5	Neg	-
20	Orissa	4,500	2.56	1.14	1.8	4.30
21	Punjab	15,270	Neg	0.07	-	-
22	Rajasthan	5,290	1.2	1.8	-	-
23	Sikkim	900	-	-	0.03	-
24	Tamil Nadu	7,420	0.52	0.56	0.07	0.60
25	Tripura	1,200	0.05	0.13	-	-
26	Uttar Pradesh	28,500	1.38	1.61	1.33	-
27	Uttaranchal	2,686	0.2	0.01		-
28	West Bengal	2,526	0.17	2.76	0.42	2.1
29	Andaman & Nicobar Islands	115	0.01	0.03	-	1.20
30	Chandigarh	2	-	Neg	Neg	-
31	Dadra & Nagar Haveli	54	0.05	-	-	-
32	Daman & Diu	12	-	Neg	-	Neg
33	Delhi	150	0.04	-	-	-
34	Lakshadweep	-	-	-	-	-
35	Pondicherry	247	-	Neg	0.01	Neg.
	Total	**195,210**	**21.60**	**24.14**	**7.98**	**12.40**

Source : Department of Animal Husbandry and Dairying, Ministry of Agriculture
Neg - Negligible

TABLE 3.3.17: INCIDENCE OF LIVESTOCK AND POULTRY DISEASES IN INDIA

(Jan-Dec 2003)

Sl. No.	Disease Name	Species	Number of		
			Outbreak	Attack	Death
1	Foot and mouth disease	Bovine	1814	116420	1956
		Buffalo	8	7140	110
		Ovine/Caprine	76	5488	378
		Swine	5	83	11
2	Haemorrhagic septicaemia	Bovine	586	4128	1970
		Buffalo	217	1042	481
3	Black quarter/Black leg	Bovine	797	4438	1370
		Buffalo	*	84	41
4	Anthrax	Bovine	79	318	238
		Buffalo	*	1	1
		Ovine/Caprine	67	520	309
5	Distomatosis (liver fluke)/Fascioliasis	Bovine	137	21919	10
		Buffalo	9	74	
		Ovine/Caprine	19	282	
6	Enterotoxaemia	Ovine/Caprine	260	2573	1401
7	Sheep pox and goat pox	Ovine/Caprine	265	6771	1447
8	Bluetongue	Ovine/Caprine	391	20047	2523
9	Contagious caprine pleuropneumonia	Caprine	22	3223	463
10	New Castle disease	Avian	338	363901	44302
11	Classical Swine fever	Swine	53	1156	520
12	Fowl typhoid	Avian	60	89830	3855
13	Ranikhet (New castle)disease	Avian	812	160183	37878
14	Coccidiosis	Avian	259	70283	10208
		Bovine	34	358	75
		Ovine/Caprine	18	156	12
		Swine	2	6	
15	Fowl pox	Avian	110	3527	269
16	Fowl cholera	Avian	8	1225	415
17	Marek's disease	Avian	1	1	1
18	Infectious bursal disease (Gumboro)	Avian	185	104401	9431
19	Duck plague	Avian	30	2430	888
20	Rabies	Bovine	51	130	130
		Buffalo	3	15	15
		Canine	7	20	20
		Ovine/Caprine	4	9	9
		Equine	2	3	3
21	Brucellosis	Bovine	9	24	
		Swine	2	4	1
22	Avian mycoplasmosis/Chronic respiratory disease	Avian	35	32905	2737
23	Babesiosis	Bovine	63	1043	4
24	Anaplasmosis	Bovine	7	23	7
25	Surra(Trypanosoma evansi)	Camel	1	10	2
26	Sheep Mange	Ovine	5	31	
27	Peste Des Petits Ruminants(PPR)	Ovine/Caprine	623	32933	6183
28	Infectious Coryza	Avian	23	19580	350

Source : Department of Animal Husbandry and Dairying, Ministry of Agriculture

* *Outbreaks have been included in other species.*

CHAPTER FOUR
Atmosphere

CHAPTER FOUR

ATMOSPHERE

Atmospheric Pollution – Main Sources

4.1 The atmosphere consists of a mixture of gases that completely surround the earth. It extends to an altitude of 800 to 1000 kms above the earth's surface, but is deeper at the equator and shallow at the poles. About 99.9% of the mass occurs below 50 Km and 0.0997% between 50 and 100 km altitude. Major polluting gases/ particles are confined to the lowermost layer of atmosphere known as Troposphere that extends between 8 and 16 Kms above the earth surface.

4.2 The **main sources of atmospheric pollution** may be summarized as follows:

a) The combustion of fuels to produce energy for heating and power generation both in the domestic sector as well as in the industrial sector.

b) The exhaust emissions from the transport vehicles that use petrol, diesel oil, etc.

c) Waste gases, dust and heat from many industrial sites including chemical manufacturers, electrical power generating stations, etc.

Environment Pollution due to Energy Use

4.3 A considerable amount of air pollution results from burning of fossil fuels. Fuels are primarily derived from fossilized plant material and consist mainly of carbon and/or its compounds. The household sector is the largest consumer of energy in India, accounting for 40-50% of the total energy consumption. As per a report of Planning Commission, the share of the household sector in the final use of energy declined although retaining its dominant share at 58.9% in 1987. The most abundantly used fossil fuel for cooking is the wood, which is almost 61% of the total fuel demand for cooking. Burning of traditional fuels introduces large quantities of CO_2 when the combustion is complete, but if there is incomplete combustion and oxidation then Carbon monoxide (CO) is produced, in addition to hydrocarbons. Incomplete combustion of coal produces smoke consisting of particles of soot or carbon, tarry droplets of unburnt hydrocarbons and CO. Fossil fuels also contain 0.5–4.0% of sulphur which is oxidized to SO_2 during combustion.

4.4 The environmental effects of various fuels, namely, coal, oil, nuclear etc. are of growing concern owing to increasing consumption levels. The combustion of these fuels in industries and vehicles has been a major source of pollution. Coal production through opencast mining, its supply to and consumption in power stations, and industrial boilers leads to particulate and gaseous pollution which can cause pneumoconiosis, bronchitis, and respiratory diseases. Another major impact of coal mining is land degradation, especially of forest areas.

4.5 The consumption of petroleum products in vehicles, industries and domestic cooking activities results in the emission of pollutants in large quantities. Radioactive emissions from nuclear power plants are of grave concern as they can cause serious impact both in terms of spatial and inter-generational concerns. In addition, two key problems are long-term waste disposal and the eventual decommissioning of plants. Due to limited reserves of petroleum, main emphasis needs to be given to non-conventional energy sources such as wind energy, solar energy and ocean energy.

Industrial Emissions

4.6 Air borne emissions emitted from various industries are a cause of major concern. These emissions are of two forms, viz. solid particles (SPM) and gaseous emissions (SO_2, NO_x, CO, etc.). Liquid effluents, generated from certain industries, containing organic and toxic pollutants are also a cause of concern. Heavily polluting industries were identified which are included under the 17 categories of highly polluting industries for the purpose of monitoring and regulating pollution from them. The Ministry of Environment and Forests has, over the last two decades, developed standards for regulating emissions from various industries and emission standards for all the polluting industries including thermal power stations, iron and steel plants, cement plants, fertilizer plants, oil refineries, pulp and paper, petrochemicals, sugar, distilleries and tanneries have been prescribed. The industrial units in India are largely located in the States of Gujarat, Maharashtra, Uttar Pradesh, Bihar, West Bengal and Madhya Pradesh. The highest concentration of sulpher dioxide and oxides of nitrogen is, therefore, often found in cities located in these states. Some other industrial estates in Delhi, Punjab, Rajasthan and Andhra Pradesh are also becoming critical.

Road Transport

4.7 Road vehicles are the second major source of pollution. They emit CO, HCs, NO_x, SO_2, and other toxic substances such as TSP and lead. Diesel engines are much less polluting than petrol engines. Both types of engines are not very efficient converters of fuel energy. However, diesel types with a conversion efficiency of around 30% must be more efficient and use less fuel than petrol types with a 15-20% conversion efficiency. Both types of engines have incomplete combustion of fuel, so the major pollutant is CO, amounting to 91% by weight of all vehicle emissions.

4.8 The primary pollutants produced in vehicle emissions undergo a series of complex interrelated chemical reactions in the troposphere and lower stratosphere to form secondary products.

4.9 Four factors make pollution from the vehicles more serious in developing countries.

(i) Poor quality of vehicles creating more particulates and burning fuels inefficiently.

(ii) Lower quality of fuel being used leads to far greater quantities of pollutants.

(iii) Concentration of motor vehicles in a few large cities.

(iv) Exposure of a larger percentage of population that lives and moves in the open.

Harmful Effects of Emissions

4.10 The high concentration of particulates in the atmosphere over large urban and industrial areas can produce a number of general effects. Smoke and fumes can increase the atmospheric turbidity and reduce the amount of solar radiation reaching the ground. The overall effect of air pollution upon the biosphere and the built environment can be broadly considered under 3 headings: The effect upon-

(i) buildings and materials,

(ii) soil, vegetation, crops and animal life,

(iii) human beings.

i) **Buildings and Materials**: The fabric of buildings that are surrounded by heavily polluted air for years undergo chemical changes. Gradual erosion takes place and this is only too evident when grimy upper surface is removed. A good example is that of the famous historical monument 'Taj Mahal' at Agra, which, on

account of reaction of Sulphur-di-oxide, emitted from neighbouring industries, with the limestone has slowly, started turning yellow. As a result, on Court's directives, a number of measures have been taken to protect our national heritage monument, e.g. closure of neighbouring heavy polluting industries, operation of only non-polluting vehicles like battery buses, tonga, in the vicinity of Taj Mahal.

ii) **Soil, vegetation and Animal Life:** The presence of gaseous pollutants in the air and deposition of particulates on to the soil can effect plants. It can effect the cattle and animals too as they have been found to develop breathing difficulties and suffer from low yield of milk, lameness and joint stiffness in a polluted environment.

iii) **Human beings:** Smoke and SO_2 cause the general and most widespread effects of air pollution on people. Atmospheric smoke contains potentially carcinogenic organic compounds similar to those that occur in cigarette tobacco smoke. The CO affects the cardiovascular system, NO_xs affect the respiratory system, Ozone causes increased sensitivity to infections, lung diseases, irritation in eyes, nose and throat, etc.

Steps Taken So Far and Their Impact

4.11 With the alarming increase in the atmospheric pollution, especially in the big cities, Government has taken some important initiatives in the recent years. To start with, the emphasis and implementation has been primarily in the big cities but gradually to spread throughout the country. These relate to the progressive tightening of the auto-emission norms (1991, 1996, 1998 & 2000) and fuel quality specifications (1996) as recommended by the Central Pollution Control Board (CPCB).

4.12 Till early 1994, ambient air quality standards in India were based on 8 hourly average time only. In April 1994, these standards were revised and 24 hourly standards were also prescribed. National ambient air quality standards are prescribed for three distinct areas, viz. i) industrial, ii) residential, rural and other areas and iii) sensitive areas.

Following steps have been taken so far:

i) **Unleaded Petrol**: With the gradual reduction of lead content in petrol and finally supply of unleaded petrol for all vehicles from Sept. 1998 in the capital city of Delhi, a lethal pollutant from vehicular exhaust has been removed. The lead content in the atmosphere near traffic intersections of Delhi has reduced by more than 60% with this measure.

ii) **Sulphur in diesel**: The sulphur content in the diesel supplied in Delhi has been reduced from 0.5% in 1996 to 0.25% in 1997 so as to meet the EURO-II norms.

iii) **Tightening of the Vehicular Emission Norms**: From 1995, new passenger cars were allowed to register only if they were fitted with catalytic converters. Emission norms for such cars were tightened by 50 % as compared to 1996 norms. With the recent directions of the Hon'ble Supreme Court, passenger cars (both petrol and diesel) are required to meet atleast EURO-I norms in June 1999 and from Apr. 2000 only such vehicles meeting EURO-III norms will be permitted to register in the NCR of Delhi. CNG operated vehicles are also permitted by the Supreme Court directions.

iv) **2-T Oil for Two stroke engines**: From 1.04.99, on the recommendations of CPCB, the low smoke 2T oil became effective. To prevent the use of 2T oil in excess of the required quantity, premixed 2T oil dispensers have been installed in all the petrol filling stations of Delhi. Sale of loose 2T oil has also been banned from Dec. 1998.

v) **Phasing out of Grossly Polluting Vehicles:** On CPCB's recommendations,

initially 20 yr. old vehicles were prohibited from plying from Dec.1998, followed by phasing out of 17 yr. old vehicles from Nov.98 and 15 yr. old from Dec. '98.

Impact on Pollution Load and Air Quality in Delhi

4.13 The major impacts have been observed through the implementation of emission norms and fuel quality specifications effective from 1996, as also phasing out of 15 year old commercial vehicles and leaded petrol in the year 1998 and phasing out of 8 year old commercial vehicles and 15 year old two wheelers from 2000 onwards. The ambient air quality as monitored by CPCB during 1999 shows reduction in levels of various pollutants in ambient air as compared to previous year. The reducing trend was observed with respect to Carbon Monoxide, nitrogen dioxide, and lead in residential areas.

Noise Pollution

4.14 Of late, noise has been recognized as a pollutant which until recently was considered only as a nuisance. The Central Pollution Control Board (CPCB) has notified the ambient noise standards in 1987 under section 20 of the Air (Prevention and Control of Pollution) Act, 1981. The noise standards specify limits as 55dB(A) and 45dB(A) as limits for day and night time, respectively, for residential areas, 75 dB(A) and 70 dB(A) in the day and night time for industrial areas, and 50 dB (A) and 40 dB(A) in the day and night for silence zones. Special campaign for reduction in use of fire crackers in Delhi have resulted in reduced pollution levels during Diwali.

4.2 Green House Gases and Their Effects

4.15 The greenhouse effect plays a crucial role in regulating the heat balance of the earth. It allows the incoming short-wave solar radiation to pass through the atmosphere relatively unimpeded; but the long-wave terrestrial radiation emitted by the earth's surface is partially absorbed and then re-emitted by a number of trace gases in the atmosphere. These gases known as GHGs (greenhouse gases) are: water vapor, carbon dioxide, methane, nitrous oxide and ozone in the troposphere and in the stratosphere. This natural greenhouse effect warms the lower atmosphere.

4.16 If the atmosphere were transparent to the outgoing long wave radiation emanating from the earth's surface, the equilibrium mean temperature of the earth's surface would be considerably lower and probably below the freezing point of water. Mere incidence of GHG's in the atmosphere, by itself, is no concern. What is more important is that their concentration should stay within reasonable limits so that global ecosystem is not unduly affected. However, by increasing the concentrations of natural GHG's and by adding new GHG's like chloroflouro carbons, the global average and the annual mean surface-air temperature (referred to as the global temperature) can be raised, although the rate at which it will occur is uncertain. This is the enhanced greenhouse effect, which is over and above that occurring due to natural greenhouse concentration. Such a rise in the atmospheric concentration of GHG's has led to an upward trend in global temperature.

4.17 While it is required to follow the general commitments under the Framework Convention on Climate Change, India is not required to adopt any GHG reduction targets. Irrespective of international commitments, it seems prudent to be ready with

- Inventory of sinks and sources of GHG emission
- Predict the cumulative impact of national and international GHG emissions to plan for temperature and sea level rise
- Devise land use plans for the coastal areas likely to be affected
- Devise water and land management strategies especially agricultural sector.

TABLE 4.1.4 (c) : ANNUAL MEAN CONCENTRATIONS OF SULPHUR DIOXIDE (SO_2) IN AMBIENT AIR - Contd.

(µg/m³)

States/Union Territories		Station	Annual Mean Concentration			
			1999	2000	2001	2002
Uttar Pradesh						
	i	Tajmahal, Agra ***(Sensitive)***	10.70		10.50	
	ii	Regional Office, Bodala, Agra	7.40		11.10	
	iii	Indira Chowk, Gajroula	17.80	N.A.	27.30	N.A.
	iv	Deputy Ka Porao, Kanpur	20.00	20.20	19.10	7.00
	v	Agriculture University, Kanpur	11.50	15.50	14.00	11.90
	vi	Head Post Office, Kanpur	14.00		16.10	
	vii	F & Training Centre, Kanpur	21.40	21.50	19.30	7.00
	viii	Kapoor Hotel, Hozratganj, Lucknow	25.70	N.A.	28.30	23.60
	ix	Mahanagar, Lucknow	25.90		28.20	
	x	R. O. Jawahar Nagar, Varanasi	N.A.		11.30	10.50
	xi	Kotwali, Kanpur		17.40		14.20
	xii	Jaipur House, Agra		N.A.		5.70
West Bengal						
	i	Bator, Howrah		11.10	9.10	7.10
	ii	Lal Bazar, Dalhousie, Kolkata	51.10	14.90	17.40	11.70
	iii	Kasba, Kolkata	15.50		13.50	
	iv	Calcutta CESE. Mandevitle Garden (Gariohat)		12.10		9.30
Chandigarh						
	i	Sector 17 C	N.A.	N.A.	N. A.	
Pondicherry						
	i	Housing Boadd's Office	16.80	17.90	12.20	16.10
	ii	Agriculture Department			11.40	
	iii	FRENCH, Institute	18.30	N.A.		14.30
		Industrial Station				
Andhra Pradesh						
	i	C.I.T.D., Balanagar, Hyderabad	17.60	11.50	10.90	6.30
	ii	Nacharam, Hyderabad	8.40	7.50	10.10	9.10
	iii	UPPAL, Hyderabad	13.70	17.10	14.00	4.60
	iv	Industrial Estate, Marripalem, Vishakhapatnam	14.10	14.00	13.10	6.70
Chhattisgarh						
	i	Laghu Udyog Nigam, Bhillai	31.60	27.10	28.10	26.80
	ii	MPCB Sub Station, Birgaon, Raipur	9.30	9.60	28.10	8.50
Delhi						
	i	Shahzada Bagh, Delhi	21.00	17.00	13.60	9.70
	ii	Shahadra, Delhi	20.00	17.70	13.00	16.70
	iii	ESI Disp. Najafgarh Road		14.80		N.A.
Goa						
	i	Vasco	7.70	3.50	5.30	2.90
Gujarat						
	i	Shardaben Hospital, Ahemdabad	14.60	9.00	11.20	10.00
	ii	Rallis India Ltd., Ankleshwar	54.30	N.A.		
	iii	C. E. T. P. Nandseri, Vadodara	58.10			
	iv	B. R. C. Udhna, Surat	38.50	N.A.		
	v	G. E. B., GIDC, Surat	76.70			

TABLE 4.1.4 (c) : ANNUAL MEAN CONCENTRATIONS OF SULPHUR DIOXIDE (SO_2) IN AMBIENT AIR - Contd.

(µg/m³)

States/Union Territories		Station	Annual Mean Concentration			
			1999	2000	2001	2002
Haryana						
	i	Shivalic Global, Industries, Faridabad			23.10	
	ii	Ballarpur Industries, Yamuna Nagar	9.80	18.90	22.10	28.60
	iii	Escorts Medical Centre, Faridabad	31.30	N.A.		13.10
Himachal Pradesh						
	i	Gondhpur Industrial Area, Paonta Sahib	BDL	0.50	2.00	1.90
	ii	Asstt. Commissioner Office Building, Sector 1, Parwanoo			4.40	
	iii	Tekka Bench Bridge, Shimla	3.70		3.00	
	iv	V. Farm Indl. Area, Sec. 1, Parwanoo	BDL	1.90		3.80
	v	P. S. Industrial Area, Paonta Sahib	BDL	0.50		2.00
Jharkhand						
	i	M.A.D.A. Jharia	80.10	22.30	16.30	N.A.
	ii	BIT Sindri		21.00	17.10	N.A.
	iii	Burmamines Water Tower, Jamshedpur	47.30	46.80	39.00	37.60
	iv	Near P-Station (FCI Main Hospital) Sindri	69.30			N.A.
Karnataka						
	i	K. R. Circle, Visw Bldg, Mysore	30.90	30.70	22.50	20.40
	ii	K. I. A. D. B. Bldg, Mysore	31.00	30.70	24.10	20.60
	iii	Graphite India, Bangalore	32.70	18.70	19.90	17.00
	iv	AMCO Batteries, Bangalore	37.90	19.10	19.30	12.10
Kerala						
	i	M/S Carhurandum Universal Ltd. Kanjakode			14.60	
	ii	Eloor. Cochin	10.50	41.60	24.60	31.50
	iii	Irumpanem. Cochin	11.40	20.20	9.90	2.90
	iv	FACT/Udyog Mandal			14.80	
	v	Hi-Tech Chakkai, Thiruvananthapuram			13.60	
	vi	Chingavanam, Kottayam	BDL	0.60	2.00	2.00
	vii	Mavoor, Kozhikode	BDL		2.00	
	viii	CRL Guest, House, Cochin	28.00	14.30		17.60
	ix	Velli, Thiruvanathapuram	26.10			
Madhya Pradesh						
	i	Govindpura, Akun, Bhopal	17.40	22.00	23.10	15.30
	ii	M. P. Laghu Udyog, Indore			24.50	N.A.
	iii	Chem. Div. Labour Club, Nagda	26.90	52.60	46.50	36.50
	iv	BCI Labour Club, Nagda			22.40	
	v	Industrial Area SD (office), Satna	12.40	13.70	13.30	8.40
	vi	Association of I. Pologround, Indore	27.60	28.50		
Maharashtra						
	i	Thane (E) Balkum/Kolshet, Mumbai	14.80	18.90	23.10	21.10
	ii	Parel, Mumbai	22.30	11.80	12.00	9.70
	iii	Hingma, Nagpur	9.50	9.30	8.80	8.70
	iv	MIDC Office, Hingma Rd. Nagpur	5.60		9.80	N.A.
	v	M. I. D. C. Chanderpur	33.50		28.00	
	vi	Bhosari, Pune	34.60		37.30	
	vii	WIT Campus, Solapur		18.90	19.40	20.10
	viii	MIDC Phase-II, Dombivali	31.40			
	ix	VIP Ind. Area, MIDC satpura, Nasik	31.00			
	x	PCMC Chingawad, Pune	41.10	N.A	N.A.	
	xi	Poud Phata (Kothrud, Pune)	40.30			

TABLE 4.1.4 (c) : ANNUAL MEAN CONCENTRATIONS OF SULPHUR DIOXIDE (SO_2) IN AMBIENT AIR - Contd.

(µg/m³)

States/Union Territories		Station	Annual Mean Concentration			
			1999	2000	2001	2002
Orissa						
	i	Industrial Estate, Angul			11.00	
	ii	IDL-Post (Sonaparbat), Rourkela	19.30		9.40	
	iii	Jaykaypur, Rourkela	12.30	14.50	12.50	10.90
	iv	TTPS Colony, Talcher	5.80	5.60	6.80	9.70
	v	NALCO, Angul	2.80			
	vi	Municipality Office, Rourkela	21.00	16.60		7.60
Punjab						
	i	M. Steel, Gobindgarh	17.80		11.80	
	ii	Chaudhary Diwan Chand Steel			11.80	
	iii	Milk Plant, Ludhiana	20.40	11.40	11.70	N.A.
	iv	Rita Sewing Machines, Ludhiana	20.40	11.80	12.10	12.30
	v	M/S Punjab Maltee, Jalandhar			21.00	
	vi	P. Steel, Gobindgarh	18.60			
	vii	M/s Zed Sporto, Jalandhar	25.00			
	viii	Jalandhar (Inderson's Leather Pvt. Ltd.)		22.60		N.A.
Rajasthan						
	i	RIICO Pump House, Alwar		14.70	13.80	14.30
	ii	Gaurav Solvex, Alwar	16.80		17.40	
	iii	Jothwara Indl. Area, Jaipur	12.10	23.20	14.20	15.20
	iv	VKIA, Jaipur	23.50		13.40	
	v	Basni Indl. Area, Jodhpur	13.70		13.90	
	vi	R. O. Anantpura, Kota	4.30	6.40	7.20	5.40
	vii	D. I. C. Udaipur			8.90	
	viii	Regional Office, Udaipur			5.00	
	ix	RICCO, Chittor	34.90			
Tamil Nadu						
	i	SIDCO Office, Coimbtore	7.10		6.70	N.A.
	ii	Kalhivakkam, Chennai		20.10	26.10	40.90
	iii	Govt. Higher Secondary School, Chennai			21.80	
	iv	Thiruvottiyur Municipal Office, Chennai	10.20		23.00	31.80
	v	Fenner (I) Ltd., Madurai	5.10		5.90	
	vi	Municipal K. Mandapa, Chennai	11.70	10.10		7.30
	vii	Manali Police Station, Chennai	13.70			31.80
	viii	Chemical Research Centre, Tuticorin				N.A.
Uttaranchal						
	i	Rai Pur Road, Dehradun	17.20	19.10	19.60	17.60
Uttar Pradesh						
	i	Nunhai, Agra	N.A.		N.A.	
	ii	Anpara Colony, Anpara	59.30	64.60	53.00	30.10
	iii	Ranusagar Colony, Anpara	59.10	63.80	51.10	29.60
	iv	Raunag Auto Ltd., Gajroula	25.70	26.60	35.50	41.10
	v	M/S Associated Chem. Pvt., Kanpur	20.40		20.40	
	vi	Lajpat Nagar, Kanpur	14.20	17.80	15.20	13.70
	vii	Talkatora, Luknow	31.50		N.A.	Inadequate data
	viii	Bulandshahar Road Indl. Area, Ghaziabad	N.A.		23.00	
	ix	Shahibabad Industrial Area, Ghaziabad	33.40		25.70	
	x	S. P. Engg. Works, Fazalganj, Kanpur				7.30

TABLE 4.1.4 (c) : ANNUAL MEAN CONCENTRATIONS OF SULPHUR DIOXIDE (SO_2) IN AMBIENT AIR - Concld.

(µg/m³)

States/Union Territories		Station	Annual Mean Concentration			
			1999	2000	2001	2002
West Bengal						
	i	Howrah Municipal Corp., Howrah	..	13.60	12.20	11.90
	ii	Bandhaghat, Howrah	..	13.40	10.90	14.40
	iii	Kossipore Police Station, Kolkata	66.90	25.30	21.90	13.30
	iv	WBIIDC, Haldia	..	25.20	12.70	6.60
	v	Super Market, Haldia	..	33.80	17.10	8.50
Chandigarh						
	i	Modern Food Indl. Area	6.50	Inadeq uate data	N.A.	9.00
Pondicherry						
	i	PIDC I. Estate, Metropolyam	..	N.A.	17.50	19.80

Surce: *Central Polution Control Board*

TABLE 4.1.5 : NUMBER OF MOTOR VEHICLES REGISTERED IN INDIA (TAXED AND TAX-EXEMPTED)

(As on 31st March)

(Number)

Sl. No.	Year/State/UT	Two-Wheelers	Auto-Rickshaws	Jeeps	Cars	Taxis	Buses	Goods Vehicles #	Misce-llaneous ##	Total No. of Vehicles
1	2	3	4	5	6	7	8	9	10	11
	1995-96	23252287	1010344	671682	3150951	381011	448415	2030728	2966042	33911460
	1996-97	25728982	1175283	727965	3527303	417013	484099	2343000	2927887	37331532
	1997-98	28642351	1360151	824525	3829209	484374	537237	(b) 2535930	3154263	41368040
	1998-99	31327607	1495200	837700	4201774	516449	539819	(b) 2553689	3403087	44875325
	1999-2000	34117662	1583561	919067	4647969	575612	562308	2715005	3735620	48856804
	2000-01	38556026	1777130	1126148	5297219	634357	633900	2948300	4017946	54991026
	2001-02	41478136	1881085	1168868	5717456	684490	668825	3044976	4219191	58863027
	2001-2002									
	State:									
1	Andhra Pradesh	3473401	1 56443	51443	279903	52033	62552	156705	103524	4336004
2	Arunachal Pradesh	10605	1430	2260	2340	299	665	2878	667	21144
3	Assam	330445	22844	13563	85088	9256	9346	88182	37089	595813
4	Bihar	644477	30787	32560	58335	20703	15365	48060	174387	1024674
5	Chhattisgarh	784390	5034	7001	29846	4809	15135	37628	64727	948570
6	Goa	257469	8571	-	59677	7321	4190	25310	4036	366574
7	Gujarat	4306000	260514	99116	461020	35203	44780	345477	455878	6007988
8	Haryana	1136917	29666	80003	190716	6587	5120	137945	361899	1948853
9	Himachal Pradesh	129866	3233	10783	33696	10163	7769	34700	14084	244294
10	Jammu & Kashmir	209991	13344	10266	57130	8139	18304	33225	13469	363868
11	Jharkhand	748050	30733	19850	75568	18076	8278	59257	23991	983803
12	Karnataka	2478705	1 75992	40144	397809	34559	60445	173903	274121	3635678
13	Kerala	1289764	256862	70212	305887	102503	80444	181874	27826	2315372
14	Madhya Pradesh	2369734	40100	34329	124555	50440	23590	97088	433111	3172947

TABLE 4.1.5 : NUMBER OF MOTOR VEHICLES REGISTERED IN INDIA (TAXED AND TAX-EXEMPTED)-*Concld.*

(As on 31st March)

(Number)

Sl. No.	Year/State/UT	Two-Wheelers	Auto-Rickshaws	Jeeps	Cars	Taxis	Buses	Goods Vehicles #	Misce-llaneous ##	Total No. of Vehicles
1	2	3	4	5	6	7	8	9	10	11
15	Maharashtra	5023126	440018	230427	757229	97081	63129	425692	376869	7413571
16	Manipur	53695	2263	6185	4870	316	2048	5947	1557	76881
17	Meghalaya	19395	-	8930	12853	4514	2463	15660	3261	67076
18	Mizoram	15146	623	3237	3740	3063	761	4111	3121	33802
19	Nagaland	42621	10552	35189	34945	2992	4784	40521	5174	176778
20	Orissa	955669	16708	27663	54041	12350	15061	71025	62339	1214856
21	Punjab	2255749	31745	27033	214327	10429	16917	100670	446277	3103147
22	Rajasthan	2205253	54219	116001	160479	24134	51022	153477	432019	3196604
23	Sikkim	4189	-	2267	1042	3417	638	1412	-	12965
24	Tamil Nadu	4600565	111942	36877	483799	64036	37866	220408	102604	5658097
25	Tripura	32634	7901	1344	4954	1375	1985	5775	1460	57428
26	Uttaranchal	306197	5693	6070	29615	11321	4174	11194	31627	405891
27	Uttar Pradesh	3834680	70229	74846	295672	24853	35315	129572	705775	5170942
28	West Bengal	1036009	-	@	366043	41298	22336	189568	34551	1689805
	Union Territory:									
1	A & N Islands	21743	784	1033	1693	436	459	1519	789	28456
2	Chandigarh	315113	-	@	31242	466	1492	5654	2059	386026
3	Dadra & Nagar Haveli	7483	417	533	2783	159	180	1444	253	13252
4	Daman & Diu	25701	722	-	10601	41	286	3266	260	40877
5	Delhi	2354530	86985	115669	1009524	20628	47957	226939	14175	3876407
6	Lakshadweep	3369	286	77	14	-	5	217	513	4481
7	Pondicherry	195455	4445	3957	46420	1490	3964	8673	5699	270103

Source: *Transport Research Wing, Ministry of Road Transport & Highways.*

\# : *Includes trucks three and four wheelers used for carrying goods.*

(b) : *Includes Omini Buses*

\## : *Includes tractors and trailers.*

@ : *Included in cars*

TABLE 4.1.6 : TOTAL REGISTERED MOTOR VEHICLES IN METROPOLITAN CITIES OF INDIA

(as on 31st March, 2002)

(Number)

Sl. No.	Name of City	Transport					
		Multi-axied/Articul-ated Vehicles Trucks & Lorries	Light Motor Vehicles (Goods)	Buses	Taxies	Light Motor Vehicles (Passengers-Auto)	Total Transport
1	2	3	4	5	6	7	8
1	Ahmedabad	8786	9809	14872	4639	40944	**79050**
2	Bangalore	26482	19722	11287	14850	72210	**144551**
3	Bhopal	4152	3782	2604	5296	9377	**25311**
4	Chennai	24296	6254	5765	11122	39027	**86464**
5	Cochin **	7769	16351	3726	7247	12978	**48071**
6	Coimbatore	8457	2926	1297	2509	5371	**20560**
7	Delhi	161650	65289	47578	20628	86985	**382130**
8	Hyderabad $	20763	16479	2539	3098	45800	**88679**
9	Indore	24197	6596	4003	11146	9446	**55388**
10	Jaipur	27705	1876	15027	6148	8509	**59265**
11	Kanpur	7452	2343	875	311	2430	**13411**
12	Kolkata *	59576	N.A.	8586	32199	9747	**110108**
13	Lucknow	7222	4639	2895	5405	7936	**28097**
14	Ludhiana ***	13252	10190	1425	2095	6421	**33383**
15	Madurai	6002	2294	1801	2827	6361	**19285**
16	Mumbai	19134	36278	12768	63679	101829	**233688**
17	Nagpur	9354	8306	2589	602	10932	**31783**
18	Patna	15172	2987	3003	2914	15781	**39857**
19	Pune	19446	13718	7478	3750	44349	**88741**
20	Surat	2872	5910	785	850	27000	**37417**
21	Vadodara	6346	10875	2730	4981	25503	**50345**
22	Varanasi	2888	2262	986	493	4016	**10645**
23	Visakhapatnam $	974	456	99	288	1543	**3360**
Total		**483947**	**249342**	**154718**	**207087**	**594495**	**1689589**

TABLE 4.1.6 : TOTAL REGISTERED MOTOR VEHICLES IN METROPOLITAN CITIES OF INDIA-*Concld.*

(as on 31st March, 2002)

(Number)

Sl. No.	Name of City	Non-Transport								
		Two Wheelers	Cars	Jeeps	Omni Buses	Trac-tors	Trai-lers	Oth-ers	Total Non-Transport	Grand Total (Transport +Non Trans-port)
1	2	9	10	11	12	13	14	15	16	17
1	Ahmedabad	693421	115524	9426	—	109	171	1645	**820296**	**899346**
2	Bangalore	1253408	234888	6931	12971	6847	6183	14499	**1535727**	**1680278**
3	Bhopal	268659	23104	3058	—	9278	3436	636	**308171**	**333482**
4	Chennai	1011072	234381	8450	310	1152	—	13721	**1269086**	**1355550**
5	Cochin **	136219	33028	3700	—	469	985	3713	**178114**	**226185**
6	Coimbatore	363042	52427	4039	424	5798	—	2037	**427767**	**448327**
7	Delhi	2354530	1009524	115669	379	4771	99	9305	**3494277**	**3876407**
8	Hyderabad $	757884	84187	15127	3802	204	282	659	**861945**	**950624**
9	Indore	425094	45953	4278	—	10694	7348	1633	**495000**	**550388**
10	Jaipur	518530	69284	21630	—	21393	2686	548	**634071**	**693336**
11	Kanpur	321215	39541	3887	1755	3543	422	1181	**371544**	**384955**
12	Kolkata *	298959	238560	(a)	—	4736	N.A.	11683	**553938**	**664046**
13	Lucknow	442441	59425	10803	—	11090	911	3006	**527676**	**555773**
14	Ludhiana ***	500685	63516	2589	—	44708	311	494	**612303**	**645686**
15	Madurai	203632	11769	780	97	3416	(b)	1008	**220702**	**239987**
16	Mumbai	475352	326886	22560	3971	1382	1100	4560	**835811**	**1069499**
17	Nagpur	384383	26069	8585	497	3475	3716	453	**427178**	**458961**
18	Patna	210033	33878	12500	1055	7760	6438	1280	**272944**	**312801**
19	Pune	491747	63489	11232	612	908	752	832	**569572**	**658313**
20	Surat	487013	46770	3432	—	132	206	403	**537956**	**575373**
21	Vadodara	395692	46597	6117	—	1568	3244	2451	**455669**	**506014**
22	Varanasi	283769	19045	2632	-	20371	1296	907	**328020**	**338715**
23	Visakhapatnam $	190546	12628	393	—	595	524	733	**205419**	**208779**
Total		**12467126**	**2890473**	**277818**	**25873**	**164399**	**40110**	**77437**	**15943236**	**17632825**

Source : *Motor Transport Statistics of India 2001-02, Transport Research Wing, Ministry of Road Transport & Highways*

* : *Data relates to 1997-98* (a) : *Included in cars* $: *Data relates to1998-99*

** : *Data relates to 1996-97* (b) : *Included in tractors* N. A. : *Not Available*

(—) : *Nil* *** : *Data relates to 2000-01*

With the increasing urbanization and industrialization, the transport demand has also increased consequently. The total number of vehicles in India has increased from about 11 million in 1986 to more than 59 million, in 2001-02, of which about 30% is concentrated in the 23 metropolitan cities. This has increased the vehicular pollution. The different factors are the types of engines used, the age of the vehicles, poor road conditions and congested traffic. The principal vehicular pollutants are Carbon Monoxide, Oxides of Nitrogen, Hydrocarbons, suspended and particulate matters, a varying amount of Sulphur Dioxide depending on the Sulphur content of the fuel and lead compounds.

TABLE 4.1.7 : WORKING OF STATE TRANSPORT UNDERTAKINGS

(As on 31st March)

Sl. No.	Year/State/UT	Fleet Strength (Buses) (no.)	Vehicles in Bus Scheduled Service (No.)	Passenger Kilometres Performed (Lakh km.)	Gross Revenue Receipts (Rs. Lakh)	Current Expenditure (Total Operating Cost) (Rs. Lakh)	Net Revenue (Rs. Lakh)
1	2	3	4	5	6	7	8
	1995-96	91144	80572	3916078	657591	759655	-102064
	1996-97	88479	78896	3816364	632465	735700	-103234
	1997-98	101514	91916	4067927	831140	941947	-110807
	1998-99	105336	95092	4243137	902597	1080743	-178147
	1999-2000	115034	103392	4608822	1102700	1303904	-201204
	2000-01	114970	104629	4553052	1532556	1727202	-194646
	2001-02	114689	103328	4414562	1604050	1823316	-219266
	2002-03	**114875**	**99749**	**4280342**	**1661835**	**1814309**	-152474
	State:						
1	Andhra Pradesh	18108	17702	745688	287998	306172	-18174
2	Arunachal Pradesh	228	—	—	—	—	—
3	Assam	447	—	—	—	—	—
4	Bihar	1540	—	—	—	—	—
5	Goa	375	292	8686	4172	4549	-377
6	Gujarat	9896	8203	364236	135809	159683	-23874
7	Haryana	3403	3364	140652	57181	62429	-5248
8	Himachal Pradesh	1711	1676	39515	23707	26693	-2986
9	Jammu and Kashmir	700	—	—	—	—	—
10	Karnataka	12312	11662	550213	194783	188648	6135
11	Kerala	4404	—	—	—	—	—
12	Madhya Pradesh	1699	1665	55354	22675	32668	-9993
13	Maharashtra	22292	19689	676562	365290	391617	-26327
14	Manipur	25	—	—	—	—	—
15	Meghalaya	128	—	—	—	—	—
16	Mizoram	84	33	236	209	952	-743
17	Nagaland	170	83	968	567	1515	-948
18	Orissa	250	241	8629	3270	3219	56
19	Punjab	2632	2500	87607	37955	48954	-10999
20	Rajasthan	4371	4157	181939	67593	71670	-4077
21	Sikkim	105	76	411	1740	2280	-540
22	Tamil Nadu	16672	15092	1071703	323062	323147	-85
23	Tripura	89	57	905	340	1128	-788
24	Uttar Pradesh	6554	5700	217847	81238	86757	-5519
25	West Bengal	3011	1697	45554	25008	33715	-8707
26	**Union Territory:**						
27	A. & N. Island	170	—	—	—	—	—
28	Chandigarh	417	—	—	—	—	—
29	Delhi	3082	2496	100573	35157	80269	-45112

Source : *Central Institute of Road Transport*

TABLE 4.1.8 : AMBIENT AIR QUALITY IN DELHI

Sl. No.	Parameters/Area	Year				
		1995	1998	1999	2000	2001
1	2	3	4	5	6	7
1	**Sulphur Dioxide (µg/m³)**					
	Industrial Area	24.1	20.2	19.5	19.0	13.0
	Residential Area	16.5	15.8	17.0	17.0	14.0
	Traffic Intersection	42.0	25.0	20.0	18.0	15.0
2	**Nitrogen Dioxide (µg/m³)**					
	Industrial Area	37.0	34.7	33.5	36.0	29.0
	Residential Area	32.5	28.6	26.5	31.0	29.0
	Traffic Intersection	66.0	63.0	60.0	59.0	67.0
3	**Suspended Particulate (µg/m³)**					
	Industrial Area	403.0	363.0	361.0	433.0	358.0
	Residential Area	409.0	345.0	349.0	370.0	311.0
	Traffic Intersection	452.0	426.0	418.0	490.0	476.0
4	**Lead (µg/m³)**					
	Residential Area	155.0	95.0	46.0	40.0	47.0
	Traffic Intersection	335.0	136.0	70.0	102.0	103.0
5	**Carbon Mono-oxide (µg/m³)**					
	Traffic Intersection	3916.0	5450.0	4241.0	4686.0	4183.0

Source : Central Pollution Control Board

TABLE 4.1.9: EMISSION LIMITS FOR DIESEL DRIVEN VEHICLES

Sl. No.	Test	Light absorption Coefficient (Millilitre)	Maximum Smoke Density	
			Bosch Units	HartridgeUnit
1	2	3	4	5
1	Full load at a speed of 60 to 70 per cent of maximum engine rated speed specified by the manufacturer	3.1	5.2	75.0
2	Free acceleration	2.3	—	65.0

Source : *TERI Energy Data Directory and Yearbook, 2003-04*

TABLE 4.1.10 : PHASED TIGHTENING OF EXHAUST EMISSION STANDARDS FOR INDIAN AUTOMOBILES

Sl. No.	Category	1991	1996	2000 (Euro II)	2005 (Euro III)
1	2	3	4	5	6
1	**Petrol Vehicles : (in grams/km)**				
I.	**Two wheelers**				
	(a) CO	12-30	4.5	2.0	-
	(b) HC	8-12	-	-	-
	(c) ($HC+NO_x$)	-	3.6	2.0	-
II.	**Three Wheelers**				
	(a) CO	12-30	6.75	4.0	-
	(b) HC	8-12	-	-	-
	(c) ($HC+NO_x$)	-	5.40	2.0	-
III.	**Cars with CC :**				
	(a) CO	-	4.34-6.20	2.72	2.2
	(b) HC	-	-	-	-
	(c) ($HC+NO_x$)	-	1.5-2.18	0.97	0.5
IV.	**Cars without CC :**				
	(a) CO	14.3-27.1	8.68-12.4	2.72	2.2
	(b) HC	2.0-2.9	-	-	-
	(c) ($HC+NO_x$)	-	3.00-4.36	0.97	0.5
2	**Diesel Vehicles :**				
	A : Gross Vehicles Weight > 3.5 ton (Heavy Duty Vehicles)-in grams/kWh				
	(a) CO	14.0	11.2	4.5	4
	(b) HC	3.5	2.4	1.1	1.1
	(c) NO_x	18.0	14.4	8.0	7
	(d) PM > 85 KW/g/KWh	-	-	0.36	0.15
	(e) PM < 85 KW/g/KWh	-	-	0.61	0.15
	B : Gross Vehicles Weight < 3.5 ton (Light duty Vehicles)*-in grams/km				
	(a) CO	14.3-27.1	5.0-9.0	2.72-6.90	1.06
	(b) ($HC+NO_x$)	2.7-6.9	2.0-4.0	0.97-1.70	0.71
	(c) NO_x	-	-	-	0.566
	(d) PM	-	-	0.14-0.25	0.080

Source : *The Energy And Resources Institute.*

CO : *Carbon Monoxide* CC : *Catalytic Converter*

HC : *Hydrocarbon* PM : *Particulate matter*

NO_x : *Oxides of Nitrogen*

* : *The test cycle is as per 13 mode cycle or a chasis dynamometer.*

Euro I w.e.f. 1-6-99 and Euro II w.e.f. 1-4-2000 for private (non-commercial) vehicles in NCR.

Stricter emission norms for new vehicles effective from 1.4.2000 have been notified by the Ministry of Surface Transport and has come into force. The Progressive tightening of emission norms for vehicles at manufacturing stage has brought out significant improvement in exhaust emission of new vehicles after March, 2000.

