



Statistics Related to Climate Change -



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Foreword

Climate change is a driving force of evolution that life on earth has undergone since its origin. The impacts of climate change is engaging the attention of planners, governments and the politicians worldwide since the emergence of the threat of climate change which has origins in anthropogenic activities. There is a growing concern about man made developments causing, even if partially or insignificantly, the climate change outcomes. The Fourth Assessment Report of the Inter-governmental Panel on Climate Change(IPCC) has reported that the impact of human activities on climate and climate systems is unequivocal. It is no longer the scientific enquiry but the concern now rather is the timing and magnitude of the abrupt changes in the climate.

Climate has played a significant role in the economic development of India. Climate change is net result of several factors and many sectors of the economy are climate sensitive. Therefore, it is essential to have assessments of impacts of climate change to various sectors of the economy directly or indirectly to enable devising approaches, strategies and action plans to respond to the changes. Obviously such assessments require compilation and dissemination of related statistics.

Realizing the importance and need for such an effort, the Central Statistics Office(CSO) of Ministry of Statistics and Programme Implementation took initiatives in 2008 by way of discussing the subject in the 16th Conference of Central and State Statistical Organizations and subsequently organizing a seminar on 'Climate Change – Data Availability and Requirements' to discuss the subject with researchers, academicians, technocrats and officials from Ministries dealing with matters related to environment and climate. As an outcome of these events, CSO constituted an Expert Committee in 2009 under the Chairmanship of Dr. K.S. Rao, Professor, Department of Botany, University of Delhi to develop a framework for 'Statistics Related to Climate Change.' The framework developed by the Expert Committee was given a final shape after consultations with some key Ministries and discussions in a National Seminar organized by CSO in 2013 which was attended by Academicians, Researchers, State/UT Governments, Data Producing Ministries and Data Users.

I am happy to introduce the first issue of the publication titled "Statistics Related to Climate Change in India". The impact of Climate Change is multi-dimensional and accordingly the statistics presented in this publication have been collected from various sources. I am thankful to Professor K.S. Rao and other Members of the Committee for developing the framework. The work of the team of officers and staff in the Social Statistics Division of CSO under the able guidance of Smt. S. Jeyalakshmi, the then Addl. Director General in preparing this publication is commendable. I am sure that the users of this publication will find it quite useful.

(T.C.A. Anant)

November, 2013

Chief Statistician of India and Secretary
Ministry of Statistics and Programme Implementation

Preface

The industrialization that started from the late 17th Century is believed to have accelerated the process of climate change by emissions of Greenhouse Gases to the atmosphere . The liberalization of the Indian Economy in the early 1990s and the unprecedented growth have brought our country in the centre stage of climate change discussions.

The present state of the environment with regard to climate change is reflected in the condition of the atmosphere and hydrological system of the earth.

The various initiatives taken by CSO since 1997 have led to collection, compilation and dissemination of Statistics related to Environment and a regular annual publication titled “Compendium of Environment Statistics” is brought out. As discussions on climate change took centre stage, it was decided to put together data sets related to climate change in accordance with the framework developed by CSO. The publication consists of three distinct parts viz. causal factors behind climate change; impact factors of climate change; and mitigation and adaptation. The draft publication prepared by CSO based on the framework was discussed in a National Workshop organized by CSO in Kolkata in October, 2013 in which subject experts, researchers, academicians and representatives of Central Ministries and State Governments participated. All the data tables were also discussed in detail. The publication has been finalized thereafter.

I wish to place on record our gratitude and sincere thanks to all data source agencies for providing us the requisite data for preparation of this publication and also all the participants in the workshop held in October, 2013 for their valuable inputs in finalizing the publication. I wish to place on record appreciation for the team comprising Dr. V. Parameswaran, Deputy Director General, Shri James Mathew, Director, Ms. Avneet Kaur, Assistant Director, Shri R.K. Panwar, SSO, Shri Sai Manohar, Consultant and Shri Khushiram Gajrana, Personal Assistant of SSD involved in the preparation of this publication. We would be glad to receive suggestions for improvement in the contents of this publication.