TABLE 4.1.11 (a) : PRODUCTION OF ODS IN INDIA

(MT)

Sl. No.	ODS	1991	1995	1996	1997	1998
1	2	3	4	5	6	7
1	CFC-11	1450.0	6607.5	7282.0	8635.0	6291.0
2	CFC-12	328.0	15042.0	15176.0	15024.0	13721.0
3	CFC-113	40.0	162.0	2.0	—	—
4	H-1211	50.0	77.3	100.0	106.0	—
5	H-1301	0.0	1.0	0.5	0.3	—
6	CTC	3920.0	7968.0	12101.0	15718.0	19225.0
7	MCF	540.0	—	—	—	—
	Total	6328.0	29857.8	34661.5	39483.3	39237.0

Source : Ozone cell, Ministry of Environment and Forests

TABLE 4.1.11(b) TOTAL CONSUMPTION OF ODS

(MT)

Sl. No.	ODS	1991	1995	1996	1997	1998
1	2	3	4	5	6	7
1	CFC-11	1900.00	6608.50	6831.00	7058.45	7049.53
2	CFC-12	2850.00	3740.00	4159.90	3710.21	2697.12
3	CFC-113	320.00	154.00	26.00	12.00	—
4	CFC-114	—	4.00	—	—	—
5	CFC-115	—	2.00	—	—	—
6	CFC-1211	550.00	206.40	167.60	162.00	79.20
7	CFC-1301	200.00	89.56	66.00	58.50	26.00
8	CTC	4000.00	2829.00	7978.00	7159.00	5700.00
9	MCF	550.00	1358.00	1415.00	N.A.	—
	Total	10370.00	14991.46	20643.50	18160.16	15551.85

Source : *Ozone cell, Ministry of Environment and Forests*

TABLE 4.2.1 : INSTALLED CAPACITY OF POWER UTILITIES on 31st March, 2003

(Mega Watts)

Sl. No.	State/Union Territory	Hydro	Thermal			Wind	Nuclear	Total
			Steam	Diesel	Gas			
1	2	3	4	5	6	7	8	9
I	**Northern Region**	**8703.30**	**15469.50**	**14.99**	**3213.20**	**16.10**	**1180.00**	**28597.08**
1	Haryana	883.87	1102.49	3.92	0.00	0.00	0.00	1990.28
2	Himachal Pradesh	612.20	0.00	0.13	0.00	0.00	0.00	612.33
3	Jammu & Kashmir	311.69	0.00	8.94	175.00	0.00	0.00	495.63
4	Punjab	2403.17	2130.00	0.00	0.00	0.00	0.00	4532.17
5	Rajasthan	971.61	1975.00	0.00	113.80	16.10	0.00	3076.51
6	Uttar Pradesh	523.90	4102.00	0.00	0.00	0.00	0.00	4625.90
7	Uttaranchal	986.85	0.00	0.00	0.00	0.00	0.00	986.85
8	Chandigarh	0.00	0.00	2.00	0.00	0.00	0.00	2.00
9	Delhi	0.00	320.01	0.00	612.40	0.00	0.00	932.41
10	Central sector	2010.00	5840.00	0.00	2312.00	0.00	1180.00	11342.00
II	**Western region**	**4477.14**	**20691.50**	**17.48**	**4929.10**	**588.80**	**760.00**	**31464.02**
1	Gujarat	563.00	4819.00	17.48	1757.10	166.90	0.00	7323.48
2	Madhya Pradesh	919.93	2157.50	0.00	0.00	22.59	0.00	3100.02
3	Chhatisgharh	120.00	1280.00	0.00	0.00	0.00	0.00	1400.00
4	Maharashtra	2874.16	8075.00	0.00	1832.00	399.20	0.00	13180.36
5	Goa	0.05	0.00	0.00	48.00	0.11	0.00	48.16
6	Dadra & Nagar Haveli	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	Daman & Diu	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	Central sector	0.00	4360.00	0.00	1292.00	0.00	760.00	6412.00
III	**Southern region**	**10017.84**	**13432.50**	**949.29**	**2550.40**	**1020.73**	**780.00**	**28750.76**
1	Andhra Pradesh	3271.94	3102.50	36.80	1112.40	92.60	0.00	7616.24
2	Karnataka	2943.75	1730.00	234.42	220.00	68.60	0.00	5196.77
3	Kerala	1807.00	0.00	256.44	174.00	2.03	0.00	2239.47
4	Tamil Nadu	1995.15	3220.00	411.66	661.50	857.50	0.00	7145.81
5	Lakshadweep	0.00	0.00	9.97	0.00	0.00	0.00	9.97
6	Pondicherry	0.00	0.00	0.00	32.50	0.00	0.00	32.50
7	Central sector	0.00	5380.00	0.00	350.00	0.00	780.00	6510.00
IV	**Eastern region**	**2459.50**	**14027.38**	**76.50**	**190.00**	**2.59**	**0.00**	**16755.97**
1	Bihar	44.90	553.50	0.00	0.00	0.00	0.00	598.40
2	Jharkhand	130.00	1500.00	0.00	0.00	0.00	0.00	1630.00
3	Orissa	1883.00	420.00	0.00	0.00	1.49	0.00	2304.49
4	West Bengal	164.71	4506.38	12.20	100.00	1.10	0.00	4784.38
5	D.V.C.	144.00	2637.50	0.00	90.00	0.00	0.00	2871.50
6	A. & N. Islands	0.00	0.00	59.30	0.00	0.00	0.00	59.30
7	Sikkim	32.90	0.00	5.00	0.00	0.00	0.00	37.90
8	Central sector	60.00	4410.00	0.00	0.00	0.00	0.00	4470.00
V	**North-eastern region**	**1109.07**	**330.00**	**119.81**	**750.50**	**0.16**	**0.00**	**2309.54**
1	Assam	2.00	330.00	20.69	269.00	0.00	0.00	621.69
2	Manipur	3.20	0.00	45.41	0.00	0.00	0.00	48.61
3	Meghalaya	186.71	0.00	2.05	0.00	0.00	0.00	188.76
4	Nagaland	28.20	0.00	2.00	0.00	0.16	0.00	30.36
5	Tripura	16.01	0.00	4.85	106.50	0.00	0.00	127.36
6	Arunachal Pradesh	29.69	0.00	15.88	0.00	0.00	0.00	45.57
7	Mizoram	8.26	0.00	28.94	0.00	0.00	0.00	37.19
8	Central sector	835.00	0.00	0.00	375.00	0.00	0.00	1210.00
	All-India	**26766.83**	**63950.88**	**1178.07**	**11633.20**	**1628.39**	**2720.00**	**107877.36**

Source : *Central Electricity Authority*

TABLE 4.2.2 : GENERATING CAPACITY AND ELECTRICITY GENERATION

Parameter	1980-81	1990-91	1995-96	1996-97	1997-98	1998-99	1999-2000	2000-01	2001-02	2002-03
2	3	4	5	6	7	8	9	10	11	12
Generating capacity*										
All-India (Utilities + Non-Utilities)	**33316**	**74699**	**95081**	**97874**	**102268**	**107355**	**113220.67**	**117782.57**	**122191.16**	**126239.99**
Total (Utilites)	**30214**	**66086**	**83294**	**85795**	**89102**	**93255**	**97884.47**	**101626.21**	**105045.96**	**107877.36**
Public sector	28832	63344	79418	80783	82846	85430	88934.88	91690.03	94246.01	96526.32
Private sector	1382	2742	3876	5012	6256	7825	8949.59	9936.18	10799.95	11351.04
Average annual growth rate (per cent) during the decade	7.46	8.14	5.94	5.7	5.1	4.68				
Non-utilities(including railways)	**3102**	**8613**	**11787**	**12079**	**13166**	**14100**	**15336.20**	**16156.36**	**17145.20**	**18361.62**
Hydro	3	4	3	3	21	21	46.80	46.72	51.10	51.10
Steam	2137	5010	6324	6171	6648	6950	7675.66	7996.79	8354.03	9094.16
Gas	54	475	956	1166	1330	1950	1816.89	1823.31	2125.91	2385.15
Diesel and wind	908	3124	4504	4739	5167	5179	5796.85	6289.54	6614.16	6831.21
Electricity Generation**										
All-India (Utilities + Non-Utilities)	**119260**	**289439**	**418043**	**436729**	**465825**	**494143**	**536452.35**	**560842.03**	**579120.06**	**596542.86**
Total (Utilities)	**110844**	**264329**	**379877**	**395889**	**421747**	**448563**	**481055.19**	**501204.07**	**517439.24**	**532692.96**
Public sector	104114	251382	361725	374126	395593	416726	438658.49	457223.29	474322.96	484648.12
Private sector	6730	12947	18152	21763	26154	31837	42396.70	43980.78	43116.28	48044.84
Average annual growth rate (per cent) during the decade	7.10	9.08	8.35	7.75	7.63	7.32				
Non-utilities(including Railways)	**8416**	**25110**	**38166**	**40840**	**44078**	**45580**	**55397.16**	**59637.96**	**61680.82**	**63849.90**
Hydro	15	15	17	29	79	80	98.36	99.85	116.59	90.32
Steam	7232	20017	28754	29130	30686	31900	34813.90	40256.24	41853.85	42229.66
Gas	102	1845	4576	5039	5776	5900	9932.01	7782.34	8835.19	10198.16
Diesel and wind	1067	3233	4819	6642	7537	7700	10552.89	11499.53	10875.19	11331.76

Source : *Central Electricity Authority*
* : *in megawatts*
** : *in gigawatts-hours*

TABLE 4.2.3 : ACTUAL POWER SUPPLY POSITION

(All figures in MU net)

Sl. No.	Region/ State/ System	April 2000 to March 2001				April 2001-March 2002			
		Require-ment	Availa-bility	Short-age	Short-age %	Require-ment	Availa-bility	Shortage	Short age %
1	2	8	9	10	11	4	5	6	7
I.	**Northern Region**	**145567**	**134633**	**10934**	**7.5**	**150383**	**142410**	**7973**	**5.3**
	1 Chandigarh	1072	1068	4	0.4	1110	1108	2	**0.2**
	2 Delhi	18575	17667	908	4.9	19350	18741	609	**3.1**
	3 Haryana	17275	16793	482	2.8	18138	17839	299	**1.6**
	4 Himachal Pradesh	3190	3087	103	3.2	3293	3206	87	**2.6**
	5 Jammu & Kashmir	6410	5361	1049	16.4	6635	5899	736	**11.1**
	6 Punjab	27670	26923	747	2.7	28780	27577	1203	**4.2**
	7 Rajasthan	25080	24178	902	3.6	24745	24495	250	**1.0**
	8 Uttar Pradesh	46295	39556	6739	14.6	48332	43545	4787	**9.9**
II.	**Western Region**	**173975**	**155384**	**18591**	**10.7**	**175016**	**156793**	**18223**	**10.4**
	1 Chhatisgarh					8054	7825	229	**2.8**
	2 Goa	1766	1576	190	10.8	1767	1767	0	**0.0**
	3 Gujarat	53038	47877	5161	9.7	53693	47530	6163	**11.5**
	4 Madhya Pradesh	39644	34747	4897	12.4	31013	26233	4780	**15.4**
	5 Maharashtra	79527	71184	8343	10.5	80489	73438	7051	**8.8**
III.	**Southern Region**	**134300**	**123677**	**10623**	**7.9**	**140516**	**128095**	**12421**	**8.8**
	1 Andhra Pradeash	47792	44055	3737	7.8	48394	44302	4092	**8.5**
	2 Karnataka	30242	27490	2752	9.1	32556	28493	4063	**12.5**
	3 Kerala	13564	12670	894	6.6	13334	12349	985	**7.4**
	4 Tamil Nadu	42702	39462	3240	7.6	46232	42951	3281	**7.1**
IV.	**Eastern Region**	**48073**	**48101**	**-28**	**-0.1**	**50687**	**50197**	**490**	**1.0**
	1 Bihar	9208	8563	645	7.0	9370	8992	378	**4.0**
	2 D.V.C.	8368	8510	-142	-1.7	8319	8312	7	**0.1**
	3 Orissa	11710	12070	-360	-3.1	12328	12318	10	**0.1**
	4 West Bengal	18787	18958	-171	-0.9	20670	20575	95	**0.5**
V.	**North-Eastern Region**	**5298.1**	**5606.3**	**-308.2**	**-5.8**	**5935.1**	**5854.9**	**80.2**	**1.4**
	1 Arunachal Pradesh	127.7	130.1	-2.4	-1.9	136.3	134.6	1.7	**1.2**
	2 Assam	3092.9	3332.8	-239.9	-7.8	3450.5	3425.2	25.3	**0.7**
	3 Manipur	463.9	453.4	10.5	2.3	456.5	440.6	15.9	**3.5**
	4 Meghalaya	563.9	605.2	-41.3	-7.3	700.1	705	-4.9	**-0.7**
	5 Mizoram	249.7	256.5	-6.8	-2.7	284.5	278.5	6	**2.1**
	6 Nagaland	226.0	231.9	-5.9	-2.6	260.1	258.4	1.7	**0.7**
	7 Tripura	574.0	596.4	-22.4	-3.9	647.1	612.6	34.5	**5.3**
	All India	**507213.1**	**467401.3**	**39811.8**	**7.8**	**522537**	**483350**	**39187**	**7.5**

Source : *Central Electricity Authority*

\- : *Indicates Surplus*

TABLE 4.2.4 : ANNUAL GROSS GENERATION OF POWER BY SOURCE

(in MU units)

Sl. No.	Year	Hydro	Steam @	Diesel & Wind @	Gas	Nuclear	Thermal*	Total
1	2	3	4	5	6	7	8	9
1	1980-81	46541.8	60713.8	61.5	522.0	3001.3		110840.4
2	1985-86	51020.6	112540.1	50.6	1756.9	4981.9		170350.1
3	1990-91	71641.3	178321.7	111.3	8113.2	6141.1		264328.6
4	1991-92	72757.1	197163.2	134.0	11450.0	5524.4		287028.7
5	1992-93	69869.2	211123.5	162.3	13480.4	6726.3		301361.7
6	1993-94	70462.7	233150.7	310.9	14727.6	5397.7		324049.6
7	1994-95	82712.0	243110.2	545.2	18474.8	5648.2		350490.4
8	1995-96	72759.2	273743.5	714.4	24858.4	7981.7		380057.2
9	1996-97	68900.8	289378.3	1554.3	26984.9	9071.1		395889.4
10	1997-98	74581.7	300730.5	1929.3	34423.2	10082.6		421747.3
11	1998-99	82690.0	308056.0	2136.0	43480.0	12015.0	353662.0	448367.0
12	1999-00	80637.0	377814.0	3989.0	49773.0	13267.0	386776.0	480680.0
13	2000-01	74481.0	357006.0	3822.0	48311.0	16928.0	408139.0	499548.0
14	2001-02	73580.0				19475.0	424385.0	517439.0
15	2002-03	64014.0				19390.0	449289.0	532693.0
16	2003-04	73800.0				17700.0	466600.0	558100.0

Source: *(i) Central Electricity Authority, (ii) TEDDY 2003-04*

* : *Including Coal, Lignite, Diesel & Gas based stations*

@' : *CEA are not monitoring Captioc Power Plants Wind & Generation of small stations i.e. Mini & Micro Hydel*

The power generating capacity , owned and operated by utilities, has grown at a rate of over 10% per year since 1950. The shares of hydro power and thermal power have changed substantially. The share of hydro capacity declined from 43.4% in 1970-71 to 42% in 1980-81 and further reduced to 17.7% in 1997-98 and 12% in 2002-03.Further, its' share in 2003-04 has increased to 13.2%.

It is difficult to strike an optional balance between Hydro and Thermal power, as it may depend upon the system load curve, performance of various types of plants etc.

Perhaps, one of the most important reasons for the decline in the share of hydro electricity is that its gestation period is larger than that of thermal capacity. This is, because, equipment and construction procedures for thermal projects are largely independent of site conditions and can, therefore, be standardized. Hydro-development has also lagged behind due to inter-state disputes and sharing of water, inadequate funding and on account of environmental considerations with addition to installed capacity, gross utility generation also increased rapidly

TABLE 4.2.5 : NUMBER OF TOWNS AND VILLAGES ELECTRIFIED IN INDIA

(As on 31.03.2003)

Sl. No.	State/Union Territory	Towns		Villages	
		Total	Electrified	Total	Electrified (provisional)
1	2	3	4	5	6
I.	**Northern Region**	**1342**	**1342**	**193577**	**147579**
1	Haryana	94	94	6759	6759
2	Himachal Pradesh	58	58	16997	16890
3	Jammu & Kashmir	58	58	6477	6300
4	Punjab	120	120	12428	12428
5	Rajasthan	222	222	37889	36885
6	Uttar Pradesh	753	753	97122	55230
7	Uttaranchal			15681	12863
8	Chandigarh	5	5	25	25
9	Delhi	32	32	199	199
II.	**Western Region**	**1099**	**1099**	**130421**	**127467**
1	Gujarat	264	264	18028	17940
2	Madhya Pradesh	465	465	51806	50400
3	Chhatisgharh			19720	18321
4	Maharashtra	336	336	40412	40351
5	Goa	31	31	360	360
6	Daman & Diu	2	2	24	24
7	Dadra & Nagar Haveli	1	1	71	71
III.	**Southern Region**	**1251**	**1251**	**71128**	**70808**
1	Andhra Pradesh	264	264	26586	26565
2	Karnataka	306	306	27066	26767
3	Kerala	197	197	1384	1384
4	Tamil Nadu	469	469	15822	15822
5	Pondicherry	11	11	263	263
6	Lakshadweep	4	4	7	7
IV.	**Eastern Region**	**786**	**786**	**153363**	**117628**
1	Bihar	271	271	67513	48048
2	Jharkhand				
3	Orissa	124	124	46989	37307
4	West Bengal	382	382	37910	31367
5	A & N Islands	1	1	504	501
6	Sikkim	8	8	447	405
V.	**North-Eastern Region**	**195**	**195**	**38769**	**28843**
1	Assam	93	93	24685	19039
2	Manipur	31	31	2182	2007
3	Meghalaya	12	12	5484	2757
4	Nagaland	9	9	1216	1216
5	Tripura	18	18	855	817
6	Arunachal Pradesh	10	10	3649	2316
7	Mizoram	22	22	698	691
	Total (All India)	**4673**	**4673**	**587258**	**492325**

Source : *Central Electricity Authority*

TABLE 4.2.6 : STATEWISE PRODUCTION OF COAL AND LIGNITE

(Million tonnes)

Sl. No.	States	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04(P)
1	2	4	5	6	7	8	9	10
I.	**Coal**	**300.403**	**296.508**	**304.103**	**313.696**	**327.787**	**341.272**	**361.168**
1	Andhra Pradesh	28.941	27.326	29.556	30.274	30.811	33.236	33.852
2	Assam	0.687	0.637	0.572	0.660	0.640	0.633	0.733
3	Bihar	81.274	76.161	76.533	41.896			
4	Chhatisgarh				22.803	53.621	56.758	61.504
5	Jammu & Kashmir	0.005	0.010	0.028	0.033	0.035	0.025	0.020
6	Jharkhand				33.520	76.813	78.628	79.549
7	Madhya Pradesh	84.753	84.937	87.901	69.927	44.156	45.736	49.825
8	Maharashtra	26.171	25.279	27.698	28.754	30.830	31.359	32.912
9	Meghalaya	3.234	4.238	4.060	4.065	5.149	4.406	5.439
10	Orissa	42.162	43.512	43.554	44.803	47.805	52.229	60.049
11	Uttar Pradesh	15.781	15.646	16.220	16.863	16.533	17.783	15.791
12	West Bengal	17.395	18.762	17.981	20.098	21.394	20.479	21.494
II.	**Lignite**	**23.231**	**23.419**	**22.475**	**24.247**	**24.813**	**26.018**	**27.958**
1	Gujarat	4.943	5.002	4.701	5.858	6.167	6.921	6.724
2	Rajasthan	0.179	0.249	0.222	0.217	0.277	0.473	0.678
3	Tamilnadu	18.109	18.168	17.552	18.172	18.369	18.624	20.556

Source : *Office of the Coal Controller*

P : *Provisional*

Coal is the most abundant source of commercial energy in India. Coal resources are continually assessed by the Geological Survey of India through regional mapping and exploratory drilling. The total coal reserves (as on 1 January, 2002) have been assessed at about 234 billion tonnes of which 87 billion tonnes are proven resources.

Coal production increased rapidly after the nationalisation of coal mines. From about 72.9 million ton in 1970/71, it rose to 211.7 million ton in 1990/91 and to 361 million ton in 2003-2004 making India the world's fourth largest coal producer. The increase is predominantly in non-coking coal production. One of the major constraints on the profitability of the coal sector is the low productivity levels in underground mines. The underground mines employ 80% of manpower, but contribute to only 30% of the total output. Since the nationalisation of the coal industry, India's mine planners have chosen opencast mining over underground methods, to enhance productivity and meet production targets. The drawback of extracting the majority of the coal with opencast methods is that its quality is unavoidably affected by contamination of overburden mixes into the coal.

TABLE 4.2.7 : PRODUCTION OF COAL FROM OPENCAST WORKING BY MECHANISATION AND OVERBURDEN REMOVED DURING THE YEAR, 2002

(Tonnes)

Sl. No.	States	Total Opencast Output	Mechanisation			Overburden Removed (in '000 Cubic metres)
			Fully Mechanised	Semi Mechanised	Manual	
1	2	3	4	5	6	7
I	**COAL**	**272949129**	**272943054**	**—**	**6075**	**1824222**
1	Andhra Pradesh	19459353	19459353	—	—	89533
2	Assam	534096	534096	—	—	4579
3	Chhattisgarh	48192345	48192345	—	—	704405
4	Jharkhand	69190665	69184590	—	6075	128711
5	Madhya Pradesh	29415081	29415081	—	—	102833
6	Maharashtra	27749893	27749893	—	—	99734
7	Orissa	49483751	49483751	—	—	484662
8	Uttar Pradesh	20076000	20076000	—	—	176199
9	West Bengal	8847945	8847945	—	—	33566
II	**LIGNITE**	**25032574**	**25032574**	**—**	**—**	**143244**
1	Gujarat	6888879	6888879	—	—	28744
2	Rajasthan	406580	406580	—	—	3808
3	Tamilnadu	17737115	17737115	—	—	110692

Source : *Directorate -General of Mines Safety, Dhanbad*

TABLE 4.2.8 : PRODUCTIVITY IN COAL MINES IN THE YEAR, 2002

(Tonnes)

Sl. No.	StateOutput Per Man Year			Output Per Manshift		
	Belowground	Opencast	Overall	Belowground	Opencast	Overall
1 2	3	4	5	6	7	8
I COAL	**291**	**4285**	**818**	**0.94**	**11.36**	**2.62**
1 Andhra Pradesh	295	3266	545	0.98	10.67	1.82
2 Assam	129	919	230	0.43	2.90	0.76
3 Jharkhand	210	2422	603	0.69	7.65	1.96
4 Jammu & Kashmir	39	—	31	0.13	—	0.10
5 Madhya Pradesh	450	5923	869	1.42	17.91	2.71
6 Maharashtra	343	4142	1038	1.09	12.52	3.22
7 Orissa	360	10211	3142	1.17	31.64	9.90
8 Uttar Pradesh	—	5959	3312	—	18.59	10.37
9 West Bengal	231	2574	263	0.75	8.17	0.85
II LIGNITE	**—**	**5029**	**2743**	**—**	**16.20**	**8.83**
1 Gujarat	—	7080	4140	—	23.55	13.76
2 Rajasthan	—	3598	2525	—	11.80	8.33
3 Tamil Nadu	—	4557	2429	—	14.56	7.76

Source : Directorate -General of Mines Safety, Dhanbad

TABLE 4.2.9 : STATEWISE INVENTORY OF GEOLOGICAL RESERVES OF COAL

(Million tonnes)

Sl No.	State	As on	Proved	Indicated	Inferred	Total
1	2	3	4	5	6	7
1	Andhra Pradesh (Gondawana)	1-1-2002	7729	5459	2448	15636
		1-1-2003	7944	6122	2518	16584
		1-1-2004	8091	6092	2514	16697
2	Arunachal Pradesh (Tertiary)	1-1-2002	31	40	19	90
		1-1-2003	31	40	19	90
		1-1-2004	31	40	19	90
3	Assam (Tertiary)	1-1-2002	279	27	34	340
		1-1-2003	279	27	34	340
		1-1-2004	279	27	34	340
4	Jharkhand & Bihar (Gondawana)	1-1-2002	35235	28987	6282	70503
	Jharkhand (Gondawana)	1-1-2003	35266	29552	6326	71144
	Jharkhand (Gondawana)	1-1-2004	35305	30211	6348	71864
5	Bihar (Gondawana)	1-1-2002	0	0	160	160
		1-1-2003	0	0	160	160
		1-1-2004	0	0	160	160
6	M P & Chhatisgarh (Gondawana)	1-1-2002	6857	7866	3234	17957
	Madhya Pradesh (Gondawana)	1-1-2003	7100	7888	3217	18205
	Madhya Pradesh (Gondawana)	1-1-2004	7503	8233	2924	18660
7	Chhatisgarh (Gondawana)	1-1-2002	7627	23640	4108	35375
		1-1-2003	8561	25410	4165	38135
		1-1-2004	8771	26419	4355	39545
8	Maharashtra (Gondawana)	1-1-2002	4495	2050	1536	8081
		1-1-2003	4508	2151	1534	8194
		1-1-2004	4652	2156	1605	8413
9	Meghalaya (Tertiary)	1-1-2002	118	41	301	459
		1-1-2003	118	41	301	459
		1-1-2004	118	41	301	460
10	Nagaland (Tertiary)	1-1-2002	3	1	15	19
		1-1-2003	3	1	15	20
		1-1-2004	4	1	15	20
11	Orissa (Gondawana)	1-1-2002	13080	29809	15123	58012
		1-1-2003	14301	29516	15285	59103
		1-1-2004	14613	31239	15135	60987
12	Uttar Pradesh (Gondawana)	1-1-2002	766	296	0	1062
		1-1-2003	766	296	0	1062
		1-1-2004	766	296	0	1062
13	West Bengal (Gondawana)	1-1-2002	11099	11163	4157	26419
		1-1-2003	11207	11570	4475	27252
		1-1-2004	11383	11523	4488	27394
	India (Total)	**1-1-2002**	**87320**	**109378**	**37417**	**234114**
		1-1-2003	**90085**	**112613**	**38050**	**240748**
		1-1-2004	**91516**	**116281**	**37901**	**245692**

Source : *Office of Coal Controller, Kolkata*

Note : *Data may not add up to respective total due to rounding off.*

TABLE 4.2.10 : INVENTORY OF GEOLOGICAL RESERVES OF COAL BY TYPE

(Million tonnes)

Sl. No.	Types of Coal	As on	Proved	Indicated	Inferred	Total
1	2	3	4	5	6	7
1	**Coking**					
	I. Prime coking	1-1-2002	4614	699	0	**5313**
		1-1-2003	4614	699	0	**5313**
		1-1-2004	4614	699	0	**5313**
	II. Medium coking	1-1-2002	11294	11749	1866	**24909**
		1-1-2003	11325	11839	1889	**25053**
		1-1-2004	11325	11839	1889	**25053**
	III. Blendable/semi-coking	1-1-2002	482	907	222	**1610**
		1-1-2003	482	907	222	**1610**
		1-1-2004	482	1003	222	**1707**
2	**Non-coking** (Including High	1-1-2002	70929	96024	35329	**202282**
	Sulphur)	1-1-2003	73664	99168	35940	**208772**
		1-1-2004	75096	102736	35787	**213619**
	Total	**1-1-2002**	**87320**	**109378**	**37417**	**234114**
		1-1-2003	**90085**	**112613**	**38050**	**240748**
		1-1-2004	**91517**	**116277**	**37898**	**245692**

Source : *Office of the Coal Controller, Kolkata*

TABLE 4.2.11 : ESTIMATED POTENTIAL FOR RENEWABLE ENERGY TECHNOLOGIES IN INDIA

Sl. No.	Source/Systems	Approximate Potential
1	Biogas Plants	120 lakh
2	Improved Chulhas	1200 lakh
3	Wind	45000 MW
4	Small Hydro	15000 MW
5	Biomas Power/Cogeneration	1 9500 MW
6	Biomass Gasifiers	—
7	Solar PV	20 MW/sq.km
8	Waste -to -Energy	2500 MW
9	Solar Water Heating	140 Million sq.m Collector Area.

Source: *Ministry of Non-Conventional Energy Sources*

The Ministry of Non-Conventional Energy Resources was created in 1992. The main responsibilities of the ministry include the development and utilization of new and renewable sources of energy such as biogas, biomass, solar energy, wind energy, small hydro power, ocean energy, geo-thermal energy, hydrogen and drought animal power.

TABLE 4.2.12 : STATE-WISE WIND POWER CUMMULATIVE INSTALLED CAPACITY

(In megawatts)

Sl No.	State	AS ON MARCH, 2003			AS ON MARCH, 2004		
		Demonstration Projects	Private Projects	Total Capacity	Demonstration Projects	Private Projects	Total Capacity
1	2	3	4	5	6	7	8
1	Andhra Pradesh	5.4	87.2	92.6	5.4	93.4	98.8
2	Gujarat	17.3	155.8	173.1	17.3	184.7	202.0
3	Karnataka	2.6	121.7	124.3	4.6	204.6	209.2
4	Kerala	2.0	—	2.0	2.0	—	2.0
5	Madhya Pradesh	0.6	22.0	22.6	0.6	22.0	22.6
6	Maharashtra	8.4	392.8	401.2	8.4	399.0	407.4
7	Rajasthan	6.4	54.3	60.7	6.4	172.1	178.5
8	Tamil Nadu	19.4	970.9	990.3	19.4	1342.2	1361.6
9	West Bengal	1.1	—	1.1	1.1	—	1.1
9	Others	1.6	—	1.6	—	—	—
Total		**64.8**	**1804.7**	**1869.5**	**65.2**	**2418.0**	**2483.2**

Source : *TERI Energy Data Directory and Year Book 2003-04*

TABLE 4.2.13 : STATE-WISE SMALL HYDRO STATION INSTALLED/UNDER CONSTRUCTION UPTO 3 MW CAPACITY, 1997-98

S. No.	State	SHP Station installed		SHP Projects Under Construction	
		Number	Capacity(MW)	Number	Capacity(MW)
1	2	3	4	5	6
1	Andhra Pradesh	7	7.01	36	42.10
2	Arunachal Pradesh	30	20.15	17	20.63
3	Assam	2	2.20	—	—
4	Bihar	4	0.04	5	2.46
5	Goa	—	—	2	2.90
6	Gujarat	1	2.00	—	—
7	Haryana	1	0.20	1	0.10
8	Himachal Pradesh	14	9.49	18	11.19
9	Jammu & Kashmir	15	4.37	10	11.20
10	Karnataka	12	17.20	18	23.17
11	Kerala	4	3.52	6	14.00
12	Madhya Pradesh	5	3.25	8	14.40
13	Maharashtra	5	6.82	4	6.20
14	Manipur	6	4.10	4	3.50
15	Meghalaya	1	1.51	7	0.28
16	Mizoram	9	5.36	9	8.80
17	Nagaland	5	3.17	4	5.50
18	Orissa	3	1.26	7	9.92
19	Punjab	4	3.90	8	9.50
20	Rajasthan	5	4.32	1	0.54
21	Sikkim	8	9.25	2	3.20
22	Tamil Nadu	3	4.75	4	6.40
23	Tripura	2	1.01	1	0.10
24	Uttar Pradesh	61	32.54	25	19.73
25	West Bengal	8	7.98	7	9.23
26	A. & N. Island	—	—	1	2.25
	Total	**215**	**155.40**	**205**	**227.30**

Source : *Annual Report, 1997-98, Ministry of Coal, Govt. of India, New Delhi*
As reproduced in Yearbook of Energy - Environment Statistics(YES), 1998
Bharat Information Technology Services(BIT)

In India, power generation in small scale hydro-resources is categorized as micro hydro for projects with an installed capacity of upto 100 kW, mini-hydro upto 2 MW, and small hydro upto 15 MW capacity. The categorization is fairly fluid, but here small hydro refers collectively to micro, mini, and small hydro upto 3 MW capacity.

TABLE 4.2.14 : DOMESTIC PRODUCTION OF PETROLEUM PRODUCTS IN INDIA

(000' Tonne)

Sl. No.	Year	Light Distillates			Middle Distillates			
		Liquified Petroleum Gas @	Motor Gasoline	Naphtha	Kerosene	Aviation Turbine Fuel	High Speed Diesel oil	Light Diesel Oil
1	2	3	4	5	6	7	8	9
1	1970-71	169	1526	1205	2896	710	3840	986
2	1971-72	195	1615	1217*	2995	808	4356	1065
3	1972-73	227	1581	1330*	2813	801	4598	1010
4	1973-74	259	1647	1438*	2613	875	5039	1079
5	1974-75	278	1298	1720	2052	837	6034	1084
6	1975-76	331	1275	1910	2439	925	6285	946
7	1976-77	363	1340	1986	2581	1001	6399	1047
8	1977-78	383	1423	2120	2450	1077	7129	1224
9	1978-79	403	1515	2262	2514	1177	7350	1227
10	1979-80	406	1512	2415	2539	1104	7975	1230
11	1980-81	366	1519	2115	2396	1001	7371	1108
12	1981-82	410	1614	3004	2907	1009	9042	949
13	1982-83	406	1797	2986	3393	1137	9761	1121
14	1983-84	514	1937	3578	3528	1195	10862	1081
15	1984-85	596	2144	3470	3364	1297	11086	1253
16	1985-86	867	2309	4955	4030	1519	14624	1177
17	1986-87	995	2515	5437	4912	1553	15450	1172
18	1987-88	1026	2662	5462	5104	1695	16296	1259
19	1988-89	1034	2822	5378	5201	1753	16656	1468
20	1989-90	1179	3328	5227	5700	1575	17737	1540
21	1990-91	1221	3552	4859	5471	1801	17185	1509
22	1991-92	1250	3420	4546	5339	1539	17404	1482
23	1992-93	1249	3709	4586	5199	1636	18289	1453
24	1993-94	1314	3843	4666	5270	1788	18809	1474
25	1994-95	1432	4129	5662	5261	1968	19593	1364
26	1995-96	1539	4462	5975	5267	2127	20661	1351
27	1996-97	1598	4704	6123	6236	2119	22202	1286
28	1997-98	1666	4849	6103	6701	2147	23354	1246
29	1998-99	1724	5573	6081	5341	2289	26716	1336
30	1999-00	2487	6232	8170	5735	2292	34793	1624
31	2000-01	4088	8070	9908	8714	2513	39052 (R)	1481
32	2001-02	4778	9699	9180	9681	2595	39899 (R)	1703
33	2002-03	4903	10361	9650	10028	3053	40207	2079

(R) : *Revised*

@ : *Excludes LPG production from natural gas.*

* : *Estimated from calendar year figures.*

TABLE 4.2.14 : DOMESTIC PRODUCTION OF PETROLEUM PRODUCTS IN INDIA - *Concld.*

(000' Tonne)

Sl. No.	Year	Heavy Ends				Others**	Total
		Fuel Oil	Lubricants	Petroleum Coke	Bitumen		
1	2	10	11	12	13	14	15
1	1970-71	4090	231	151	805	501	17110
2	1971-72	4098	140*	142*	1009*	999	18639
3	1972-73	3688	304*	132*	1109*	267	17830
4	1973-74	3931	318*	131*	1093*	1072	19495
5	1974-75	4243	387	137	873	668	19603
6	1975-76	5083	342	160	697	436	20829
7	1976-77	4728	368	163	945	471	21432
8	1977-78	5332	413	155	992	521	23219
9	1978-79	5644	490	122	962	527	24193
10	1979-80	6351	487	99	1103	573	25794
11	1980-81	6120	426	86	1082	533	24123
12	1981-82	6908	407	141	1298	493	28182
13	1982-83	7964	434	149	1397	528	31073
14	1983-84	8000	470	136	1069	556	32926
15	1984-85	7886	414	181	944	601	33236
16	1985-86	7955	501	192	1107	645	39881
17	1986-87	8011	491	264	1224	737	42761
18	1987-88	8466	478	257	1370	653	44728
19	1988-89	8171	497	275	1548	896	45699
20	1989-90	8952	547	275	1671	959	48690
21	1990-91	9429	561	229	1603	1142	48562
22	1991-92	9637	390	216	1710	1416	48349
23	1992-93	10403	533	221	1862	1219	50359
24	1993-94	10304	489	233	1874	1020	51084
25	1994-95	9822	504	259	1845	1088	52927
26	1995-96	9579	633	256	2032	1199	55081
27	1996-97	10298	619	246	2283	1291	59005
28	1997-98	11080	593	282	2158	1129	61308
29	1998-99	11030	586	286	2419	1163	64544
30	1999-00	11352	728	465	2485	3048	79411
31	2000-01	11392	684	2473	2721	4555	95614
32	2001-02	12227	651	2784	2561	4372	100004
33	2002-03	12167	684	2659	2941	5408	104140

Source : Ministry of Petroleum & Natural Gas.

* : *Estimated from calendar year figures*

** : *Includes those of light distillates, middle distillates and heavy ends.*

TABLE 4.2.15 : AVAILABILITY OF CRUDE OIL AND PETROLEUM PRODUCTS IN INDIA

(000' Tonne)

Sl. No.	Year	Crude Oil			Petroleum Products		
		Production	Net Imports	Gross Availability	Production	Net Imports	Gross Availability
1	2	3	4	5	6	7	8
1	1970-71	6822	11683	18505	17110	752	17862
2	1971-72	7299	12951	20250	18639	2011	20650
3	1972-73	7321	12084	19405	17830	3399	21229
4	1973-74	7189	13855	21044	19495	3387	22882
5	1974-75	7684	14016	21700	19603	2473	22076
6	1975-76	8448	13624	22072	20829	2048	22877
7	1976-77	8898	14048	22522	21432	2550	23982
8	1977-78	10763	14507	25270	23219	2832	26051
9	1978-79	11633	14657	26290	24193	3834	28027
10	1979-80	11766	16121	27887	25794	4636	30430
11	1980-81	10507	16248	26755	24123	7253	31376
12	1981-82	16194	14460	30654	28182	4829	33011
13	1982-83	21063	12397	33460	31073	4233	35306
14	1983-84	26020	10445	36465	32926	2856	35782
15	1984-85	28990	7164	36154	33236	5159	38395
16	1985-86	30168	14616	44784	39881	1902	41783
17	1986-87	30480	15476	45956	42761	556	43317
18	1987-88	30357	17734	48091	44728	739	45467
19	1988-89	32040	17815	49855	45699	4200	49899
20	1989-90	34087	19490	53577	48690	3971	52661
21	1990-91	33021	20699	53720	48562	6012	54574
22	1991-92	30346	23994	54340	48349	6509	54858
23	1992-93	26950	29247	56197	50359	7564	57923
24	1993-94	27026	30822	57848	51084	8042	59126
25	1994-95	32239	27349	59588	52927	10697	63624
26	1995-96	35167	27342	62509	55081	16900	71981
27	1996-97	32900	33906	66806	59005	17103	76108
28	1997-98	33858	34493	68351	61308	20589	81897
29	1998-99	32722	39808	72530	64544	23052	87596
30	1999-00	31949	57805	89754	79411	15862	95273
31	2000-01	32426	74097	106523	95614	902	96516
32	2001-02	32032	78706	110738	100004	-3076 (R)	96928 (R)
33	2002-03(P)	33042	81989	115031	104140	-3552	100588

Source : *Ministry of Petroleum & Natural Gas.*

P : *Provisional* **R** : *Revised*

TABLE 4.2.16 : GROSS AND NET PRODUCTION & UTILISATION OF NATURAL GAS IN INDIA

(Million cubic metre)

Sl. No.	Year	Gross Production	Re-injected	Flared	Net Production	Utilisation
1	2	3	4	5	6	7
1	1970-71	1445	36	762	647	647
2	1971-72	1535	49	768	718	718
3	1972-73	1565	141	653	771	771
4	1973-74	1713	115	836	762	762
5	1974-75	2041	139	951	951	951
6	1975-76	2368	162	1082	1124	1124
7	1976-77	2428	190	857	1381	1381
8	1977-78	2839	184	1191	1464	1464
9	1978-79	2812	148	953	1711	1711
10	1979-80	2767	127	964	1676	1676
11	1980-81	2358	67	769	1522	1522
12	1981-82	3851	110	1519	2222	2222
13	1982-83	4936	91	1888	2957	2957
14	1983-84	5961	45	2517	3399	3399
15	1984-85	7241	48	3052	4141	4141
16	1985-86	8134	66	3118	4950	4950
17	1986-87	9853	63	2718	7072	7072
18	1987-88	11467	54	3445	7968	7968
19	1988-89	13217	84	3883	9250	9250
20	1989-90	16988	96	5720	11172	11172
21	1990-91	17998	102	5130	12766	12766
22	1991-92	18645	132	4072	14441	14441
23	1992-93	18060	90	1854	16116	16116
24	1993-94	18335	71	1924	16340	16340
25	1994-95	19381	23	2020	17338	17338
26	1995-96	22639	17	1437	21202	21202
27	1996-97	23255	0	1760	21495	21495
28	1997-98	26401	0	1879	24522	24522
29	1998-99	27428	0	1712	25716	25716
30	1999-00	28446	0	1560	26886	26886
31	2000-01	29477	0	1617	27860	27860
32	2001-02	29714	0	1677	28037	28037
33	2002-03 (P)	31395	0	1423	29972	29972

Source : *Ministry of Petroleum & Natural Gas.*

P : *Provisional*

TABLE 4.2.17 : INDUSTRY-WISE OFF-TAKE OF NATURAL GAS IN INDIA

(Million Cubic Metre)

Sl No.	Year	Energy Purposes				Non-Energy Purposes		
		Power Generation	Industrial Fuel	Tea Plantation	Others*	Fertilizer Industry	Others @	Total
1	2	3	4	5	6	7	8	9
1	1970-71	261	116	15	68	187	-	647
2	1971-72	313	129	19	61	196	-	718
3	1972-73	339	148	20	63	201	-	771
4	1973-74	323	157	22	81	179	-	762
5	1974-75	354	164	29	86	318	-	951
6	1975-76	366	143	33	117	463	2	1124
7	1976-77	344	155	38	157	663	24	1381
8	1977-78	372	165	39	184	673	31	1464
9	1978-79	560	175	43	189	721	23	1711
10	1979-80	514	156	39	187	755	25	1676
11	1980-81	492	163	45	190	611	21	1522
12	1981-82	612	166	47	379	991	27	2222
13	1982-83	1025	185	51	513	1155	28	2957
14	1983-84	1209	230	56	588	1283	33	3399
15	1984-85	1454	250	62	739	1603	33	4141
16	1985-86	1299	223	78	816	2500	34	4950
17	1986-87	2041	257	93	1320	3335	26	7072
18	1987-88	2721	281	99	1347	3490	30	7968
19	1988-89	1823	526	87	1371	5334	109	9250
20	1989-90	2140	695	78	1567	6578	114	11172
21	1990-91	3634	827	89	1825	5612	779	12766
22	1991-92	4774	766	108	2237	5509	1047	14441
23	1992-93	4967	1450	105	2103	6672	819	16116
24	1993-94	4785	1794	121	2466	6499	675	16340
25	1994-95	5229	1927	134	2420	6936	693	17339
26	1995-96 $	6836	2301	111	767	7602	474	18091
27	1996-97 $	6935	2631	130	802	7625	509	18632
28	1997-98 $	8114	3106	117	775	8752	649	21513
29	1998-99 $	8714	3005	147	1104	8869	650	22489
30	1999-2000	8829	2329	140	5126	8592	1869	26885
31	2000-2001	8801	2870	151	5377	8480	2181	27860
32	2001-2002	9214 (R)	2979	147	5894	7957	1846	28037 (R)
33	2002-03 (P)	10510	2939	119	6199	7955	2250	29972

Source : *Ministry of Petroleum & Natural Gas.*

P : *Provisional* (R) : *Revised*

* : *Includes domestic fuel, captive use & LPG shrinkage.*

$: *Excludes off-takes of Natural Gas by ONGC.*

@ : *Includes petro-chemicals.*

TABLE 4.2.18 : THE STATUS OF BIOMASS PROJECTS

Sl. No.	Project Status	Biomass Power		Cogeneration		Total	
		MW	Nos	MW	Nos	MW	Nos
1	2	3	4	5	6	7	8
1	Commissioned	234	45	379	50	613	95
2	Under implementation	297	43	374	39	644	82