November, 2013

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SECTION- I

Introduction to Statistics Related to Climate Change India: Concepts and Framework

1.1 Introduction

Climate change is a phenomenon being experienced by the mankind since its origin on the earth. The Planet earth is going through this phenomenon ever since its birth. It is also a driving force of evolution that life on earth has undergone over the last million of years. Climate change necessarily brings about changes in the weather conditions. There is reason to believe that climate change could affect agricultural productivity, and cause increased health hazards and submergence of lands due to rise in the sea level to name a few. Climate change is the net result of many factors caused by continuous evolution of Planet Earth through many geological eras. However, there is growing concern about manmade developments causing, even if partially or insignificantly, the climate change outcomes. The industrialization that started from the late 17th century is believed to have accelerated the process of climate change by emissions of Greenhouse Gases (GHGs) to the atmosphere. The observed levels of GHGs have perhaps nearly crossed tolerance levels in the atmosphere so that the survival for many animal and human species is at stake, while developmental needs of human race are contributing to factors like deforestation, urbanization etc., that can hasten the process of climate change.

The multidimensional impact of climate change on life in our Planet is being studied in detail by the Intergovernmental Panel on Climate Change (IPCC) and is also being discussed at annual meetings of the Conference of Parties to the UN Framework Convention on Climate Change (UNFCCC) adopted at Rio de Janeiro in 1992. The year 2012 marked the 20th anniversary of the Rio Conference and extensive discussions have been held at the Rio+20 Conference on the progress made in the mitigation of climate change as well as adaptation to the consequences of climate change, such as increases in mean temperatures, adverse changes in precipitation, sea level rise and concerns about the occurrence of extreme climatic events like drought, floods and coastal storms. Since anthropogenic factors are mainly responsible for the present trends in global warming, it is only human action and intervention that can help to alleviate the adverse impacts of climate change.

1.1.1 Background

Awareness on the impact of climate change has been increasing since 1960 when a group of people gathered together protesting against a polluting industry in Great Britain. The thinkers and social scientists have recognized the impacts of climate change since then and a movement to save the earth and the precious life on it gained momentum. The Stockholm Conference in the year 1972 was the first international recognition and manifestation of the urgency to address climate change as it affects both the developed and developing countries, though, the degree of impact could vary. The atmosphere is a global public good and it is commonly shared by all living beings in the earth's ecosystem. The awareness on the degradation of the environment and its impact on the climate system and the natural resources have gained momentum after the efforts of the United Nations, especially after the Stockholm Conference held during June, 1972. The Stockholm conference recognized the concept of 'Sustainable Development' and the impact of development and industrialization on the environmental quality of a nation. This conference led to the

formation of the United Nations Environment Programme (UNEP).

United Nations Statistics Division (UNSD) recognized the subject of Climate Change as one of its priorities in the Environment Statistics. Climate Change comes under the ambit of the UN framework Convention on Climate Change (UNFCCC) wherein different countries are required to report their Green House Gases (GHGs) emission to the UN. There is also Inter Governmental Panel on Climate Change (IPCC) which reports to UNFCCC. With the financial assistance from UNEP, the UNSD brought out a framework for the collection of data on environment and related variables in 1984, called 'Framework for the Development of Environment Statistics' (FDES). FDES sets out the scope of environment statistics by relating the components of the environment to information categories that are based on the recognition that environmental problems are the result of human activities and natural events reflecting a sequence of action, impact, and reaction. In 1995, UNSD brought out a list of environmental indicators which evolved through the studies undertaken by them in the participating countries and in collaboration with the Inter-Governmental Working Group on Advancement of Environment Statistics. The FDES, however, covers most of the environmental indicators which are also related with climate change. It is therefore difficult to segregate climate change as a separate subject outside the domain of environment statistics. However it is important is to examine the availability of statistics for climate change indicators either under the system of environmental statistics per se or through special mechanisms addressing climate change issues. There is need to identify parameters defining necessary climate change data-needs, availability of credible data and identification of data-gaps for assessing causes and effects of climate change and provide a framework for their levels of relevance and international harmonization in the Indian context.

Revision of the Framework for the Development of Environment Statistics' (FDES)

The Framework for the Development of Environment Statistics (FDES) was first published in 1984 by the United Nations Statistics Division (UNSD). The 1984 FDES and subsequent publications have been a useful framework for guiding countries in the development their environment statistics programmes. During the time since its publication there have been a number of scientific, political, technological, statistical and experience-based developments which suggested that the FDES was ready for revision.

As a consequence, the United Nations Statistical Commission, at its 41st session (23-26 February 2010), endorsed a work programme and the establishment of an Expert Group for the revision of the FDES. The members of the Expert Group represented producers and users of environment statistics of countries from all regions and at different stages of development, as well as international organizations, specialized agencies and non-governmental organizations. ADG (SSD) is a member of the Expert Group.

The revision process

The revision was based on an agreed set of criteria and has been supported by extensive international expert consultation. The 1984 FDES was used as the starting point. It was revised taking into account the lessons learned during its application in different countries as well as improved scientific knowledge about the environment and new requirements created by emerging environmental concerns and policy issues including major multilateral environmental agreements (MEAs). The revision has also taken into account the increasing prominence of environmental sustainability and sustainable development issues and concepts. Existing environment statistics and indicator frameworks were analyzed, including major developments in the field of environmental-economic accounting and selected thematic developments pertinent to environment statistics. In its 44th Session in February 2013, the United Nations Statistical Commission has endorsed the Revised FDES.

The revised FDES is a multipurpose conceptual and statistical framework that is comprehensive and integrative in nature. It provides an organizing structure to guide the collection and compilation of environment statistics and to synthesize data from various subject areas and sources. It is broad and holistic in nature, covering the issues and aspects of the environment that are relevant for analysis, policy and decision making. The FDES is structured in a way that allows links to economic and social domains. It seeks to be compatible with other frameworks and systems, both statistical and analytical, such as for instance the System of Environmental-Economic Accounting (SEEA), the Driving force – Pressure – State – Impact – Response (DPSIR) framework, and the Millennium Development Goals (MDGs) indicator framework. As such, the FDES facilitates data integration within environment statistics and with economic and social statistics.

The revised FDES organizes environment statistics into a structure of six components, each of them broken down into sub-components and statistical topics. The six components cover environmental conditions and quality; the availability and use of environmental resources and related human activities; the use of the environment as a sink for wastes and residuals and related human activities; extreme events and disasters; human habitat and environmental health; and social and economic measures for the protection and management of the environment. The statistical topics represent the quantifiable aspects of the components and they are grouped into sub-components, taking into account the types and sources of the statistics needed to describe them.