Source : *TERI Energy Data Directory and Yearbook, 2003-2004*

TABLE 4.2.19 : STATEWISE AND YEARWISE COMPOSITION OF COMMISSIONED BIOMASS POWER PROJECTS

(MW)

Sl. No.	State	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04
1	2	4	5	6	7	8	9	10	11	12	13
1	Andhra Pradesh	-	-	1.0	-	10.0	1.0	—	—	—	—
2	Gujarat	-	-	-	-	0.5	-	—	—	—	—
3	Haryana	-	-	-	-	-	-	—	—	—	—
4	Karnataka	-	-	1.0	-	10.0	26.0	—	—	—	—
5	Madhya Pradesh	-	-	-	-	5.0	-	—	—	—	—
6	Maharashtra	1.5	4.5	1.5	-	-	-	—	—	—	—
7	Punjab	-	-	-	-	-	-	—	—	—	—
8	Tamil Nadu	-	19.0	25.5	33.5	10.0	-	—	—	—	—
9	Uttar Pradesh	4.0	6.5	-	8.0	8.0	24.0	—	—	—	—
Total		**5.5**	**30.0**	**29.0**	**41.5**	**43.5**	**51.0**	**70.3**	**89.0**	**103**	**129.5**

Source : *TERI Energy Data Directory and Yearbook, 2003-2004*

TABLE 4.2.20 : NATIONAL PROGRAMME ON IMPROVED CHULLAHS

(Number)

Sl. No.	State / UT / Agency	Annual Target		Achievements (April - December 2001)		2002-03
		No. of Villages	No. of Chulhas	Target	Achievement	Target
1	2	3	4	5	6	7
	States					
1	Andhra Pradesh	800	175000	87500	34824	25000
2	Assam	300	12500	6250	32	-
3	Bihar	80	6000	3000	2178	2000
4	Chhattisgarh	150	15000	7500	-	5000
5	Gujarat	490	105000	52500	48926	10000
6	Goa	20	4000	2000	1510	100
7	Haryana	300	60000	30000	28482	-
8	Himachal Pradesh	6	1000	500	510	500
9	Jammu & Kashmir	100	30000	15000	-	5000
10	Jharkhand	100	16000	8000	-	5000
11	Karnataka	300	60000	30000	32179	10000
12	Kerala	200	40000	20000	20443	10000
13	Madhya Pradesh	10	1500	750	-	1000
14	Maharashtra	540	86000	43000	16071	10000
15	Manipur	100	5000	2500	1231	-
16	Meghalaya	100	5000	2500	-	-
17	Mizoram	150	5000	2500	-	-
18	Nagaland	150	5000	2500	1660	-
19	Orissa	700	200000	100000	138636	30000
20	Punjab	250	35000	17500	-	-
21	Rajasthan	150	30000	15000	6234	-
22	Sikkim	100	5000	2500	4096	-
23	Tamil Nadu	300	60000	30000	45312	15000
24	Tripura	200	18000	9000	4157	-
25	Uttranchal	40	2000	1000	154	400
26	Uttar Pradesh	800	150000	75000	52384	10000
27	West Bengal	1300	325000	162500	191086	20000
	Union Territories					
1	Andaman and Nicobar Islands	8	1200	600	841	-
2	Dadar and Nagar Haveli	5	500	250	-	-
3	Delhi	12	2000	1000	-	-
4	Lakshadweep	2	300	150	-	-
5	Pondicherry	15	4000	2000	1435	1000
	Agency					
1	KVIC	1970	260000	130000	65517	-
2	AIWC	220	25000	12500	2448	-
3	Biotech	50	5000	2500	-	-
Total		**10018**	**1755000**	**877500**	**700346**	**165000**

Source : *The Energy and Resources Institute*

KVIC : *Khadi and Village Industries Commission* AIWC : *All India Women's Conference*

TABLE 4.2.21 : DISTRIBUTION OF FAMILY - TYPE BIOGAS PLANTS (NUMBER OF INSTALLATIONS)

Sl. No.	State/UT	Estimated Potential	Cumulative Achievement as on 31-12-96 #	Cumulative Achievement 2001-02	Achievement 2002 (April-December)
1	2	3	4	5	6
	State				
1	Andhra Pradesh	1065600	172410	334054	8023
2	Arunachal Pradesh	7500	139	1514	49
3	Assam	307700	12629	51269	–
4	Bihar	939900	74499	121913	12
5	Chhattisgarh	–		3047	2215
6	Goa	8000	2212	3355	32
7	Gujarat	554000	237513	351745	3501
8	Haryana	300000	28896	44160	1095
9	Himachal Pradesh	125600	34871	43933	190
10	Jammu & Kashmir	128500	1068	1965	–
11	Jharkhand	–		400	–
12	Karnataka	680000	135428	340270	8986
13	Kerala	150500	37374	79532	618
14	Madhya Pradesh	1491200	86461	204100	3347
15	Maharashtra	897000	535279	675177	3539
16	Manipur	38700	1038	1956	16
17	Meghalaya	24000	329	2309	–
18	Mizoram	3000	1178	2818	53
19	Nagaland	6700	401	1667	75
20	Orissa	605000	106156	185690	4285
21	Punjab	411600	31235	68745	1877
22	Rajasthan	915300	55304	66552	162
23	Sikkim	7300	1622	3475	255
24	Tamil Nadu	615800	169605	201295	1210
25	Tripura	28500	3576	1719	16
26	Uttar Pradesh	2021000	241396	370219	4600
27	Uttaranchal	–		1547	288
28	West Bengal	695000	76713	203679	7983
	Union Territory				
1	Andaman and Nicobar Islands	2200	117	137	–
2	Chandigarh	1400	87	97	–
3	Dadra and Nagar Haveli	2000	157	169	–
5	Delhi	12900	624	676	–
6	Pondicherry	4300	517	573	
	Agencies				
1	KVIC, Mumbai	–	–	–	11649
2	AIWC, New Delhi	–	–	–	–
3	SDA, Kanjirapally	–	–	–	5810
4	Biotech	–	–	–	525
	Total	**12049900**	**2048834**	**3369757**	**70411**

Source : *The Energy and Resources Institute*

\# : *These figures are lower estimates of the actual installations.*

KVIC : *Khadi and Village Industries Commission*

AIWC : *All India Women's Conference*

SDA : *Sustainable Development Agency*

TABLE 4.3.1 : NUMBER OF REGISTERED FACTORIES BY MANUFACTURING INDUSTRIES

Sl. No.	Year	Manufacturing	Electricity, Gas & Water	Repair Services & Cold Storage	All Activities
1	2	3	4	5	6
1	1987-88	98379	458	3759	102596
2	1988-89	99724	481	3872	104077
3	1989-90	103373	493	4126	107992
4	1990-91	105511	518	4150	110179
5	1991-92	107454	505	4327	112286
6	1992-93	113890	961	4643	119494
7	1993-94	116227	542	4825	121594
8	1994-95	117564	554	4892	123010
9	1995-96	125281	4013	5277	134571
10	1996-97	125166	4160	5230	134556
11	1997-98	126272	3856	5423	135551
12	1998-99	* 130222	143	1341	131706
13	1999-2000	* 130035	158	1365	131558
14	2000-01	* 127036	163	4069	131268
15	2001-02	* 124099	170	4279	128548

Source : *Central Statistical Organisation*

* : *From 1998-99, all electricity undertakings other than Captive Units have been kept outside the purview of ASI*

TABLE 4.3.2 : SUMMARY STATUS OF POLLUTION CONTROL IN 17 CATEGORIES OF INDUSTRIES

(As on 31-03-2004)

Sl. No.	Category	Total No. of Units	Status (No of Units)		
			Closed	C #	Defaulter
1	2	3	4	5	6
1	Aluminium	7	1	6	0
2	Caustic	33	0	33	0
3	Cement	205	17	182	6
4	Copper	4	0	4	0
5	Distillery	209	39	167	3
6	Dyes & Dying Industries	102	10	90	2
7	Fertilizer	124	13	109	2
8	Iron and Steel	19	1	14	4
9	Leather	94	15	75	4
10	Pesticide	111	8	102	1
11	Petrochemicals	75	0	74	1
12	Pharmaceuticals	401	41	350	10
13	Pulp & Paper	136	26	108	2
14	Refinery	16	0	16	0
15	Sugar	462	50	409	3
16	TPP	151	3	133	15
17	Zinc	6	1	5	0
	Total	**2155**	**225**	**1877**	**53**

Source : *Ministry of Environment & Forests, Annual Report 2003-2004*

\# : *Having adequate facilities to comply with the standards*

Air-borne emissions emitted from various industries are a cause of major concern. These emissions are of two forms, viz., solid particles (SPM) and gaseous emission (SO2, NOx, CO etc.). Liquid effluents, generated from various industries, containing organic and toxic pollutants are also a cause for severe concern. Heavily polluting industries were identified which are included under the 17 categories of highly polluting industries for the purpose of monitoring and regulating pollution from them.

There are 2155 industries in the country falling under the 17 categories of highly polluting industries. Thermal power and fertilizer industries are defaulting in meeting air pollution standards; sugar and pulp & paper industries are the major defaulters in complying with the norms for liquid effluents.

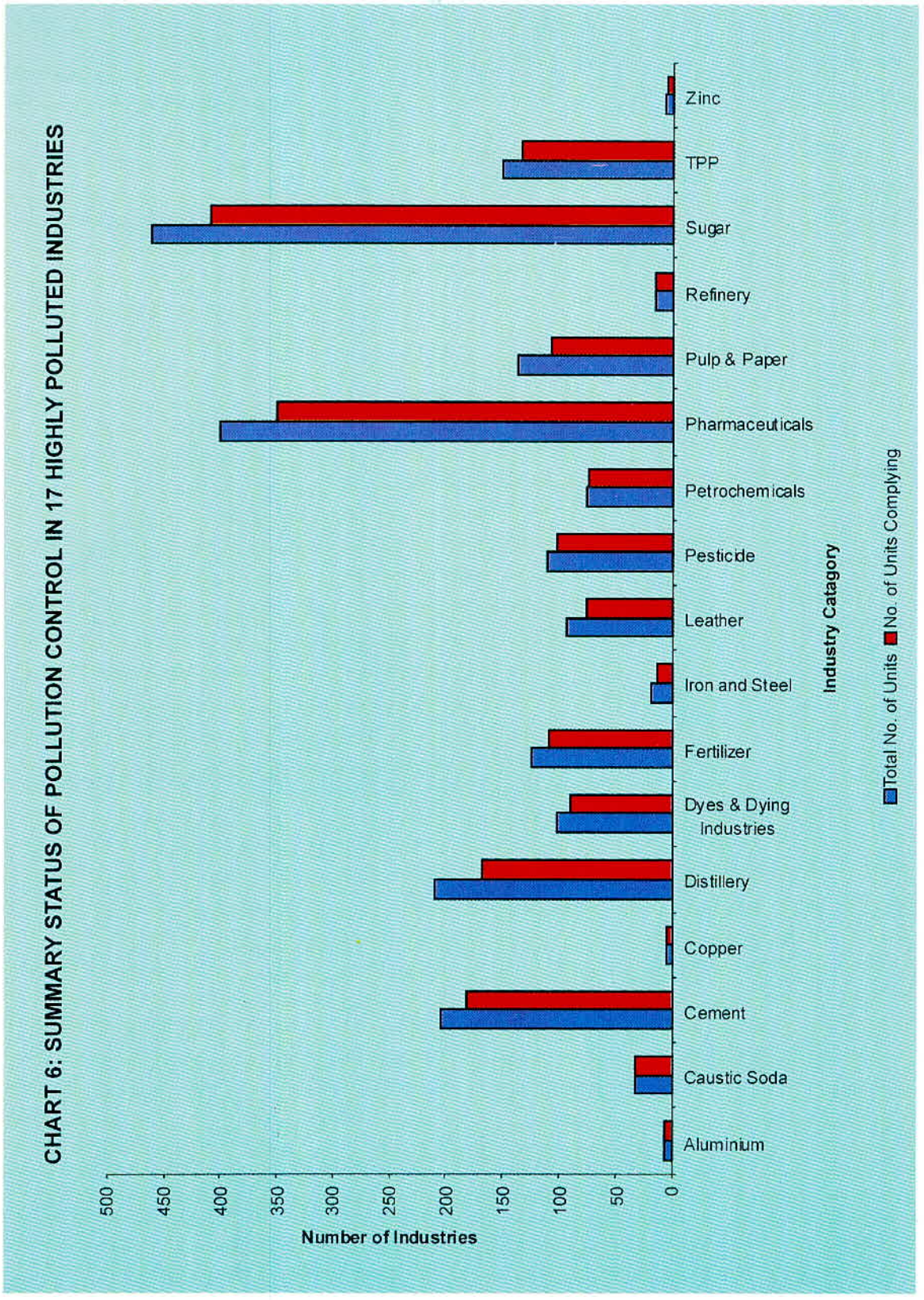


CHART 6: SUMMARY STATUS OF POLLUTION CONTROL IN 17 HIGHLY POLLUTED INDUSTRIES
Zinc
TPP
Sugar
Refinery
Pulp & Paper
Pharmaceuticals
Petrochemicals
Pesticide
Leather
Iron and Steel
Fertilizer
Dyes & Dying Industries
Distillery
Copper
Cement
Caustic Soda
Aluminium
0
50
100
150
200
250
300
350
400
450
500
Number of Industries
Industry Catagory
Total No. of Units
No. of Units Complying

TABLE 4.3.3: STATE-WISE SUMMARY STATUS OF THE POLLUTION CONTROL IN PRE AND POST-91 UNITS OF 17 CATEGORIES OF INDUSTRIES

Sl. No.	State/UT	Total No. of Units	Status (No. of Units)		
			Closed	C#	Defaulters
1	2	3	4	5	6
	States				
1	Andhra Pradesh	269	29	240	0
2	Arunachal Pradesh	0	0	0	0
3	Assam	16	3	12	1
4	Bihar	46	19	27	0
5	Chhattisgarh	25	2	21	2
6	Goa	8	0	8	0
7	Gujarat	283	10	272	1
8	Haryana	107	24	69	14
9	Himachal Pradesh	11	0	11	0
10	Jammu & Kashmir	10	3	7	0
11	Jharkhand	21	3	16	2
12	Karnataka	116	17	99	0
13	Kerala	43	6	37	0
14	Madhya Pradesh	78	15	61	2
15	Maharashtra	392	26	356	10
16	Manipur	0	0	0	0
17	Meghalaya	1	0	1	0
18	Mizoram	0	0	0	0
19	Nagaland	0	0	0	0
20	Orissa	29	3	21	5
21	Punjab	72	9	60	3
22	Rajasthan	108	8	96	4
23	Sikkim	1	0	1	0
24	Tamil Nadu	156	2	154	0
25	Tripura	0	0	0	0
26	Uttaranchal	20	0	20	0
27	Uttar Pradesh	263	27	232	4
28	West Bengal	66	17	44	5
	Union Territories				
29	Andaman & Nicobar	0	0	0	0
30	Chandigarh	1	0	1	0
31	Daman & Diu, Dadra & Nagar Haveli	0	0	0	0
32	Delhi	5	1	4	0
33	Lakshadweep	0	0	0	0
34	Pondicherry	8	1	7	0
Total		**2155**	**225**	**1877**	**53**

Source : *Annual Report 2003-2004, Ministry of Environment & Forests*

\# : *Having adequate facilities to comply with the standards*

TABLE 4.3.4 : SUMMARY STATUS OF POLLUTION CONTROL IN GROSSLY POLLUTING INDUSTRIES DISCHARGING THEIR EFFLUENTS INTO RIVERS AND LAKES

(As on 30.09.2003)

Sl. No.	Name of the State/Union Territory	No. of Defaulters Units	No. of Units Closed	No. of Units Which Have Provided Requisite Treatment/ Disposal Facilities after Issuance of Directions	No. of Defaulting Units
1	2	3	4	5	6
1	Andhra Pradesh	60	18	42	0
2	Assam	7	6	1	0
3	Bihar	14	4	10	0
4	Gujarat	17	3	14	0
5	Haryana	21	9	12	0
6	Karnataka	20	2	18	0
7	Kerala	36	4	32	0
8	Madhya Pradesh	2	1	0	1
9	Maharashtra	6	3	3	0
10	Orissa	9	3	4	2
11	Pondicherry	4	0	4	0
12	Punjab	18	1	16	1
13	Tamil Nadu	366	118	248	0
14	Uttar Pradesh	241	59	181	1
15	West Bengal	30	7	23	0
	Total	**851**	**238**	**608**	**5**

Source : *Ministry of Environment & Forests, Annual Report 2003-2004*

TABLE 4.3.5 : MAXIMUM PERMISSIBLE LIMITS FOR INDUSTRIAL EFFLUENT DISCHARGES

(Mg/Litre)

Sl. No.	Parameter	Into Inland Surface Waters Indian Standards 2490 (1974)	Into Public Sewers Indian Standards: 3306 (1974)	Onland for Irrigation Indian Standards: 3307 (1974)	Marine Coastal Area
1	2	3	4	5	6
1	pH	5.5-9.0	5.5-9.0	5.5-9.0	5.5-9.1
2	Biological oxygen demand (for 5 days at 20°C)	30.00	350.00	100.00	100.00
3	Chemical oxygen demand	250.00	-	-	250
4	Suspended solids	100.00	600.00	200.00	
5	Total dissolved solids (inorganic)	2100.00	2100.00	2100.00	-
6	Temperature (°C)	40.00	45.00	-	45.00
7	Oil and grease	10.00	20.00	10.00	20.00
8	Phenolic Compounds	1.00	5.00	-	5.00
9	Cyanides	0.20	2.00	0.20	0.20
10	Sulphides	2.00	-	-	5.00
11	Fluorides	2.00	15.00	-	15.00
12	Total residual chlorine	1.00	-	-	1.00
13	Pesticides	-	-	-	-
14	Arsenic	0.20	0.20	0.20	0.20
15	Cadmium	2.00	1.00	-	2.00
16	Chromium (hexavalent)	0.10	2.00	-	1.00
17	copper	3.00	3.00	-	3.00
18	Lead	0.10	1.00	-	1.00
19	Mercury	0.01	0.01	-	0.01
20	Nickel	3.00	3.00	-	5.00
21	Selenium	0.05	0.05	-	0.05
22	Zinc	5.00	15.00	-	15.00
23	Chlorides	1000.00	1000.00	600.00	-
24	Boron	2.00	2.00	2.00	-
25	Sulphates	1000.00	1000.00	1000.00	-
26	Sodium (%)	-	60.00	60.00	-
27	Ammoniacal nitrogen	50.00	50.00	-	50
28	Radioactive materials				
	Alpha emitters (milli curie/millilitre)	10^{-7}	10^{-7}	10^{-8}	10^{-7}
	Beta emitters (μ curie/millilitre)	10^{-6}	10^{-6}	10^{-7}	10^{-6}

Source : *Central Pollution Control Board*

TABLE 4.3.6 : EFFLUENT STANDARDS FOR SUGAR INDUSTRY

Sl. No.	Parameter	Permissible Limits (Mg/Litres)	
		Disposal on Land	Disposal in Surface Water
1	2	3	4
1	Biological Oxygen Demand (5 days at 20°C)	100	30
2	Suspended Solids	100	30

Source : *TERI Energy Data Directory and Yearbook, 2002-2003*

TABLE 4.3.7 : EFFLUENT STANDARDS FOR LARGE PULP AND PAPER INDUSTRIES

Capacity (Tonnes a year)	Parameter	Permissible Limits
1	2	3
Above 24,000	pH	7.0-8.5
	Biological Oxygen Demand at 20°C	30 mg/litre
	Chemical Oxygen Demand	350 mg/litre
	Suspended solids	50 mg/litre
	Total organic chloride	2.0 kg/tonne of paper produced
	Flow (total waste water discharge)	–
	Large pulp and paper[a]	200 m^3/tonne of paper produced
	Large rayon grade newsprint	150 m^3/tonne of paper produced

Source : *TERI Energy Data Directory and Yearbook, 2002-2003*

a : *the standards with respect to total waste water discharge for large pulp and paper mills established from 1992 will meet the standards of 100 m^3/tonne of paper produced*

TABLE 4.3.8 : EFFLUENT STANDARDS FOR OIL REFINERIES

(Mg/Litre)

Sl. No.	Parameter	Permissible Limit	Quantum (Kg/Thousand Tonnes of Crude Processed)
1	2	3	4
1	Oil and grease	10.0	7.00
2	Phenol	1.0	0.70
3	Sulphide	0.5	0.35
4	Biological Oxygen Demand (5 days at 20°C)	15.0	10.50
5	Suspended Solids	20.0	14.00
6	pH	–	6.00-8.50

Source : *TERI Energy Data Directory and Yearbook, 2002-2003*

TABLE 4.3.9 : EFFLUENT STANDARDS FOR ALUMINIUM INDUSTRY

Sl. No.	Plant	Parameters	Permissible Limits
1	2	3	4
1	**Alumina Plant**		
	Raw material handling	Primary and secondary crusher particulate matter	150 mg/m^3
	Precipitation area : calcination	Particulate matter	250 mg/m^3
		Carbon Mono-oxide	1 % maximum
		Stack Height[a]	
2	**Smelter plant**		
	Green anode shop	Particulate matter	150 mg/m^3
	Anode bake oven	Particulate matter	150 mg/m^3
		Total fluoride	0.3kg/tonne at Al
3	**Potroom**	Particulate matter	150 mg/m^3
		Total fluoride	
		Vertical stud soderberg	4.7 kg/tonne of Al produced
		Horizontal stud soderberg	6.0 kg/tonne of Al produced
		Prebacked side worked	2.5 kg/tonne of Al produced
		Prebacked centre worked	1.0 kg/tonne of Al produced
		Stack Height[a]	

Source : *TERI Energy Data Directory and Yearbook, 2002-2003*

a $H = 14\ Q^{0.3}$, where Q is the emission rate of sulphur dioxide in Kg/h and H is the stack height in meters.

TABLE 4.3.10 : EFFLUENT STANDARDS FOR PETRO-CHEMICAL (BASIC & INTERMEDIATES) INDUSTRY

(Mg/Litre)

Sl. No.	Parameter	Permissible Limit
1	2	3
1	pH	6.5-8.5
2	Biological Oxygen Demand (5 days at 20^{0}C)[a]	50.0
3	Phenol[b]	5.0
4	Sulphide (as S)	2.0
5	Chemical Oxygen Demand	250.0
6	Cyanide (as CN)	0.2
7	Fluoride (as F)[c]	15.0
8	Total Suspended Solids	1000.0
9	Hexavalent Chromium	0.1
10	Total Chromium (as Cr)[d]	2.0

Source : TERI Energy Data Directory and Yearbook, 2002-2003

a : The state board may prescribe the biological oxygen demand value of 30 mg/l if the recepient system so demands.

b : The limit for phenol shall be confirmed at the outlet of effluent treatment of phenol plant. However, at the final disposal point, the limit shall be less than 1 mg/l

c : The limit for fluoride shall be confirmed at the outlet of the chrome removal unit. However, at the disposal point, fluoride concentration shall be lower than 5 mg/l

d : The limits for total and hexavalent chromium shall be confirmed at the outlet of the chromate removal. This implies that in the final treated effluent total, and hexavalent chromium shall be lower than prescribed herein

TABLE 4.4.1 : CONTRIBUTION OF GREEN HOUSE GASES TO ATMOSPHERE

Sl. No.	Green Houses Gases	Contribution to atmosphere (%)
1	2	3
1	Carbondioxide	55
2	Methane	15
3	CFCs 11 & 12	17
4	Nitrousoxide	6
5	Others	7

Source : Central Pollution Control Board

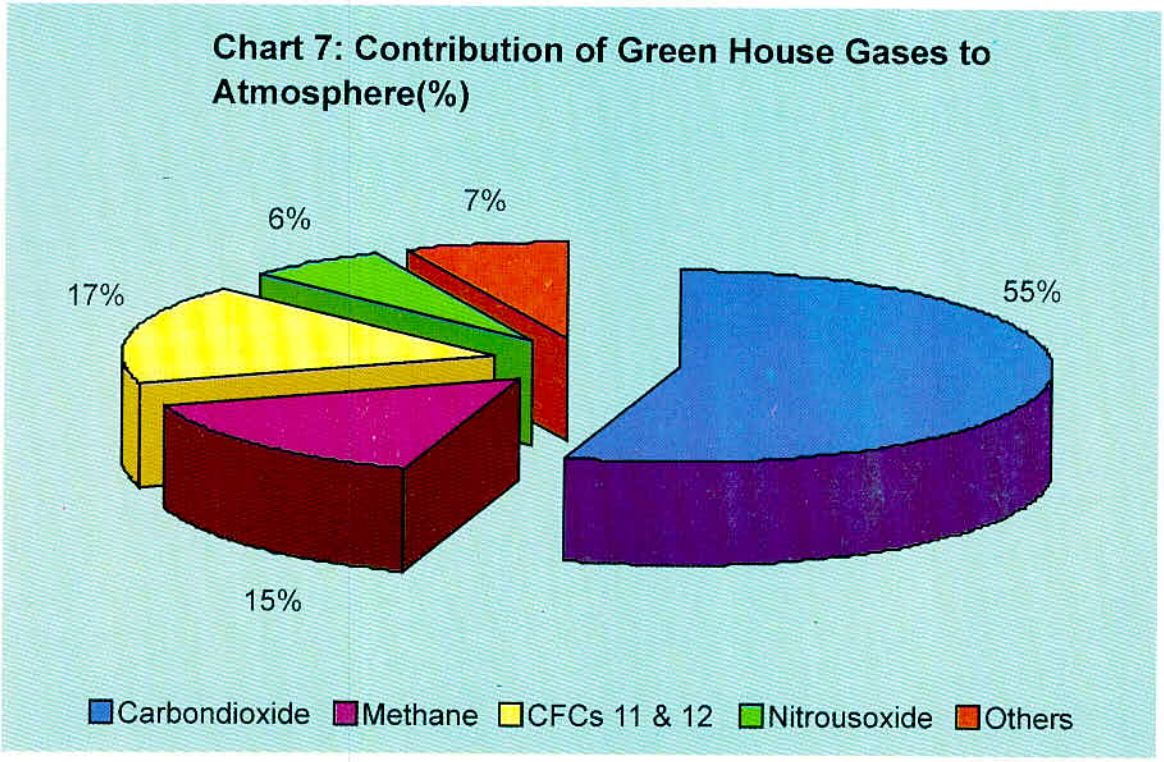


TABLE 4.4.2 : GLOBAL AVERAGE TEMPERATURE AND ATMOSPHERIC CONCENTRATIONS OF CO_2

Sl. No.	Year	Temperature (°C)	Carbon Dioxide (Parts Per Million)	Emissions from Fossil Fuel Burning (Million Tonnes of Carbon)
1	2		3	4
1	1950	13.87	–	1612
2	1955	13.88	–	2013
3	1960	14.01	316.80	2535
4	1965	13.90	319.90	3087
5	1966	13.96	321.20	3222
6	1967	14.00	322.00	3334
7	1968	13.94	322.90	3501
8	1969	14.03	324.50	3715
9	1970	14.02	325.50	3997
10	1971	13.89	326.20	4143
11	1972	14.00	327.30	4305
12	1973	14.13	329.50	4538
13	1974	13.89	330.10	4545
14	1975	13.94	331.00	4518
15	1976	13.86	332.00	4776
16	1977	14.11	333.70	4910
17	1978	14.02	335.30	4962
18	1979	14.09	336.70	5249
19	1980	14.16	338.50	5177
20	1981	14.22	339.80	5004
21	1982	14.06	341.00	4961
22	1983	14.25	342.60	4944
23	1984	14.07	344.20	5116
24	1985	14.03	345.70	5277
25	1986	14.12	347.00	5439
26	1987	14.27	348.70	5561
27	1988	14.29	351.30	5774
28	1989	14.19	352.70	5882
29	1990	14.37	354.00	5953
30	1991	14.32	355.50	6023
31	1992	14.14	356.40	5907
32	1993	14.14	357.00	5904
33	1994	14.25	358.90	6055
34	1995	14.37	360.90	6187
35	1996	14.23	362.60	6326
36	1997	14.40	363.80	6422
37	1998	14.56	366.60	6407
38	1999	14.32	368.30	6239
39	2000	14.31	369.40	6315
40	2001	14.36	370.90	6378
41	2002(P)	14.52	372.90	6443

Source: The Energy And Resources Institute

P : Provisional

TABLE 4.5.1 : AMBIENT AIR QUALITY STANDARDS IN RESPECT OF NOISE

Sl. No.	Area	Limits in dB(A)L_{eq}	
		Day Time	Night Time
1	2	3	4
1	Industrial Area	75	70
2	Commercial Area	65	55
3	Residential Area	55	45
4	Silence Zone	50	40

Source : Central Pollution Control Board

Notes :

1 Day Time — 06.00 hour to 22.00 hour (16 hours)

2 Night time —22.00 hour to 06.00 hour (08 hours)

3 Areas upto 100 metres around certain premises like hospitals, educational institutions and courts, religious places or any other area which is declared as silence zones by the competent authority.

4 Mixed categories of areas may be declared as one of four aforesaid categories by the competent Authority.

— * dB (A) L_{eq} denotes the time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.

— A "decibel" is a unit in which noise is measured.

— "A", in dB (A) L_{eq} denotes the frequency weighting in the measurement of noise and corresponds to frequency response characteristics of the human ear.

— L_{eq} : It is an energy mean of the noise level over a specified period.

According to study on occupational hazards, even short exposures to intense noise can shift upward the hearing threshold while prolonged exposure or intermittent exposure over a long period produces a damaging effect on hearing resulting in a permanent threshold shift. Accordingly, the Central Pollution Control Board(CPCB) has prescribed norms for noise levels.

CHAPTER FIVE

LAND AND SOIL

5.1 On the basis of nine-fold land-use classification, the land use statistics is available for roughly 306 million hectares (mha) of land out of the 329 million hectares of the total geographic area which accounts for 93% of the total land.

5.2 The area under barren and uncultivable land is generally unsuitable for agriculture either because of topography or its inaccessibility. Instances are the desert areas in Rajasthan, the saline land in part of the Rann of Kutch in Gujarat, and the weed infected and ravine land in Madhya Pradesh. Recently, the area under non-agricultural land has increased due to increase in developmental activities; e.g. housing, transport system, irrigation, etc. About 24 mha are occupied by the housing, the industry and for other non-agricultural uses, 19.2 mha are snowbound and remote, leaving only 263 million hectare for agriculture, forestry, pasture and other biomass production. The net sown area increased from 119 mha in 1950-51 to 140 mha in 1970-71, mostly through reclamation of old fallow and cultivable wastelands and diversion of groves. Since 1970-71, the net area sown has remained almost the same at around 142 mha levels. The data shows that land use in the country, over the last five decades, has undergone drastic change. Land under agriculture has almost doubled, forest cover has dwindled to less than half, large tracts of fertile agriculture and forest land have been diverted for urbanization and settlements. Deforestation contributes to loss of precious top soil which amounts to about 35 percent of the global sediment load going to oceans even though water flowing through our rivers is only about five percent of the flow of rivers in the world.

Land Degradation

5.3 Land is degraded when it suffers a loss of intrinsic qualities, decline in its capabilities or loss in its productive capacity. Land degradation may be due to natural causes or human causes or it may be due to combination of both. Soil erosion is the major cause of land degradation.

Soil Erosion

5.4 Soil is the non-renewable natural resource which supports life on earth. It is estimated that one-sixth of the world's soils have already been degraded by water and wind erosion. This has two important consequences: the reduced ability of society to produce sufficient food due to loss of quality and depth of soils; and resulted in off-site pollution associated with erosion. These include siltation of dams, pollution of water-courses by agricultural chemicals and damage to property by soil-laden runoff. On-site issues of declining soil quality tend to be spatially dispersed occurring on many different soil types whereas off-site pollution issues tend to be locally concentrated.

5.5 Soil erosion problems are not confined to the Developing World. In the last two decades, there has been a growing appreciation of the threat to European soils as a result of intensification of agriculture, overgrazing and climate change. The threat is most apparent in the Mediterranean Region where the term "desertification" has been used to describe a series of inter-related changes which include soil erosion. The EU-funded Mediterranean Desertification and Land Use (MEDALUS) project is currently addressing these latter issues for much of Southern Europe.

5.6 In India, about 130 mha of land (45% of total geographical area) is affected by serious soil erosion through ravine and gully, shifting cultivation, cultivated wastelands, sandy areas, deserts and water logging (Govt. of India, 1989).

5.7 Soil erosion by rain and river that takes place in hilly areas causes landslides and floods, while cutting trees for firewood, agricultural implements and timber, grazing by a large number of livestock, over and above, the carrying capacity of grass lands, traditional agricultural practices, construction of roads, indiscriminate (limestone) quarrying and other activities, have all led to the opening of hill-faces to heavy soil erosion. Wind erosion causes expansion of deserts, dust, storms, whirlwinds and destruction of crops, while moving sand covers the land and makes it sterile. Excessive soil erosion with consequent high rate of sedimentation in the reservoirs and decreased fertility has become serious environmental problems with disastrous economic consequences. Of the 16 rivers of world, which experience severe erosion and carry heavy sediment load, 3 rivers, namely; Ganges, Brahmaputra and Kosy occupy the 2nd, 3rd and 12th position, respectively.

5.8 Soil erosion results in huge loss of nutrients in suspension or solution, which are removed away from one place to another, thus causing depletion or enrichment of nutrients. Besides the loss of nutrients from the topsoil, there is also degradation through the creation of gullies and ravines, which makes the land unsuitable for agricultural production. Subsidence of the land in some areas and landslides in the hilly tracts are problems affecting highways, habitations and irrigation dams.

5.9 The use of pesticides above permissible limits enters the food chain, causing health hazards. A major concern particularly about chlorinated hydrocarbons like DDT is their persistence in soil.

5.10 Among fertilizers, the conversion of fertilizer-N to gaseous forms-ammonia (NH_3) and various oxides of Nitrogen leads to atmospheric pollution. Escape of fertilizer-N as ammonia gas is called ammonia volatilization. The presence of ammonia and sulphur dioxide may lead to acid rains which ultimately degrade the soil. Atmospheric ammonia contaminates water bodies, impairs visibility and causes corrosion. Nitrous oxide also contributes to global warming.

Mining

5.11 The activity of mining and quarrying covers underground and surface mines, quarries and wells and includes extraction of minerals and also all the supplemental activities such as dressing and benefaction of ores, crushing, screening, washing, cleaning, grading, milling floatation, melting floatation and other preparations carried out at the mine site which are needed to render the material marketable.

5.12 The mining activities in the country are governed by the Mineral Conservation Development Rules (MCDR), 1988. Every license holder of mining lease shall take all possible precautions for protection of environment and control of pollution while conducting prospecting, mining beneficiation or metallurgical operations in the area. Specific provisions for proper removal and utilization of top soil, storage of over burden and waste rocks, reclamation and rehabilitation of lands, precautions against air pollution, noise and ground vibrations, restoration of flora, discharge of toxic liquid, control of surface subsidence have been provided under the MCDR. The Indian Bureau of Mines collects the statistics on all these aspects under the above rules.

TABLE 5.1.1 : LAND USE CLASSIFICATION IN INDIA

	Classification	1950-51	1960-61	1970-71	1980-81	1990-91	1995-96P	1999-00P	2000-01P
	1	2	3	4	5	6	10	14	15
I.	**Geographical Area**	**328.73**	**328.73**	**328.73**	**328.73**	**328.73**	**328.73**	**328.73**	**328.73**
II.	**Reporting Area for Land Utilisation Statistics (1 to 5)**	**284.32**	**298.46**	**303.76**	**304.16**	**304.86**	**304.88**	**306.02**	**306.25**
1.	Forests	40.48	54.05	63.92	67.47	67.80	68.82	68.97	69.41
2.	Not Available for Cultivation (a+b)	47.52	50.75	44.64	39.62	40.48	41.46	42.32	42.83
	(a) Non Agricultural Uses	9.36	14.84	16.48	19.66	21.09	22.36	23.27	23.57
	(b) Barren and Unculturable Land	38.16	35.91	28.16	19.96	19.39	19.10	19.13	19.26
3.	Other Uncultivated Land (excluding fallow land (a+b+c)	49.45	37.64	35.06	32.31	30.22	28.64	28.48	27.93
	(a)Permanent Pastures and Other Grazing Land	6.68	13.97	13.26	11.97	11.40	11.06	11.04	10.90
	(b) Land Under Miscellaneous Tree Crops and Groves not Included in Net Area Sown	19.83	4.46	4.30	3.60	3.82	3.48	3.64	3.37
	(c) Culturable Wasteland	22.94	19.21	17.50	16.74	15.00	14.10	13.80	13.66
4.	Fallow Land (a+b)	28.12	22.82	19.88	24.75	23.36	23.85	25.07	24.99
	(a) Fallow Land Other Than Current Fallows	17.44	11.18	8.76	9.92	9.66	10.02	10.08	10.19
	(b) Current Fallows	10.68	11.64	11.12	14.83	13.70	13.83	14.99	14.80
5.	Net Area Sown (6-7)	118.75	133.20	140.27	140.00	143.00	142.20	141.10	141.10
6.	Gross Cropped Area	131.89	152.77	165.79	172.63	185.74	187.47	190.32	187.01
7.	Area Sown More Than Once	13.14	19.57	25.52	32.63	42.74	45.27	49.22	45.91
8.	Cropping Intensity*	111.1	114.70	118.20	123.30	129.90	131.84	134.90	132.50
III.	**Net Irrigated Area**	**20.85**	**24.66**	**31.10**	**38.72**	**48.02**	**53.40**	**56.76**	**54.68**
IV.	**Gross Irrigated Area**	**22.56**	**27.98**	**38.20**	**49.78**	**63.20**	**71.35**	**77.99**	**75.14**

Source : Department of Agriculture & Cooperation, Ministry of Agriculture.
P : Provisional
* : Cropping Intensity is obtained by dividing the gross cropped area by the net area sown.

Out of total geographic area of 329 mha, only 306 mha is the reporting area (the rest being unadministered for various reasons). About 23 mha are occupied for non-agricultural uses (housing, industry and others), 19 mha are snow bound and remote leaving only 263 mha for agriculture, forestry, pasture and other bio-mass production. The net sown area increased from 119 mha in 1950-51 to 140 mha in 1970-71 mostly through reclamation of old fallow and culturable wastelands and diversion of groves. Net area sown has increased only marginally from 140 mha in 1970-71 to 141 mha in 2000-01, indicating that the private efforts have peaked and the intervention of the Government is required for further land reclamation.

CHART 8 : LAND USE CLASSIFICATION IN INDIA

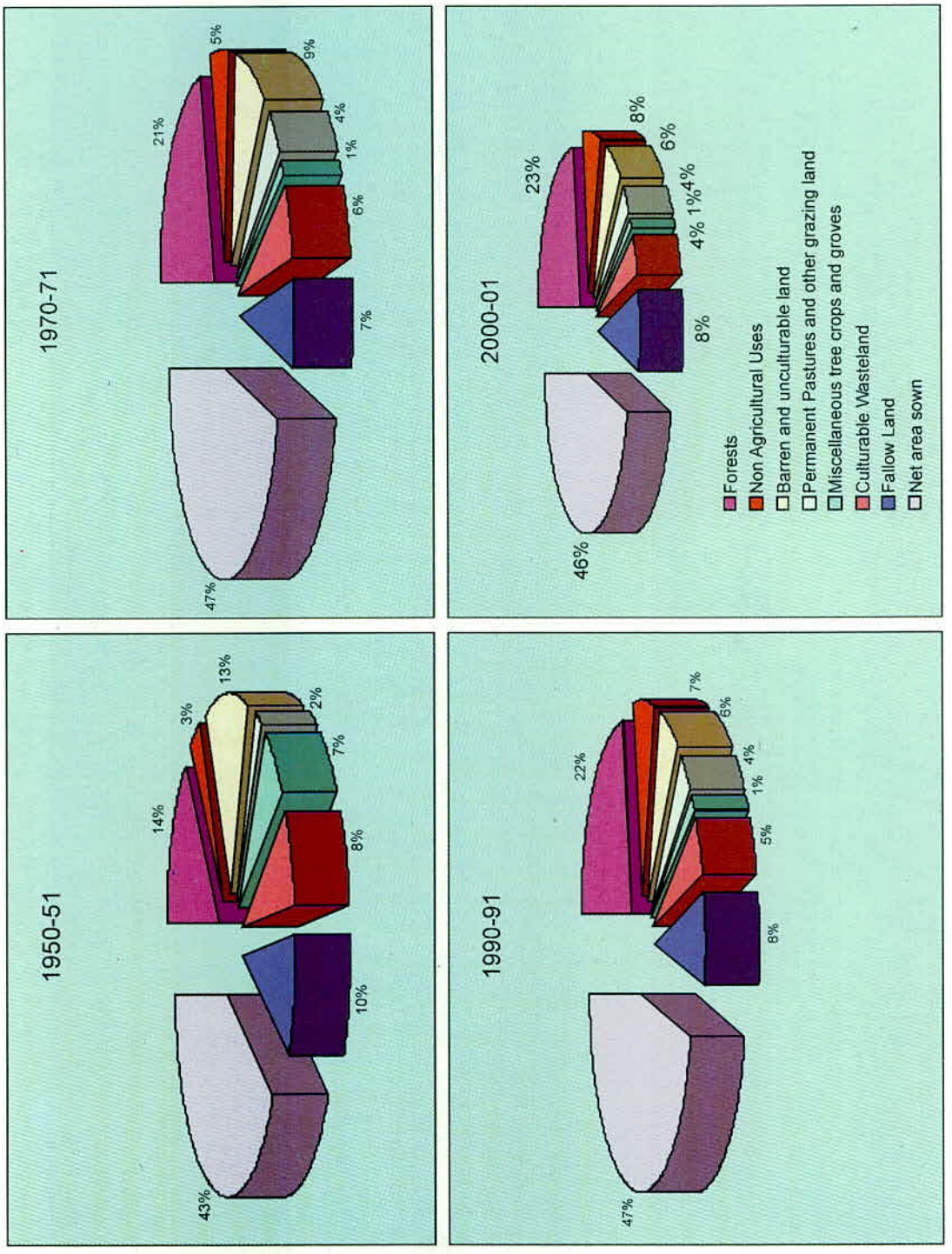


TABLE 5.1.2 : SELECTED CATEGORIES OF LAND USE CLASSIFICATION

(Million hectare)

Sl. No.	Years	Net Sown Area (A)	Gross Sown Area (B)	Area Sown More Than Once (B-A)	Net Irrigated Area (C)	Gross Irrigated Area (D)	Area Irrigated More Than Once (D-C)
1	2	3	4	5	6	7	8
1	1950-51	118.75	131.89	13.14	20.85	22.56	1.71
2	1960-61	133.20	152.77	19.57	24.66	27.98	3.32
3	1970-71	140.27	165.79	25.52	31.10	38.19	7.09
4	1980-81	140.00	172.63	32.63	38.72	49.78	11.06
5	1985-86	140.90	178.46	37.56	41.86	54.28	12.42
6	1990-91	143.00	185.74	42.74	47.78	62.47	14.69
11	1995-96P	142.20	187.47	45.27	53.40	71.35	17.95
15	1999-2000P	141.1	190.32	49.22	56.76	77.99	19.10
16	2000-01P	141.1	187.01	45.91	54.68	75.14	20.46

Source : Department of Agriculture & Cooperation, Ministry of Agriculture.

P : Provisional

The net area under irrigation has increased from 20.85 mha in 1950-51 to 54.68 mha in 2000-01. The development in irrigation potential is largely due to the efforts of the Govt. in developing irrigation facilities through major/medium and minor irrigation projects.

Ground water sources contributed nearly 51% of the total area irrigated in 1991-92. There has been a drastic increase in the utilization of ground water since the 1960's due to rural electrification. As a result our ground water resources are getting depleted .Surface water sources, rivers, canals, tanks and rivulets have also been affected considerably due to the degradation and siltation of riverbeds.

TABLE 5.1.3 : STATEWISE INFORMATION ON SOILS OF PRIORITY WATERSHEDS OF RIVER VALLEY PROJECTS/ FLOOD PRONE RIVER CATCHMENTS

(Area in lakh hectares)

Sl. No.	State/UT	Catchment Area	Surveyed Area	Priority Area	Subwatershed Area On Which Reports Available
1	2	3	4	5	6
	States				
1	Andhra Pradesh	57.55	57.55	15.41	7.19
2	Arunachal Pradesh	–	–	–	–
3	Assam	1.53	1.53	0.86	0.24
4	Bihar	21.12	21.12	3.02	0.38
5	Chhattisgarh	91.70	91.70	16.36	9.31
6	Goa	–	–	–	–
7	Gujarat	5.74	5.74	2.19	1.92
8	Haryana	18.13	18.13	3.07	0.22
9	Himachal Pradesh	42.33	28.96	15.82	4.85
10	Jammu & Kashmir	2.70	4.10	1.52	0.16
11	Jharkhand	48.99	48.99	17.20	10.21
12	Karnataka	103.90	103.90	26.38	13.38
13	Kerala	2.86	2.86	1.57	0.88
14	Madhya Pradesh	174.92	160.65	51.32	19.30
15	Maharashtra	197.46	196.76	48.15	15.80
16	Manipur	–	–	–	–
17	Meghalaya	–	–	–	–
18	Mizoram	0.05	0.05	0.05	0.00
19	Nagaland	–	–	–	–
20	Orissa	27.92	27.92	8.88	10.83
21	Punjab	10.32	10.32	0.52	0.01
22	Rajasthan	76.07	48.20	12.58	5.95
23	Sikkim	4.09	4.09	2.14	1.10
24	Tamil Nadu	5.38	5.38	1,09	1.19
25	Tripura	0.45	0.45	0.35	0.04
26	Uttaranchal	25.70	25.70	10.56	0.61
27	Uttar Pradesh	35.96	35.96	11.76	3.37
28	West Bengal	19.84	19.84	4.10	7.13
29	Chhattisgarh & M. P.	9.04			
30	Bihar & Jharkhand	13.38	13.38	4.23	1.12
31	Uttaranchal & U. P.	3.75			
	Union Territories				
1	Andaman & Nicobar Island	–	–	–	–
2	Chandigarh	0.10	0.10	0.04	0.00
3	Dadra & Nagar Haveli	0.13	0.13	0.06	0.10
4	Daman & Diu	–	–	–	–
5	Delhi	1.06	1.06	0.17	0.00
6	Lakshadweep	–	–	–	–
7	Pondicherry	–	–	–	–
	Total	**1002.17**	**945.96**	**269.41**	**115.32**

Source : All India Soil and Land Use Survey, Ministry of Agriculture

TABLE 5.1.4 : STATE-WISE INFORMATION ON DEGRADED LAND OF THE DISTRICTS

(Hectare)

Sl. No.	State/UT	District	Total Area	Total Degraded	% Degraded Area
1	2	3	4	5	6
1	Andaman & Nicobar	–	–	–	–
2	Andhra Pradesh	1 Kurnool	1761393	309412	17.5
		2 Nellore	1307600	169808	13
3	Arunachal Pradesh	–	–	–	–
4	Assam	–	–	–	–
5	Bihar	1 Banka	278768	29294	10.51
		2 Bhagalpur	255822	32589	12.74
		3 Gaya	473659	7727	1.63
		4 Munger	634594	144617	22.79
		5 Siwan	221900	22611	10.19
6	Chandigarh	–	–	–	–
7	Chhattisgarh	–	–	–	–
8	Dadra & Nagar Haveli	–	–	–	–
9	Daman Diu	–	–	–	–
10	Delhi	–	–	–	–
11	Goa				
		1 North Goa	175592	24634	14.03
		2 South Goa	194608	19639	10.09
12	Gujarat				
		1 Bharuch	776430	192841	24.84
		2 Bhavnagar	1115500	271337	24.33
		3 Surat	776161	85469	11.1
13	Haryana	–	–	–	–
14	Himachal Pradesh				
		1 Chamba	671500	74238	11.05
		2 Kullu	566604	259127	45.73
15	Jammu & Kashmir	–	–	–	–
16	Jharkhand				
		1 Palamau	802291	50363	6.28
17	Karnataka				
		1 Chickmagalur	722072	16038	2.26
		2 Bagalkot	658877	135145	20.51
		3 Bijapur	1053471	256010	24.3
		4 Gulbarga	1610208	313347	19.46
		5 Tumkur	1055090	N/A	–
18	Kerala				
		1 Palghat	448000	16204	3.6
19	Lakshadeep	–	–	–	–
20	Madhya Pradesh				
		1 Balaghat	924500	112941	12.21
		2 Gwalior	456449		
		3 Jhabua	646912	322601	49.9
		4 Morena	1168336	373553	27.2
		5 Sidhi	1039194	228736	22.01
21	Maharashtra				
		1 Bhandara	934716	49933	5.35
		2 Nasik	1527764	647462	42.38
		3 Wardha	630900	69308	10.98

TABLE 5.1.4 : STATE-WISE INFORMATION ON DEGRADED LAND OF THE DISTRICTS—Concld.

(Hectare)

Sl. No.	State/UT	District	Total Area	Total Degraded	% Degraded Area
1	2	3	4	5	6
22	Manipur	–	–	–	–
23	Meghalaya				
		1 East Garohills	260300	34201	10.37
		2 South Garohills	185700	N/A	–
		3 West Garohills	370700	N/A	–
24	Mizoram				
		1 Aizawl	357631	109184	30.53
		2 Champhai	318583	184795	58.01
		3 Kolasib	138251	16865	12.2
		4 Mamit	302575	50986	16.85
		5 Serchhip	142160	70702	49.74
25	Nagaland	–	–	–	–
26	Orissa	–	–	–	–
27	Pondicherry	–	–	–	–
28	Punjab	–	–	–	–
29	Rajasthan				
		1 Ajmer	842388	398913	47.36
		2 Jhunjhunu	591681	81478	13.78
		3 Nagaur	1764504	361120	20.47
30	Sikkim	–	–	–	–
31	Tamilnadu				
		1 Coimbatore	746128	19566	2.62
		2 Dharmapuri	962247	194532	20.21
		3 Erode	825997	5579	0.68
		4 Thirunelveli	682308	36240	5.31
		5 Tuticorin	459054	78213	17.04
32	Tripura	–	–	–	–
33	Uttar Pradesh				
		1 Agra	400369	92650	23.14
		2 Lalitpur	504149	95450	18.9
		3 Mathura	376432	22975	6.1
		4 Sitapur	570633	88717	15.55
34	Uttranchal	–	–	–	–
35	West Bengal				
		1 Puruliya	625100	198619	31.77
		2 North 24 Pargana	378090	64062	16.94
		3 South 24 Paragna	966171	263635	27.29
	GRAND TOTAL	**52**	**35660062**	**6703466**	**18.80**

Source : All India Soil and Land Use Survey, Ministry of Agriculture

TABLE 5.2.1 : USE OF AGRICULTURAL INPUTS

Sl. No.	Programme	Unit	1980-81	1990-91	2000-01	2001-02	2002-03
1	2	3	4	5	9	10	11
1.	**Seeds**						
	I. Production of Breeder Seeds	Thousand Quintals	5.27	33.89	42.69	45.48	48.86
	II. Production of Foundation Seeds	Lakh Quintals	–	3.35	5.91	5.44	6.00
	III. Distribution of Certified/Quality Seeds	Lakh Quintals	25.01	57.10	86.27	91.80	93.00
2.	**Consumption of Chemical Fertilizers (I+II+III)**	Lakh Tonnes	55.16	125.46	167.02	173.60	160.94
		Kg./ha	31.83	67.49	87.56	90.12	84.92
	I. Nitrogenous(N)	Lakh Tonnes	36.78	79.97	109.20	113.10	104.74
	II. Phosphatic(P)	Lakh Tonnes	12.14	32.21	42.15	43.82	40.19
	III. Potassic(K)	Lakh Tonnes	6.24	13.28	15.67	16.67	16.01
3.	**Consumption of Pesticides(Technical Grade Material)**	Thousand Tonnes	45.00	75.00	43.58	47.02	48.30
4.	**Area under Major Crops**						
	Rice	Million ha	40.15	42.69	44.71	44.90	40.28
	Wheat	Million ha	22.28	24.17	25.73	26.34	24.86
	Jowar	Million ha	15.81	14.36	9.86	9.80	9.20
	Bajra	Million ha	11.66	10.48	9.83	9.53	7.60
	Maize	Million ha	6.01	5.90	6.61	6.58	6.29
5.	**Area covered under Soil Conservation (Cummulative)**	Million ha	24.37	34.90	39.47*	39.41	39.51
6.	**Irrigated Area**	Million ha	54.10	70.80	N.A.	N.A.	N.A.
	Major & Medium	Million ha	22.70	26.00	N.A.	N.A.	N.A.
	Minor @	Million ha	31.40	44.80	N.A.	N.A.	N.A.

Source : *Agricultural Statistics at a Glance, 2004, Department of Agriculture & Cooperation, Ministry of Agriculture*

N.A. : Not available

@ : The figures for minor irrigation indicate the net benefit after allowing for seepage.

* : Excluding state sector soil conservation programme

TABLE 5.2.2 : PERFORMANCE OF CROP PRODUCTION

Sl. No.	Crops	1992-93	1993-94	1994-95	1996-97	1997-98	1998-99	1999-2000	2000-01	2001-02	2002-03 $
1	2	3	4	5	6	7	8	9	10	11	12
1	Rice	72.86	80.30	81.81	81.73	82.54	86.08	89.68	84.98	93.34	72.65
2	Wheat	57.21	59.84	65.77	69.35	66.35	71.29	76.37	69.68	72.77	65.10
3	Coarse Cereals	36.59	30.82	29.88	34.11	30.40	31.33	30.33	31.08	33.38	25.30
4	Total Cereals	166.67	170.96	177.46	185.19	179.29	188.70	196.38	185.74	199.48	163.04
5	Total Pulses	12.82	13.30	14.04	14.25	12.97	14.91	13.42	11.08	13.37	11.14
6	Total Foodgrains	179.48	184.26	191.50	199.44	192.26	203.61	209.80	196.81	212.85	174.19
7	Sugarcane	228.03	229.66	275.54	277.56	279.54	29.57	299.32	295.96	297.21	281.57
8	Total Oilseeds	20.11	21.50	21.34	24.38	21.32	24.75	20.72	18.44	20.66	15.06
9	Cotton @	11.40	10.74	11.89	14.23	10.85	12.29	11.53	9.52	10.00	8.72
10	Jute & Mesta #	8.59	8.43	9.08	11.13	11.02	9.81	10.56	10.56	11.67	11.38
11	Non-Foodgrains *	164.00	169.50	180.90	200.90	181.80	200.20	189.00	177.90	189.10	168.20
	All Crops *	151.60	157.30	165.20	175.70	165.40	178.20	176.90	167.30	178.30	150.70

Source : Department of Agriculture & Cooperation, Ministry of Agriculture

$: Final Estimate for 2002-2003

@ : Production in million bales of 170 kg. each

: Production in million bales of 180 kg. each

* : Index number base : 1981-82 = 100

The crop yields have increased greatly in India over the past 20-25 years. Most of these increases have been due to the development of crop varieties which respond to fertilizers. The different types of cropping systems practised in traditional agriculture have given way to systems involving only a few crops which are highly nutrient depleting but high yielding. The legumes, grasses, and millets which were regular components of cropping systems in Indian agriculture have largely been phased out in highly productive areas due to poor economic returns and replaced by high yielding rice, wheat, sugarcane, etc. As a result, the water level is receding at an alarming rate. This has created the problems of soil erosion and the destruction and disturbances to wild life habitats.

TABLE 5.2.3 : AREA UNDER PRINCIPAL CROPS

(Million hectare)

Sl. No.	Crops	1970-71	1980-81	1994-95	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03
1	2	3	4	6	7	8	9	10	11	12	13
1	Rice	37.6	40.2	42.8	43.4	43.4	44.8	45.2	44.7	44.9	40.3
2	Wheat	18.2	22.3	25.8	25.9	26.7	27.5	27.5	25.7	26.3	24.9
3	Pulses	22.5	22.5	23.0	22.4	22.9	23.5	21.1	20.3	22.0	20.0
4	Foodgrains	124.3	126.7	123.9	123.6	123.8	125.2	123.1	121.0	122.8	111.5
5	Cotton	7.6	7.8	7.9	9.1	8.9	9.3	8.7	8.5	9.1	7.7
6	Jute & Mesta	1.1	1.3	0.9	1.1	1.1	1.0	1.0	1.0	1.0	1.0
7	Sugarcane	2.6	2.7	3.9	4.2	3.9	4.1	4.2	4.3	4.4	4.4
8	Tobacco	0.5	0.5	0.4	0.4	0.5	0.5	0.4	0.3	0.5	0.5
9	Oilseeds	16.6	17.6	25.3	26.3	26.1	26.2	24.3	22.8	22.6	21.2

Source : Department of Agriculture and Cooperation, Ministry of Agricuture

TABLE 5.2.4(a) : CAPACITY AND PRODUCTION IN THE CHEMICAL INDUSTRY (INSECTICIDES) IN INDIA

(Thousand Tonnes)

Sl. No.	Products	1999-2000		2000-2001		2001-2002		2002-03		2003-04 (P)	
		Cap.	Production	Cap.	Production	Cap.	Production	Capacity	Production	Capacity	Production
1	2	3.0	4.0	5	6	7	8	9	10	11	12
	Insecticides										
1	B.H.C.	*	*	*	*	*	*	*	*	*	*
2	D.D.T.	6.3	3.6	6.3	3.8	6.3	3.5	6.3	2.9	4.2	4.5
3	Malathion	9.5	6.0	9.5	5.9	9.5	5.6	9.5	4.2	11	4.1
4	Parathion (Methyl)	4.0	1.9	4	2.0	4	2.1	4	1.9	4	1.3
5	Dimethoate	0.8	1.4	3.2	1.5	3.2	0.8	3.2	0.8	3.2	0.9
6	D.D.V.P.	3.9	2.5	3.9	2.6	3.9	2.8	3.9	2.5	4.3	3.5
7	Quinalphos	5.6	2.2	5.6	2.6	5.6	2.1	5.6	1.8	3.5	1.8
8	Monocrotophos	16.2	9.5	16.2	8.3	16.2	6.7	16.2	6.5	10.8	7.5
9	Phosphamidon	5.7	4.7	5.7	3.5	5.7	0.5	5.7	0.8	3.2	0.4
10	Phorate	7.5	6.1	7.5	6.1	7.5	4.8	7.5	3.2	8.2	5.1
11	Ethion	5.1	3.4	5.1	3.5	5.1	4.1	5.1	1.7	1.4	2.5
12	Endosulphan	10.1	8.3	10.1	8.5	10.1	4.5	10.1	3.7	10.1	3.7
13	Fenvalarate	2.1	1.4	2.1	1.6	2.1	1.2	2.1	0.5	2	0.9
14	Cypermethrin	4.6	3.8	4.6	4.4	4.6	5.1	4.6	5.1	4.5	5.2
15	Anilophos	0.6	0.9	1.2	0.8	1.2	0.6	1.2	0.4	1.2	0.3
16	Acephate	4.8	2.9	4.8	3.1	4.8	4.4	4.8	4.8	6.8	4
17	Chlorpyriphos	10.3	7.5	10.3	8.0	10.3	7	10.3	6.4	11.2	4.4
18	Phosalone	1.0	0.5	1	0.6	1	0.5	1	0.4	1	0.5
19	Metasystox	*	0.7	*	0.6	*	0.7	*	0.5	*	0.5
20	Abate	*	0.2	*	0.3	*	0	*	0.1	*	0
21	Fenthion	*	0.2	*	0.2	*	0.07	*	0.4	*	0.2
22	Triazaphos	*	0.8	*	0.8	*	1.5	*	1.2	*	2.1
23	Lindane	1.3	1.1	1.3	0.5	1.3	0.3	1.3	0.3	1.2	0.4
24	Temephos	0.1	0.0	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.1
25	Deltamethrin	0.3	0.1	0.3	0.1	0.3	0.1	0.3	0.2	0.4	0.2
26	Alphamethrin	0.4	0.4	0.4	0.1	0.4	0.3	0.4	0.2	0.2	0.2
Total		**100.2**	**70.1**	**103.3**	**69.6**	**103.3**	**59.5**	**103.3**	**50.6**	**92.6**	**54.3**

Source : Department of Chemicals & Petrochemicals, Ministry of Chemicals & Fertilizers

* : Not available

TABLE 5.2.4(b) : CAPACITY AND PRODUCTION IN THE CHEMICAL INDUSTRY IN INDIA (FUNGICIDES, HERBICIDES, WEEDICIDES, RODENTICIDES, FUMIGENTS)

(Thousand Tonnes)

Sl. No.	Products	1999-2000		2000-2001		2001-2002		2002-03		2003-04 (P)	
		Inst. Cap.	Production	Inst. Cap.	Production	Inst. Cap.	Production	Capacity	Production	Capacity	Production
1	2	3.0	4.0	5	6	7	8	9	10	11	12
I	**Fungicides**	**14.60**	**12.14**	**14.50**	**13.58**	**15.20**	**12.60**	**16.60**	**19.30**		
	1 Captan & Captafol	1.80	1.10	1.80	1.40	1.80	1.20	1.80	0.80	1.80	0.70
	2 Ziram	0.20	*	0.40	0.10	0.40	0.00	0.40	*	0.40	0.30
	3 Carbendazim (Bavistin)	1.20	0.90	1.20	0.70	1.10	0.70	1.80	1.30	1.50	0.80
	4 Calixin	0.20	0.04	0.20	0.04	0.20	0.06	0.20	0.10	0.20	NEG
	5 Mancozab	11.00	10.30	11.00	9.90	11.00	11.60	11.00	10.20	11.20	17.30
	6 Copper-Oxychloride	*	0.20	*	NEG	*	0.02	*	0.20	1.50	0.20
II	**Herbicides**	**3.80**	**2.00**	**3.80**	**1.50**	**3.80**	**0.60**	**3.80**	**0.20**	**1.60**	**0.5**
	1 2, 4-D	2.90	1.30	2.9	1.3	2.9	0.20	2.9	0	1.2	0.2
	2 Butachlor	0.90	0.70	0.9	0.2	0.9	0.40	0.9	0.2	0.4	0.3
III	**Weedicides**	**14.74**	**8.00**	**14.68**	**5.87**	**12.88**	**5.50**	**12.88**	**3.30**	**9.44**	**5.10**
	1 Isoproturon	8.50	4.60	8.50	3.80	8.50	3.80	8.5	2.7	6.4	4.4
	2 Glyphophate	1.80	1.70	1.80	0.70	2.00	0.40	2	0.1	2.6	0.3
	3 Paraquat	4.00	1.40	4.00	1.20	2.00	1.00	2	*	*	*
	4 Diuron	0.04	0.00	0.04	0.02	0.04	0.00	0.04	0.1	0.1	0.1
	5 Atrazin	0.10	0.10	0.04	0.10	0.04	0.20	0.04	0.2	0.04	0.1
	6 Fluchlorine	0.30	0.20	0.30	0.05	0.30	0.10	0.3	0.2	0.3	0.2
IV	**Rodenticides**	**3.20**	**2.30**	**3.20**	**3.10**	**3.20**	**2.50**	**3.20**	**2.20**	**4.10**	**1.40**
	1 Zinc Phosphide	0.90	0.50	0.90	0.60	0.90	0.30	0.9	0.2	0.9	0.2
	2 Aluminium Phosphide	2.30	1.80	2.30	2.50	2.30	2.20	2.3	2	3.2	1.2
V	**Fumigants**	**0.50**	**0.20**	**0.50**	**0.16**	**0.50**	**0.14**	**0.50**	**0.20**	**0.50**	**0.10**
	1 Methyl Bromide	0.30	0.10	0.30	0.06	0.30	0.04	0.3	0.1	0.3	0.0
	2 Dicofol	0.20	0.10	0.20	0.10	0.20	0.10	0.2	0.1	0.2	0.1

Source : Department of Chemicals & Petrochemicals, Ministry of Chemicals & Fertilizers

* : Not Available

TABLE 5.2.5 : STATE-WISE CONSUMPTION OF PESTICIDES

(MT's Technical Grade)

Sl. No.	Name of State/ U.T.s	1996-97	1997-98	1998-99	1999-00	2000-01
1	2	3	4	5	6	7
1	Andhra Pradesh	8702	7298	4741	4054	4000
3	Arunachal Pradesh	20	18	18	17	30
2	Assam	300	284	260	260	245
4	Bihar	1039	1150	834	832	853
6	Goa	2	2	4	4	6
5	Gujarat	4545	4642	4803	3646	2822
7	Haryana	5040	5045	5035	5025	5025
8	Himachal Pradesh	300	200	276	385	302
9	Jammu & Kashmir	63	78	75	26	1
	Jharkhand	–	–	–	–	150
10	Karnataka	3665	2962	2600	2484	2020
11	Kerala	1141	602	1161	1069	754
12	Madhya Pradesh	1159	1641	1643	1528	871
13	Maharashtra	4567	3649	3468	3614	3239
14	Manipur	31	20	31	21	20
15	Meghalaya	20	8	9	8	6
16	Mizoram	18	17	16	19	8
17	Nagaland	9	9	9	10	8
18	Orissa	885	924	942	998	1006
19	Punjab	7300	7150	6760	6972	7005
20	Rajasthan	3075	3211	3465	2547	3040
21	Sikkim	16	16	15	0.16	4
22	Tamil Nadu	1851	1809	1730	1685	1668
23	Tripura	22	19	16	17	11
24	Uttar Pradesh	7859	7444	7419	7459	7023
	Uttaranchal	–	–	–	–	–
25	West Bengal	4291	3882	3678	3370	3250
26	Andaman & Nicobar Islands	9	4	5	5	3
27	Chandigarh	3	3	3	4	2
28	Delhi	61	65	64	62	55
29	Dadra & Nagar Haveli	4	4	4	2	6
30	Daman and Diu	1	1	1	1	2
31	Lakshadweep	1	1	1	1	2
32	Pondicherry	115	81	71	70	65
	All-India	**56114**	**52239**	**49157**	**46195.16**	**43502**

Source : Department of Chemical and Petrochemicals, Ministry of Chemicals & Fertilizers and Data Book 2004, Indian Council of Agricultural Research

TABLE 5.2.6 : CONSUMPTION OF CHEMICAL FERTILIZERS

(Thousand Tonnes)

Sl. No.	Year	Nitrogen (N)	Phosphate (P_2O_5)	Potash (K_2O)	Total
1	2	3	4	5	6
1	1960-61	210.0	53.1	29.0	292.1
2	1970-71	1487.0	462.0	228.0	2177.0
3	1980-81	3678.1	1213.6	623.9	5515.6
4	1990-91	7997.2	3221.0	1328.0	12546.2
5	1991-92	8046.3	3321.2	1360.5	12728.0
6	1992-93	8426.8	2843.8	883.9	12154.5
7	1993-94	8788.3	2669.3	908.4	12366.0
8	1994-95	9507.1	2931.7	1124.7	13563.5
9	1995-96	9822.8	2897.5	1155.8	13876.1
10	1996-97	10301.7	2976.8	1029.6	14308.1
11	1997-98	10901.7	3913.6	1372.5	16187.8
12	1998-99	11353.8	4112.2	1331.5	16797.5
13	1999-2000(P)	11592.7	4798.3	1678.7	18069.7
14	2000-01(P)	10920.2	4214.6	1567.5	16702.3
15	2001-02(P)	11310.2	4382.4	1667.1	17359.7
16	2002-03(P)	10474.1	4018.8	1601.2	16094.1

Source : Department of Chemicals and Petrochemicals, Ministry of Chemicals & Fertilizers

P : Provisional

TABLE 5.3.1 : FREQUENTLY OCCURRING NATURAL DISASTERS IN INDIA

Sl. No.	Type	Location/ Area	Affected Population (in Million)
1	2	3	4
1	Cyclones	Entire 5700 km long coastline of Southern, Peninsular India covering 9 States viz Gujarat, Maharashtra,Goa, Karnataka, Kerala, Tamil Nadu, Andhra Pradesh, Orissa and West Bengal and Union Territory of Pondicherry besides Islands of Lakshadweep and Andaman and Nicobar	10
2	Floods	8 major river valleys spread over 40 million hectares of area in the entire country	260
3	Drought	About 68% of total sown area and 16% of total area of the country spread in 14 States of Andhra Pradesh, Bihar, Gujarat, Haryana, Jammu & Kashmir, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Rajasthan, Tamil Nadu, Uttar Pradesh, West Bengal & Himachal Pradesh covering a total of 116 districts and 746 blocks	86
4	Earthquake	56% of the total area of the countrysusceptible to seismic disturbances	400
5	Landslide	Entire sub Himalayan region and Western Ghats	10
6	Avalanche	Many parts of the Himalaya	1
7	Fires	States of Bihar, West Bengal, Orissa and north eastern States	140

Source : India: State of the Environment, 2001

India is prone to natural disasters. Due to its locational and geographical features, it is vulnerable to a number of natural hazards like cyclones, droughts, floods, earthquakes, fires, landslides and avalanches.

Natural disasters result in heavy economic losses, apart from the loss of human life and the hardship inflicted on the survivors. On an average, atleast one major disaster hits India every year, causing irrepairable damage to life and property.

TABLE 5.3.2 : MAJOR EARTHQUAKES IN INDIA

Sl. No.	Date	Lattitude (Degree N)	Longitude (Degree E)	Magnitude	Yield in Mega/ Others at Source	Region	Remarks
1	2	3	4	5	6	7	8
1	16.06.1819	24.00	70.00	8.0	12.59(0.62)	Kutch	About 2000 people killed
2	12.06.1897	25.00	92.00	8.7	63.1	Assam	One of the greatest earthquake of historical time Shillong city was razed to the ground 1542 killed.
3	04.04.1905	32.30	76.25	8.0	12.59(0.62)	Kangra	20000 lives lost
4	15.01.1934	26.60	86.80	8.3	25.12(1.25)	India-Nepal Border	Most severe in Indian history, More than 10000 killed
6	26.06.1941	12.40	92.50	8.1	15.85(0.79)	Andaman Islands	Flooding in port Blair
7	15.08.1950	28.46	96.66	8.5	39.81(1.99)	Assam	532 people killed
8	06.08.1988	25.14	95.12	5.8	0.79(0.04)	Burma-India Border	3 killed 11 injured
9	20.08.1988	26.78	86.61	6.5	0.04(0.02)	Nepal-India Border	1000 people killed, 1000 injured Extensive damage in Northern Bihar
10	19.10.1991	30.75	78.86	6.6	0.50(0.03)	West UP Hills(Uttarkashi)	768 people killed
11	30.09.1993	18.07	76.00	6.3	0.48(0.2)	Latur, Osmanabad	7601 people killed
12	22.05.1997			6.0		Jabalpur	38 People killed
13	29.03.1999	–	–	–	–	Uttar Pradesh	106 Human Lives lost, 395 Persons injured
14	26.01.2001	–	–	–	–	Gujarat	Over 20000 people killed, 150000 injured and 15900000 affected

Source : Ministry of Environment & Forests and State Forest Report 2001

The two thirds of India lies in the Seismic zones of moderate to severe intensity. The Himalayan Range, the Indo-gangetic plains and the Kuthch and Kathaiwar region of Western India are geologically the most unstable parts, and are most prone to earthquakes. The Himalayan frontal arc flanked by the chaman fault in the west constitutes one of the most seismically active intra-continental regions in the world. In a span of 53 years, four earthquakes, exceeding magnitude 8 on the Richter scale, occurred in this region. These are the Assam earthquakes of 1897 and 1950, the Kangra earthquake of 1905 and the Bihar-Nepal earthquake of 1935. Besides the Himalayan regions, the Union Territories of Andaman and Nicobar Islands are also quite vulnerable to earthquakes. Peninsular India comprises stable continental crust regions, which are considered stable since they are away from tectonic activity of the boundaries. These regions are considered seismically the least active but the Latur earthquake in Maharashtra on September 30, 1993 of magnitude 6.4 in the Richter scale showed that this region, too, is unstable and earthquake prone.

The Department of earthquake engineering, University of Roorkee was established in 1960 to carry out Research and Development, Consultancy and Training in Earthquake Engineering. The Department helps in designing earthquake resistant structure. They use various techniques of seismic methods of geophysics in assessing the status of a locality.

TABLE 5.3.3 : LIST OF IDENTIFIED DROUGHT PRONE DISTRICTS IN THE COUNTRY

Sl. No.	State/ District	No. of Taluka	Area of the District (Sq. Kms.)	As Per CWC's Study-1982		Percentage Area Affected
				No. of Taluka Affected by Drought	Area Affected by Drought (Sq. Kms)	
1	2	3	4	5	6	7
I	**Andhra Pradesh**	**79**	**125113.03**	**19**	**32839.51**	**26**
	1. Anantpur	11	19134.9	5	10455.8	55
	2. Chittoor	11	15143.1	–	–	–
	3. Cuddapah	9	15372.9	1	1473.7	10
	4. Hyderabad	9	7762.49	3	3157.9	41
	5. Kurnool	11	17600.4	2	3825.97	22
	6. Mahboob Nagar	12	18472	3	4285	23
	7. Nalgonda	7	14223.24	1	1772.05	12
	8. Prakasam	9	17404	4	7869	45
II	**Bihar**	**12**	**31364.6**	–	–	–
	9. Munger	4	7884.5	–	–	–
	10. Nawadah	1	2494	–	–	–
	11. Rohtas	2	7199.7	–	–	–
	12. Bhojpur	2	3971.1	–	–	–
	13. Aurangabad	1	3305	–	–	–
	14. Gaya	2	6510.3	–	–	–
III	**Gujarat**	**124**	**121238.9**	**103**	**106818.4**	**88**
	15. Ahmedabad	7	8565.9	5	7530.3	88
	16. Amreli	10	6711.4	10	6711.4	100
	17. Banaskantha	11	12404.3	9	11018.1	89
	18. Bhavnagar	12	9786.3	12	9786.3	100
	19. Bharuch	11	7805.7	11	7805.7	100
	20. Jamnagar	10	10143	10	10143	100
	21. Kheda	10	6888.1	3	2407	35
	22. Kachchh	9	19476.5	9	19476.5	100
	23. Mahesana	11	9011.8	3	2803.5	31
	24. Panchmahal	11	8849.8	10	7975.1	90
	25. Rajkot	13	11152.3	12	10667.7	96
	26. Surendra Nagar	9	10443.8	9	10443.8	100
IV	**Haryana**	**15**	**16587.85**	**8**	**8338.5**	**50**
	27. Bhiwani	4	4657.38	4	4657.38	100
	28. Gurgaon	5	4862.8	2	1462.44	30
	29. Mahendragarh	3	3221.67	2	2218.68	69
	30. Rohtak	3	3846	–	–	–
V	**Jammu & Kashmir**	**8**	**15999.3**	**2**	**2407.6**	**15**
	31. Doda	4	11691	–	–	–
	32. Udhampur	4	4308.3	2	2407.6	56
VI	**Jharkhand**	**3**	**12019.9**	–	–	–
	33. Palamau	3	12019.9	–	–	–

TABLE 5.3.3 : LIST OF IDENTIFIED DROUGHT PRONE DISTRICTS IN THE COUNTRY-Contd.

Sl. No.	State/ District	No. of Taluka	Area of the District (Sq. Kms.)	As Per CWC's Study-1982		Percentage Area Affected
				No. of Taluka Affected by Drought	Area Affected by Drought (Sq. Kms)	
1	2	3	4	5	6	7
VII	**Karnataka**	**139**	**152163.33**	**42**	**57645.54**	**38**
	34. Bangalore	11	7949.5	–	–	–
	35. Belgaum	10	13460.8	1	1996	15
	36. Bellary	8	9548.5	3	3994.3	42
	37. Bijapur	11	17092.83	7	12477.44	73
	38. Chikmagalur	7	7222	1	804.8	11
	39. Chitradurga	9	10754.5	5	7477.5	70
	40. Dharwar	17	13480.1	3	2772.32	21
	41. Gulbarga	10	16167.8	5	8131	50
	42. Hasan	8	6833.3	1	1277.8	19
	43. Kolar	11	8215.2	4	3444.7	42
	44. Mandya	7	4961	1	1034.28	21
	45. Mysore	11	11947	1	1235.9	10
	46. Raichur	9	13972.4	4	6347.6	45
	47. Tumkur	10	10557.7	6	6651.9	63
VIII	**Madhya Pradesh**	**47**	**87219.52**	**26**	**37307.93**	**43**
	48. Betul	3	7062.9	–	–	–
	49. Datia	2	2034	–	–	–
	50. Dewas	5	6723.5	3	4219	63
	51. Dhar	5	8195.41	4	6287	77
	52. Jhabua	5	6792.8	5	6792.8	100
	53. Khandwa	3	6379.6	1	1865	29
	54. Khargone	8	13490	5	6955.37	52
	55. Shahdol	4	13860.06	–	–	–
	56. Shajapur	4	6178	3	4533.07	73
	57. Sidhi	3	10390.75	1	3768.49	36
	58. Ujjain	5	6112.5	4	4887.2	80
IX	**Maharashtra**	**100**	**123767.05**	**45**	**57664.7**	47
	59. Ahmednagar	13	16762.2	7	9491.8	57
	60. Aurangabad	12	16385	2	3111.3	19
	61. Bir	7	11169	3	4595	41
	62. Nasik	13	15631.5	7	8098.9	52
	63. Osmandabad	11	14027	7	9515	68
	64. Pune	14	15688.2	4	4932.1	31
	65. Sangli	8	8610.25	5	5939.66	69
	66. Satara	11	10436.9	4	3878.5	37
	67. Solapur	11	15057	6	8102.5	54
X	**Orissa**	**6**	**22862.41**	**1**	**2002.07**	9
	68. Phulbani	3	11090.41	1	2002.07	18
	69. Kalahandi	3	11771	–	–	–

TABLE 5.3.3 : LIST OF IDENTIFIED DROUGHT PRONE DISTRICTS IN THE COUNTRY-Concld.

Sl. No.	State/ District	No. of Taluka	Area of the District (Sq. Kms.)	As Per CWC's Study-1982		Percentage Area Affected
				No. of Taluka Affected by Drought	Area Affected by Drought (Sq. Kms)	
1	2	3	4	5	6	7
XI	**Rajasthan**	**76**	**218950.45**	**57**	**194203.27**	**89**
	70. Ajmer	5	8449.6	3	4317.8	51
	71. Banswara	5	5055	5	5055	100
	72. Barmer	5	29521.4	5	29521.4	100
	73. Bikaner	4	27396.4	4	27396.4	100
	74. Churu	7	16861.35	7	16861.35	100
	75. Dungarpur	3	3770	3	3770	100
	76. Jaisalmer	2	41674.3	2	41674.3	100
	77. Jalore	4	10554.4	3	8308.8	79
	78. Jhunjhunun	4	5928	3	4460.2	75
	79. Jodhpur	5	22633.8	5	22633.8	100
	80. Nagpur	8	17628	8	17628	100
	81. Pali	7	12211.2	2	4763.8	39
	82. Udaipur	17	17267	7	7812.42	45
XII	**Tamilnadu**	**77**	**84091.14**	**8**	**7451.66**	9
	83. Coimbatore	10	15603.79	–	–	–
	84. Dharmapuri	8	9718.6	1	1227.8	13
	85. Madurai	12	12264.1	–	–	–
	86. Ramanathapuram	12	12575.49	3	3090.36	25
	87. Salem	9	8543	–	–	–
	88. Tiruchirapalli	10	11078.86	1	943.3	9
	89. Tirunelveli	12	12505.5	3	2190.2	18
	90. Kanyakumari	4	1701.8	–	–	–
XIII	**Uttar Pradesh**	**31**	**43033.1**	**4**	**4609.4**	11
	91. Allahabad	8	7255	–	–	–
	92. Banda	5	7645.1	1	1354.4	18
	93. Hamirpur	6	7192	1	1072	45
	94. Jalaun	4	4549	2	2183	48
	95. Mirzapur	4	11301	–	–	–
	96. Varanasi	4	5091	–	–	–
XIV	**West Bengal**	**8**	**26720.8**	–	–	–
	97. Bankura	2	6855.8	–	–	–
	98. Midnapur	5	13606	–	–	–
	99. Puruliya	1	6259	–	–	–
				–	–	–
	Total	**725**	**1081131.38 in 99 Districts**	**315**	**511288.64 in 74 Districts**	**47**

Source : Central Water Commission.

Criteria adopted by CWC:

"Drought is a situation occurring in an area when the annual rainfall is less then 75% of the normal in 20% of the years examined. Any Taluka or equivalent unit where 30% or more of the cultivated areas are irrigated, is considered to have reached a stage which enable it to sustain a reasonably stable agriculture and to be reasonably protected against drought.

TABLE 5.3.4 : FLOOD AFFECTED AREA & FLOOD DAMAGES IN INDIA (abstract for the period 1953 to 2002)

Sl. No.	Item	Unit	Average Flood Damage During 1953-2002	Maximum Damage (Year)	Damage During 2002 (Tentative)
1	2	3	4	5	6
1	Area Affected	Million ha.	7.38	17.50 (1978)	2.87
2	Population Affected	Million	32.97	70.45 (1978)	22.41
3	Human Lives Lost	Nos.	1560.00	11316.00 (1977)	640.00
4	Cattle Lost	Nos.	91555	618248 (1979)	3647.00
5	Cropped Area Affected	Million ha.	3.48	10.15 (1988)	1.27
6	Value of Damage to Crops	Rs. Crore	596.97	2510.90 (1988)	547.13
7	Houses Damaged	Million	1.19	3.51 (1978)	0.45
8	Value of Damage to Houses	Rs. Crore	189.10	1307.89 (1995)	455.17
9	Value of Damage to Public Utilities	Rs. Crore	566.24	3171.40 (1998)	486.49
10	Value of Damage to Houses, Crops and Public Utilities	Rs. Crore	1376.08	5845.98 (1998)	1488.79

Source : Central Water Commission.

Note : Figures for 1998, 1999, 2000, 2001 & 2002 are tentative

TABLE 5.3.5 : STATEWISE DAMAGE DUE TO HEAVY RAINS, FLOOD, CYCLONE DURING SOUTH-WEST MONSOON –2003 (Provisional)

(As on 21-11-2003)

Sl. No.	States/UTs	Calamity	Affected							Damage				Lives lost	
			Total Districts (No.)	Districts (No.)	Talukas /Blocks /Mpls.	Villages	Total Area (in lakh Ha.)	Population (in lakh)	Crop Area (in lakh Ha.)	Estimated value of crops (Rs. in crores)	Houses (No.)	Estimated value of houses (Rs. In Crores)	Estimated value of Public proper-ties (Rs. in Crores)	Human (No.)	Cattle (No.)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Arunachal Pradesh	HR/F/L	15	15	12	68	0.48	0.11	0.48	63.66	2115	NR	263.32	43	12785
2	Assam	HR/F	24	22	NR	4962	7.01	52.75	3.82	NR	4641	2.05	189.55	30	108
3	Bihar	HR/F	38	24	172	5064	6.05	75.69	6.05	62.66	45175	19.92	10.35	241	106
4	Chhattisgarh	F	16	11	52	1996	0.85	6.84	0.85	53.87	44367	45.92	230.71	30	3058
5	Gujarat	HR	25	11	29	1304	1.09	21	1.09	30.36	13878	NR	NR	139	1071
6	Himachal Pradesh	HR/F	12	10	NR	NR	0.32	3.03	0.16	17.79	2924	60.06	87.96	89	452
7	Karnataka	F/L	NR	4	4	75	0.07	0.013	0.07	NR	4183	1.04	20.45	29	23
8	Kerala	HR/F/L	14	14	NR	498	0.28	0.12	0.28	0.36	2886	1.72	0.01	32	Nil
9	Orissa	HR/F	30	23	1484	6846	4.78	35.76	4.78	87	184843	NR	NR	60	2474
10	Madhya Pradesh	HR/F	48	2	NR	2164	1.27	14.36	1.27	NR	30511	23.64	51.6	18	735
11	Maharashtra	HR/F/Fire/lightning	35	34	NR	2717	NR	0.6	NR	NR	9459	4.22	NR	260	977
12	Meghalaya	HR/F		1	NR	2	NR	Neg.	NR	NR	3	NR	NR	3	Nil
13	Rajasthan	FF	32	1	3	181	0.17	NR	0.17	NR	2564	0.45	2.05	Nil	NR
14	Uttar Pradesh	HR/F/ lightning	71	54	202	17148	23.72	135.92	12.92	NR	322244	NR	NR	980	3304
15	Uttaranchal	HR/L	13	12	NR	312	NR	NR	NR	NR	499	NR	NR	20	300
16	West Bengal	HR/L	19	7	30	365	0.04	1.64	0.04	1.2	11917	0.2	0.25	18	NR
TOTAL			**392**	**245**	**1998**	**43702**	**46.13**	**347.833**	**31.98**	**316.9**	**682209**	**159.22**	**856.25**	**1992**	**25393**

Source : Disaster Management Division, Ministry of Home Affairs
Note : F - Flood, FF- Flash Flood, L - Landslide, HR - Heavy Rains, C - Cyclone, NR - Not Reported, Neg.-Negligible

TABLE 5.3.6 : STATEWISE DAMAGE DUE TO HEAVY RAINS, CYCLONE ETC. DURING PRE-MONSOON, 1999

as on 8.12.1999

Sl. No.	State/UT's	Period/Date of Occurrence	Total Districts (No.)	District Affected (No.)	Villages Affected (No.)	Area Affected (Lakh Hectares)	Population Affected (Lakh)	Damage to crop Area (Lakh Ha.)	Value of (Rs. Lakhs)	Damage to Houses/ Huts (No.)	Value of Houses Damaged (Rs. lakhs)	Human Lives Lost (No.)	Animals Lost (No.)
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Arunachal Pradesh	9 May, 1999	14	1	–	–	0.02	–	–	17	–	1	–
2	Gujarat	17 May. 1999	24	3	–	–	–	–	–	–	–	453	–
3	Kerala	4 Feb.- 9 April, 99	14	14	139	55.36	–	1.00	541.61	2898	72.07	25	–
Total			**52**	**18**	**139**	**55.36**	**0.02**	**1**	**541.61**	**2915**	**72.07**	**479**	

Source : Natural Disaster Management, Ministry of Agriculture

TABLE 5.3.7 : STATE-WISE DAMAGE DUE TO HEAVY RAINS, FLOOD AND SUPER CYCLONIC STORMS DURING NORTH-EAST MONSOON –1999

(As on 23-2-2000)

Sl. No.	State/UT's	Period/Date of Occurrence	Calamity	Total Districts (No.)	District Affected (No.)	Villages Affected (No.)	Area Affected (Lakh Hectares)	Population Affected (Lakh)	Damage to Crop Area (Lakh Ha.)	Damage to Houses/ Huts (No.)	Human Lives Lost (No.)	Animals Lost (No.)	No. of Persons Injured (No.)	Value of Crops Damaged (Rs. In Lakhs)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Andhra Pradesh	17-18 Oct. 99	Cyclone	23	1	1044	–	1.89	–	3425	3	388	–	–
2	Kerala	22 oct.- 22 Nov. 99	H.R./Lig./Lan.	14	14	50	–	–	–	1218	21	–	–	110.35
3	Orissa	17-18 Oct. 99	Cyclone	30	4	5181	1.58	37.47	1.58	331580	199	10578	406	–
		29-30 Oct. 99	Super Cyclone	30	12	14643	18.43	129.22	18.43	1828532	9887	444531	2507	–
4	Tamilnadu	1st Oct. - 15 Dec.99	Heavy Rains	30	29	–	–	–	0.20	36072	103	573		–
5	West Bengal	28-29 Oct. 99	Super Cyclone	18	4	1109 & 1901*	1.02	7.85	0.34	16240	–	–	2913	5773.00

Source : Natural Disaster Management, Ministry of Agriculture
* : Mandals/Mouzas

TABLE 5.3.8 : INFORMATION ON DROUGHT-EXTENT OF DAMAGE, 2001-2002

(As on December 2001)

Sl. No.	State/UT's	Total District (No.)	District Affected (No.)	Villages Affected (No.)	Population Affected (Lakh)	Damage to Crop Area (Lakh Ha.)	Estimated Value of Dameged Crop (Rs. In Thousand)	Cattle Population Affected (In Lakhs)
1	2	3	4	5	6	7	8	9
1	Andhra Pradesh	23	22	142	61.55	17.69	NR	NR
2	Bihar	37	32	NR	NR	3	NR	NR
3	Karnataka	27	15	NR	NR	16.22	NR	NR
4	Madhya Pradesh	45	22	14851	26.64	9.53	NR	34.28
5	Maharashtra	35	12	7262	NR	21	NR	NR
Total		**167**	**103**	**22255**	**88.19**	**67.44**	**0**	**34.28**