Table : Components and Sub-components of the FDES

Component 1: Environmental Conditions and Quality

Sub-component 1.1: Physical Conditions

Sub-component 1.2: Land Cover, Ecosystems and Biodiversity

Sub-component 1.3: Environmental Quality

Component 2: Environmental Resources and their Use

Sub-component 2.1: Non-energy Mineral Resources

Sub-component 2.2: Energy Resources

Sub-component 2.3: Land

Sub-component 2.4: Soil Resources

Sub-component 2.5: Biological Resources

Sub-component 2.6: Water Resources

Component 3: Residuals

Sub-component 3.1: Emissions to Air

Sub-component 3.2: Generation and Management of Wastewater

Sub-component 3.3: Generation and Management of Waste

Component 4: Extreme Events and Disasters

Sub-component 4.1: Natural Extreme Events and Disasters

Sub-component 4.2: Technological Disasters

Component 5: Human Settlements and Environmental Health

Sub-component 5.1: Human Settlements

Sub-component 5.2: Environmental Health

Component 6: Environment Protection, Management and Engagement

Sub-component 6.1: Environment Protection and Resource Management Expenditure

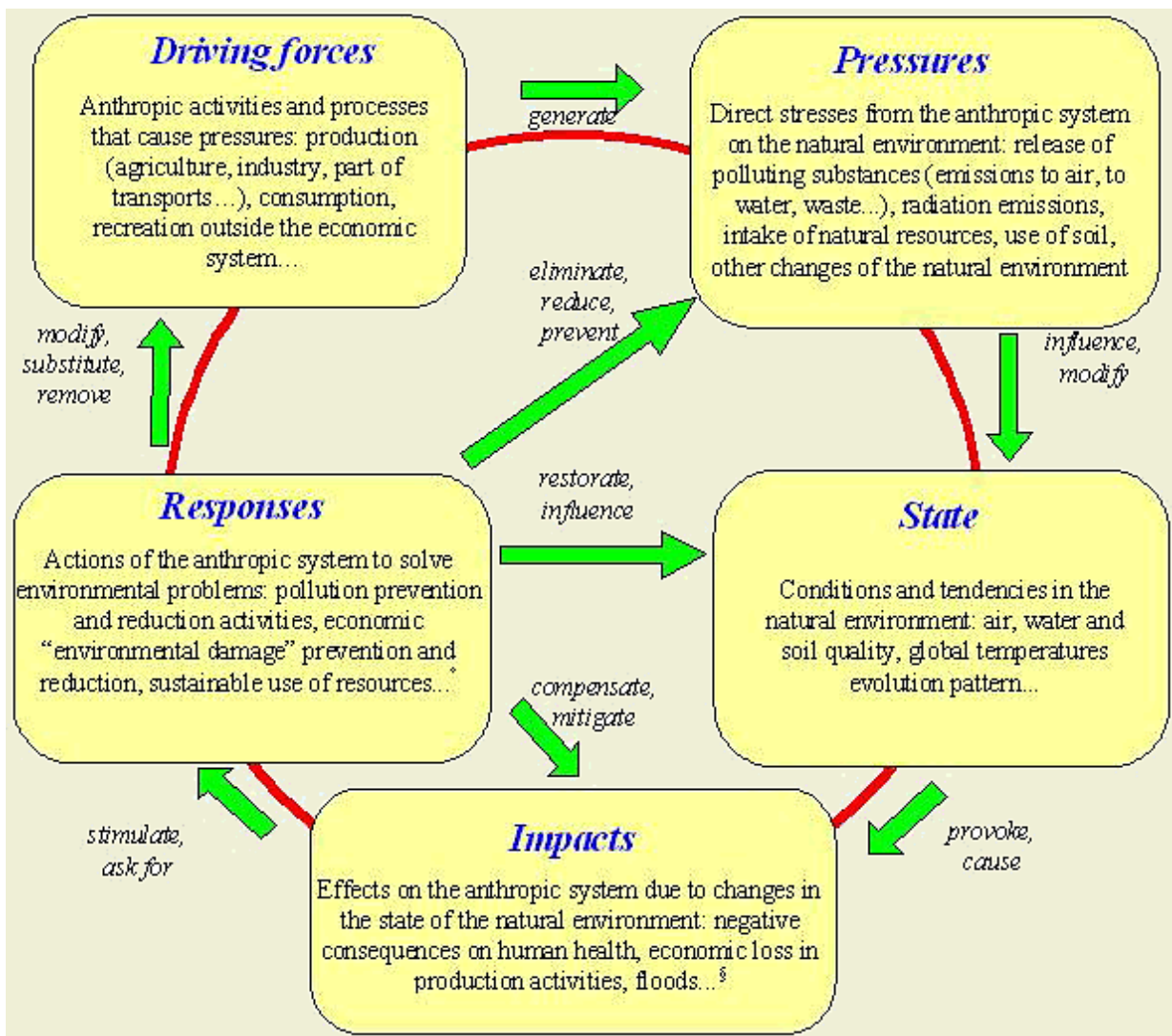
Sub-component 6.2: Environmental Governance and Regulation

Sub-component 6.3: Extreme Event Preparedness and Disaster Management

Sub-component 6.4: Environmental Information and Awareness

1.1.2. Climate change assessment

A common way to assess and manage environmental problems is the so-called Driving forces-Pressure-State-Impact-Response framework (DPSIR). Driving forces are the socio-economic forces driving human activities, which increase or mitigate pressures on the environment. Pressures are the stresses that human activities generate on the environment. Impacts are the effects of environmental degradation on society, the economy and ecosystems. Responses refer to the responses of society to the environmental situation. This framework is very helpful to organize information on the state of the environment, both for researchers, policy makers and the general public. Specific indicators can be compiled for each part of the DPSIR framework. Climate change and its relations with the economy can be described using the DPSIR model.