Source : Natural Disaster Management, Ministry of Agriculture

TABLE 5.3.9 : DAMAGE DUE TO EARTHQUAKE DURING 2001-2002

(As on 27.11.2001)

Sl. No.	State	Priod of Occurrenc	Total Districts (No.)	District Affected (No.)	Talukas/ Blocks/ Mpls.	Villages Affected (No.)	Population Affected (Lakh)	Damage to Houses/ Huts (No. in Lakh)	Estimaed Value of Houses (Rs in Crores)	Estimaed Value of Public Properties . (Rs in Crores)	Human Lives Lost (No.)	Animals Lost (No.)
1	2	3	4	5	6	7	8	9	10	11	12	13
1	Gujarat	26.01.2001	25	21	181	7633	157	12.54	–	21262	13805	20717

Source : Natural Disaster Management, Ministry of Agriculture

TABLE 5.3.10 : INDIA'S MAJOR NATURAL DISASTERS SINCE 1980

Sl. No.	Year	Type	Affected Population Location/ Area	Loss of Human (Million)	Life	Loss to Crops and Property
1	1980	Floods	Uttar Pradesh	30	1525	Rs. 2.0 Billion
2	1981	Floods	Uttar Pradesh	13	362	1.5 Million hectares of cropped area affected
3	1982	Floods	Orissa	10	1000	3 Million hectares of agricultural land affected. Loss estimated to run into thousands of millions of Rupees
4	1982	Cyclone	Saurashtra	–	514	Livestock death toll nearly 0.15 million.Loss to crops estimated at about Rs. 1.27 Billion
5	1983	Cyclone	Andhra Pradesh	–	134	Livestock death toll-42800. Damage to crops estimated at Rs. 0.34 Billion
6	1984	Cyclone	Andhra Pradesh and Tamil Nadu	–	658	Livestock death toll-90650. Damage to crops estimated at Rs. 2.32 Billion
7	1985	Floods	Haryana, Punjab and Uttar Pradesh	–	Heavy Toll	Large area of standing Kharif crop affected heavily
8	1986	Floods	Andhra Pradesh, Bihar and Uttar Pradesh	–	Heavy Toll	Large area of standing Kharif crop affected heavily
9	1987	Floods	Assam, Bihr and West Bengal	–	Over 1400	–
10	1988	Cyclone	West Bengal	–	532	Livestock death toll-57604
11	1989	Floods	Andhra Pradesh, Assam, Gujarat, Himachal Pradesh, Jammu and Kashmir, Karnataka, Maharashtra, Orissa, Uttar Pradesh and West Bengal	–	Over 1400	–
12	1990	*	Cyclone Andhra Pradesh and Tamil Nadu	7.78	928	Rs. 22.470 Billion
13	1991	*	Earthquake Uttarkashi, Uttar Pradesh	0.4	768	Rs. 0.890 Billion
14	1992	Drought	Maharashtra			Rs. 28.23 Billion
15	1993	*	Floods Arunachal Pradesh, Assam, Bihar, Gujarat, Haryana, Himachal Pradesh, J & K, Mizoram, Punjab, Rajasthan, Tripura and Uttar Pradesh	28.8	1643	Rs. 21.060 Billion
16	1994	Cyclone	Andhra Pradesh and Tamil Nadu	–	226	Loss to propertty estimated at Rs. 6.12 Billion in Tamil Nadu and 444194 Hectares of land in Andhra Pradesh
17	1995	Floods	Large parts of the country	–	1360	Property worth Rs. 17.7 Billion and crop in 2.35 Million Hectares dameaged
18	1996	Floods	Large parts of the country	–	1700	Property worth Rs. 22.0 Billion and crop in 20.0 Million Hectares dameaged
19	1996	Cyclone	Andhra Pradesh	–	1058	0.3 Million houses fully and a similar number partially damaged. 0.1 Million Hectares of crop damaged. Loss to property worth Rs. 61.26 Billion.
20	1997*	Earthquake	Jabalpur	–	39	–
21	1998*	Earthquake	Chamoli	–	100	–
22	1999**	Cyclone	Orissa	12.9	9887	1.8 Million Hectares of crop area and 1.6 Houses damaged
23	2001	Earthquake	Gujarat			Over 20,000 people killed, 1,50,000 injured and 1,59,00,000 affected, 12.54 lakhs house damaged

Source : India: State of Environment Report 2001 & State Forest Report, 2001

* : State of the Environment: India 1995, Ministry of Environment and Forests, Government of India

** : Minstry of Agrivulture

45	Laterite	Tonne	591875	594665	795017	605598	615271	638220	739098
46	Limestone	000 t	110417	110968	128787	127202	130912	155742	154125
47	Lime Kankar	Tonne	378844	252125	206767	228926	171635	310435	349259
48	Limeshell	Tonne	82294	91761	98033	82008	128497	119931	134371

TABLE 5.4.1 : NUMBER OF REPORTING MINES IN INDIA
(Excluding atomic and minor minerals)

TABLE 5.4.2 : PRODUCTION [1] OF MINERALS-Concld.
(Excluding atomic and minor minerals)

Sl. No.	Minerals	Unit	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04(P)
1	2	3	6	7	8	9	10	11	12
49	Magnesite	Tonne	373520	349852	325764	317765	287985	278267	322540
50	Mica (Crude)	Tonne	1697	1484	1807	1154	2026	1232	1091
51	Mica (Waste & Scrap)[2]	Tonne	909	1067	1579	2963	4069	2342	3110
52	Ochre	Tonne	358155	375371	424019	390019	612663	778540	804884
53	Perlite	Tonne	80	207	383	274	176	283	279
54	Pyrites	Tonne	125474	88730	9539	-	-	-	-
55	Pyrophyllite	Tonne	103022	91924	107458	148346	150345	147233	167159
56	Pyroxenite	Tonne	-	-	-	-	169995	256381	244628
57	Quartz	Tonne	209133	253859	251157	302226	248372	271267	279385
58	Quartzite	Tonne	58714	45109	60506	55311	26793	39313	57509
59	Silica Sand	Tonne	1451156	1718325	1558419	2357601	1722061	2017282	2446883
60	Sand (Others)	Tonne	2060426	2589600	2152751	1817439	1982427	2026477	1859365
61	Salt (Rock)	Tonne	2801	2607	2813	2530	2679	1620	1793
62	Shale	Tonne	614198	816492	779949	828422	914879	1276207	1901697
63	Slate	Tonne	10655	9711	10559	10046	4859	6841	6933
64	Steatite	Tonne	474541	481554	557112	553241	598366	688135	730462
65	Selenite	Tonne					20705	18759	18556
66	Sulphur [3]	Tonne	12852	14889	24883	62047	85818	102977	108856
67	Vermiculite	Tonne	4699	4274	3123	5003	5097	5499	3264
68	Wollastonite	Tonne	97742	94700	117094	121891	136420	178298	150804

Source : Indian Bureau of Mines/website www.coal.nic.in
(1) : Excluding the minerals declared as prescribed substances under the Atomic Energy Act 1962.
(2) : Includes the mine waste and waste obtained while dressing of crude mica at the mine site
(3) : Obtained as by-product from fertilizer plants and oil refineries. P : Provisional;

TABLE 5.4.3 : INFORMATION ON REHABILITATION OF MINING LAND/ RECLAIMATION OF ABANDONED MINES

Sl. No.	Item	For the Year 2002-2003	Cumulative
1	2	3	4
1	No. of abandoned mines	11	84
2	No. of abandoned mines reclaimed	4	40
3	Total area reclaimed in abnandoned mines (hect.)	31.35	636.17
4	No. of mines (working) where reclaimation / rehabilitation is being carried out	146	689
5	Area of such reclaimed / rehabilitation in working mines (in hect.)	615.45	8723.97

Source : Indian Bureau of Mines

TABLE 5.4.4 : STATUS OF AFFORESTATION IN MAJOR NON-COAL MINES UPTO 2002-03

Sl. No.	Minerals	Mines Covered	Area Covered (Hects.)	Trees Planted	Trees Survived	Survival Rate (%)
1	2	3	4	5	6	7
1	Bauxite	83	1710.36	5615106	4218162	75.12
2	Chromite	14	401.39	1753367	1095825	62.50
3	Copper	7	353.77	1333360	844920	63.37
4	Dolomite	67	301.88	496853	333579	67.14
5	Gold	5	412.00	906400	634480	70.00
6	Iron Ore	130	8775.55	26238892	18027837	68.71
7	Iron and Manganese	31	203.09	632314	953085	150.73
8	Lead & Zinc Ore	9	1363.50	699400	624250	89.26
9	Limestone	397	9351.24	14669327	10730517	73.15
10	Manganese Ore	57	2154.27	5453113	3538974	64.90
11	Magnesite	18	514.27	472286	319817	67.72
12	Pyrites	1	7.00	20750	14715	70.92
13	Others Minerals	404	2099.27	2950366	1954286	66.24
	Total	**1223**	**27647.59**	**61241534**	**43290447**	**70.69**

Source : Indian Bureau of Mines

TABLE 5.4.5 : MINING MACHINERY IN METALLIFERROUS OPEN CAST MECHANISED MINES DURING 2001-02 & 2002-03 (Excluding Fuel, Atomic and Minor Minerals)

Sl. No.	Machinery	2001-02		2002-03	
		In Use	In Reserve	In Use	In Reserve
1	2	3	4	5	6
1	Dipper Shovels	653	61	588	47
2	Loaders	500	22	492	16
3	Bulldozers	451	39	465	24
4	Motor Graders	69	3	56	4
5	Haulers/Dumpers	4273	259	4489	219
6	Drills	945	159	853	124
7	Crushers	272	23	272	12
8	Air Compressors	816	132	726	104
9	Locomotives	28	9	22	9
10	Back Hoe	346	15	377	17
11	Cranes	131	14	132	12
12	Surface Miner	13	–	6	–
13	Drag Lines	1	–	–	1

Source : Indian Bureau of Mines

CHAPTER SIX

WATER

6.1 India is rich in surface water resources. Average annual precipitation is nearly 4000 cubic km. and the average flow in the river system is estimated to be 1880 cubic km. Because of concentration of rains only in the three monsoon months, the utilizable quantum of water is about 690 cubic km. However, conditions vary widely from region to region. Whereas, some regions are drought affected, others are frequently flooded. With the rapid increase in the population, the demand for irrigation, human and industrial consumption of water has increased considerably, thereby causing depletion of water resources. The assumption that "Fresh water is a gift of God which would continue to be available in perpetuity and in abundance" is under challenge. The main preoccupation of water resources development in the country is the extension and improvement of irrigation and hydel power generation. Water requirements for industrial and domestic use are met partly from reservoirs constructed and managed by the irrigation department. The agriculture production technologies have put a lot of stress on underground water resources.

River Water

6.2 Rivers are the lifeline of majority of population in cities, towns and villages and most of these are considered as sacred. Every river stretch has a distinct water use like bathing, drinking, municipal supply, navigation, irrigation and fishing, sports, etc. Simultaneously, it is also used as receptacle for discharge of industrial effluent, municipal sewage and dumping of solid wastes. The Water (Prevention and Control of Pollution) Act, 1974 is aimed to support the quality of various designated best uses of water bodies. The Water Quality Atlas of the Indian River System has been prepared by CPCB on the basis of five major uses of the river water such as:

(a) Drinking water source without conventional treatment but after disinfection;

(b) Outdoor bathing organized;

(c) Drinking water source but with conventional treatment followed by disinfection;

(d) Propagation of wildlife, fisheries;

(e) Irrigation, industrial cooling, controlled waste disposal.

For maintaining the quality of river water, the pollution levels in rivers have been detected by monitoring limited number of the physico-chemical parameters, which could only determine the changes in chemical characteristics of water bodies. Deterioration in water quality, over the past several years has gradually rendered the river water quality unsuitable for various beneficial purposes.

Monitoring of Rivers

6.3 The river water quality monitoring is most essential aspect of restoring the water quality. The Central Pollution Control Board (CPCB) has undertaken the responsibility to monitor the quality of water through 495 monitoring stations located in various water bodies all over the country. This is done through three major schemes 1) Global Environmental Monitoring System (GEMS)- 50 stations, 2) Monitoring of Indian National Aquatic Resources (MINARS) - 430 stations and 3) Yamuna Action Plan (YAP) - 15 stations.

Biological Water Quality Evaluation and Criteria

6.4 There are two methods adopted for water quality evaluation which are complementary to each other.

1. Saprobic Score (BMWP)

This methodology involves inventory of the presence of benthic macro-invertibrate fauna up to the family level with the taxonomic precision. All possible families having saprobic indicator value are classified on score scale of 1 to 10 according to their preference for saprobic water quality. The saprobic scores of all the families are registered and averaged to produce BMWP score.

2. Diversity Score (Sequential Comparison)

This method involves pairwise comparison of sequentially encountered individuals and the difference of two benthic animals can be observed upto the species level, where no taxonomic skill is required. The diversity is the ratio of total no. of different animals (runs) and the total number of organisms encountered. The ratio of diversity has a value between 0 and 1.

Water Pollution

6.5 The types and sources of water contamination include "point" sources of pollution which usually refers to wastes being discharged from a pipe; and "non point" sources, which means all other sources such as storm water runoff (which picks up oils and other contaminants from various areas), irrigation (which carries fertilizers and pesticides into groundwater), leaks from storage tanks and leakage from disposal sites. The non-point sources are technically the most difficult to regulate in India. Water pollution comes from three main sources: domestic sewage, industrial effluents and run-off from activities such as agriculture. Water pollution from domestic and human wastewater causes many severe water borne diseases. The problem of water pollution due to industries is because of the inadequate measures adopted for effluent treatment than to the intensity of industrial activities. The 13 major water polluting industries have been identified and are closely monitored by the Central Pollution Control Board.

6.6 Access to safe drinking water remains an urgent need as about 70.5% of the households in the urban area and 8.7 % in rural areas receive organized piped water-supply and the rest have to depend on surface or ground water which is untreated. The diseases commonly caused due to contaminated water are diarrhea, trachoma, intestinal worms, hepatitis, etc. The most common contamination in the water is from the disease bearing human wastes, which is usually detected by measuring fecal coliform levels. Inadequate access to safe drinking water and sanitation facilities leads to higher infant mortality and intestinal diseases.

6.7 An uncontrolled disposal of urban waste into water bodies, open dumps and poorly designed landfills, causes contamination of surface water and ground water. For industries, surface water is the main source for drawing water and discharging effluents. Industrial wastes containing heavy metals such as mercury, chromium, lead and arsenic can threaten or destroy marine life besides polluting aquatic food resources.

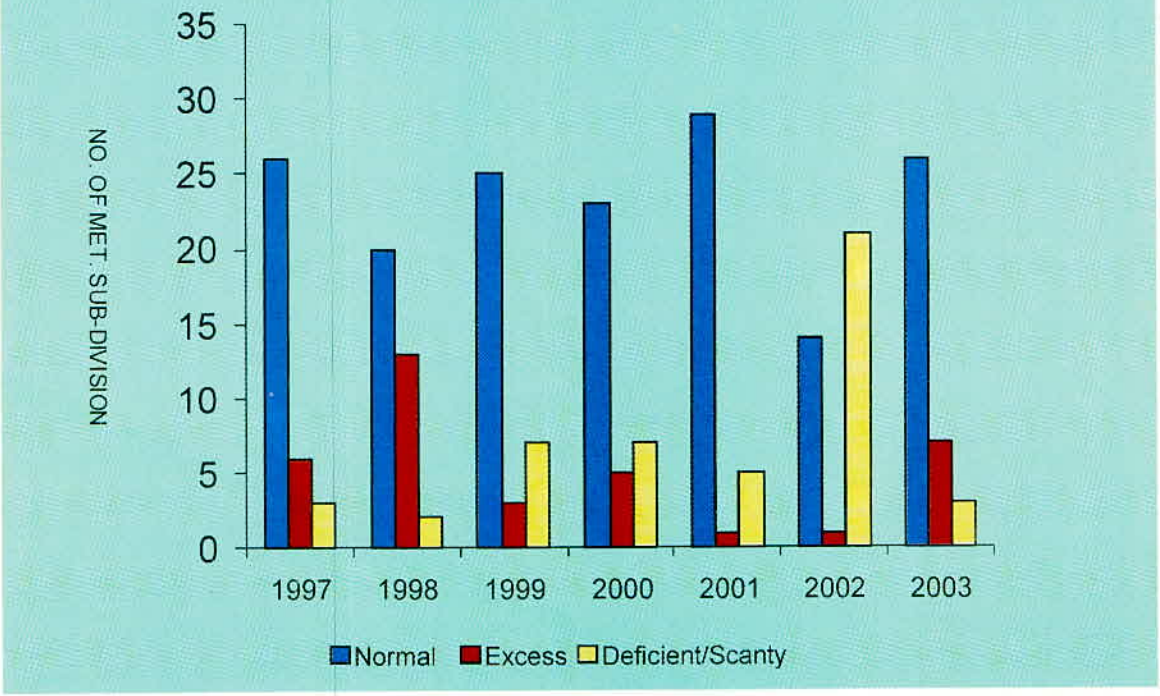
TABLE 6.1.1 MONSOON PERFORMANCE

(June-September)

Sl. No.	Year	Number of Meteorological Sub-Divisions			Percentage of Districts With Normal/Excess Rainfall	Percentage of Long Period Average Rainfall for the Country as a Whole
		Normal	Excess	Deficient/Scanty		
1	2	3	4	5	6	7
1	1997	26	6	3	81	102
2	1998	20	13	2	81	106
3	1999	25	3	7	67	96
4	2000	23	5	7	66	92
5	2001	29	1	5	68	92
6	2002	14	1	21	44	81
7	2003	26	7	3	75	102

Source : India Meteorological Department

CHART 9 : MONSOON PERFORMENCE (JUNE-SEPTEMBER)



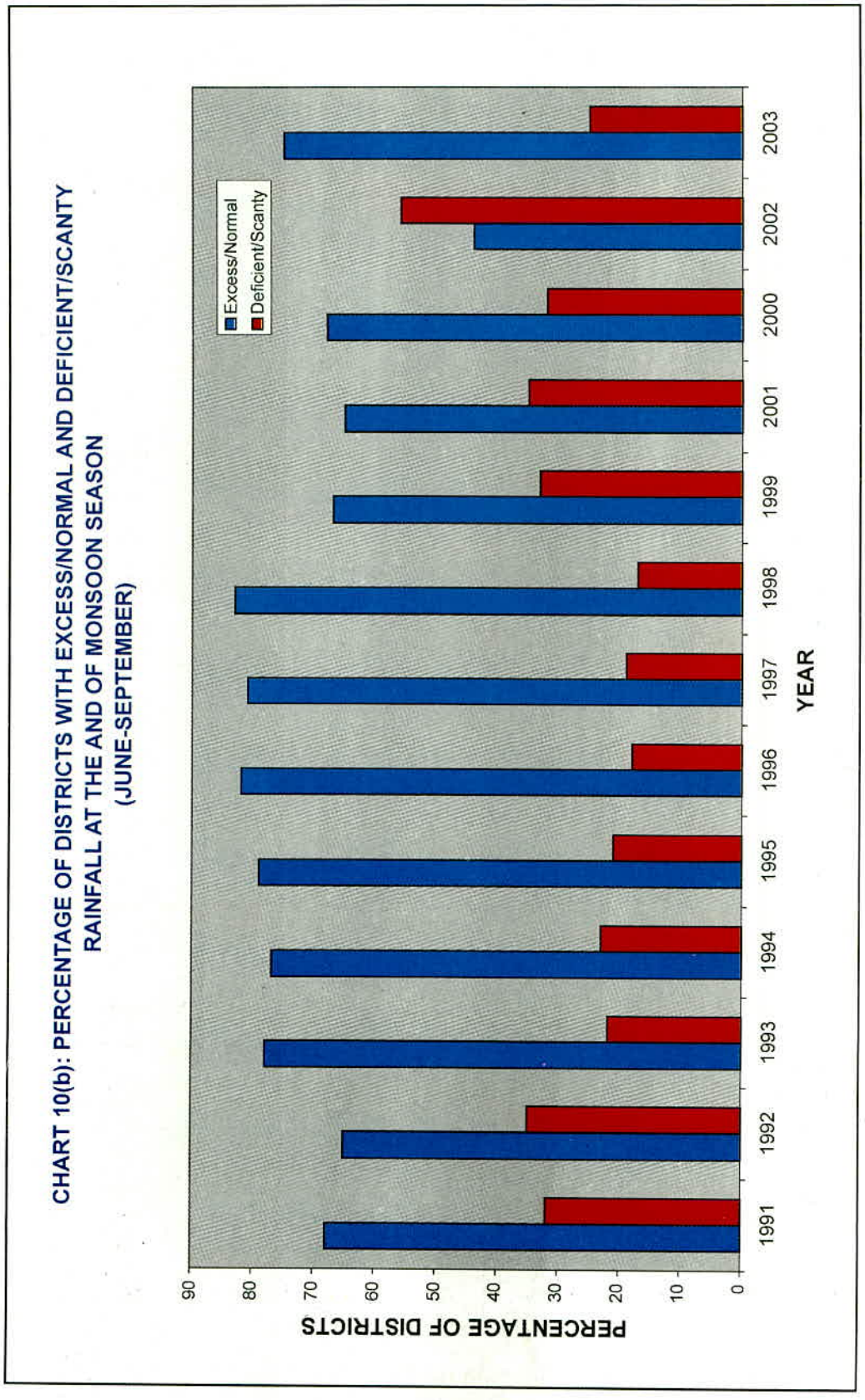


CHART 10(b): PERCENTAGE OF DISTRICTS WITH EXCESS/NORMAL AND DEFICIENT/SCANTY RAINFALL AT THE AND OF MONSOON SEASON (JUNE-SEPTEMBER)
Excess/Normal
Deficient/Scanty
PERCENTAGE OF DISTRICTS
0
10
20
30
40
50
60
70
80
90
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
YEAR

TABLE 6.1.7 : WATER FLOW IN STREAM FOR THE PERIOD 1997-98 to 2002-03

(Cusecs)

Sl. No.	Name of Basin/River	Name of Guage Station		No. of CWC Sites	Year for Which Data Given	Maximum Flow		Minimum Flow	
		First Site	Last Site			First Site	Last Site	First Site	Last Site
1	2	3	4	5	6	7	8	9	10
1	Mahi	Mataji	Khanpur	6	1997-98	2210.00	11956.00	0.00	7.748
2	Tapi	Dedtalai	Ghala	12	1998-99	13000.00	10040.00	0.00	10.000
3	Narmada	Dindori	Garudeshwar	21	1998-99	1256.00	21743.00	1.28	54.710
4	Godavari	Ghargaon	Polavaram	58	2000-01	242.20	36215.00	0.00	67.620
5	Cauvery	Kudige	Musiri	16	1999-2000	2265.00	6400.00	0.00	0.000
6	Krishna	Karad	Vijaywada	57	2000-01	774.10	8140.00	0.00	5.482
7	Mahanadi	Baronda	Tikarpara	21	2002-03	406.70	12306.00	0.00	154.100
8	Subarnarekha	Muri	Ghatsila	3	2002-03	74.57	2037.00	0.42	11.330

Source : Central Water Commission.

TABLE 6.1.8 : STATE-WISE DETAILS OF INLAND WATER RESOURCES OF VARIOUS TYPES

(Lakh Hactares)

Sl. No.	Name of the State/UT.	Rivers & Canals (Length in Kms.)	Reservoirs	Tanks, Lakes & Ponds	Beels, Oxbow Lakes & Derelict Water Bodies	Brackish Water	Total Water Bodies
1	2	3	4	5	6	7	8
	States						
1	Andhra Pradesh	11514	2.34	5.17	-	0.79	8.20
2	Arunachal Pradesh	2000	-	2.76	0.42	-	3.18
3	Assam	4820	0.02	0.23	1.10	-	1.35
4	Bihar	4414@	0.60	0.95	0.05	-	1.60
5	Goa	250	0.03	0.03	-	-	0.06
6	Gujarat	3865	2.43	0.71	0.12	3.76	7.02
7	Haryana	5000	NEG	0.10	0.10	-	0.20
8	Himachal Pradesh	3000	0.42	0.01	-	-	0.43
9	Jammu & Kashmir	27781	0.07	0.17	0.06	-	0.30
10	Karnataka	9000	2.11	2.90	-	0.08	5.09
11	Kerala	3918	0.30	0.30	2.43	2.43	5.46
12	Madhya Pradesh	20661	2.94	1.19	-	-	4.13
13	Maharashtra	16000	2.79	0.59	-	0.10	3.48
14	Manipur	3360	0.01	0.05	0.04	-	0.46
15	Meghalaya	5600	0.08	0.02	NEG	-	0.10
16	Mizoram	1395	-	0.02	-	-	0.02
17	Nagaland	1600	0.17	0.50	NEG	-	0.67
18	Orissa	4500	2.56	1.14	1.80	4.17	9.67
19	Punjab	15270	NEG	0.07	-	-	0.07
20	Rajasthan	5290	0.00	1.80	0.00	-	1.80
21	Sikkim	900	1.20	-	0.03	-	1.23
22	Tamil Nadu	7420	0.52	0.56	0.07	0.56	1.71
23	Tripura	1200	0.05	0.13	0.00	0.00	0.18
24	Uttar Pradesh	31200	1.50	1.62	1.33	0.00	4.45
25	West Bengal (P)	4741	0.17	2.76	0.42	2.10	5.45
	Union Territories						
26	Andaman & Nicobar Islands	115	0.01	0.03	-	0.37	0.41
27	Chandigarh	2	-	NEG	NEG	-	-
28	Dadra & Nagar Haveli	54	0.05	0.00	0.00	0.00	0.05
29	Daman & Diu	12	-	NEG	-	-	-
30	Delhi	150	0.04	0.00	0.00	0.00	0.04
31	Pondicherry	247	-	NEG	0.01	0.01	0.02
	TOTAL	195279	20.31	23.81	7.98	14.37	66.47

Source : Department of Animal Husbandary and Dairing, Ministry of Agriculture
@ : Relates to the rivers only (Statistics of Inland Water Transport 1999-2000)
NEG : Negligible

TABLE 6.1.9 : NAVIGABLE WATERWAYS IN INDIA, 2002-03

(Km.)

Sl. No.	State/River/ Canals/ Lakes	Total Length	Navigable Length
1	2	3	4
1	**ANDHRA PRADESH**		
	Godavari	757	206
	Krishna	386	35
	Others *	1997	258
	Total	3140	499
2	**ASSAM**		
	Brahmaputra	891	891
	Borak	140	140
	Subansiri	35	20
	Kapali	70	30
	Joljoli	35	15
	Dhansiri	100	22
	Dikhow	42	15
	Total	1313	1133
3	**BIHAR**		
	Damodar	...	—
	Ganga	510	510
	Gandak	300	300
	Koshi	233	160
	Ghaghra	100	100
	Sone	226	31
	Mahananda	140	—
	Burhi Gandak	400	—
	Punpun	200	—
	Phalgu Harihar	300	—
	Kiul	100	—
	Kari Koshi	150	—
	Chandan	100	—
	Karmnasha	144	—
	Total	2903	1101
4	**GOA**		
	Mandovi	78	65
	Zuari	56	45
	Mapusa	26	20
	Chapora	34	25
	Tiracol	29	15
	Sal	20	15
	Cumbarjua Canal	17	17
	Others	—	12
	Total	260	214
5	**KERALA**		
	Pamba	275	194
	Manimala	135	105
	Kurumali	64	64
	Chalkudi	130	130
	Mahi	54	54
	Valappattanam	110	45
	Chaliyar Puzha	207	65
	Kuttiyadi	74	74
	Vamanapuram	86	15
	Neyyar	56	15
	Karamana	67	22
	Kallada	66	12
	Achen Coil	191	75
	Vadathalthodu	4	4
	Cochin Lake	25	25
	Anachal	8	8
	Chittattukarathodu	8	8
	Bharathapuzha	289	25
	Manali	36	—
	Karuvannur	17	17
	Keeranallur	8	7
	Kadalundi	130	19
	Tirur-Ponnanipui	30	30
	Akalapuzha	13	13
	Ponurpuzha	60	30
	Thalssery	8	8
	Dharmadam	4	4
	Kariangoda	50	15
	Kavvai	31	8
	Perumba	51	8
	Ramapuram	19	5
	Kuppan	82	30
	Manjeswaram	16	—
	Uppala	30	4
	Shiriya	40	8
	Mogral	34	4
	Chandragiri	105	12
	Chittari	25	3
	Nileswaram	46	5
	Total	2684	1170

: Data not received from the State Government

TABLE 6.1.9 : NAVIGABLE WATERWAYS IN INDIA, 2002-03-Concld.

(Km.)

Sl. No.	State/River/ Canals/ Lakes	Total Length	Navigable Length
1	2	3	4
6	**JAMMU AND KASHMIR#**		
7	**GUJARAT**		
	Narmada	230	160
	Tapti	200	45
	Others	–	72
	Total	430(b)	277(b)
8	**ORISSA**		
	Mahanadi	493	199
	Brahmani	541	277
	Baitarani	344	32
	Subarnarekha	–	50
	Budha Balanga	–	35
	Dhamara	–	20
	Salandi	–	17
	Panchputra	–	21
	Pernei	–	45
	Hatel	–	30
	Bansagadal	–	32
	Hansua	–	37
	Tirkota	–	18
	Jamboo	–	6
	Gobari	–	16
	Ramchandi	–	16
	Kharansi	–	14
	Batigharia	–	14
	Birupa	–	110
	Genguti	–	45
	Luna	–	37
	Devi	–	20
	Pradhi	–	15
	Kadha	–	30
	Kusavadra	–	25
	Daya	–	9
	Rajua	–	7
	Makara	–	11
	Ohers *	–	356
	Total	1378	1544
9	**TAMIL NADU #**		
10	**MAHARASHTRA #**		
11	**KARNATAKA**		
	Sharavathi	250	13
	Tungabhadra	375	375
	Malaprabha	230	230
	Ghataprabha	160	160
	Krishna	325	325
	Cauvery	270	34
	Kabini	117	22
	Arkavathi	32	6
	Hemavathi	174	16
	Bheema	860	125
	Sita	15	1
	Netravathi	15	1
	Total	2823	1308
12	**UTTAR PRADESH #**		
13	**WEST BENGAL**		
	Hooghly	580	580
	Mahananda	206	58
	Ajoy	174	174
	Jalangi	232	232
	Dwarka	129	129
	Bakreswar	102	102
	Damodar	437	437
	Dwarekeswar	103	103
	Silabati	135	135
	Kumari	308	308
	Ichamati	232	232
	Others @	2103	2103
	Total	4741	4593

Source : Transport Research Wing, Ministry of Surface Transport

@ : Includes 268 Kms. Pertaining to canals. ** : Includes 1234 Kms. Pertaining to canals.
* : Including canals
\# Data not received from state government (b) : Relates to 1994-95
Notes : In respect of other States, information is not available.

TABLE 6.1.10: GROUND WATER RESOURCE POTENTIAL AS PER BASIN (PRORATA BASIS)

Sl. No.	Basin	Total Replenishable Ground Water Resource (M.C.M/Yr)	Provision for Domestic Industrial & Other Uses (M.C.M/Yr)	Available for Irrigation (M.C.M/Yr)	Net Draft (M.C.M/Yr)	Balance for Future Use (M.C.M/Yr)	% Level of G.W. Develop-ment
1	2	3	4	5	6	7	8
1	Brahmaputra	26545.69	3981.35	22564.34	760.06	21804.29	3.37
2	Brahmani with Baitarni	4054.23	608.13	3446.09	291.22	3154.88	8.45
3	Cambai composite	7187.25	1078.09	6109.16	2449.06	3660.10	40.09
4	Caveri	12295.71	1844.35	10451.35	5782.85	4668.50	55.33
5	Ganga	170994.74	26030.47	144964.26	48593.67	96370.56	33.52
6	Godavari	40649.82	9657.69	30992.12	6054.23	24937.90	19.53
7	Indus	26485.42	3053.95	23431.47	18209.30	5222.17	77.71
8	Krisnhna	26406.97	5578.34	20828.63	6330.45	14498.19	30.39
9	Kutch & Saurashtra	11225.09	1738.10	9486.99	4851.87	4791.02	51.14
10	Madras & Southern	18219.72	2732.95	15486.77	8933.25	6553.52	57.68
11	Mahanadi	16460.55	2471.10	13989.45	972.63	13016.81	6.95
12	Meghna	8516.69	1277.48	7239.21	285.34	6953.87	3.94
13	Narmada	10826.54	1653.75	9172.79	1994.18	7178.61	21.74
14	Northeast Composite	18842.61	2826.39	16016.22	2754.93	13261.29	17.20
15	Pennar	4929.29	739.39	4189.89	1533.38	2656.51	36.60
16	Subranarekha	1819.41	272.91	1546.50	148.06	1398.43	9.57
17	Tapi	8269.50	2335.79	5933.70	1961.33	3972.38	33.05
18	Western Ghat	17693.72	3194.78	14499.18	3318.12	11181.06	22.88
	Total	**431422.93**	**71075.02**	**360348.15**	**115223.93**	**245280.08**	**31.92**

Source: Central Ground Water Board

Out of the total replenishable ground water; about 84% is made available for agriculture and livestock, the rest 16% is made available for domestic consumption, industrial use and power generation. However, not all the water abstracted is effectively used, there are sizeable losses in conveyance and application of irrigated water, a large part of water used by industry and domestic purposes is returned to the streams as effluent waste; and most of the water drawn by power station is used for cooling purposes and is available for reuse.

The water pollution in India comes from three main sources : domestic sewage, industrial effluents and run off from activities such as agriculture. Major industrial sources of pollution in India include the fertilizer plants, refineries, pulp and paper mills, leather tanneries, metal plating and other chemical industries.

TABLE 6.1.11 : GROUND WATER RESOURCES

Sl. No.	States	Total Replenishable Ground Water Resource BCM/Yr	Provision for Domestic Industrial & Other Uses BCM/Yr	Available Ground Water Resource for Irrigation BCM/Yr	Projected Net Draft (as on 2003) BCM/Yr	Balance Ground Water Resource for Future Use (As on 2003) BCM/Yr	Level of Ground Water Development (As on 2003) [%]
1	2	3	4	5	6	7	10
	States	**43.4771**	**71.4020**	**363.3696**	**149.8151**	**213.5991**	**41.23**
1	Andhra Pradesh	35.2909	5.2936	29.9973	8.5687	21.4286	28.56
2	Arunachal Pradesh	1.4385	0.2158	1.2227	-	1.2227	Neg.
3	Assam	22.4786	3.3718	19.1068	1.8390	17.2678	9.62
4	Bihar	26.9796	4.0470	22.9327	10.6284	12.3043	46.35
5	Chhattisgarh	16.0705	2.4106	13.6599	0.8102	12.8497	5.93
6	Delhi	0.2916	0.1939	0.0977	0.1180	0.0000	120.78
7	Goa	0.2182	0.0327	0.1855	0.0154	0.1701	8.30
8	Gujarat	20.3767	3.0566	17.3199	9.5546	7.7653	55.17
9	Haryana	11.1794	1.6769	9.5025	8.1316	1.3709	85.57
10	Himachal Pradesh	0.2926	0.0439	0.2487	0.0314	0.2173	12.61
11	Jammu & Kashmir	4.4257	0.6640	3.7620	0.0306	3.7314	0.81
12	Jharkhand	6.6045	0.9907	5.6138	1.8390	3.7751	32.75
13	Karnataka	16.1750	2.4186	13.7564	4.7599	8.9965	34.60
14	Kerala	7.9003	1.3135	6.5869	1.4606	5.1263	22.17
15	Madhya Pradesh	34.8186	5.2228	29.5958	8.0179	25.7793	27.09
16	Maharashtra	37.8677	12.3973	25.4704	9.4352	16.0352	37.04
17	Manipur	3.1540	0.4730	2.6810	Neg.	2.6810	Neg.
18	Meghalaya	0.5397	0.0810	0.4587	0.0182	0.4405	3.97
19	Mizoram	1.4000	0.2100	1.1900	Nil	1.1900	Neg.
20	Nagaland	0.7240	0.1090	0.0.615	Neg.	0.0.615	Neg.
21	Orissa	20.1287	3.0193	17.1094	3.6086	13.5008	21.09
22	Punjab	18.1923	1.8192	16.3730	16.3972	0.0000	100.15
23	Rajasthan	12.6021	1.9977	10.6044	9.2583	1.3462	87.31
24	Sikkim	0.0736	0.0108	0.0628	Neg.	0.0628	Neg.
25	Tamil Nadu	26.4069	0.3.961	22.4458	14.4539	7.9929	64.39
26	Tripura	0.6634	0.0995	0.5639	0.1885	0.3754	33.43
27	Uttar Pradesh	82.5459	12.3819	70.1640	32.3337	37.8304	46.08
28	Uttaranchal	2.8411	0.4262	2.4149	0.8208	1.5941	33.99
29	West Bengal	23.0914	3.4637	19.6277	7.4967	12.1310	38.19
	Union Territories	**0.8877**	**0.0976**	**0.5510**	**0.1600**	**0.1100**	
1	Andaman & Nicobar	0.3263	0.0134	0.3129	Neg.	0.0319	Neg.
2	Chandigarh	0.0297	0.0044	0.0252	0.0245	0.0007	97.34
3	Dadar & Nagar Haveli	0.0422	0.0063	0.0359	0.0046	0.0313	12.74
4	Daman	0.0071	0.0011	0.0060	0.0048	0.0012	80.00
5	Diu	0.0037	0.0006	0.0031	0.0029	0.0002	94.84
6	Lakshadweep	0.3042	0.0456	0.0195	0.0077	0.0119	39.21
7	Pondicherry	0.1746	0.0262	0.1484	0.1155	0.0329	77.85
	Grand Total	**435.6592**	**71.4997**	**364.1595**	**149.9751**	**213.7090**	**41.18**

Source: Central Ground Water Board

For resources available to meet the needs, it is useful to distinguish between (a) total volume of water resources from surface flow and ground water recharge available in a year ; (b) the volumes which are considered to be utilizable ; (c) actual utilization.

The estimates of surface flows continue to be based largely on empirical formulae relating rainfall to surface runoff. The lack of data based on measurement of actual flow in the main river and tributaries of different river systems over sufficiently long periods (30-40 years observations are considered to be reasonable basis) remains one of the most serious handicaps in the planning of water resources development. The states have their own gauges, but since many rivers are the subject of inter-state disputes, they are unwilling to provide the data on observed flows.

TABLE 6.1.12 : PROJECTED ANNUAL REQUIREMENT OF WATER (BY DIFFERENT USES)

(In BCM)

Sl. No.	Different Uses of Water	Year				
		1990	2000	2010	2025	2050
1	2	3	4	5	6	7
1	Domestic	32	42	56	73	102
2	Irrigation	437	541	688	910	1072
3	Industry	–	8	12	23	63
4	Energy	–	2	5	15	130
5	Others	33	41	52	72	80
	Total	**502**	**634**	**813**	**1093**	**1447**

Source : Central Water Commission
BCM : Billion Cubic Metres

TABLE 6.1.13 : CATCHMENT AREA OF MAJOR RIVER BASINS

Sl. No.	Name of the River	Origin	Length (Km.)	Catchment Area (Sq. Km.)
1	2	3	4	5
1	Indus	Mansarovar (Tibet)	1114 (2880)	321289 (1165500)
2	a) Ganga	Gangotri (Uttaranchal)	2525	861452 (1186000)
	b) Brahmaputra	Kailash Range (Tibet)	916 (2900)	194413 (580000)
	c) Barak & other rivers flowing into Meghna like Gomti, Muhari, Fenny etc.	Manipur Hills (Manipur)		41723
3	Sabarmati	Aravalli Hills (Rajasthan)	371	21674
4	Mahi	Dhar (Madhya Pradesh)	583	34842
5	Narmada	Amarkantak (Madhya Pradesh)	1312	98796
6	Tapi	Betul (Madhya Pradesh)	724	65145
7	Brahmani	Ranchi (Bihar)	799	39033
8	Mahanadi	Nazri Town (Madhya Pradesh)	851	141589
9	Godavari	Nasik (Maharashtra)	1465	312812
10	Krishna	Mahabaleshwar (Maharashtra)	1401	258948
11	Pennar	Kolar (Karnataka)	597	55213
12	Cauvery	Coorg (Karnataka)	800	81155
Total				**2528084**

Source : Central Water Commission
Note : Figures within bracket indicate the total river basin in india and neighbouring countries.

TABLE 6.1.14 : PRIMARY WATER QUALITY CRITERIA

Sl. No.	Designated Best Use	Class of Water	Criteria
1	2	3	4
1	Drinking WaterSource without Conventional Treatment but after Disinfection	A	1 Total Coliforms Organised MPN/100ml shall be 50 or less 2 pH between 6.5 & 8.5 3 Dissolved Oxygen 6mg/l or more 4 Biochemical Oxygen Demand 5 days 20°C 2mg/l or less.
2	Outdoor bathing (organised)	B	1 Total Coliforms Organism MPN/100ml shall be 500 or less 2 pH between 6.5 & 8.5 3 Dissolved Oxygen 5mg/l or more 4 Biochemical Oxygen demand 5 days 20°C 3mg/l or less.
3	Drinking Water Source	C	1 Total Coliforms Organism MPN/100ml shall be 5000 or less 2 pH between 6 & 9 3 Dissolved Oxygen 4mg/l or more 4 Biochemical Oxygen demand 5 days 20°C 3mg/l or less.
4	Propagation of Wild Life	D	1 pH between 6.5 & 8.5 Fisheries 2 Dissolved Oxygen 4mg/l or more 3 Free Ammonia (as N) 1.2 mg/l or less
5	Irrigation, Industrial Cooling, Controlled Waste	E	1 pH between 6.0 or 8.5 2 Electrical conductivity at 25°C Micro mhos/cm Max 2250. 3 Sodium Absorption Ratio, Max 26 4 Boron, Max 2mg/l

Source : Water Quality - Status & Statistics (1996 & 1997), Central Pollution Control Board

The water quality at any location is determined as the one which is satisfied at least 80% of time by all the criteria parameters. To further elucidate on this as if at a location 80% of the time DO, pH were in the range specified for class A, BOD for class B and total coliforms for class C, then the existing status is determined as C.

TABLE 6.1.15 : BIOLOGICAL WATER QUALITY CRITERIA (BWQC)

Sl. No.	Taxonomic Groups	Range of Saprobic Score (BMWP)	Range of Diversity Score	Water Quality Characteristics	Water Quality Class	Indicator Colour
1	2	3	4	5	6	7
1	Ephemeroptera, Plecoptera, Trichoptera, Hemiptera, Diptera	7 and more	0.2 - 1	Clean	A	Blue
2	Ephemeroptera, Plecoptera, Trichoptera, Hemiptera, Planaria, Odonata, Diptera	6 - 7	0.5 - 1	Slight Pollution	B	Light Blue
3	Ephemeroptera, Plecoptera, Trichoptera, Hemiptera, Odonata, Crustacea, Mollusca, Polychaeta, Coleoptera, Diptera, Hirudinea, Oligochaeta	3 - 6	0.3 - 0.9	Moderate Pollution	C	Green
4	Hemiptera, Mollusca, Coleoptera, Diptera, Oligochaeta	2 - 5	0.4 & less	Heavy Pollution	D	Orange
5	Diptera, Oligochaeta, No Animal	0 - 2	0 - 0.2	Severe Pollution	E	Red

Source : Central Pollution Control Board

TABLE 6.1.16 : PHYSICO - CHEMICAL AND BIOLOGICAL WATER QUALITY OF POLLUTED STRETCH OF RIVER YAMUNA AND AGRA CANAL

Sl. No.	Location	Water Quality Class		Water Quality (Biological)
		Physico - Chemical (PWQC)	Biological (BWQC)	
1	2	3	4	5
1.	Okhla Barrage (River Yamuna)	E	E	Severe Pollution
2.	Inlet of BTPP at Agra Canal	E	E	Severe Pollution
3.	Mixing of BTPP outlet at Agra Canal	E	E	Severe Pollution

Source : Central Pollution Control Board
BTPP : Badarpur Thermal Power Plant

TABLE 6.1.17 : WASTE WATER GENERATION, COLLECTION, TREATMENT IN METRO CITIES : STATUS

Sl. No.	Name of Metro City	Total Population	Municipal Population	Volume of Waste Water Generated (mld)			Waste Water Collected		Capacity (mld)	Treatment		Mode of Disposal
				Domestic	Industrial	Total	Volume (mld)	%		Primary	Secondary	
1	2	3	4	5	6	7	8	9	10	11	12	13
1	Ahmedabad	3312216	2876710	520.0	36.0	556.0	445.0	80.0	430.0	Y	Y	Sabarmati river
2	Bangalore	4130288	4130288	375.0	25.0	400.0	300.0	75.0	290.0	Y	Y	V. Valley,Ksc Valley
3	Bhopal	1062771	1062771	189.3	–	189.3	94.6	50.0	87.0	Y	Y	Agriculture
4	Bombay	12596243	12288519	2228.1	227.9	2456.0	2210.0	90.0	109.0	Y	Y	Sea
5	Kolkata	11021918	9643211	1383.8	48.4	1432.2	1074.9	75.1	–	–	–	Hughly river/ Fish Farm
6	Coimbatore	1100746	816321	60.0	–	60.0	45.0	75.0	–	–	–	Nayal river, Irrigation
7	Delhi	8419084	8419084	1270.0	–	1270.0	1016.0	80.0	981.0	Y	Y	Agriculture, Yamuna River
8	Hyderabad	4344437	4098734	348.3	25.0	373.3	299.0	80.1	115.0	Y	–	River, Irrigation
9	Indore	1109056	1091674	145.0	–	145.0	116.0	80.0	14.0	Y	–	Khan River, Irrigation
10	Jaipur	1518235	1458483	220.0	–	220.0	165.0	75.0	27.0	Y	Y	Agriculture
11	Kanpur	2029889	1874409	200.0	–	200.0	150.0	75.0	41.0	Y	Y	Ganga, Sewage Farm
12	Kochi	1140605	670009	75.0	–	75.0	45.0	60.0	–	–	–	Cochin Back waters
13	Lucknow	1669204	1619115	106.0	–	106.0	80.0	75.5	–	–	–	Gomati River
14	Ludhiana	1042740	1042740	94.4	–	94.4	47.0	49.8	–	–	–	Agriculture
15	Madras	5421985	4752974	276.0	–	276.0	257.0	93.1	257.0	Y	Y	Agriculture, Sea
16	Madurai	1085914	940989	48.0	–	48.0	33.6	70.0	–	–	–	Agriculture
17	Nagpur	1664006	1624752	204.8	–	204.8	163.0	79.6	45.0	Y	Y	Agricultire
18	Patna	1099647	917243	219.0	–	219.0	164.0	74.9	105.0	Y	N	River, Fishries
19	Pune	2493987	2244196	432.0	–	432.0	367.0	85.0	170.0	Y	Y	River
20	Surat	1518950	1498817	140.0	–	140.0	112.0	80.0	70.0	Y	·	Garden/Creek
21	Vadodara	1126824	1031346	120.0	20.0	140.0	105.0	75.0	81.0	Y	Y	river, Agriculture
22	Varanasi	1030863	1030863	170.0	–	170.0	127.0	74.7	101.0	Y	Y	Ganga, Agriculture
23	Vishakhapatnam	1057118	752037	68.0	–	68.0	55.0	80.9	–	–	–	–
	Total	**70996726**	**65885285**	**8892.7**	**382.3**	**9275.0**	**7471.1**	**80.6**	**2923.0**			

Source : Central Pollution Control Board Y = Yes N = No

Note : Data Collected During 1995-96

TABLE 6.1.18 : MINIMUM & MAXIMUM OF OBSERVED VALUES OF WATER QUALITY PARAMETERS AT CWC SITES ON WEST FLOWING RIVERS

(1999-2000)

Sl. No.	Name of the Site	Name of the River/Stream	pH Value		Specific Conductance in Micromhos/cm at 25 °C		Sodium Absorption Ratio (%/cm)		Cl	Mg Max.	Fe	SO_4	NO_3	SP Max.	RSC	Total Hardness Max.
			Min.	Max.	Min.	Max.	Min.	Max.	Maximum (9me/l)							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Badalapur	Ulhas	7.44	8.26	138	530	0.24	1.45	0.910	2.210	0.011	0.520	0.025	44.21	0.82	154.81
2	Mangaon	Kal	7.36	7.91	100	122	0.24	2.07	0.480	1.030	0.002	0.098	0.001	63.59	0.57	63.63
3	Adavali	Gad	7.36	8.30	73	104	0.00	0.82	0.550	1.180	0.006	0.160	0.031	43.01	0.24	75.15
4	Santeguli	Aghanashini	6.80	8.24	68	204	0.11	0.50	0.920	0.710	0.001	0.176	0.004	21.13	0.00	81.64
5	Haladi	Haladi	6.58	8.21	52	120	0.06	0.24	0.650	0.450	0.001	0.177	0.003	13.95	0.00	54.59
6	Yennehole	Yennehole	7.07	8.18	80	178	0.07	0.22	0.860	0.440	0.001	0.167	0.003	13.57	0.00	65.11
7	Bantwal	Netravathi	7.16	8.22	80	228	0.10	0.38	0.860	0.590	0.001	0.516	0.001	23.81	0.00	72.12
8	Erinjipuzha	Payaswani	6.95	7.65	38	96	0.21	0.38	0.320	0.240	0.000	0.042	-	26.98	0.00	28.05
9	Perumannu	Valapatanam	6.90	7.57	36	73	0.19	0.40	0.360	0.200	0.000	0.042	-	30.00	0.00	28.05
10	Kuniyil	Chaliyar	6.92	7.78	58	120	0.23	0.51	0.440	0.280	0.000	0.033	-	29.90	0.00	32.05
11	Kumbidi	Bharathapuizha	7.20	7.86	107	188	0.43	0.74	0.680	0.400	0.000	0.133	-	33.77	0.00	5.08
12	Pulamantholi	Pulanthodu	6.75	7.32	44	90	0.25	0.57	0.360	0.280	0.000	0.059	-	35.44	0.00	30.05
13	Ambaramplayam	Bharathapuzha	7.39	8.06	125	696	0.38	2.12	2.320	2.080	0.011	0.684	0.168	41.12	0.88	212.00
14	Pudur	Bharathapuzha	7.47	8.35	300	520	0.51	0.86	2.240	1.160	0.000	0.708	-	27.62	0.16	154.25
15	Mankara	Bharathapuzha	7.45	8.27	173	490	0.45	0.92	2.000	1.200	0.000	0.667	-	31.99	0.00	150.25
16	Arangli	Chalakudy	6.75	7.80	41	60	0.20	0.31	0.320	0.160	0.000	0.021	-	25.00	0.00	20.03
17	Neeleshwaram	Periyar	6.90	7.72	34	56	0.16	0.29	0.280	0.160	0.000	0.025	-	24.44	0.00	22.04
18	Ramangalam	Muvattupuzha	6.86	7.86	43	62	0.21	0.33	0.280	0.160	0.000	0.033	-	26.42	0.00	20.03
19	Kalampur	Kaliyar	6.65	7.05	26	46	0.14	0.31	0.280	0.120	0.000	0.034	-	25.49	0.00	18.03
20	Kidangoor	Meenachil	6.60	7.63	32	55	0.19	0.53	0.320	0.120	0.000	0.046	-	38.46	0.00	22.03
21	Kalloopara	Manimala	6.72	7.40	33	57	0.24	0.50	0.240	0.160	0.000	0.050	-	35.71	0.00	18.03
22	Malakkara	Pamba	6.60	7.15	28	36	0.16	0.29	0.200	0.200	0.000	0.025	-	27.78	0.00	18.03
23	Thumpamon	Achankovil	6.35	7.65	43	70	0.21	0.50	0.360	0.160	0.000	0.038	-	35.71	0.00	26.04
24	Pattazhy	Kallada	6.85	7.55	39	52	0.30	0.40	0.240	0.160	0.000	0.050	-	32.61	0.00	18.03
25	Ayilam	Vamanapuram	6.92	7.75	42	58	0.37	0.51	0.240	0.120	0.000	0.033	-	37.25	0.00	16.03

Source : Central Water Commission

Remarks :

pH : The logarithm to the base 10 of the reciprocal of Hydrogen ion concentration

Cl : Chlorine **SO_4** : Sulphate **NO_3** : Nitrate **Fe** : Iron **Mg** : Magnesium

SP : Sodium Percentage **RSC** : Residual Sodium Carbonate **me/l** : Milli equivalent per litre

TABLE 6.1.19 : MINIMUM & MAXIMUM OF OBSERVED VALUES OF WATER QUALITY PARAMETERS AT CWC SITES ON EAST FLOWING RIVERS

(1999-2000)

Sl. No.	Name of the Site	Name of the River/Stream	pH Value		Specific Conductance in Micromhos/cm at 25 °C		Sodium Absorption Ratio (%/cm)		Cl	SO_4	No_3	Fe	Mg	SP	RSC	Hardness
			Min.	Max.	Min.	Max.	Min.	Max.	Maximum (9me/l)					Max.	Max.	Max.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Thammavaram	Gundalakamma	8.00	8.64	650	1274	1.18	5.48	2.25	3.280	0.071	0.006	3.04	72.01	2.37	225.93
2	Nellore	Penner	7.25	8.28	379	970	1.71	2.93	2.32	0.811	0.097	0.009	1.88	50.77	0.00	210.36
3	Chemnur	Penner	7.66	8.15	502	1326	2.28	3.48	2.88	1.145	0.104	0.003	2.57	58.22	0.00	272.98
4	Alladupalli	Penner/Kunderu	7.48	7.92	455	1061	2.25	3.89	2.57	1.062	0.008	0.003	1.88	56.49	0.00	195.66
5	Singavaram	Penner/ Chitravathy	River Dry	8.14	River Dry	323	-	3.08	0.52	0.158	0.004	0.001	0.36	58.62	0.00	44.04
6	Tadapatri	Penner	8.05	8.21	435	1070	1.85	3.84	2.09	0.916	0.006	0.002	1.74	57.57	0.00	191.83
7	Nagalamadike	Penner	7.97	8.21	499	1069	2.77	3.76	2.46	0.725	0.008	0.002	1.69	61.67	0.00	207.67
8	Nandipalli	Penner/Sagileru	-	8.78	-	690	-	3.34	1.42	0.506	0.001	0.001	1.26	55.44	0.00	134.11
9	Naidupetta	Swarnamukhi	-	7.51	-	300	-	1.53	0.86	0.489	0.003	0.001	0.71	44.44	0.00	78.64
10	Sulurpet	Kalingi	-	7.46	-	249	-	1.15	1.11	0.708	0.004	0.002	0.26	41.94	0.00	62.55
11	Chengalapattu	Palar	7.80	7.89	393	593	1.59	2.44	1.60	-	-	0.014	1.60	48.21	0.64	160.28
12	Magrala	Cheyyar	###	7.97	445	562	1.49	2.30	1.44	-	0.041	0.001	1.60	47.33	0.32	152.00
13	Avaramkuppam	Palar	7.97	8.35	428	879	2.64	4.11	1.68	0.765	0.105	0.011	2.08	60.82	3.68	188.00
14	Villupuram	Ponniyar	7.80	8.56	518	633	1.90	2.56	1.52	0.416	0.113	0.080	2.00	49.09	0.90	176.00
15	Vazhavachanur	Ponniyar	7.29	8.30	440	1093	1.50	2.91	4.32	0.645	0.145	0.010	3.12	52.18	1.45	325.00
16	Gummanur	Ponniyar	7.08	8.50	543	1163	1.80	3.11	3.92	0.873	0.366	0.019	2.88	51.90	1.04	340.58
17	Kudalaiyathur	Vellar	7.83	8.17	296	702	1.19	2.53	1.20	0.848	0.042	0.020	3.04	46.49	0.64	200.00
18	Paramakudi	Vaigai	7.86	8.07	448	451	1.32	1.78	1.36	0.332	0.097	0.018	1.68	42.32	0.51	152.00
19	Ambasamudram	Vaigai	8.03	8.22	251	679	0.87	1.70	2.08	0.708	0.195	0.018	2.48	35.26	0.10	228.00
20	Theni	Suruliyar	7.37	8.06	116	759	0.39	1.48	2.48	0.416	0.164	0.010	2.96	33.28	0.51	272.00
21	Irrukkankudi	Vaippar	8.21	8.52	267	549	1.26	2.53	1.20	1.333	0.092	0.011	1.52	50.77	0.07	136.00
22	Murappanadu	Tambraparani	7.07	8.27	116	304	0.52	1.28	1.20	0.291	0.132	0.015	1.12	36.32	3.00	108.19
23	A.P. Puram	Clittar	7.84	8.10	659	2244	4.77	5.19	4.24	2.498	0.503	0.009	6.88	53.78	0.00	557.00

Source : Central Water Commission

Remarks :

pH : The logarithm to the base 10 of the reciprocal of Hydrogen ion concentration

Cl : Chlorine **SO_4** : Sulphate **NO_3** : Nitrate **Fe** : Iron **Mg** : Magnesium

SP : Sodium Percentage **RSC** : Residual Sodium Carbonate **me/l** : Milli equivalent per litre

TABLE 6.1.20 : RIVER-BASIN WISE DISTRIBUTION OF WATER QUALITY MONITORING STATIONS

Sl. No.	River (main stream) Lake etc.	Tributaries	Total Stations
1	2	3	4
1	**Baitarni (5)**	----	5
2	**Brahmani (11)**	Karo (1), Koel (2), Sankh (1).	15
3	**Brahmputra (6)**	Burhidihing (1), Dhansiri (6), Disang (1), Jhanji (1), Subansiri (1), Bhogdoi (1), Bharalu (1) Borak (1), Deepar Bill (1), Digboi (1), Mora Bharali (1),Teesta (4), Dickhu (1), Maney(2), Ranchu (2)	31
4	**Cauvery (20)**	Arkavati (1), Amravati (1), Bhawani (5), Kabini (4), Laxmantirtha (1), Shimsa (2), Hemavati (1)	35
5	**Ganga (28)**	Barakar (1),, Betwa (3), Chambal (8), Damodar (5), Gandak (1), Saryu-Ghaghra (3), Gomti (5), Hindon (3). Kali (West) (2), Kali Nadi (2). Khan (1), Kshipra (3), Mandakini (Madhya Pradesh) (1) , Parvati (2), Ramganga (1), Rapti (1), Rihand (2), Rupanarayan (1), Sai (1), Sone (5), Tons (Madhya Pradesh) (2), Yamuna (23),Sind (1), Johila (1),Sankh(1), Gohad (1), Kolar(1). Churni (2), Tons (Himachal Pradesh) (1)	118
6	**Godavari (11)**	Manjira(2), Maner(2), Nira(I),), Wainganga{3), Wardha(I)	20
7	**Indus**	Beas (19), Chenab (1), Jhelum (3), Larji (1), Parvati (1), Ravi (3), Sutlej (20), Tawi (1), Gawkadal (1), Chuntkol(1), Sirsa(2)	53
8	**Krishna (17)**	Bhadra (3), Bhima (9), Ghataprabha (2), Malprabha (3), Muneru (1), Musi (2), Nira (1), Paleru (1), Tunga (1), Tungabhadra (5), Panchganga (1)	46
9	**Mahi (7)**	Anas (1), Panam(1)	9
10	**Mahanadi (16)**	Ib (4), Hasdeo (2), Kathajodi (1), Kharoon (1), Kuakhai (2), Sheonath (2), Birupa (1)	29
11	**Narmada (14)**	Chhota Tawa (1)	15
12	**Pennar (4)**	--	4
13	**Sabarmati (8)**	Meswa (1), Shedhi (1), Khari (1).	11
14	**Subarnerekha (6)**	--	6
15	**Tapi (10)**	Girna (2).	12

Table 6.1.20 : RIVER-BASIN WISE DISTRIBUTION OF WATER QUALITY MONITORING STATIONS—Concld.

Sl. No.	River (main stream) Lake etc.	Tributaries	Total Stations
1	2	3	4
16	**Medium rivers**	Ambika (1), Ulhas (2), Ulhas-Bhasta (1), Ulhas -Kalu (1) Imphal (4), Mandovi (2), Palar (1), Pamba (3), Pariyar (3), Rushikulya (2), Tambiraparani (7), Achankoil (2), Chalakudy (1), Damanganga (6), Ghaggar (16), Kallada (1), Kali Karnataka (1), Manimala (2), Mindhola (1), Nagavalli (3), Amlakhadi (1), Chaliyar (2), Iril (2), Kharkhala (1), Karmana (1), Kolak (2), Kundalika (1), Meenachil (1), Muvattupuza (1), Patalganga (2), Umtrew (1), Vamanpuram (1), Zuari (2), Gumti (2), Kalna (1), Valvant (1), Madai (1), Khandepar (1), Asanora (1), Bhadar (1), Neyyar (1), Ithikkara (1), Kadalundy (1), Kuttiyady (1), Mahe (1), Kuppum (1), Neelsvaram (1), Karingoda (1), Chandergiri (1), Chitrapuzha (1), Nambul (2), Ganol (1), Simsang (1), Myntdu (1), Arasalar (1), Kodra (1), Haora (1).	105
17	**Lakes**	Hussainsagar (1), Saroornagar (1), Himayatsagar (1), Pulicate (1), Salaulim (1), Kankoria (1), Chandola (1), Ajwah (1), Sursagar (1), Brahamsarovar (1), Sukhna (1), Govindsagar (1), Pongdam (1), Renuka (1), Wuller (1), Dal (1), Ulsoor (1), Hebbala Valley (1), Oruvathikotta (1), Sasthamcotta (1), Ashthamudi (1), Paravur (1), Vembanad (1), Periar (1), Kodumgallor (1), Kayamkula (1), Punnamadakayal (1), Pookotekayal (1), Upper Lake (1), Lower Lake (1), Multai Lake (1), Loktak (4), Umiam (1), Ward (1), Thadlaskena (1), Osteri (1), Bahour (1), Harike (2), Pichola (1), Udaisagar (1), Ramgarhjaipur (1), Pushkar (1), Fatehsagar (1), Kalyana (1), Nakki (1), Udhagamadalam (1), Kodaikanal (1), Yercaud (1), Lakshminarayan Baridigh (1), Rudrasagar (1), Ramgarh-Uttar Pradesh (1), Naini (1), Rabindrasarovar (1)	64
	Tanks	Dharamsagar (1), Bibinagar (1), Kistrapetrareddy (1), Gandigudem (1), Goysagar (1)	
	Ponds	Elangabeel System (1), Lakshadweep (1)	
18	**Creeks, Canals, Tanks, Ponds, Drains**	Creeks (3M), Agartala Canal (1M), Gurgaon Canal (1M), Western Yamuna Canal (9M), Drains (12M)	26
19	**Groundwater**	——	180
		Total	**784**

Source: Central Pollution Control Board.
G - GEMS (Global Environmental Monitoring System),
M - MINARS (Monitoring of Indian National Aquatic Resources)

TABLE 6.1.21 : ANNUAL INTERNAL RENEWABLE WATER RESOURCES & WATER WITHDRAWALS IN SELECTED COUNTRIES OF WORLD

Sl. No.	Country	Annual Internal Renewable Water Resources[a]		Annual Withdrawals			Sectoral Withdrawals (Percent)		
		Total (Cubic Kilometres)	1995 Per Capita (Cubic Metres)	Year of Data	% of Water Resources[a]	Per Capita (Cubic Metres)	Domestic	Industry	Agriculture
1	2	3	4	5	6	7	8	9	10
1	Egypt	58.1	923	1992	97	956	6[d]	9	85
2	Kenya	30.2	1069	1990	7	87	20[d]	4	76
3	Nigeria	280.0	2506	1987	1	41	31[d]	15	54
4	Bhutan	95.0	57998	1987	0	14	36[b]	10	54
5	China	2800.0	2292	1980	16	461	6[b]	7	87
6	India	2085.0	2228	1975	18	612	3[b]	4	93
7	Indonesia	2530.0	12804	1987	1	96	13[b]	11	76
8	Iran	117.5	1746	1975	39	1362	4[b]	9	87
9	Japan	547.0	4373	1990	17	735	17[b]	33	50
10	Korea, Rep.	66.1	1469	1992	42	632	19[b]	35	46
11	Italy	167.0	2920	1990	34	986	14[d]	27	59
12	Russian Federation	4498.0	30599	1991	3	790	17[d]	60	23
13	United Kingdom	71.0	1219	1991[c]	17	205	20[d]	77	3
14	Argentina	994.0	28739	1976	4	1043	9[b]	18	73
15	Brazil	6950.0	42957	1990	1	246	22[b]	19	59
16	Mexico	357.4	3815	1991[c]	22	899	6[b]	8	86
17	Canada	2901.0	98462	1991[c]	2	1602	18[b]	70[b]	12[b]
18	United States	2478.0	9413	1990	19	1870	13[d]	45[b1]	42[b1]

Source: Global Environment Outlook, 1997, United Nations Environment Programme

Notes :

a : Annual Internal Renewable water Resources usually include river flows from other countries.

b : Sectoral withdrawal percentages are estimated for 1987.

c : Data are from early 1990s.

d : Sectoral percentages date from the year of other annual withdrawal data.

TABLE 6.2.2 : MAIN ACTIVITIES ALONG THE INDIAN COASTAL ZONE

1		2
	Land Based :	
I.	Coast dependent	Ports & Harbours
		Oil Terminals
		Paper & Pulp mills
		Metallurgical Plants
		Fish Processing
		Power Plants
II.	Coast prefering	Urban, commercial & residential development
		Tourism & beach recreation
		Agriculture
III.	Coast independent	Defence
	Water based	Offshore oil and gas
		Offshore placer mining
		Navigation
		Naval defence
		Water sports
		Fishing

Source : The State of Environment, 1995, Ministry of Environment & Forests

Coastal areas are of enormous socio-economic importance, because of both their traditional resources viz. fish, tourist potential, commercial and residential development as well as the new types of resources using new technologies such as ocean thermal energy, wave energy, offshore mineral deposits, mariculture etc. The high economic value of these areas and the relative fragility and vulnerability to natural hazards, sea level rise and anthropogenic activities make the preservation and the management of coastal zone resources and its environment of enormous importance.

TABLE 6.2.3 : INDUSTRIAL & SEWAGE DISCHARGES TO THE COASTAL WATERS

Sl. No.	State/Coast	Industrial Waste Water(MLD)
1	2	3
1	Gujarat	566
2	Maharashtra	80
3	Goa	12
4	Karnataka	43
5	Kerala	151
6	Tamil Nadu	378
7	Pondicherry	6
8	Andhra Pradesh	2466*
9	Orissa	1
10	West Bengal	22
	Total	**3725**

Source :Central Pollution Control Board
* : Including 2116 MLD from Aquaculture farms
Note : The data collected during 1995-96

TABLE 6.2.4 : POLLUTANTS AND THEIR IMPACTS ON THE MARINE ENVIRONMENT

Sl. No.	Sources	Impacts
1	2	3
1	Municipal and Domestic Waste	Reduce dissolved oxygen (DO); increase hydrogen sulphide levels; incidence of faecal coliform & faecal streptococci; high biological oxygen demand (BOD)
2	Industrial Waste	Affect DO, temperature, turbidity, pH, ammonia values; increases BOD, COD, suspended solids
3	Toxic Metals	Cause change in chemical and biochemical processes, increase in turbidity, lethal and sublethal effects on marine life
4	Oil Pollution	Causes smothering, clogging and toxicity
5	Fertilizers	Affect nutrient levels and may cause eutrophication
6	Dredging & Reclamation	Affect habitats of marine organisms; lethal and sublethal effects; affects flushing capacity of the waterbody
7	Siltation	Increases in nutrient levels and can cause excessive algal bloom; may also cause damage to coral reefs and coastal nurseries
8	Discharge of Coolant Waters	Raises the temprature of the water can cause the growth of the blue-green algae
9	Toxic Chemicals	Cause lethal and sublethal effects on marine organisms
10	Offshore Mining	Increases particulate loading which can lead to loss of light and reduced primary productivity ; smothering and clogging of benthic communities
11	Radionuclides	Bioaccumulation in fish and other benthic communities

Source : The State of Environment, 1995

TABLE 6.2.5 : "POTENTIAL HOTSPOTS" ALONG THE INDIAN COAST

Sl. No.	States	Coastal Cities/Towns
1	2	3
1	Gujarat	Okha, Veraval
2	Maharashtra	Bassein, Bombay Harbour, Thane, Trombay, Versova, Ulhas creek, Mahim
3	Goa	Marmagoa
4	Karnataka	Karwar, Mangalore
5	Kerala	Kochin, Thiruvananthapuram
6	Tamil Nadu	Ennore, Madras Harbour, Cooum, Port Calimere, Koodankulam, Arumuganeri, Tuticorin
7	Andhra Pradesh	Vishakhapatnam
8	Orissa	Gopalpur, Paradip, Puri
9	West Bengal	Indo-Bangladesh border, Sandheads, Diamond Harbour

Source: State of the Environment, 1995

Pressures on the marine environment arise from both natural as well as anthropogenic activities. The latter occurs either due to overexploitation of coastal and marine resources or due to the use of the coastal and marine environment as sinks of pollutants and other wastes arising as by-products of development activities. There are various such sources of marine pollution, their impacts varying according to the nature of the coastal or marine environment impacted upon and on the nature of the pollutant itself.

Marine population occurs off most metropolitan cities and densely populated coastal towns in India, but there are 25 heavily polluted potential 'hot spots' along the Indian coast.

7.5 Water is a finite resource. We are wasting too much. Conserving water is one way of ensuring that more is available for those who do not have it. The reduction of non-revenue water in Asia (currently ranging from 25-70 per cent in most water utilities) will significantly lower capital requirements for new investments and conserve. It costs far less to reduce non-revenue water than to expand capacity and perpetuate system inefficiencies. Access can also be expanded by applying the results of research in new technologies that separate water use (e. g., for cooking, drinking, bathing, sanitation), and through natural means such as rainwater harvesting and storage. In conjunction, water quality must remain a key focus area.

7.6 We do not need only food, we also need potable drinking water, adequate system for disposal of excreta, good sanitation and personal hygiene to reduce prevalence of morbidity. Several studies carried out in our villages confirm that diarrhea and respiratory diseases are the most common and dangerous diseases among children. The majority of illness tends to synergies malnutrition both by demanding higher energy intake to meet the rise in BMR which accompany fever and by requiring higher intake of protein and other nutrients to form antibodies to fight the illness. It is this negative correlation that Japan used to formulate its policy in post war years to provide water for drinking, pit latrines to dispose of excreta, sanitation to control breeding of flies and mosquitoes, which in turn resulted an increase in life expectation of 12 years during the immediate post war decade.

SOLID WASTE AND HAZARDOUS MATERIAL MANANGEMENT

7.7 Due to a rapid growth of urbanization, there is a substantial increase in generation of solid waste in both absolute and per capita terms. Surveys have been conducted to assess for solid waste generation, collection, treatment and disposal in 291 Class I cities and 345 Class II cities. It has been indicated that very little amount of waste generated is treated. The problems in management of wastes relate to its collection, handling, transport and disposal. Segregation of solid wastes is not uncommon in India as much of recycling work is being done either by ragpickers or non-Governmental agencies in few areas. Proper sanitary landfilling sites need to be developed which are effective in keeping the surface and ground water free from leachates.

7.8 When this solid waste is not collected and disposed of efficiently and effectively, it attracts rodents and flies which then spread diseases. It also pollutes and degrades land and water resources. If these wastes are left untreated, they would ferment slowly and produce bio-gas which would be distributed in the atmosphere. The bio-gas contains 65-70% methane, gas which is a green house gas, have a global warming potential 34 times more than that of Carbon Dioxide. Therefore, development of suitable technologies for utilization of wastes is essential to minimize adverse health and environment consequences. Comprehensive guidelines are available with Central Pollution Control Board for Toxic Waste Management including hospital wastes.

STUDY ON SOLID WASTES IN DELHI

7.9 As per the study conducted in 1999, to generate data on Solid Wastes produced in Delhi, it was found that an average daily generation of municipal solid wastes in Delhi is 5327 tons. Its physical analysis revealed that the wastes consist of about 47% of biodegradable component. The

recyclable components include paper and cardboard (6.7%), plastics (4.17%) and metal (1%). Total revenues to be earned through selling out these recyclable components will be of the order of crores of rupees. Data revealed that a large amount of Municipal Solid Waste generated can be recycled and reused. Technique and technologies for the same are available. It is also economically attractive and commonly practised by many countries in the world.

PLASTICS WASTE MANAGEMENT

7.10 Use of plastics have grown manifolds all over the world as it has many advantages. They are light, easy to mould, durable and easy to adopt to different user requirements. However, plastics are difficult to destroy and are classified as non-biodegradable. On the other hand, it is easy to recycle plastics.

7.11 In the Indian context, it is seen that the growth of the plastic industries is phenomenal. Polymer demand in India has consistently recorded double digit growth rates, trebling every 10 years. India's per capita consumption of 1.6 kg of plastics in 1998 was expected to rise to around 4 Kg by the year 2000. However, as compared to the world's statistics of per capita consumption of plastics, it is still far less. In the year 1998 , the per capita consumption of Western Europe was 60 Kg. that of Japan 70 Kg. and of USA 78 Kg. as against 1.6 Kg of India. Also, about 60% of the plastic wastes generated in India are recycled which is the highest in the world. However, the remaining 40 % of the plastic wastes remains uncollected, unsegregated, strewn on the ground, littered around in open drains or in unmanaged garbage dumps. The collection of such Soiled Waste including the one recycled three or even four times earlier, is not only uneconomical for recovery of material, but also unhygienic and undermines the environmental benefits of materials recycling. These indiscriminately disposed solid plastic wastes are of concern in view of causing chokage of municipal sewers, blocking of the storm water run-offs in drains particularly in hilly areas, causing deaths to many animals, like, cows which feed on the garbage food thrown in polythene bags.

TABLE 7.1.1: POPULATION TOTALS - INDIA AND STATES

(Numbers)

Sl. No.	States/U.Ts.	1981		1991		2001	
		Male	Female	Male	Female	Male	Female
1	2	3	4	5	6	7	8
	States						
1	Andhra Pradesh	27,109,616	26,441,410	33,724,581	32,783,427	38,527,413	37,682,594
2	Arunachal Pradesh	339,322	292,517	465,004	399,554	579,941	518,027
3	Assam	9,444,037	8,597,211	11,657,989	10,756,333	13,777,037	12,878,491
4	Bihar	35,930,560	33,984,174	33,838,238	30,692,316	43,243,795	39,754,714
5	Chhattisgarh++		..	8,872,620	8,742,308	10,474,218	10,359,585
6	Goa	510,152	497,597	594,790	575,003	687,248	660,420
7	Gujarat	17,552,640	16,533,159	21,355,209	19,954,373	26,385,577	24,285,440
8	Haryana	6,909,679	6,012,440	8,827,474	7,636,174	11,363,953	9,780,611
9	Himachal Pradesh	2,169,931	2,110,887	2,617,467	2,553,410	3,087,940	2,989,960
10	Jammu & Kashmir+	3,164,660	2,822,729	4,142,082	3,694,969	5,360,926	4,782,774
11	Jharkhand++	..	..	11,363,853	10,480,058	13,885,037	13,060,792
12	Karnataka	18,922,627	18,213,087	22,951,917	22,025,284	26,898,918	25,951,644
13	Kerala	12,527,767	12,925,913	14,288,995	14,809,523	15,468,614	16,372,760
14	Madhya Pradesh	26,886,305	25,292,539	25,394,673	23,171,569	15,468,614	28,904,371
15	Maharashtra	32,414,432	30,368,386	40,825,618	38,111,569	50,400,596	46,478,031
16	Manipur[1]	721,006	699,947	938,359	898,790	1,095,634	1,071,154
17	Meghalaya	683,710	652,109	907,687	867,091	1,176,087	1,142,735
18	Mizoram	257,239	236,518	358,978	330,778	459,109	429,464
19	Nagaland	415,910	359,020	641,282	568,264	1,047,141	942,895
20	Orissa	13,309,786	13,060,485	16,064,146	15,595,590	18,660,570	18,144,090
21	Punjab	8,937,210	7,851,705	10,778,034	9,503,935	12,985,045	11,373,954
22	Rajasthan	17,854,154	16,407,708	23,042,780	20,963,210	29,420,011	27,087,177
23	Sikkim	172,440	143,945	216,427	190,030	288,484	252,367
24	Tamil Nadu	24,487,624	23,920,453	28,298,975	27,559,971	31,400,909	31,004,770
25	Tripura	1,054,846	998,212	1,417,930	1,339,275	1,642,225	1,556,978
26	Uttaranchal++	..	..	3,674,540	3,438,943	4,325,924	4,163,425
27	Uttar Pradesh	58,819,535	52,042,977	70,362,417	61,636,387	87,565,369	78,632,552
28	West Bengal	28,560,901	26,019,746	35,510,633	32,567,332	41,465,985	38,710,212
	Union Territories						
1	A&N Islands	107,261	81,480	154,369	126,292	192,972	163,180
2	Chandigarh	255,278	196,332	358,614	283,401	506,938	393,697
3	D&N Haveli	52,515	51,161	70,953	67,524	121,666	98,824
4	Daman & Diu	38,298	40,683	51,595	49,991	92,512	65,692
5	Delhi	3,440,081	2,780,325	5,155,512	4,265,132	7,607,234	6,243,273
6	Lakshadweep	20,377	19,872	26,618	25,089	31,131	29,519
7	Pondicherry	304,561	299,910	408,081	399,704	486,961	487,384
	All India+ & 1	**353,374,460**	**329,954,637**	**439,358,440**	**407,062,599**	**532,156,772**	**496,453,556**

Source : Office of the Registrar General, India

\+ : The 1991 Census was not held in Jammu & Kashmir. The interpolated Population of Jammu & Kashmir, is based on the Final Population of 2001

++ : The States of Uttaranchal, Jharkhand and Chhattisgarh are carved out from Uttar Pradesh, Bihar, and Madhya Pradesh respectivly, in 2001 Census. In 1991 the recasted figures for these States are given as per jurisdiction of 2001 Census.

1 India and Manipur figures are final and include estimated figures for those of the three sub-divisions viz. Mao Maram, Paomata and Purul of Senapati district of Manipur as population Census 2001 in these three sub-divisions were cancelled due to technical and administrative reasons although a population census was carried out in these sub-divisions also as per schedule.

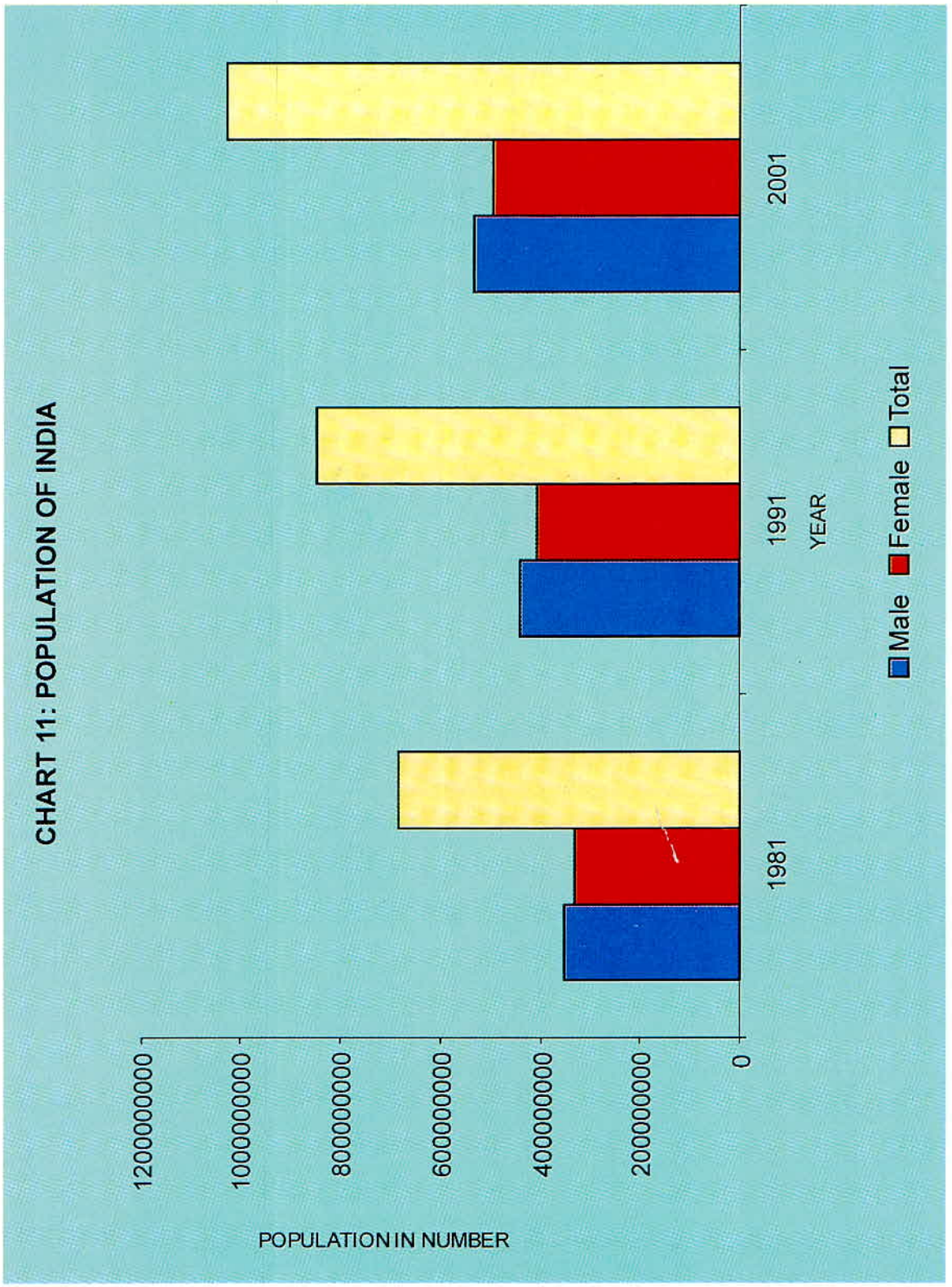


CHART 11: POPULATION OF INDIA
POPULATION IN NUMBER
1200000000
1000000000
800000000
600000000
400000000
200000000
0
1981
1991
2001
YEAR
Male
Female
Total

TABLE 7.1.2 : INFANT MORTALITY RATE

(Per Thousand Live Births)

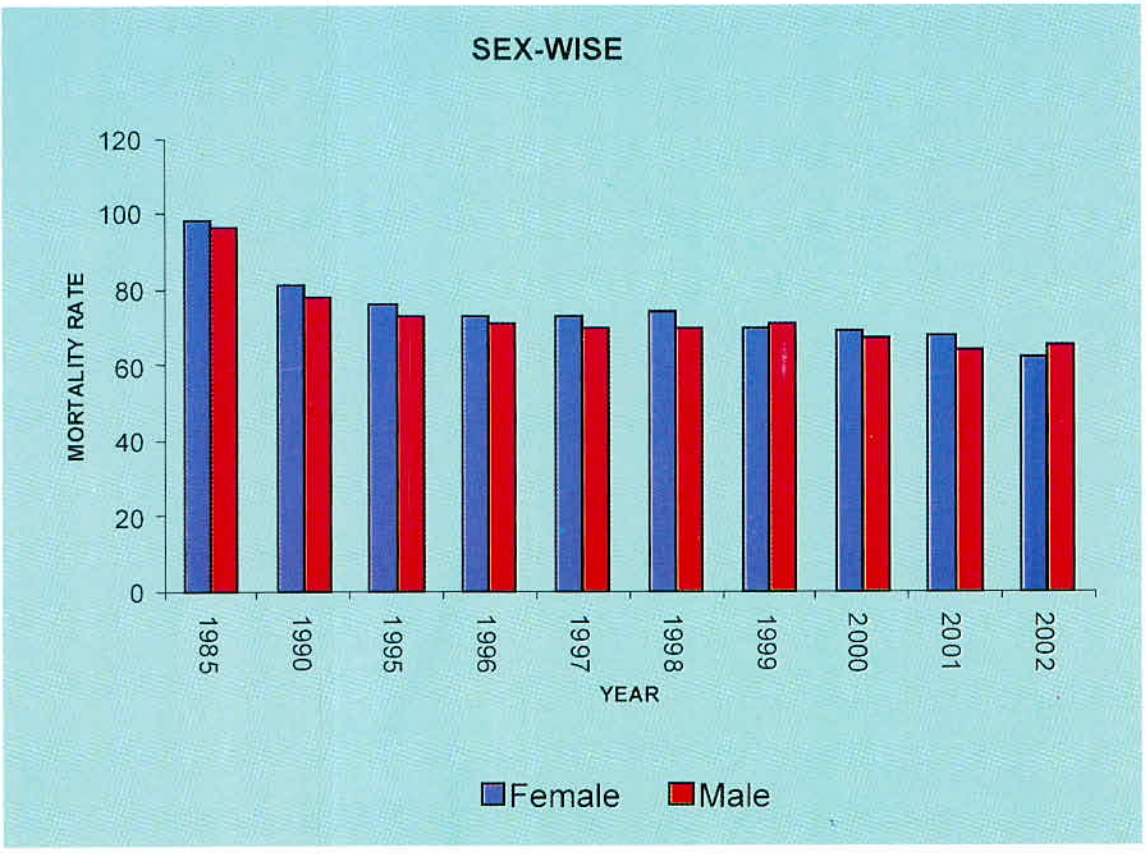
Sl. No.	Year	Sex		Sector		Overall
		Female	Male	Rural	Urban	
1	2	3	4	5	6	7
1	1985	98	96	107	59	97
6	1990	81	78	86	50	80
11	1995*	76	73	80	48	74
12	1996*	73	71	77	46	72
13	1997*	72	70	77	45	71
14	1998*	74	70	77	45	72
15	1999	70	71	75	44	70
16	2000	69	67	74	44	68
17	2001	68	64	72	42	66
18	2002**	62	65	69	40	63

Source : Office of the Registrar General, India, Sample Registration System

* : Excludes Jammu and Kashmir due to non-receipt of returns.

** : Excludes Nagaland (Rural) due to part-receipt of returns.

CHART 12 : INFANT MORTALITY RATE (PER THOUSAND LIVE BIRTHS)



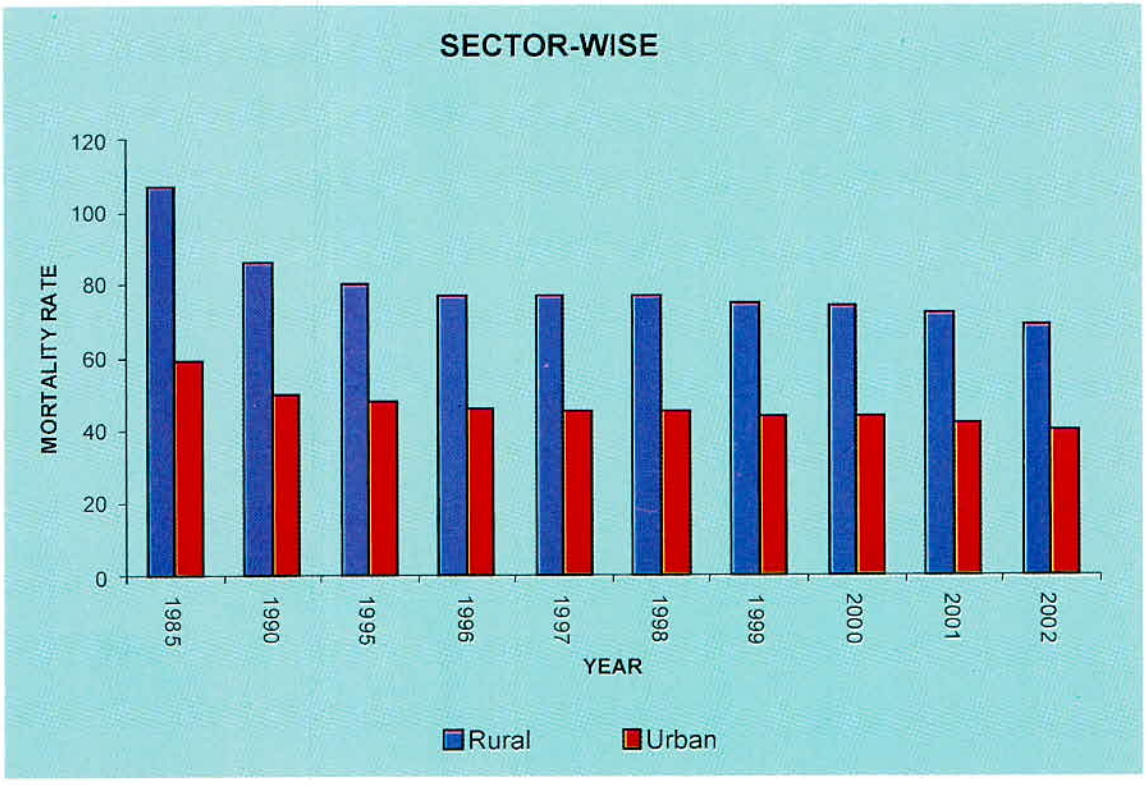


TABLE 7.1.3 : EXPECTATION OF LIFE AT BIRTH

(In Years)

Sl. No.	Year	Female	Male	Combined
1	2	3	4	5
1	1901-11	23.3	22.6	22.9
2	1911-21	20.9	19.4	20.1
3	1921-31	26.6	26.9	26.8
4	1931-41	31.4	32.1	31.8
5	1941-51	31.7	32.4	32.1
6	1951-61	40.6	41.9	41.3
7	1961-71	44.7	46.4	45.6
8	1970-75	49.0	50.5	49.7
9	1976-80	52.1	52.5	52.3
10	1981-85	55.7	55.4	55.5
11	1986-90	58.1	57.7	57.7
12	1987-91*	58.6	58.1	58.3
13	1988-92*	59.0	58.6	58.7
14	1989-93*	59.7	59.0	59.4
15	1990-94*	60.4	59.4	60.0
16	1991-95*	60.9	59.7	60.3
17	1992-96*	61.4	60.1	60.7
18	1993-97*	61.8	60.4	61.1
19	1994-98	62.2	60.6	61.4
20	1995-99	62.5	60.8	61.7

Source : Office of the Registrar General, India.