1.1.3. Driving forces of climate change

Basic economic developments are the main drivers behind human induced climate change. Increased production of goods and services, changes in the production structure, increased transportation, a higher demand for all kinds of consumer goods, etc., contribute to a higher pressure on the atmosphere thereby increasing the greenhouse gas concentration. Particularly important is, of course, the ever increasing demand for energy. At present the world's economy runs on fossil fuels. The combustion of coal, oil and natural gas and derived products provide energy to nearly all economic activities. The emission of Carbon Dioxide (CO₂) is a residual product of burning these fossil fuels. Also changes in land use pattern, deforestation and land clearings are important driving forces leading to a rise in Carbon Dioxide emissions.

1.1.4. Pressure on the environment:

Driving forces lead to human activities such as transportation or food production, i.e. result in meeting a need. These human activities exert 'pressures' on the environment, as

a result of production or consumption processes, which can be divided into three main types: (i) excessive use of environmental resources, (ii) changes in land use, and (iii) emissions (of chemicals, waste, radiation, noise) to air, water and soil. Emissions include direct emissions to air, water and soil, indirect emissions to air, water and soil, Production of waste, Production of noise, Radiation Vibration, Hazards.

Greenhouse Gases (GHGs)

Greenhouse Gases (GHGs) are gases in the atmosphere that absorb and emit radiation within the thermal infrared range. Earth's most abundant GHGs are water vapor, Carbon Dioxide, atmospheric Methane, Nitrous Oxide (NO), Ozone (O₃) and Chloro-Fluro-Carbons (CFCs). Greenhouse effect is a process by which radioactive energy leaving a planetary surface is absorbed by some atmospheric gases called greenhouse gases. The ability of the atmosphere to capture and recycle energy emitted/reflected by earth's surface is the defining characteristic of the greenhouse effect. Global warming is believed to be the result of the strengthening of greenhouse effect mostly due to human produced increases of greenhouse gases in the atmosphere. The pressures related to climate change being considered are the greenhouse gas emissions caused by economic activities. CO₂ is by far the most important greenhouse gas, and originates mainly from the combustion of fossil fuels and biomass. However, other greenhouse gasses like methane, Nitrous Oxide and halocarbons also contribute to climate change. Methane is mainly produced by domesticated animals such as dairy cows, pigs etc, rice growing, gas flaring and mining activities. Nitrous Oxide mainly originates from agricultural land management, animal manure management, combustion of fossil fuels, and the production of fertilizers and nitric acid.

1.1.5. State of the environment

The present state of the environment with regard to climate change is reflected in the condition of the atmosphere and hydrologic system of the earth. This state can be described using the so-called Essential Climate Variables (ECV's). Within the atmospheric domain these are air temperature, air pressure, precipitation rates, surface radiation, and also the concentration of the different GHGs. In the oceanic domain these are sea surface temperatures, sea level, sea ice, ocean current etc. In the terrestrial domain these are river discharge, ground water levels, lake water levels, land cover (including vegetation type), glaciers, etc.

Global Climate Observing System (GCOS) Essential Climate Variables

The 50 GCOS Essential Climate Variables (ECVs) (2010) are required to support the work of the UNFCCC and the IPCC. All ECVs are technically and economically feasible for systematic observation. It is these variables for which international exchange is required for both current and historical observations. Additional variables required for research purposes are not included in this table. It is emphasized that the ordering within the table is simply for convenience and is not an indicator of relative priority.

Domain	GCOS Essential Climate Variables
	<p>Surface:[1] Air temperature, Wind speed and direction, Water vapour, Pressure, Precipitation, Surface radiation budget.</p>
Atmospheric (over land, sea and ice)	<p>Upper-air:[2] Temperature, Wind speed and direction, Water vapour, Cloud properties, Earth radiation budget (including solar irradiance).</p>
	<p>Composition: Carbon dioxide, Methane, and other long-lived greenhouse gases[3], Ozone and Aerosol, supported by their precursors[4].</p>
	<p>Surface:[5] Sea-surface temperature, Sea-surface salinity, Sea level, Sea state, Sea ice, Surface current, Ocean colour, Carbon dioxide partial pressure, Ocean acidity, Phytoplankton.</p>
Oceanic	
	<p>Sub-surface: Temperature, Salinity, Current, Nutrients, Carbon dioxide partial pressure, Ocean acidity, Oxygen, Tracers.</p>
	<p>River discharge, Water use, Groundwater, Lakes, Snow cover, Glaciers and ice caps, Ice sheets, Permafrost, Albedo, Land cover (including vegetation type), Fraction of absorbed photosynthetically active radiation (FAPAR), Leaf area index (LAI), Above-ground biomass, Soil carbon, Fire disturbance, Soil moisture.</p>
Terrestrial	

[1] Including measurements at standardized, but globally varying heights in close proximity to the surface.

[2] Up to the stratopause.

[3] Including nitrous oxide (N₂O), chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), hydrofluorocarbons (HFCs), sulphur hexafluoride (SF₆), and perfluorocarbons (PFCs).

[4] In particular nitrogen dioxide (NO₂), sulphur dioxide (SO₂), formaldehyde (HCHO) and carbon monoxide (CO).

[5] Including measurements within the surface mixed layer, usually within the upper 15m.

1.1.6. The impact of climate change on the economy

Climate change has the potential to create a wide range of economic impacts. In all likelihood all sectors of the economy will be affected. Some impacts will gradually affect economic processes, such as the effect of increasing temperature on energy demand, whereas others may come as extreme events, such as sudden floods or forest fires. Impacts may be either negative or positive. For

example, agriculture may become more productive or tourism may flourish in areas experiencing higher or lower temperatures. However, in a global level, the negative impacts will generally outweigh the economic benefits. Beside industry specific impacts, the economy as a whole may be at risk in certain areas due to an increase in sea level and an increase in runoff by rivers. Coastal zones usually contain large human populations and a high concentration of economic activities. Flooding and extreme storm events may seriously disrupt economic activities and cause loss of produced capital. The same is true for areas adjacent to major river systems which may be subject to flooding when precipitation and overland flow increases.

Assessing the impact of climate change faces a fundamental challenge of complexity. The set of mechanisms through which climate may influence economic outcomes, positive or negative is extremely large and difficult to investigate. For example, a decrease in agricultural output or value added products may be induced by climate change. However, climate change is only one driver among many that will shape agriculture in future decades. Other factors, such as technological developments, socio-economic factors or other environmental issues could have a similar large impact.

1.1.7. Initiatives of Central Statistics Office

The Central Statistics Office (CSO) under National Statistical Organization (NSO) constituted a Steering Committee on Environment Statistics in 1996 to examine the indicators identified by UNSD and recommend a set of parameters which are relevant in Indian context and applicable to our needs and requirements. The Committee recommended for the adoption of five broad categories of the UNSD Framework for Development of Environment Statistics (FDES), 1984 viz., bio-diversity, atmosphere, land/soil, water and human settlements. Accordingly, CSO decided to bring out an Annual publication by title 'Compendium of Environment Statistics' covering all the parameters as identified by the said Committee. So far CSO has brought out thirteen issues and the latest one, is for year 2012 covers the data available up to 2012.

The liberalization of the Indian economy in the early 1990s and the unprecedented growth have brought our country in the centre stage of climate change discussions worldwide. The growth in the energy sector and the use of fossil fuels for the development needs have resulted increased emission of Carbon Dioxide and other GHGs in absolute terms. The findings of IPCC indicate that there was 0.4⁰C change in the surface temperature in India during the last century and a recession in the Himalayan glaciers. The formation of Prime Minister's Council of National Action Plan on Climate Change (NAPCC) is an outcome of all these related events which happened in the past decade.

The 16th Conference of Central and State Statistical Organizations (COCSSO) held at Shimla during 4-5 December, 2008 felt that India's official statistics on Climate change is insufficient to address the challenges posed by the country and a more elaborate and a meaningful database to be built to ascertain the impact of climate change. Hence COCSSO recommended that

'for collection of statistics, to capture climate change effectively, an Expert

Committee should be set up in the Ministry of Statistics and Programme Implementation with members drawn from concerned Ministries, State Departments, research Organizations and outside experts to identify the parameters that affect environment’.