Notes : Figures for 1901-11 to 1961-71 are based on Census Actuarial Reports and for 1970-75 onwards on the basis of estimate from Sample Registration System

* : Excludes Jammu and Kashmir

The expectation of life at birth of female which was lower than that of male till 1980 has shown an upward trend during the decade 1981-90 and thereafter. This trend is similar in respect of almost all the states except in a few states i.e. Bihar and Orissa. This may be one of the reasons that in these States the combined expectation of life at birth is much lower than the National Average of 61.7(1995-99).

One of the major reasons for the decline in expectation of life in these states can be attributed to rapid growth of population and poverty, more than forty percent population living below the poverty line which is much more than National Average of 26.1 percent.

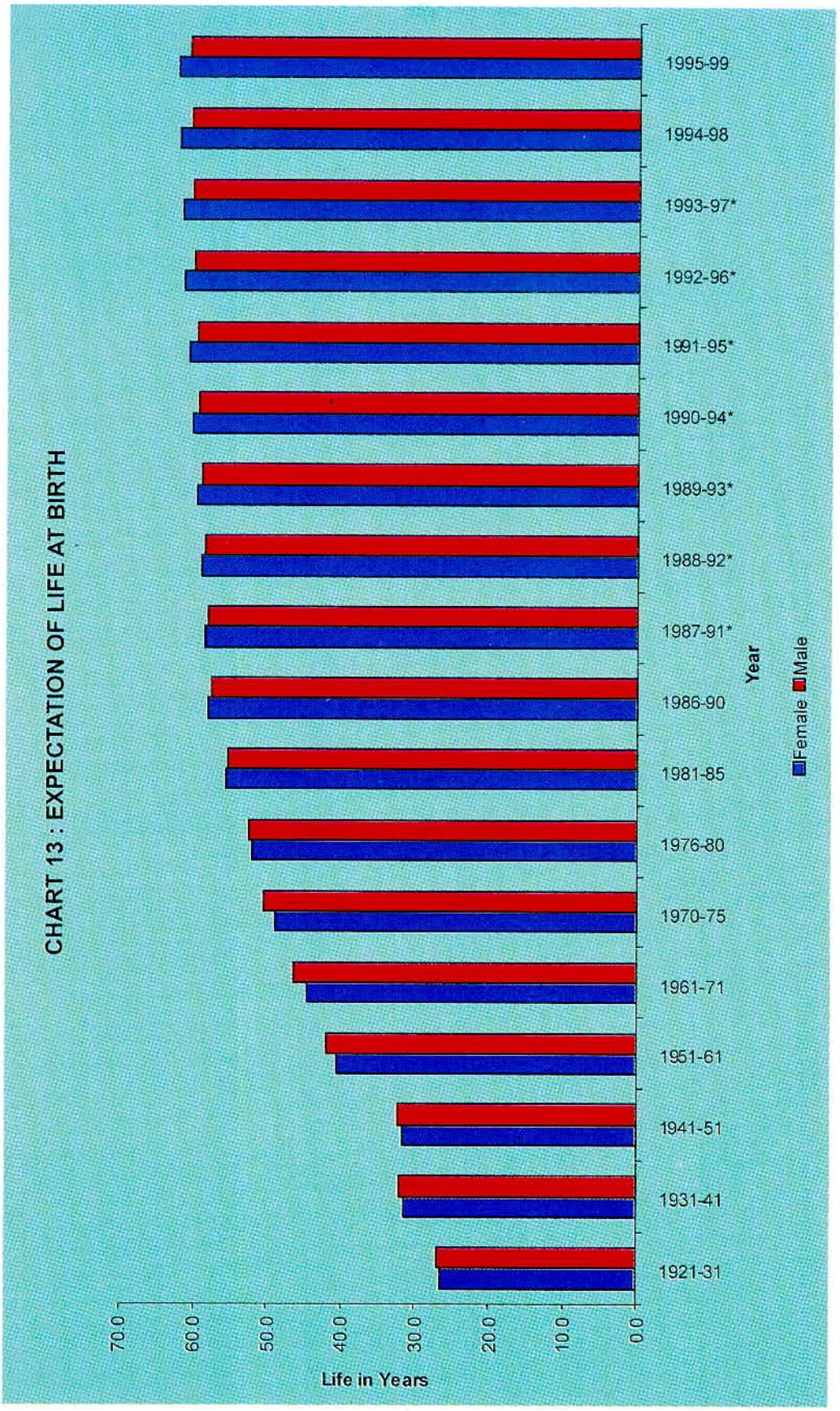


CHART 13 : EXPECTATION OF LIFE AT BIRTH
1995-99
1994-98
1993-97*
1992-96*
1991-95*
1990-94*
1989-93*
1988-92*
1987-91*
1986-90
1981-85
1976-80
1970-75
1961-71
1951-61
1941-51
1931-41
1921-31
Year
Female
Male
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Life in Years

TABLE 7.1.4 (a): STATE-WISE PERCENTAGE OF POPULATION BELOW THE POVERTY LINE -RURAL

Sl. No.	States/Union Territories	1973-74	1977-78	1983	1987-88	1993-94	1999-2000
1	2	3	4	5	6	7	8
	States						
1	Andhra Pradesh	48.41	38.11	26.53	20.92	15.92	11.05
2	Arunachal Pradesh	52.67	59.82	42.60	39.35	45.01	40.04
3	Assam	52.67	59.82	42.60	39.35	45.01	40.04
4	Bihar	62.99	63.25	64.37	52.63	58.21	44.30
5	Goa	46.85	37.64	14.81	17.64	5.34	1.35
6	Gujarat	46.35	41.76	29.80	28.67	22.18	13.17
7	Haryana	34.23	27.73	20.56	16.22	28.02	8.27
8	Himachal Pradesh	27.42	33.49	17.00	16.28	30.34	7.94
9	Jammu & Kashmir	45.51	42.86	26.04	25.70	30.34	3.97
10	Karnataka	55.14	48.18	36.33	32.82	29.88	17.38
11	Kerala	59.19	51.48	39.03	29.10	25.76	9.38
12	Madhya Pradesh	62.66	62.52	48.90	41.92	40.64	37.06
13	Maharashtra	57.71	63.97	45.23	40.78	37.93	23.72
14	Manipur	52.67	59.82	42.60	39.35	45.01	40.04
15	Meghalaya	52.67	59.82	42.60	39.35	45.01	40.04
16	Mizoram	52.67	59.82	42.60	39.35	45.01	40.04
17	Nagaland	52.67	59.82	42.60	39.35	45.01	40.04
18	Orissa	67.28	72.38	67.53	57.64	49.72	48.01
19	Punjab	28.21	16.37	13.20	12.60	11.95	6.35
20	Rajasthan	44.76	35.89	33.50	33.21	26.46	13.74
21	Sikkim	52.67	59.82	42.60	39.35	45.01	40.04
22	Tamil Nadu	57.43	57.68	53.99	45.80	32.48	20.55
23	Tripura	52.67	59.82	42.60	39.35	45.01	40.04
24	Uttar Pradesh	56.53	47.60	46.45	41.10	42.28	31.22
25	West Bengal	73.16	68.34	63.05	48.30	40.80	31.85
	Union Territories						
1	Andman& Nicobar Islands	57.43	57.68	53.99	45.80	32.48	20.55
2	Chandigarh	27.96	27.32	23.79	14.67	11.35	5.75
3	Dadra & Nagar Haveli	46.85	37.64	14.81	67.11	51.95	17.57
4	Daman & Diu	NA	NA	NA	NA	5.34	1.35
5	Delhi	24.44	30.19	7.66	1.29	1.90	0.40
6	Lakshadweep	59.19	51.48	39.03	29.10	25.76	9.38
7	Pondicherry	57.43	57.68	53.99	45.80	32.48	20.55
	All India	**56.44**	**53.07**	**45.65**	**39.09**	**37.27**	**27.09**

Source : Planning Commission Estimates.

Notes :
1. Poverty Ratio of Assam is used for Sikkim, Arunachal Pradesh, Meghalaya, Mizoram, Manipur, Nagaland, and Tripura.
2. Poverty Line of Maharashtra and expenditure distribution of Goa is used to estimate Poverty Ratio of Goa.
3. Poverty Line of Himachal Pradesh and expenditure distribution of Jammu & Kashmir is used to estimate poverty ratio of Jammu & Kashmir.
4. Poverty Ratio of Tamilnadu is used for Pondicherry and A & N Islands.
5. Urban Poverty Ratio of Punjab used for both rural and urban Poverty of Chandigarh.
6. Poverty Line of Maharashtra and expenditure distribution of Dadra & Nagar Haveli is used to estimate Poverty Ratio of Dadra & Nagar Haveli.
7. Poverty Ratio of Goa is used for Daman & Diu.
8. Poverty ratio of Kerala is used for Lakshadweep.
9. Urban poverty ratio of Rajasthan for the Year 1999-2000 may be treated as tentative.
10. Poverty Ratio of Himachal Pradesh is used for Jammu & Kashmir for 1993-94.

TABLE 7.1.4 (b) : STATE-WISE PERCENTAGE OF POPULATION BELOW THE POVERTY LINE- URBAN

Sl. No.	States/Union Territories	1973-74	1977-78	1983	1987-88	1993-94	1999-2000
1	2	3	4	5	6	7	8
	States						
1	Andhra Pradesh	50.61	43.55	36.30	40.11	38.33	26.63
2	Arunachal Pradesh	36.92	32.71	21.73	9.94	7.73	7.47
3	Assam	36.92	32.71	21.73	9.94	7.73	7.47
4	Bihar	52.96	48.76	47.33	48.73	34.50	32.91
5	Goa	37.69	36.31	27.00	35.48	27.03	7.52
6	Gujarat	52.57	40.02	39.14	37.26	27.89	15.59
7	Haryana	40.18	36.57	24.15	17.99	16.38	9.99
8	Himachal Pradesh	13.17	19.44	9.43	6.29	9.18	4.63
9	Jammu & Kashmir	21.32	23.71	17.76	17.47	9.18	1.98
10	Karnataka	52.53	50.36	42.82	48.42	40.14	25.25
11	Kerala	62.74	55.62	45.68	40.33	24.55	20.27
12	Madhya Pradesh	57.65	58.66	53.06	47.09	48.38	38.44
13	Maharashtra	43.87	40.09	40.26	39.78	35.15	26.81
14	Manipur	36.92	32.71	21.73	9.94	7.73	7.47
15	Meghalaya	36.92	32.71	21.73	9.94	7.73	7.47
16	Mizoram	36.92	32.71	21.73	9.94	7.73	7.47
17	Nagaland	36.92	32.71	21.73	9.94	7.73	7.47
18	Orissa	55.62	50.92	49.15	41.63	41.64	42.83
19	Punjab	27.96	27.32	23.79	14.67	11.35	5.75
20	Rajasthan	52.13	43.53	37.94	41.92	30.49	19.85
21	Sikkim	36.92	32.71	21.73	9.94	7.73	7.47
22	Tamil Nadu	49.40	48.69	46.96	38.64	39.77	22.11
23	Tripura	36.92	32.71	21.73	9.94	7.73	7.47
24	Uttar Pradesh	60.09	56.23	49.82	42.96	35.39	30.89
25	West Bengal	34.67	38.20	32.32	35.08	22.41	14.86
	Union Territories						
1	Andman& Nicobar Islands	49.40	48.69	46.96	38.64	39.77	22.11
2	Chandigarh	27.96	27.32	23.79	14.67	11.35	5.75
3	Dadra & Nagar Haveli	37.69	36.31	27.00	-	39.93	13.52
4	Daman & Diu	NA	NA	NA	NA	27.03	7.52
5	Delhi	52.23	33.51	27.89	13.56	16.03	9.42
6	Lakshadweep	62.74	55.62	45.68	40.33	24.55	20.27
7	Pondicherry	49.40	48.69	46.96	38.64	39.77	22.11
	All India	**49.01**	**45.24**	**40.79**	**38.20**	**32.36**	**23.62**

Source : Planning Commission Estimates.

Notes :
1. Poverty Ratio of Assam is used for Sikkim, Arunachal Pradesh, Meghalaya, Mizoram, Manipur, Nagaland, and Tripura.
2. Poverty Line of Maharashtra and expenditure distribution of Goa is used to estimate Poverty Ratio of Goa.
3. Poverty Line of Himachal Pradesh and expenditure distribution of Jammu & Kashmir is used to estimate poverty ratio of Jammu & Kashmir.
4. Poverty Ratio of Tamilnadu is used for Pondicherry and A & N Islands.
5. Urban Poverty Ratio of Punjab used for both rural and urban Poverty of Chandigarh.
6. Poverty Line of Maharashtra and expenditure distribution of Dadra & Nagar Haveli is used to estimate Poverty Ratio of Dadra & Nagar Haveli.
7. Poverty Ratio of Goa is used for Daman & Diu.
8. Poverty ratio of Kerala is used for Lakshadweep.
9. Urban poverty ratio of Rajasthan for the Year 1999-2000 may be treated as tentative.
10. Poverty Ratio of Himachal Pradesh is used for Jammu & Kashmir for 1993-94.

TABLE 7.1.4 (c): STATE-WISE PERCENTAGE OF POPULATION BELOW THE POVERTY LINE -COMBINED

Sl. No.	States/Union Territories	1973-74	1977-78	1983	1987-88	1993-94	1999-2000
1	2	3	4	5	6	7	8
	States						
1	Andhra Pradesh	48.86	39.31	28.91	25.86	22.19	15.77
2	Arunachal Pradesh	51.93	58.32	40.88	36.22	39.35	33.47
3	Assam	51.21	57.15	40.47	36.21	40.86	36.09
4	Bihar	61.91	61.55	62.22	52.13	54.96	42.60
5	Goa	44.26	37.23	18.90	24.52	14.92	4.40
6	Gujarat	48.15	41.23	32.79	31.54	24.21	14.07
7	Haryana	35.36	29.55	21.37	16.64	25.05	8.74
8	Himachal Pradesh	26.39	32.45	16.40	15.45	28.44	7.63
9	Jammu & Kashmir	40.83	38.97	24.24	23.82	25.17	3.48
10	Karnataka	54.47	48.78	38.24	37.53	33.16	20.04
11	Kerala	59.79	52.22	40.42	31.79	25.43	12.72
12	Madhya Pradesh	61.78	61.78	49.78	43.07	42.52	37.43
13	Maharashtra	53.24	55.88	43.44	40.41	36.86	25.02
14	Manipur	49.96	53.72	37.02	31.35	33.78	28.54
15	Meghalaya	50.20	55.19	38.81	33.92	37.92	33.87
16	Mizoram	50.32	54.38	36.00	27.52	25.66	19.47
17	Nagaland	50.81	56.04	39.25	34.43	37.92	32.67
18	Orissa	66.18	70.07	65.29	55.58	48.56	47.15
19	Punjab	28.15	19.27	16.18	13.20	11.77	6.16
20	Rajasthan	46.14	37.42	34.46	35.15	27.41	15.28
21	Sikkim	50.86	55.89	39.71	36.06	41.43	36.55
22	Tamil Nadu	54.94	54.79	51.66	43.39	35.03	21.12
23	Tripura	51.00	56.88	40.03	35.23	39.01	34.44
24	Uttar Pradesh	57.07	49.05	47.07	41.46	40.85	31.15
25	West Bengal	63.43	60.52	54.85	44.72	35.66	27.02
	Union Territories						
1	Andman& Nicobar Islands	55.56	55.42	52.13	43.89	34.47	20.99
2	Chandigarh	27.96	27.32	23.79	14.67	11.35	5.75
3	Dadra & Nagar Haveli	46.55	37.20	15.67	67.11	50.84	17.14
4	Daman & Diu	NA	NA	NA	NA	15.80	4.44
5	Delhi	49.61	33.23	26.22	12.41	14.69	8.23
6	Lakshadweep	59.68	52.79	42.36	34.95	25.04	15.60
7	Pondicherry	53.82	53.25	50.06	41.46	37.40	21.67
	All India	**54.88**	**51.32**	**44.48**	**38.86**	**35.97**	**26.1**

Source : Planning Commission Estimates.

Notes :
1. Poverty Ratio of Assam is used for Sikkim, Arunachal Pradesh, Meghalaya, Mizoram, Manipur, Nagaland, and Tripura.
2. Poverty Line of Maharashtra and expenditure distribution of Goa is used to estimate Poverty Ratio of Goa.
3. Poverty Line of Himachal Pradesh and expenditure distribution of Jammu & Kashmir is used to estimate poverty ratio of Jammu & Kashmir.
4. Poverty Ratio of Tamilnadu is used for Pondicherry and A & N Islands.
5. Urban Poverty Ratio of Punjab used for both rural and urban Poverty of Chandigarh.
6. Poverty Line of Maharashtra and expenditure distribution of Dadra & Nagar Haveli is used to estimate Poverty Ratio of Dadra & Nagar Haveli.
7. Poverty Ratio of Goa is used for Daman & Diu.
8. Poverty ratio of Kerala is used for Lakshadweep.
9. Urban poverty ratio of Rajasthan for the Year 1999-2000 may be treated as tentative.
10. Poverty Ratio of Himachal Pradesh is used for Jammu & Kashmir for 1993-94.

The estimates of poverty have been released from the year 1973-74 onward using the full survey data on household consumption expenditure collected by the National Sample Survey Organization (NSSO) at an interval of approximately five years. The estimates are available for the year 1973-74, 1977-78, 1983, 1987-88, 1993-94 and 1999-2000. The methodology behind these estimates, often termed as "official methodology", has been outlined in the Appendix VI.

The results show that during the last three decades the percentage of population below poverty line has declined significantly in rural areas as well as in urban areas. The 1999-2000 survey results have revealed that 27.09% of rural population and 23.62% of urban population is living below the poverty line.

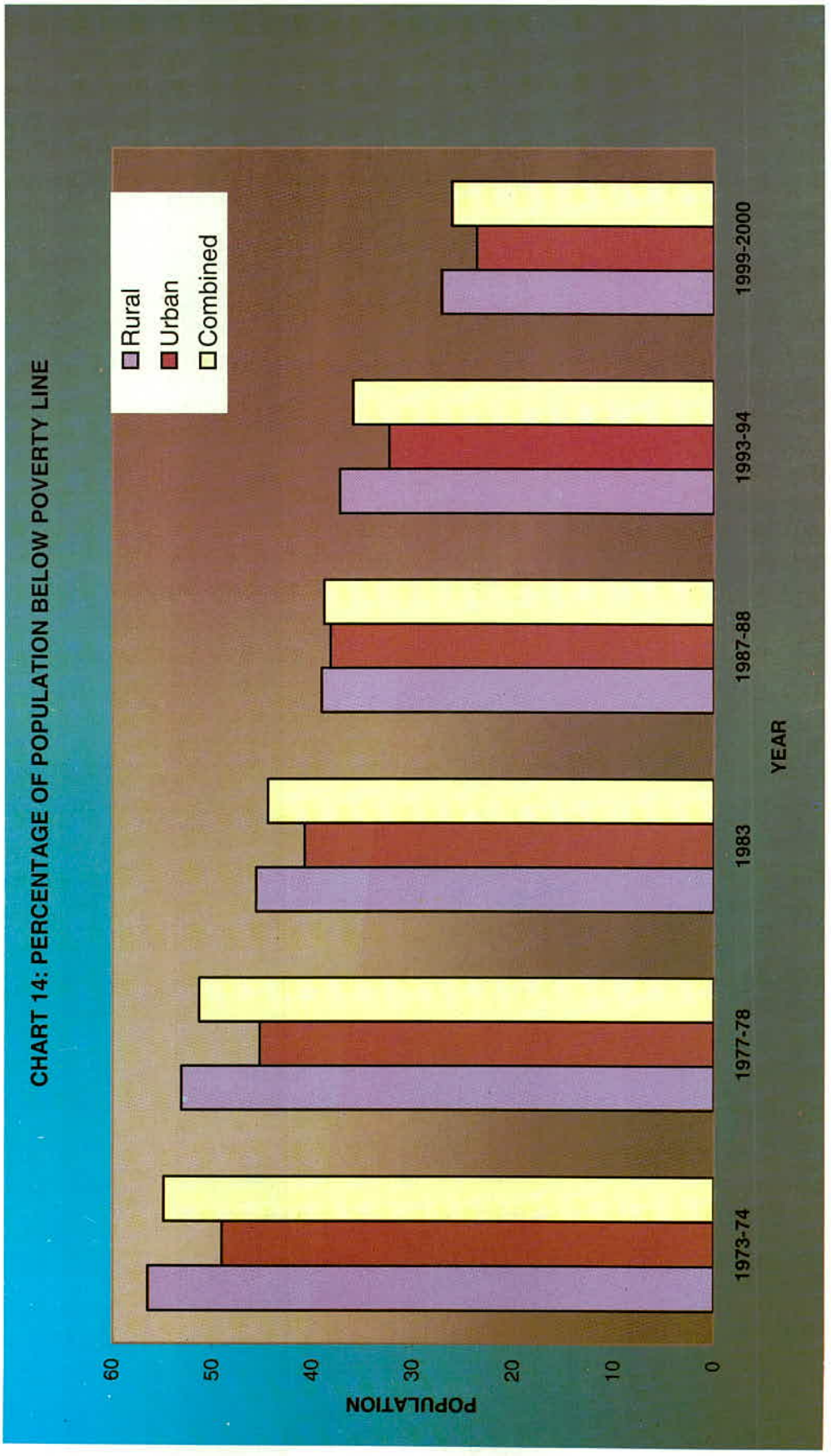


CHART 14: PERCENTAGE OF POPULATION BELOW POVERTY LINE
Rural
Urban
Combined
POPULATION
0
10
20
30
40
50
60
1973-74
1977-78
1983
1987-88
1993-94
1999-2000
YEAR

TABLE 7.2.1 : URBAN-RURAL BREAKUP OF TOTAL POPULATION, NUMBER OF HOUSEHOLDS, HOUSES AND AVERAGE SIZE OF HOUSEHOLDS, AVERAGE NO. OF HOUSEHOLDS AND PERSONS PER HOUSE

Sl. No.	Year	Total Population	No. of Households	No. of Houses	Av. Size of Households	Av. No of Household Per Persons	Av. No of House Per House
1	2	3	4	5	6	7	8
1	1981*						
	Total	665,287,849	119,772,545	121782109**	5.6	1.0	5.5
	Urban	157,680,171	28,905,949	29,897,491	5.5	1.0	5.3
	Rural	507,607,678	90,866,596	91,884,618	5.6	1.0	5.5
2	1991+						
	Total	838,583,988	152,009,467	159425666**	5.5	1.0	5.3
	Urban	215,771,612	40,418,141	43,518,317	5.3	0.9	5.0
	Rural	622,812,376	111,591,326	115,907,349	5.6	1.0	5.4
3	2001++						
	Total	1,028,610,328	193,579,954	202973364#	5.3	1.0	5.1
	Urban	286,119,689	55,832,570	58,514,738	5.1	1.0	4.9
	Rural	742,490,639	137,747,384	144,458,626	5.4	1.0	5.1

Source : Office of Registrar General of India

* : Excluding Assam

\+ : Excluding J & K

** : No. of Occupied residential houses + No. of Census houses vacant at the time of house listing.

++ India figures are final and exclude those of the three sub-divisions viz. Mao Maram, Paomata and Purul of Senapati district of Manipur as population Census 2001 in these three sub-divisions were cancelled due to technical and administrative reasons although a population census was carried out in these sub-divisions as per schedule.

\# The occupied residential houses and vacant houses are based on Census 2001 Houselisting data.

TABLE 7.2.2 : NUMBER OF HOUSEHOLDS, POPULATION AND OCCUPIED RESIDENTIAL AND VACANT HOUSES WITH RURAL/URBAN BREAK UP

Sl. No.	Total/ Urban/ Rural		Number of Households	Population			No. of Houses at the time of Houselisting		
				Total	Male	Female	Total #	Occupied residential	Vacant
1	2	3	4	5	6	7	8	9	10
1	1981*								
	Total	Total	119,772,545	665,287,849	343,930,423	321,357,426	121,782,109	113,735,542	8,046,567
		Institutional	247,457	3,790,700	3,116,289	674,411			
	Urban	Total	28,905,949	157,680,171	83,876,403	73,803,768	29,897,491	27,604,947	2,292,544
		Institutional	143,015	2,377,559	1,956,711	420,848			
	Rural	Total	90,866,596	507,607,678	260,054,020	247,553,658	91,884,618	86,130,595	5,754,023
		Institutional	104,442	1,413,141	1,159,578	253,563			
2	1991+								
	Total	Total	152,009,467	838,583,988	435,216,358	403,367,630	159,425,666	147,013,766	12,411,900
		Institutional	244,881	4,252,976	3,351,584	901,392			
	Urban	Total	40,418,141	215,771,612	113,936,953	101,834,659	43,518,317	39,073,337	4,444,980
		Institutional	140,702	2,406,841	1,893,949	512,892			
	Rural	Total	111,591,326	622,812,376	321,279,405	301,532,971	115,907,349	107,940,429	7,966,920
		Institutional	104,179	1,846,135	1,457,635	388,500			
3	2001++								
	Total	Total	193,579,954	1,028,610,328	532,156,772	496,453,556	202,973,364	187,162,172	15,811,192
		Institutional	460,717	7,802,866	5,460,238	2,342,628			
	Urban	Total	55,832,570	286,119,689	150,554,098	135,565,591	58,514,738	52,062,718	6,452,020
		Institutional	208,470	3,758,714	2,717,220	1,041,494			
	Rural	Total	137,747,384	742,490,639	381,602,674	360,887,965	144,458,626	135,099,454	9,359,172
		Institutional	252,247	4,044,152	2,743,018	1,301,134			

Source : Office of Registrar General of India

Note :

\# : No. of census houses (occupied residential + vacant)

* : Excluding Assam

\+ : Excluding Jammu & Kashmir

++ India figures are final and exclude those of the three sub-divisions viz. Mao Maram, Paomata and Purul of Senapati district of Manipur as population Census 2001 in these three sub-divisions were cancelled due to technical and administrative reasons although a population census was carried out in these sub-divisions as per schedule.

TABLE 7.2.3 : HOUSEHOLD BY NUMBER OF DWELLING ROOMS

	No. of Households	Households having number of dwelling rooms						
		One Room	Two Rooms	Three Rooms	Four Rooms	Five or More Rooms	No exclusive Rooms	Un -specified Rooms
1	2	3	4	5	6	7	8	9
1981*								
Total	118,614,803	53,046,175	33,948,809	14,496,724	7,482,461	6,852,624	769,506	2,018,504
Rate	100.00	44.70	28.60	12.20	6.30	5.80	0.65	1.70
Urban	28,541,877	13,072,617	7,947,026	3,484,741	1,804,721	1,626,979	149,001	456,792
Rate	100.00	45.80	27.80	12.30	6.30	5.70	0.52	1.60
Rural	90,072,926	39,973,558	26,001,783	11,011,983	5,677,740	5,225,645	620,505	1,561,712
Rate	100.00	44.40	28.90	12.20	6.30	5.80	0.69	1.73
1991+								
Total	151,032,898	61,154,743	46,180,064	20,910,465	10,791,101	10,608,294	43,538	1,344,693
Rate	100.00	40.50	30.60	13.80	7.20	7.00	0.03	0.89
Urban	39,493,450	15,620,078	11,992,915	5,852,191	3,070,829	2,751,947	16,578	188,912
Rate	100.00	39.50	30.40	14.80	7.80	7.00	0.04	0.48
Rural	111,539,448	45,534,665	34,187,149	15,058,274	7,720,272	7,856,347	26,960	1,155,781
Rate	100.00	40.80	30.70	13.50	6.90	7.00	0.02	1.04
2001								
Total	191,963,935	73,856,117	57,571,314	27,541,899	14,361,957	12,660,232	5,972,416	-
Rate	100.00	38.47	29.99	14.35	7.48	6.60	3.11	
Urban	53,692,376	18,852,794	15,857,448	9,176,931	4,656,850	3,900,405	1,247,948	-
Rate	100.00	35.11	29.53	17.09	8.67	7.26	2.32	
Rural	138,271,559	55,003,323	41,713,866	18,364,968	9,705,107	8,759,827	4,724,468	-
Rate	100.00	39.78	30.17	13.28	7.02	6.34	3.42	

Source : Office of the Registrar General of India

* : Excuding Assam

Excluding houseless and Institutional Households

\+ : Excluding J& K

Excluding houseless and Institutional Households

TABLE 7.2.4 : NUMBER OF HOMELESS HOUSEHOLDS AND POPULATION SEXWISE WITH RURAL/URBAN BREAK-UP

Sl. No.		Numbers of Homeless households	Homeless Population		
			Total	Male	Female
1	2	3	4	5	6
1	**1981***				
	Total	629929	2342954	1376512	966442
	Urban	209520	618843	406154	212689
	Rural	420409	1724111	970358	753753
2	**1991+**				
	Total	522,445	2,007,489	1,180,368	827,121
	Urban	216,917	725,592	471,077	254,515
	Rural	305,528	1,281,897	709,291	572,606
3	**2001**				
	Total	447,585	1,943,766	1,136,496	807,270
	Urban	187,810	778,599	502,344	276,255
	Rural	259,775	1,165,167	634,152	531,015

Source: Office of the Registrar General of India

* : Excluding Assam

\+ : Excludes Jammu & Kashmir

TABLE 7.2.5 : STATE-WISE IDENTIFIED/ ESTIMATED SLUM POPULATION

(Population in lakh)

Sl. No.	State/Uts	1981			1991			2001		
		Urban Population	Identified Slum Population	% age	Urban Population	Estimated Slum Population	% age	Urban Population	Estimated Slum Population	% age
1	2	3	4	5	6	7	8	9	10	11
	States	**1528.805**	**260.202**	**17.0**	**2078.830**	**436.460**	**21.0**	**2769.377**	**580.669**	**21.0**
1	Andhra Pradesh	124.876	28.579	22.9	178.871	43.133*	24.1	249.654	60.166	24.1
2	Arunachal Pradesh	0.414	Nil	Nil	1.106	0.221	20.0	1.879	0.375	20.0
3	Assam	17.824	1.236	6.9	24.878	4.483+	18.0	32.367	5.826	18.0
4	Bihar	87.190	32.699	37.5	113.530	26.906	23.7	149.556	35.444	23.7
5	Goa	3.518	0.242	6.9	4.798	0.833	17.4	6.559	1.141	17.4
6	Gujarat	106.017	15.316	14.4	142.461	25.814*	18.1	189.993	34.388	18.1
7	Haryana	28.274	2.742	9.7	40.547	6.843*	16.9	59.572	10.067	16.9
8	Himachal Pradesh	3.260	0.761	23.3	4.492	1.258+	28.0	5.765	1.614	28.0
9	Jammu & Kashmir	12.604	6.270	49.7	18.394	5.922	32.2	24.173	7.783	32.2
10	Karnataka	107.296	5.745	5.4	139.078	12.934	9.3	190.989	17.761	9.3
11	Kerala	47.713	4.101	8.6	76.803	12.218	15.9	103.474	16.452	15.9
12	Madhya Pradesh	105.865	10.749	10.2	153.388	21.029	13.7	204.050	27.954	13.7
13	Maharashtra	219.936	43.149	19.6	305.416	78.724	25.8	416.155	107.367	25.8
14	Manipur	3.755	0.165	4.4	5.056	0.853	16.9	6.702	1.132	16.9
15	Meghalaya	2.413	0.660	27.4	3.300	0.833+	25.2	4.608	1.161	25.2
16	Mizoram	1.218	Nil	Nil	3.179	0.572	18.0	6.424	1.156	18.0
17	Nagaland	1.202	Nil	Nil	2.082	0.416	20.0	3.049	0.609	20.0
18	Orissa	31.103	2.820	9.1	42.350	8.432*	19.9	56.320	11.207	19.9
19	Punjab	46.478	11.668	25.1	59.932	14.144*	23.6	80.241	18.936	23.6
20	Rajasthan	72.105	10.252	14.2	100.671	24.000+	23.8	137.193	32.651	23.8
21	Sikkim	0.511	0.024	4.7	0.370	0.095+	25.7	0.479	0.123	25.7
22	Tamil Nadu	159.519	26.760	16.8	190.776	35.713*	18.7	233.080	43.585	18.7
23	Tripura	2.256	0.184	8.2	4.217	0.744*	17.6	5.078	0.893	17.6
24	Uttar Pradesh	198.991	25.800	13.0	276.059	58.391*	21.1	365.397	77.098	21.1
25	West Bengal	144.467	30.280	21.0	187.076	51.949	27.8	236.620	65.780	27.8
	Uts	**65.821**	**18.942**	**28.8**	**97.277**	**26.148**	**26.9**	**140.060**	**37.589**	**26.8**
26	A. & N. Island	0.496	Nil	Nil	0.750	0.349+	46.5	1.102	0.512	46.5
27	Chandigarh	4.228	Nil	Nil	5.758	1.612	28.0	7.618	2.133	28.0
28	Dadra & Nagar Haveli	0.069	Nil	Nil	0.117	0.023	19.7	0.199	0.039	19.6
29	Daman and Diu**	Nil	Nil	Nil	0.475	0.095	20.0	0.698	0.139	19.9
30	Delhi	57.682	18.000	31.2	84.716	22.480+	26.5	122.891	32.566	26.5
31	Lakshadweep	0.186	Nil	Nil	0.291	0.058+	19.9	0.362	0.072	19.9
32	Pondicherry	3.160	0.942	29.8	5.170	1.531	29.6	7.190	2.128	29.6
	Grand Total	**1594.626**	**279.144**	**17.5**	**2176.107**	**462.608**	**21.3**	**2909.437**	**618.258**	**21.3**

Source : A Compendium on Indian Slums ,1996, Town and Country Planning Organisation

\+ : Figures of identified/estimated slum population have been furnished (for the state as a whole) by the respective State Governments.

* : Slum population estimates are based on the information (for Class-I and Class-II cities/towns) received from the State/Ut's Government for the Year 1991.

** : Figures of 1981 have already been included in Goa.

TABLE 7.2.6 : STATE-WISE IDENTIFIED/ESTIMATED PERCENTAGE DISTRIBUTION OF SLUM POPULATION ACCORDING TO SIZE/CLASS CATEGORIES OF CITIES/TOWNS IN 1991

Sl. No.	States/Uts.	Percentage Distribution			Total Slum Population (in lakhs)
		Class I	Class II	Others	
1	2	3	4	5	6
1	Andhra Pradesh	63.3	15.5	21.2	43.133
2	Arunachal Pradesh	-	-	100.0	0.221
3	Assam	62.5	16.1	21.4	4.483
4	Bihar	68.4	18.6	13.0	26.906
5	Goa	-	7.3	92.7	0.833
6	Gujarat	72.4	12.2	15.4	25.814
7	Haryana	52.5	22.4	25.1	6.843
8	Himachal Pradesh	27.2	-	72.8	1.258
9	Jammu & Kashmir	-	-	-	-
10	Karnataka	72.3	8.8	18.9	12.934
11	Kerala	50.4	2.7	46.9	12.218
12	Madhya Pradesh	48.5	16.1	35.4	21.029
13	Maharashtra	82.5	4.5	13.0	78.724
14	Manipur	25.0	-	75.0	0.853
15	Meghalaya	50.4	-	49.6	0.833
16	Mizoram	48.8	-	51.2	0.572
17	Nagaland	-	46.9	53.1	0.416
18	Orissa	43.0	15.4	41.6	8.432
19	Punjab	65.3	18.7	16.0	14.144
20	Rajasthan	51.2	5.5	43.3	24.000
21	Sikkim	-	-	100.0	0.095
22	Tamil Nadu	67.8	13.2	19.0	35.713
23	Tripura	33.6	-	66.4	0.744
24	Uttar Pradesh	53.9	14.8	31.3	58.391
25	West Bengal	87.2	4.1	8.7	51.949
	Total States	**67.1**	**10.8**	**22.1**	**430.538**
26	Andaman & Nicobar Islands	-	100.0	-	0.349
27	Chandigarh	100.0	-	-	1.612
28	Dadra & Nagar Haveli	-	-	100.0	0.023
29	Daman and Diu	-	-	100.0	0.095
30	Delhi	100.0	-	-	22.480
31	Lakshadweep	-	-	100.0	0.058
32	Pondicherry	76.9	14.4	8.6	1.531
	Total Uts	**96.6**	**2.2**	**1.2**	**26.148**
	Grand Total	**68.8**	**10.3**	**20.9**	**456.686***

Source : A Compendium on Indian Slums, 1996, Town and Country Planning Organisation

* : Excluding Jammu & Kashmir

TABLE 7.2.7 : ESTIMATED SLUM POPULATION IN METROPOLITAN CITIES

(Population in lakh)

Sl. No.	Name of City	1981			1991				2001*		
		Total Population	Slum Population	%age	Total Population	Slum Population		%age	Total Population	Slum Population	%age
1	2	3	4	5	6	7		8	9	10	11
1	Kolkata UA	91.940	30.280	32.9	110.219	36.262	@	32.9	131.147	43.147	32.9
2	Greater Mumbai UA	89.887	30.831	34.3	125.962	43.205	@	34.3	170.701	58.550	34.3
3	Delhi UA	57.228	18.000	31.5	84.191	22.480		26.7	122.204	32.628	26.7
4	Chennai UA	42.893	13.769	32.1	54.220	15.251		28.1	69.823	19.620	28.1
5	Hyderabad UA	25.500	5.000	19.6	43.444	8.593		19.8	62.964	12.466	19.8
6	Bangalore UA	29.218	3.650	12.5	41.303	5.162		12.5	63.597	7.949	12.5
7	Ahmedabad UA	25.480	5.172	20.3	33.122	6.724	@	20.3	43.629	8.859	20.3
8	Pune UA	17.222	2.807	16.3	24.940	4.065	@	16.3	35.299	5.753	16.3
9	Kanpur UA	16.391	6.140	37.5	20.299	4.172		20.6	24.875	5.124	20.6
10	Lucknow UA	10.076	2.850	28.3	16.692	2.778		16.6	22.581	3.748	16.6
11	Nagpur UA	12.195	3.890	31.9	16.640	5.308	@	31.9	23.212	7.405	31.9
12	Jaipur UA	10.152	2.958	29.1	15.182	4.418	@@	29.1	22.108	6.433	29.1
13	Surat UA	9.239	2.347	25.4	15.190	3.858	@	25.4	22.916	5.821	25.4
14	Coimbatore UA	9.204	0.801	+8.7	11.007	0.958		8.7	13.283	1.156	8.7
15	Cochin UA	8.249	2.046	24.8	11.406	2.829	@	24.8	15.364	3.810	24.8
16	Vadodara UA	7.449	1.182	15.9	11.268	2.063		18.3	17.074	3.125	18.3
17	Indore UA	8.293	1.263	15.2	11.091	1.686	@	15.2	15.430	2.345	15.2
18	Patna UA	9.189	5.837	63.5	10.996	6.982	@	63.5	15.273	9.698	63.5
19	Madurai UA	9.077	1.634	+18.0	10.859	1.953		18.0	13.134	2.364	18.0
20	Bhopal UA	6.710	0.568	8.5	10.628	1.487	**	14.0	15.327	2.145	14.0
21	Vishakhapatnam UA	6.036	1.520	25.2	10.571	2.664		25.2	16.683	4.204	25.2
22	Varanasi UA	7.972	2.600	32.6	10.309	2.074		20.1	13.314	2.676	20.1
23	Ludhiana	6.071	3.104	51.1	10.427	3.687		35.4	16.342	5.785	35.4
Total		**515.671**	**148.249**	**28.7**	**709.966**	**188.659**		**26.6**	**966.280**	**254.811**	**26.4**

Source : T.C.P.O., Ministry of Urban Affairs & Employment

@ : Based on the percentage identified slum population of 1981.

\+ : Based on the percentage identified slum population of 1991.

** : Based on the no. of identified Jhuggi collected by the State Govt. in 1991-92

* : Estimated

Note

Classification of the size of cities is based on 1991 census.

TABLE 7.2.8 : HOUSEHOLDS CLASSIFIED BY SUPPLY OF WATER AND TOILET INSTALLATION BY RURAL AND URBAN

Sl. No		Total number of Households	Water Supply With Tap Water			Toilet Installation	
			Total	Inside	Outside	With Toilet of Any Type	Without Toilet of Any Type
1	2	3	4	5	6	7	8
1	**1981***						
	Total	118,614,803	27,317,532	12,851,006	14,466,526		
	Percentage	100.0	23.0	10.8	12.2		
	Urban	28,541,877	18,049,114	10,302,247	7,746,867	16,596,103	11,945,774
	Percentage	100.0	63.2	36.1	27.1	58.1	41.9
	Rural	90,072,926	9,268,418	2,548,759	6,719,659		
	Percentage	100.0	10.3	2.8	7.5		
2	**1991+**						
	Total	151,111,383	48,745,490	23,414,175	25,331,315	35,819,780	115291603
	Percentage	100.0	32.3	15.5	16.8	23.7	76.3
	Urban	39,523,184	25,713,794	16,691,096	9,022,698	25,236,449	14,286,735
	Percentage	100.0	65.1	42.3	22.8	63.9	36.1
	Rural	111,588,199	23,031,696	6,723,079	16,308,617	10,583,331	101004868
	Percentage	100.0	20.6	6.0	14.6	9.5	90.5
3	**2001**						
	Total	191,963,935	70,448,827	39,966,085	30,482,742	69,885,799	122078136
	Percentage	100.0	36.7	20.8	15.9	36.4	63.6
	Urban	53,692,376	36,865,072	26,676,440	10,188,632	39,581,440	14,110,936
	Percentage	100.0	68.7	49.7	19.0	73.7	26.3
	Rural	138,271,559	33,583,755	13,289,645	20,294,110	30,304,359	107967200
	Percentage	100.0	24.3	9.6	14.7	21.9	78.1

Source : Office of the Registrar General of India

* : Excluding Assam, Excluding Institutional and houseless households

\+ : Excluding J&K

Access to safe drinking water remains an urgent need as only 68.7% of occupied housing unit in urban areas received organized piped water supply and rest have to depend on surface or ground water which is untreated. The situation in rural areas is much worst. In India, almost all surface water sources are contaminated and unfit for human consumption. The diseases commonly caused due to contaminated water are diarrhea, trachoma, intestine worms, hepatitis. Inadequate access to safe drinking water and sanitation facilities leads to infant mortality and intestinal diseases.

TABLE 7.2.9 (a) : NUMBER OF SLUMS BY MAJOR SOURCE OF DRINKING WATER PER 1000 SLUMS FOR EACH STATE/UT

State/UT	Major Source of drinking water									Number of slums	
	Tap	Tube well/ hand pump	Well	Tank / pond (reserved for drinking)	Other tank / pond	River/ canal/ lake	Spring	Others	n.r.	All	Estimated	sample
Non - notified												
Jammu & Kashmir	979	21								1000	145	7
Punjab		1000								1000	104	2
Delhi	711	289								1000	1678	20
Rajasthan	266	3						731		1000	862	9
Uttar Pradesh	588	412								1000	1868	20
Bihar		1000								1000	977	8
West Bengal	719	177	80					24		1000	5253	56
Orissa	565	435								1000	390	12
Chhattisgarh	710	251	39							1000	743	6
Madhya Pradesh	751	249								1000	691	14
Gujarat	743	257								1000	1120	31
Maharashtra	908	27	10					55		1000	6472	60
Andhra Pradesh	455	545								1000	1340	13
Karnataka	765	160			75					1000	805	12
Tamil Nadu	925	29	47							1000	2234	32
Pondicherry	971	29								1000	170	10
All India	713	217	24		2			44		1000	25522	332

Source : NSS Report no. 486: Condition of Urban Slums, 2002; Salient Features

n.r. not reported

TABLE 7.2.9 (b) : NUMBER OF SLUMS BY STATUS OF ELECTRICITY CONNECTION PER 1000 SLUMS FOR EACH STATE/UT

State/UT	Slums with Electricity for						Number of slums	
	Both street lights and household use	Household use only	Street light only	No electricity	n.r.	All	Estimated	Sample
Non - notified								
Jammu & Kashmir	238	762				1000	145	7
Punjab			48	952		1000	104	2
Delhi	390	610				1000	1678	20
Rajasthan	39	247		714		1000	862	9
Uttar Pradesh	409	125	11	455		1000	1868	20
Bihar		369		631		1000	977	8
West Bengal	616	138	89	158		1000	5253	56
Orissa	433	125	413	28		1000	390	12
Chhattisgarh	749	211		39		1000	743	6
Madhya Pradesh	335	665				1000	691	14
Gujarat	532	273	188	7		1000	1120	31
Maharashtra	551	354	60	35		1000	6472	60
Andhra Pradesh	567	112		321		1000	1340	13
Karnataka	982		18			1000	805	12
Tamil Nadu	741	88	85	86		1000	2234	32
Pondicherry	930			70		1000	170	10
All India	534	251	57	158		1000	25522	332

Source : NSS Report no. 486: Condition of Urban Slums, 2002; Salient Features

n.r. not reported

TABLE 7.2.9 (c) : NUMBER OF SLUMS BY LATRINE FACILITY USED BY MOST OF THE RESIDENTS OF THE SLUM PER 1000 SLUMS FOR EACH STATE/UT

State/UT	Latrine facility used by most of the residents of the slum													Number of slums	
	Owned			Shared			Public / community								
	Septic tank / flush	Pit	Service	Septic tank/ flush	Pit	Service	Septic tank / flush	Pit	Service	Other latrine	No latrine	n.r.	All	Estimated	Sample
Non - notified															
Jammu & Kashmir									238		762		1000	145	7
Punjab								48			952		1000	104	2
Delhi							219		263		518		1000	1678	20
Rajasthan		5								16	979		1000	862	9
Uttar Pradesh		117				3	253		113		513		1000	1868	20
Bihar											1000		1000	977	8
West Bengal	46	48		271	81	26	86	114		26	300		1000	5253	56
Orissa											1000		1000	390	12
Chhattisgarh											1000		1000	743	6
Madhya Pradesh				4			247		3		745		1000	691	14
Gujarat	19						77		7	204	694		1000	1120	31
Maharashtra	32			38			650		5	26	249		1000	6472	60
Andhra Pradesh	10			17		112	47		112	24	677		1000	1340	13
Karnataka							376		75	17	532		1000	805	12
Tamil Nadu				67		64	143			62	665		1000	2234	32
Pondicherry										70	930		1000	170	10
All India	19	19		73	23	17	254	24	37	29	506		1000	25522	332

Source : NSS Report no. 486: Condition of Urban Slums, 2002; Salient Features

n.r. not reported

TABLE 7.2.10 (a) : NUMBER OF HOUSEHOLDS BY DISTANCE TO THE SOURCE OF DRINKING WATER PER 1000 HOUSEHOLDS FOR EACH STATE/UT (RURAL).

State/UT	Drinking water available								Number of households	
			Outside premises at a distance of							
	Within dwelling	Outside dwelling but within premises	Less than 0.2 km	0.2 – 0.5 km	0.5 – 1.0 km	1.0 – 1.6 km	1.6 km or more	n.r.	All	Estimated	sample
Jammu & Kashmir	303	224	353	90	17	4	9		1000	1087315	1150
Himachal Pradesh	186	204	487	110	11	2			1000	1145207	1199
Punjab	585	259	144	10	2				1000	3150742	1204
Chandigarh	392	162	446						1000	28388	96
Uttranchal	344	113	470	51	11	8		4	1000	1191388	559
Harayana	214	140	378	165	46	12	3	43	1000	2628646	943
Delhi	169	173	288	260	108	2			1000	717683	95
Rajasthan	155	117	427	202	68	14	5	13	1000	6839890	2709
Uttar Pradesh	354	186	419	36	3			3	1000	23286557	7069
Bihar	320	238	412	28	2				1000	11866728	4337
Sikkim	181	423	219	118	41	5	15		1000	81980	671
Arunachal Pradesh	209	464	252	35	27	6		7	1000	106411	852
Nagaland	100	202	638	61					1000	82602	528
Manipur	12	203	638	116	16	1	12	1	1000	255172	1094
Mizoram	44	18	767	113	41	17			1000	72178	432
Tripura	68	359	531	42					1000	600139	1248
Meghalaya	107	244	539	98	10			2	1000	344447	768
Assam	92	499	331	71	7				1000	4183959	2708
West Bengal	129	170	583	96	18	3		1	1000	12536495	4440
Chhattisgarh	39	135	670	137	17			2	1000	3556797	1000
Orissa	44	144	666	116	27	4			1000	6462237	2276
Jharkhand	102	141	601	129	17	2	7		1000	3838341	1548
Madhya Pradesh	61	118	569	204	38	3	4	3	1000	8301488	2904
Gujarat	232	227	368	111	38	9	1	14	1000	5949669	1428
Daman & Diu	529	220	242	2	0	7			1000	23260	96
D & N Haveli	64	174	593	164	5				1000	32871	144
Maharashtra	104	178	539	128	30	15	4	2	1000	12225921	3492
Andhra Pradesh	121	183	592	83	14	5	2	1	1000	14612748	3668
Karnataka	183	167	674	68	5			1	1000	6809687	2107
Goa	230	584	185	1					1000	154528	96
Lakshadweep	485	454	60						1000	4430	96
Kerala	156	514	288	27	3			13	1000	5078075	1932
Tamil Nadu	77	88	734	67	9	1	19	4	1000	10676451	2715
Pondicherry	343	93	552	12					1000	75647	144
A & N Islands	175	129	668	27					1000	43079	218
All India	180	192	509	90	18	4	3	4	1000	148051155	55966

Source : NSS Report no. 486: Condition of Urban Slums, 2002; Salient Features
n.r. not reported

TABLE 7.2.10 (b) : NUMBER OF HOUSEHOLDS BY DISTANCE TO THE SOURCE OF DRINKING WATER PER 1000 HOUSEHOLDS FOR EACH STATE/UT (URBAN).

State/UT	Drinking water available									Number of households	
			Outside premises at a distance of								
	Within dwelling	Outside dwelling but within premises	Less than 0.2 km	0.2 – 0.5 km	0.5 – 1.0 km	1.0 – 1.6 km	1.6 km or more	n.r.	All	Estimated	sample
Jammu & Kashmir	761	140	74	7			18		1000	326486	864
Himachal Pradesh	805	100	84	6	6				1000	172585	240
Punjab	724	211	65						1000	1674246	1248
Chandigarh	637	265	95	2					1000	299066	240
Uttranchal	697	179	121	3					1000	329812	384
Harayana	727	116	118	15	12	6		5	1000	1089711	767
Delhi	659	145	186	9	1				1000	2653502	1686
Rajasthan	568	202	166	44	4	15		1	1000	2536776	1662
Uttar Pradesh	698	110	171	17	1			2	1000	6565552	3684
Bihar	617	176	186	20	1				1000	1537895	1008
Sikkim	794	108	85	11				2	1000	13046	192
Arunachal Pradesh	618	239	93	23				27	1000	25853	396
Nagaland	404	335	260						1000	44468	228
Manipur	152	376	393	68	1			11	1000	89266	708
Mizoram	462	191	305	42					1000	56365	912
Tripura	344	370	277	9					1000	94457	480
Meghalaya	265	415	313	1	4			2	1000	68708	384
Assam	321	558	105	11				4	1000	435469	804
West Bengal	355	153	443	32	5	5	6	2	1000	4647497	3383
Chhattisgarh	360	241	380	15	3				1000	782011	480
Orissa	327	291	350	32					1000	1170986	803
Jharkhand	353	232	360	45	7	2		1	1000	974414	911
Madhya Pradesh	385	191	333	81	7	2		1	1000	3149590	2160
Gujarat	679	200	117	3					1000	3728078	1617
Daman & Diu	610	227	162	1					1000	13408	192
D & N Haveli	646	80	274						1000	5983	144
Maharashtra	526	245	197	25	5	1	1		1000	8981672	5020
Andhra Pradesh	269	293	383	46	2	2	5		1000	5892701	2660
Karnataka	331	320	311	29	5			2	1000	3257320	2242
Goa	394	225	380	2					1000	90314	95
Lakshadweep	56	590	260		32		2	61	1000	5827	96
Kerala	355	411	226	5				2	1000	1733296	1295
Tamil Nadu	301	252	388	44	10		2	2	1000	5909063	4259
Pondicherry	600	131	223	38	5	2		2	1000	144890	480
A & N Islands	633	287	79						1000	20748	192
All India	481	222	260	29	4	2	1	1	1000	58521059	41916

Source : NSS Report no. 488: Condition in India, 2002: Housing Stock and construction
n.r. not reported

TABLE 7.2.10 (c) : NUMBER OF HOUSEHOLDS BY TYPE OF LATRINE PER 1000 HOUSEHOLDS FOR EACH STATE/UT (RURAL)

State/UT	Type of Latrine												Number of Households	
	Own			Shared			Public / community							
	Septic tank / flush	Pit	Service	Septic tank/ flush	Pit	Service	Septic tank / flush	Pit	Service	Other	No latrine	n.r.	All	Estimated	Sample
Urban															
Jammu & Kashmir	48	70	225	5		20	10	12	8	132	469		1000	1087315	1150
Himachal Pradesh	170	4	15	34		7	56	3		1	710		1000	1145207	1199
Punjab	180	245		19	26		13	3	1		514		1000	3150742	1204
Chandigarh	205			419		36	112				228		1000	28388	96
Uttaranchal	250	47	4	37	6	2	22	4		16	612		1000	1191388	559
Harayana	120	73	2	20	8		8				769		1000	2628646	943
Delhi	416	78	15	273	30	72	60				55		1000	717683	95
Rajasthan	44	49	6	4	13	2	4	1		2	875		1000	6839890	2709
Uttar Pradesh	52	15	25	10	3	4	7	2	3		876	1	1000	23286557	7069
Bihar	54	21	2	9	3		12	3	31	15	849		1000	11866728	4337
Sikkim	323	365	3	138	22		10	10		22	107		1000	81980	671
Arunachal Pradesh	81	69	156	12	15	3	28	23	3	320	287	2	1000	106411	852
Nagaland	324	399	85	19	52	4	18	6		57	38		1000	82602	528
Manipur	105	458	123	38	52	17	28	6	1	109	63	1	1000	255172	1094
Mizoram	156	702	66	1	8			6		25	36		1000	72178	432
Tripura	24	779	40	5	48	2	1			43	58		1000	600139	1248
Meghalaya	26	450	21	6	7		4	56	1	106	322		1000	344447	768
Assam	102	425	12	0	2	1	2	9	3	306	138		1000	4183959	2708
West Bengal	88	116	21	16	23	2	13	6	2	20	694		1000	12536495	4440
Chhattisgarh	44		1	38			4				913		1000	3556797	1000
Orissa	39	14	3	4	1		9		44	2	884		1000	6462237	2276
Jharkhand	32	3		59		1	24	2		10	868		1000	3838341	1548
Madhya Pradesh	34	11	2	9	2	1	8		2		931		1000	8301488	2904
Gujarat	142	47	3	10	3		13	1	2		780		1000	5949669	1428
Daman & Diu	303		9	232			150				306		1000	23260	96
D & N Haveli	162	26		94		6					711		1000	32871	144
Maharashtra	102	11	1	20			20	2		1	841		1000	12225921	3492
Andhra Pradesh	118	9	7	51	2	4	9	2	6	14	777		1000	14612748	3668
Karnataka	51	120	6	12	6		3	4		1	798		1000	6809687	2107
Goa	513	13	18	117	3		2	13		50	273		1000	154528	96
Lakshadweep	194	672		80	6						47		1000	4430	96
Kerala	191	635	3	19	21		3	15		9	103		1000	5078075	1932
Tamil Nadu	121	5	5	13	2	3	12		5		835		1000	10676451	2715
Pondicherry	154			26							820		1000	75647	144
A & N Islands	226	61		39							674		1000	43079	218
All India	87	75	11	19	6	2	11	3	6	16	763		1000	148051155	55966

Source : NSS Report no. 488: Condition in India, 2002: Housing Stock and construction
n.r. not reported

TABLE 7.2.10 (d) : NUMBER OF HOUSEHOLDS BY TYPE OF LATRINE PER 1000 HOUSEHOLDS FOR EACH STATE/UT (URBAN)

State/UT	Type of Latrine													Number of Households	
	Own			Shared			Public / community								
	Septic tank / flush	Pit	Service	Septic tank/ flush	Pit	Service	Septic tank / flush	Pit	Service	Other	No latrine	n.r.	All	Estimated	Sample
Urban															
Jammu & Kashmir	498	34	112	72	5	51	23	7	5	67	126		1000	326486	864
Himachal Pradesh	441	11	81	115	8	108	130		1	1	103		1000	172585	240
Punjab	529	61	47	213	25	5	3				116		1000	1674246	1248
Chandigarh	464		11	407			58		9		50		1000	299066	240
Uttaranchal	488	118		158	35	23	13				165		1000	329812	384
Harayana	577	25	14	181	41	4	4			4	150		1000	1089711	767
Delhi	489	14	35	230	5	44	45	17	30	23	69		1000	2653502	1686
Rajasthan	430	35	19	132	42	11	15		4	5	307		1000	2536776	1662
Uttar Pradesh	513	22	88	113	9	21	50	3	3	10	167	1	1000	6565552	3684
Bihar	411	33	7	136	2	12	66	3		19	310		1000	1537895	1008
Sikkim	462	70		458			3				7		1000	13046	192
Arunachal Pradesh	270	65	149	79	22	24	167	45	30	143	6	2	1000	25853	396
Nagaland	580	169	41	137	46		3	4		19			1000	44468	228
Manipur	311	238	196	131	30	68	14	2	1	9			1000	89266	708
Mizoram	487	334	69	60	12		11	24	2				1000	56365	912
Tripura	263	347	15	151	98	83	17			16	8		1000	94457	480
Meghalaya	384	83	8	383	41	13	10	8		62	9		1000	68708	384
Assam	666	134	1	79	21	14	17	2		47	18		1000	435469	804
West Bengal	384	75	24	217	67	28	53	7	2	31	112		1000	4647497	3383
Chhattisgarh	378			88	19		96		4		415		1000	782011	480
Orissa	383	18	7	145	4	3	64		1	46	329		1000	1170986	803
Jharkhand	376	15	7	186	7	15	66	1	14	3	309		1000	974414	911
Madhya Pradesh	374	61	62	116	12	11	24	4	2	2	331	1	1000	3149590	2160
Gujarat	696	32	1	129	7	7	50		6	3	68		1000	3728078	1617
Daman & Diu	559		3	126			185		11		117		1000	13408	192
D & N Haveli	658		15	243	16		28		1		38		1000	5983	144
Maharashtra	424	5	2	141	2	6	262		2	4	152		1000	8981672	5020
Andhra Pradesh	503	10	9	222	2	4	43	1	2	6	198		1000	5892701	2660
Karnataka	430	108	14	147	44	14	25	6	8	3	201		1000	3257320	2242
Goa	360		46	463			8			2	121		1000	90314	95
Lakshadweep	705	181		17			15				82		1000	5827	96
Kerala	439	403	1	49	58		3			9	37		1000	1733296	1295
Tamil Nadu	465	4	11	234	2	8	45		4	6	219		1000	5909063	4259
Pondicherry	558	3	3	174		15	30	1			217		1000	144890	480
A & N Islands	537			168			154				140	1	1000	20748	192
All India	468	43	24	165	17	13	74	3	4	10	179		1000	58521059	41916

Source : NSS Report no. 488: Condition in India, 2002: Housing Stock and construction
n.r. not reported

TABLE 7.2.11 : STATE-WISE ESTIMATED ANNUAL REQUIREMENT OF WATER FOR DOMESTIC PURPOSES INCLUDING FOR CATTLE IN DIFFERENT STATES

Sl. No.	State/UT	Population in Thousand			Water Requirement in BCM		
		1991	2001	2004	1991	2001	2004
1	2	3	4	5	6	7	8
1	Andhra Pradesh	66508	75728	78527	2.5	3.2	3.45
2	Arunachal Pradesh	865	1091	1139	0.03	0.05	0.05
3	Assam	22414	26638	28050	0.84	1.13	1.23
4	Bihar	86374	82879	87810	3.25	3.5	3.86
5	Chandigarh	642	901	969	0.02	0.04	0.04
6	Chhattisgarh	@	20796	22011	@	0.88	0.97
7	Goa	1170	1344	1451	0.04	0.06	0.06
8	Gujarat	41310	50597	53195	1.55	2.14	2.34
9	Haryana	16464	21083	22296	0.62	0.89	0.98
10	Himachal Pradesh	5171	6077	6294	0.19	0.26	0.28
11	Jammu & Kashmir	7719	10070	10935	0.29	0.43	0.48
12	Jharkhand	@	26909	28303	@	1.14	1.24
13	Karnataka	44977	52734	54824	1.69	2.23	2.41
14	Kerala	29099	31839	32862	1.09	1.34	1.45
15	Madhya Pradesh	66181	60385	64237	2.49	2.55	2.82
i6	Maharashtra	78937	96752	101275	2.97	4.09	4.45
17	Manipur	1837	2389	2499	0.07	0.1	0.11
18	Meghalaya	1775	2306	2411	0.07	0.1	0.11
19	Mizoram	690	891	932	0.03	0.04	0.04
20	Nagaland	1210	1989	2090	0.05	0.08	0.09
21	Orissa	31660	36707	38139	1.19	1.55	1.68
22	Punjab	20282	24289	25336	0.76	1.03	1.11
23	Rajasthan	44006	56473	60127	1.66	2.39	2.64
24	Sikkim	406	540	566	0.02	0.02	0.02
25	Tamil Nadu	55859	62111	64019	2.1	2.62	2.82
26	Tripura	2757	3191	3326	0.1	0.13	0.15
27	Uttar Pradesh	139112	166053	176765	5.23	7.01	7.77
28	Uttaranchal	@	8480	8925	@	0.36	0.39
29	West Bengal	68078	80221	83585	2.56	3.39	3.68
30	A. & N. Islands	281	356	377	0.01	0.02	0.02
31	D. & N. Haveli	138	220	237	0.01	0.01	0.01
32	Lakshadweep	52	61	64			
33	Pondicherry	808	974	1013	0.03	0.04	0.04
34	Delhi	9421	13783	15128	0.35	0.58	0.67
35	Daman & Diu	102	158	170		0.01	0.01
	TOTAL	**846303**	**1027015**	**1079887**	**31.84**	**43.38**	**47.49**

Source: Central Water Commission

BCM : Billion Cubic Metres

Note :

+ : All India figures relate to the estimated requirement as worked out by the standing sub committee for Assessment of availability and requirement of water for diverse uses in the country, 2000. (distributed prorata in the states in proportion to population).

@ : Three States namely Jharkhand, Uttaranchal & Chhatisgarh have been formed after 1991 as such their population as well water requirement in year 1991 have been included in the respective states: Chhattisgarh in M.P, Jharkhand in Bihar and Uttaranchal in Uttar Pradesh.

TABLE 7.2.12 : STATUS OF HABITATIONS UNDER RURAL WATER SUPPLY PROGRAMME *

Sl. No.	State/UT	Status of habitations as on 1.4.2004			
		NC	PC	FC	Total
1	2	3	4	5	6
1	Andhra Pradesh		732	69000	69732
2	Arunachal Pradesh	253	686	3359	4298
3	Assam	305	11625	58625	70555
4	Bihar			105340	105340
5	Chhattishgarh			50379	50379
6	Goa	3	29	363	395
7	Gujarat	1	58	30210	30269
8	Haryana			6745	6745
9	Himachal Pradesh		7800	37567	45367
10	Jammu & Kashmir	777	2774	7633	11184
11	Jharkhand			100096	100096
12	Karnataka		8279	48403	56682
13	Kerala		7651	2112	9763
14	Madhya Pradesh			109489	109489
15	Maharashtra	392	23974	61564	85930
16	Manipur		86	2705	2791
17	Meghalaya	13	419	8204	8636
18	Mizoram		152	655	807
19	Nagaland	40	726	759	1525
20	Orissa			114099	114099
21	Punjab	927	1324	11198	13449
22	Rajasthan	2974		90972	93946
23	Sikkim		96	1583	1679
24	Tamil Nadu			66631	66631
25	Tripura			7412	7412
26	Uttar Pradesh			243508	243508
27	Uttaranchal	33	294	30657	30984
28	West Bengal			79036	79036
29	Andaman & Nicobar Islands		102	402	504
30	Dadra & Nagar Haveli	19	41	456	516
31	Daman & Diu			32	32
32	Delhi			219	219
33	Lakshadweep		10		10
34	Pondicherry		108	159	267
35	Chandigarh			18	18
	TOTAL	**5737**	**66966**	**1349590**	**1422293**
	Percentage	**0.4**	**4.71**	**94.89**	**100**
Number of habitations uninhabited/unpopulated/migrated/urbanised					**371**
Grand Total					**1422664**

Source : Ministry of Rural Development

Note : As per reports received from States/Uts till 9.8.2004

* : Provisional

NC : Not Covered, PC: Partially Covered, FC: Fully Covered

TABLE 7.3.4 (d) : BIODEGRADABLE COMPONENTS OF MSW IN DELHI

Sl. No.	Components	Percentage (by Weight)	Weight (T/Month)	Carbon (T/month)	Nitrogen (T/Month)	C/N Ratio
1	2	3	4	5	6	7
1	Food Waste	25.22	39966.03	19183.70	1039.12	18.46
2	Yard Waste	21.85	34625.61	16551	1177.27	14.06
	Total	**47.07**	**74591.6**	**35735**	**2216.39**	**16.12**

Source : Report on the Development of Statistics in the Environment Sector - Solid Waste by Indian Society of Environmental Management, New Delhi

TABLE 7.3.4(e) : COMBUSTIBLE COMPONENTS OF MSW IN DELHI

Sl. No.	Components	Percentage (by Weight)	Weight (T/Month)
1	2	3	4
1	Paper	3.62	5736.6
2	Cardboard	3.08	4880.86
3	Plastics	4.17	6608.18
4	Textiles	0.52	824.04
5	Rubber	1.83	2899.99
6	Leather	0.37	586.34
7	Wood	1.72	2725.68
	Total	**15.31**	**24261.69**

Energy contents of Combustible Components (Dry) : 23583.62 KJ/T

Source : Report on the Development of Statistics in the Environment Sector - Solid Waste by Indian Society of Environmental Management, New Delhi

TABLE 7.3.5: MUNICIPAL SOLID WASTE GENERATION IN MAJOR CITIES

(Kg Per Capita Per Day)

Sl. No.	City	1971-73	1986/87	1994
1	Ahmedabad	0.24	.	0.59
2	Ajmer	0.24	0.44	.
3	Allahabad	0.20	0.50	.
4	Aurangabad	0.42	0.67	.
5	Bangalore	0.32	.	0.48
6	Baroda	0.29	.	0.39
7	Bhopa!	0.26	.	0.51
8	Bikaner	0.29	.	.
9	Chandigarh	0.36	.	.
10	Chennai	0.32	.	0.66
11	Coimbatore	0.31	.	0.43
12	Delhi	0.21	.	0.48
13	Gorakhpur	0.21	0.64	.
14	Guwahati	0.24	.	.
15	Gwalior	0.27	.	.
16	Howrah	0.59	.	.
17	Hyderabad	0.33	.	0.40
18	Jabalpur	0.30	.	0.00
19	Jaipur	0.28	.	0.40
20	Jodhpur	0.20	0.45	.
21	Kanpur	0.55	.	0.64
22	Kochi	.	0.27	0.52
23	Kolkata	0.50	.	0.34
24	Kota	0.25	0.40	.
25	Kozhikode	0.15	0.16	.
26	Kurnool	0.20	.	.
27	Lucknow	.	.	0.62
28	Ludhiana	.	0.40	0.40
29	Madurai	0.38	.	0.39
30	Mumbai	0.49	.	0.44
31	Nagpur	0.22	.	0.27
32	Patna	0'.48	.	0.36
33	Pune	0.24	.	0.31
34	Raipur	0.32	0.23	.
35	Rajkot	0.07	0.21	.
36	Sangli	0.23	0.30	.
37	Surat	0.15	.	0.60
38	Tata nagar	0.45	.	.
39	Thane	0.23	.	.
40	Tiruchirapalli	0.21	.	.
41	fhiruvananthapuram	0.12	0.34	.
42	Udaipur	0.14	.	.
43	Vadodara	.	.	0.39
44	Varanasi	.	.	0.40
45	Vijayawada	0.17	0.44	.
46	Visakhapatnam	.	0.31	0.40

Source : TERI Energy Data Directory and Yearbook 2002-2003

TABLE 7.3.6 : CONSUMPTION OF PLASTIC IN THE WORLD IN 2000

(Thousands Metric Tonnes)

Sl. No.	Country/Region	Consumption

WASTE MANAGEMENT

TABLE 7.3.8 : PLASTIC WASTE MANAGEMENT STATUS IN INDIA

(In thousand tonnes)

Sl. No.	Item	1995-96	2001
1	2	3	4
1	Consumption of Plastic	1889	4374
2	Waste available for Recycling	800	2000
3	Total	2689	6374

Source : Parivesh Newsletter, Sept.1998, CPCB

TABLE 7.3.9 : FIFTY YEARS OF WASTE GENERATION

(In thousand tonnes)

Sl. No.	Item	1947	1997
1	2	3	4
1	Urban Population (million)	56.9	274
2	Daily per capita waste generation (grams)	295	490
3	Total Waste Generated (million tonnes)	6	48
4	Area Under land fills (Thousand of ha)	0.12	20.2
5	Annual methane emmission (tonnes) from landfill sites	0.87	7.1

Source : Central Pollution Control Board

The above data is from Report 'Looking Back to Think Ahead', Green India 2047, growth with Resource Enhancement of Environment and Nature, The Energy Research Institute (TERI), New Delhi,1998.

TABLE 7.3.10 : CHARACTERISTIC LAND - FILL LEACHATES

Sl. No.	Parameters	Concentration (mg/l)
1	2	3
1	pH	3.7 - 8.3
2	Tot. Dis. Solid	725 - 55,000
3	Chlorides	2 - 11,373
4	Tot. Kj. Nitrogen	2 - 3,320
5	Lead	0 - 14.2
6	COD	50 - 99,000
7	BODS	0 - 19,500

Source : Central Pollution Control Board

Above characteristics of Leachate are typical characterioties of leachate {Ref. Datta, M. (1997) Generation and Control of Leachate and Landfill Gas P. 90. In waste Disposal in engineering Landfill. Narson Publishing House, New Delhi}

TABLE 7.3.11 : CURRENT STATUS OF MANAGEMENT OF MUNICIPAL SOLID WASTE

Sl. No.	Cities	Class I	Class II
1	2	3	4
1	No. of Cities	299	345
2	Total Population	1281138655	22375588
3	Waste Generation (MT/d)	48134	1454
4	**Mode of Collection**		
I.	Manually	50%	78%
II.	Trucks	49%	21%
III.	Others	1%	1%
5	**Disposal**		
I.	Dumping	94%	93%
II.	Composting	5%	6%
III.	Others	1%	1%

Source : Central Pollution Control Board

Note : No. of cities and Total population are as per 1991 census and other data is for 1994-95.

APPENDIX

ABBREVIATIONS

ASI	Annual Survey of Industries	NO_2	Nitrogen dioxide
BSI	Botanical Survey of India	NO_3	Nitrate
CEA	Central Electricity Authority	NSFP	National Social Forestry Project
CFC	Chloro-Floro-Carbons	ODP	Ozone Depletion Potential
CO	Carbon Monoxide	PM	Particulate matter
CH_4	Methane	ppm	Parts per million
Cl	Chlorine	ppbv	Part per billion by volume
CPCB	Central Pollution Control Board	ppmv/year	Parts per million by volume per year
Cu.m	Cubic Metre	Pb	Lead
Fe	Iron	ppmv	Part per million by volume
GWP	Global Warming Potential	pptv	Part per trillion by volume
GOI	Government of India	Rs.	Rupees
H_2S	Hydrogen sulphide	RSC	Residual Sodium Carbonate
ha	Hectares	SAR	Sodium absorption ratio
HC	Hydro Carbons	SFP	Social Forestry Project
IQ	Institutional Qualified	SO_2	Sulphur dioxide
Kms	Kilometers	SO_4	Sulphate
M.C.M.	Million cubic metre	SP	Sodium Percentage
Mg	Magnesium	SPM	Solid Particulate Matter
Mha	Million hectares	SWS	Sub-Water Shed
MOEF	Ministry of Environment and Forests	RSPM	Residual Suspended Particulate Matter
MW	Megawatts	Sq. Kms.	Square Kilometers
NA	Not Available	TDS	Total Dissolved Solids
Neg.	Negligible	TERI	The Energy Resources Institute
NH_3	Ammonia	WB	World Bank
NIQ	Non-Institutional Qualified	ZSI	Zoological Survey of India
NO_x	Oxides of Nitrogen	BOD	Biological Oxygen Demand
COD	Chemical Oxygen Demand	TSP	Total Suspended Particulate

APPEINDIX - 2

CONCEPTS AND DEFINITIONS OF THE TERMS USED

Area under miscellaneous tree crops, groves, etc.:
All culturable land which is not included under 'net area sown' but is put to some other agricultural use, such as land under casuarina trees, thatching grasses, bamboo bushes, and other groves for fuel, etc.

Barren and unculturable land:
Land which cannot be brought under cultivation unless at high cost, irrespective of whether such land is in isolated blocks or within cultivated holdings.

Critical:
A taxon is critical when it is facing an extremely high probability of extinction in the wild in immediate future.

Crown cover:
The canopy formed by the crowns of all the trees in a forest or in an uneven aged forest by the crowns of all trees in a specified crowns class.

Culturable waste:
Land available for cultivation but not taken up for cultivation or abandoned after a few years for one reason or the other. Such lands may be either fallow or covered with shrubs and jungles not put to any use. These may be assessed or unassessed and may lie in isolated blocks or within cultivated during the year and the last five or more consecutive years in succession, will be included in this category.

Current fallow:
Cultivable area kept fallow during the current agricultural year. Any seedling area in the current agricultural year not cropped jn the same year is also treated as current fallow.

Demersal:
Refers to fish that live on or adjacent to the sea bottom.

Dense Forest:
Forests whose crown density is 40 percent or above.

Endangered:
Species in danger of extinction and whose survival is unlikely if the casual factors continue operating. Included are species whose numbers have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction.

Expectation of Life at Birth:
The Expectation of life at birth is defined as the average number of years expected to be lived at the time of birth if current mortality trends were to continue.

Extinct:
Species that are no longer known to exist in the wild after repeated searches of the type in localities and other known or likely places.

Flush system latrine:
The type of latrine which is connected to an under ground sewerage system, from which human excreta and wastes are flushed out by water.

Forest:
Includes all actually forested area on the lands so classed or administered as forests under any legal enactment dealing with forests, whether state-owned or private.

Gross area irrigated:
An irrigated plot growing crop in more than one season, is counted as many times as it is cropped to arrive at gross area irrigated. In case of mixed crops, the area under component crops as reported by household is taken into account.

Habitat:
An area and not a particular location is called habitat. The site or environment which a plant or animal lives, such as forest.

Household:
A household is a group of persons who commonly live together and would take their meal from common kitchen unless the exigencies of work prevented any of them from doing so. There may be a household of persons related by blood or a household of unrelated persons or having a mix of both. Examples of unrelated households are boarding houses, messes, hostels, residential hotels, rescue homes, jails, ashrams, etc. These are called "Institutional Households".

Infant Mortality Rate:
Infant mortality rate is defined as the number of deaths under one year of age to thousand live births in a year.

Insufficiently Known:
A taxon is insufficiently known when an evaluation has been made but the available data are inadequate to assign a category.

Irrigation:
A device of purposely providing land with water other than rain water by artificial means.

Land put to non-agricultural uses:
Includes all land occupied by buildings, paths, etc. or under water (e.g. tank, canals, etc.) and land put to uses other than agricultural production.

Neretic :
The part of the pelagic environment that extends from the nearshore zone out to depth of about 200 m; the water overlying the continental shelf related to shallow water on the margin of the sea, generally that overlying the continental shelf.

Net area irrigated:
The total of all the areas irrigated from different sources, counting each area irrigated only once even though it was irrigated more than once in the same year.

Net area sown:
Area sown with crops and orchards, counting the area sown more than once in the same year, only once.

The above definition was elaborated as follows:

The net area sown was defined as the difference between the total geographical area of all plots of land of the holding and the sum of the areas of land under

(1) forest, (2) barren & uncultivable wastes, (3) put to non-agricultural uses, (4) culturable wastes, (5) permanent pastures & other grazing land, (6) miscellaneous tree crops excluding orchards and (7) all type of fallow lands.

Open Forest:
Forest whose crown density is more than 10 percent but less than 40 percent.

Other fallow:
All lands which are taken up for cultivation in the past, but are temporarily out of cultivation for a period of not less than one year and not more than five years including the current agricultural year are classified under 'other fallow'.

Pastures and grazing land:
Include all grazing lands irrespective of whether they are permanent pastures and meadows or not. Grazing lands within forest area shall be included under this category.

pH:
The logarithm to the base 10 of the reciprocal of Hydrogen ion concentration.

Rare:
The species with small world populations that are not at present endangered or vulnerable but are at risk. These species are usually localised within restricted geographic areas or habitats or are thinly scattered over a more extensive range.

Room:
Covered space enclosed by walls on all sides reaching from the floor to the roof and having a door way. The rooms have been further classified as NBO rooms (specification for a room as recommended by the National Buildings Organisation)and other rooms. An NBO room is defined as a room having a floor space of at least four square metres and height of at least two metres from the floor to the ceiling.

Service latrine:
The types of latrine which are attended by the scavenging services of the Municipalities or Corporations.

Slum:
A slum is defined as an areal unit having twenty five or more kachcha structures mostly of temporary nature, or fifty or more households residing mostly in kachcha structures, huddled together, or inhabited persons with practically no private latrine and inadequate public latrine and water facilities.

Species:
A group of individual specimens having close resemblance but differing from others and belonging to the same genus.

Tap:
Source through which the drinking water is distributed through pipes laid out by corporations, municipalities or other local authorities like metropolitan or town development authorities or housing estates or similar agencies. But drinking water distributed through pipes by the house owner by pumping out from unprotected wells, tanks or springs should not be regarded as tap.

Type of dwelling:
Dwellings, have been classified under three categories, namely, chawl/bustee, independent house and flat.

(a) Chawl/Bustee:
A collection of poorly built katcha or semi-pucca huts or tenements.

(b) Independent house:
A separate structure with a room or rooms and having all its accessories and a separate entrance to it. In other words, if the dwelling unit and the entire structure of the building are physically coterminous, it should be considered an independent house.

(c) Flat:
All housing arrangements other than chawl/ bustee and independent house are to be taken as flats. Flat thus includes any self-contained dwelling unit with a room or rooms provided with normal housing facilities like water supply, bath and latrine used exclusively by the family residing there or jointly with other families. It also includes detached room or rooms with or without other housing facilities.

Type of structure:
The structures have been classified into three categories, namely pucca, semi-pucca and kachcha on the basis of the materials used for construction.

(a) Pucca Structure:
A structure whose walls and roof at least are made of pucca materials.

(b) Kachcha Structure:
A structure which has walls and roof made of non-pucca materials.

(c) Semi-Pucca Structure:
A structure which has either the walls or the roof, but not both, made of pucca materials. Walls/ roof made partially of pucca materials will be regarded as kachcha walls/roof. Materials such as oven-burnt bricks, stone, stone-blocks, cement, concrete, jack-board (cement plastered reed), tiles and timber are pucca materials. Corrugated iron or asbestos sheets used in the construction of roof will also be treated as pucca materials.

Urban:
The criteria adopted for treating the urban for 1991 census is:

All statutory towns, i.e., all places with a municipality, corporation, cantonment board or notified town area committee, etc.

(a) All places which satisfied the following criteria:

(i) A minimum population of 5000;

(ii) At least 75% of the male working population engaged in non-agricultural pursuits; and

(iii) A density of population of atleast 400 per sq. km. Mile (1000 per sq. mile).

Urban Agglomeration:

(i) A city or a town with a continuous outgrowth, the outgrowth being outside the statutory limits but falling within the boundaries of the adjoining villages; or

(ii) Two or more adjoining towns with their outgrowths, if any, as in (i) above ; or

(iii) A city and one or more adjoining towns with or without outgrowths all of which form a continuous spread.

Vulnerable:

The species believed likely to move into the endangered category in the near future if the casual factors continue operating. Included are species of which most or all the populations are decreasing because of overexploitation, extensive destruction of habitat or other environmental disturbance; species with populations that have been seriously depleted and whose ultimate security is not yet assured; and species with populations that are still abundant but are under threat from serious adverse factors throughout their range.

APPEINDIX - 3

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APPEINDIX - 4

METHODS OF MEASUREMENT OF AIR POLLUTION

Methods of measurement of air pollution followed by the Central Pollution Control Board are as follows:

A. Sulpher dioxide (SO_2)

The SO_2 is absorbed from air in a solution of potassium tetrachloromercurate (TCM). The resultant complex is made to react with pararosaniline and formaldehyde to form the coloured pararosaniline methylsulphunic acid, the absorbance of this solution is measured by means of a suitable spectrophotometer at 560 nm.

B. Nitrogen dioxide (NO_2)

The NO_2 in ambient air is collected by bubbling it through a solution of sodium hydroxide and sodium arsenate. The resultant nitrite ion concentration is colorimetrically determined by reacting it with sulfanilamide and N- (1-napthyl)- ethylene diamine dihydrochloride, the absorbance is then measured at 540 nm.

C. Suspended Particulate Matter (SPM)

SPM is measured gravimetrically high volume sampling with whatman filter paper is used at average flow rate being not less than 1.1 cubic meter per minute.

Source : Ambient Air Quality – Status and Statistics, 1997, Central Pollution Control Board, Delhi

METHODS OF DETERMINATION OF WATER QUALITY PARAMETERS

	Parameter		Recommended Method
1.	Temperature		Thermometeric method
2.	pH		Electromatic method
3.	TSS		Nephlometric method
4.	Velocity of Flow	1) 2) 3)	Current method Float method Chemical method
5.	Dissolved Oxygen		Iodometric method
6.	Biochemical Oxygen Demand		Dilution method
7.	Total Kjeldahl Nitrogen	a) b) 1) 2)	Digestion Distillation Titration method (>5mg/1) Nesslerization method (<5mg/1)
8.	Nitrogen, nitrate + nitrite		Amalgamated Cadmium Reduction method for reduction of nitrate to nitrite by diazotisation method
9.	Total Coliform (MPN)		Multiple Tube Dilution technique
10.	Fecal Coliform (MPN)		Multiple Tube Dilution technique
11.	Conductivity		Conductometric method
12.	Chloride*	1) 2)	Argentometric method Mercurimetric method
13.	Hardness		EDTA Titrimetric method
14.	Calcium		EDTA Titrimetric method
15.	Magnesium		By difference of 13 & 14
16.	Alkalinity	1) 2)	Electrometric method Visual titration method
17.	Sulphate**		Turbidimetric method

	Parameter	Recommended Method
18.	Sodium	Flame photometric method
19.	Chemical Oxygen Demand	Dichromate reflux method
20.	Total Dissolved Solids	Gravemetric method
	&	
21.	Fixed Dissolved Solids	
22.	Phosphate	Molybdate method (Colorimetry)
23.	Boron	Curcumine method (Colorimetry)
24.	Free Ammonia	

Source: Water Quality - Status & Statistics (1996 & 1997)
Central Pollution Control Board

Argentometric method has been given first preference but if the colour of the sample interferes with the chromate end point then mercurimetric method should be used. Usually sulphate concentration is low in surface waters & hence gravimetric method may not be accurate as turbidimetric method, therefore, turbidimetric method is suggested.

Note : Wherever more than one methods are given, they are in order of preference.

A NOTE ON POVERTY ESTIMATION

The Planning Commission in 1979 constituted a Task Force on Minimum Needs, and' Effective Consumption Demands which defined the per capita consumption norm at Rs 49.09 per month in rural areas and Rs 56.64 per month in urban areas at 1973- 74 prices at national level corresponding to a basket of goods and services anchored on a norm of per capita daily calorie requirement of 2400 kcal in rural areas and 2100 kcal in urban areas These poverty lines expressed in terms of per capita consumption expenditure conform to a consumption basket, which satisfies the above calorie norm and meets a minimum of non-food requirements, such as clothing, shelter, transport etc. The Task Force used the age-sex-activity specific calorie allowances recommended by the Nutrition Expert Group (1968) to estimate the average daily per capita requirement for rural and urban areas using the age-sex-occupational structure of their respective population (as projected for 1982-83). Thus, to the extent the data permitted, the age, sex and occupational differentials in the daily calorie requirement of the population were captured in the average norms The major flaw in this approach was the application of the same poverty line in all the States and not taking into account the price differentials prevailing in different States To overcome this and some other drawbacks of .~he Task Force, the Planning Commission, in September, 1989, constituted the Expert Group on Estimation of Proportion and Number of Poor to "look into the methodology for estimation of poverty and to re-define the poverty line, if necessary" The Expert Group submitted its Report in July 1993 The Expert Group did not redefine the poverty line and adopted the one defined by the Task force, which was at national level in rural and urban areas The Expert Group estimated separate poverty lines for each state by disaggregating the national level poverty line. Accordingly, the poverty lines and incidence of poverty were re-worked for the previous years. (The national poverty line at 1999-2000 prices is Rs 327.56 per capita per month in rural areas and Rs 454.11 per capita per month in urban areas). It may by mentioned that it is the same consumption basket associated with the given calorie. norm that has been taken across States It is only the relative price differentials prevailing in different States and the differences in the inflation rates among the States that get reflected in different poverty lines for different States These poverty lines are updated using the State-wise Consumer's price Index of Agricultural Labourer (CPIAL) for estimating and updating the rural poverty line and Consumer Price Index of Industrial Workers (CPIIW) for estimating and updating the urban poverty line.

The Planning Commission estimates poverty at national and state level using the mentioned poverty "lines and applying it to class-wise distribution of household consumption expenditure The latter is obtained from the large sample surveys of household consumer expenditure conducted by the National Sample Survey Organisation once in approximately every five years.

It may be mentioned that. the poverty line and poverty ratio are not estimated for a number of smaller states and UTs as the sample size in these States is small. and I variations in the consumption expenditure on account of small sample make inter- temporal comparisons difficult Moreover, the price-indices data is also not available for smaller states separately For North-east States, price data for the base year is available only for Assam As a result, the poverty line for any of the North Eastern States could not be estimated. In view of these difficulties, poverty ratio of Assam is Used for Sikkim. Arunachal Pradesh. Megqalaya. Mizoram. Manipur, Nagaland and Tripura Similarly, poverty ratio of Tamil Nadu is used for Pondicherry and Andaman & Nicobar Islands and urban poverty ratio of Punjab is used for rural and urba poverty of Chandigarh.

The percentage of people living below the poverty line using data from the quinquennial rounds of National Sample Survey Organisation on Household Consumption Expenditure for the years 1987-88, 1993-94 and 1999-2000 are given in the table:

Year	Rural	Urban	Combined
1987-88	39.1	38.2	38.9
1993-94	37.3	324	36.0
1999-2000	27.1	23.6	26.1