Keeping this in view, CSO organised a two days seminar on ‘Climate Change – Data Availability and Requirements’ at Institute of Social and Economic Change (ISEC), Bangalore during April, 2009. Researchers, academicians, technocrats and officials from Ministries who deal with environment and climate were invited and their views and research findings were gathered to prepare a status paper on the subject matter

As an outcome of the seminar, CSO constituted an Expert Committee on the Development of Database on Climate Change on 20th July, 2009 under the Chairmanship of Dr. K. S. Rao, Professor, Dept. of Botany, Delhi University with the following terms of reference:

- (i) To identify indicators/parameters for which statistical data need to be collected. Such data may be utilized to capture causes and effects of climate change and to monitor adaptability and mitigation measures
- (ii) To suggest the data source agencies for the collection of above data
- (iii) To decide the relevant geographical unit/ climatic unit for which data may be collected and periodicity of such data collection
- (iv) To review the data contained in the CSO’s publication ‘Compendium of Environment Statistics’ and suggest modification, if any, in existing tables to meet the users requirement at national and international level.

The Expert Committee took up the task of finding out minimum set of indicators which are relevant and could be used for building up a database for the Climate Change in India has submitted its Draft Report in June 2010. The Report included a Framework for Climate change Statistics and recommended:-

- (1) The Annual publication entitled ‘Compendium of Environment Statistics’ should be continued in the present form without any modification in terms of its contents, parameters or its time-period as it is in conformity with the FDES.
- (2) The data source agencies identified in the report will supply the necessary data in the specified format to the CSO as per periodicity indicated.
- (3) Climate change is an ongoing phenomenon and needs historical information to identify changes if any, in the long run. So, time series data need to be compiled starting from 1990 or depending upon the availability of data.
- (4) Various ministries and departments are collecting data as per their requirements and maintaining with them in aggregate and disaggregate levels. CSO may publish the data in the aggregate form with state as the basic unit.

- (5) The periodicity of the data as indicated in the report may be followed.
- (6) The data on Mitigation and Adaptation activities may be obtained from the nodal ministries so that the same could be used for analyzing the extent and reach of the activities undertaken by them. The analysis would help to identify the strengths and weaknesses of the missions.
- (7) CSO should initiate concerted efforts to capture data for some of the indicators which are not available at present, by approaching the concerned organizations.
- (8) CSO should be the nodal agency to coordinate with the data source agencies.
- (9) CSO should bring out a new publication on Climate Change Statistics covering only the data related to the subject.

The Draft Report was sent to Ministry of Environment and Forests for comments. The comments received from MOEF were examined and the Report of the Expert Committee was accepted by the Ministry in December 2010. The Report was uploaded in the Ministry's website for comments from public. As recommended by the Expert Committee it was decided by CSO to bring out a new publication on climate change Statistics.

With the purpose of betterment and enrichment of the proposed framework CSO organised a Two day National Seminar on 'Identification and Prioritization of Statistical Indicators on Climate Change' at Centre for Economic and Social Change (CESS) Hyderabad in February 2013. The Seminar was attended by academicians, researchers, DES officers and data users. The Framework and the report of the Expert Committee was discussed in detail during the Seminar. As per the recommendations of the Seminar certain modifications were incorporated. The Framework after incorporating the suggestions and recommendations evolved from the National Seminar has been used for the present publication.

1.2 Factors Effecting Climate Change

1.2.1 Definition of Climate Change

The Inter-Governmental Panel on Climate Change (IPCC) was established by United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) to provide the world with a clear view on the current state of Climate Change and its potential environmental and socio-economic consequences. IPCC defines climate change as *'a change in the state of the climate that can be identified (e.g., using statistical tests) by changes in the mean and/or variability of its properties, and that persists for an extended period, typically decades or longer. It refers to any change in climate over time, whether due to natural variability or as a result of human activity'*.

The definition provided by UNFCCC is slightly different, as it emphasizes on *'a change that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods'*.

The UNSD has not, however, formulated any internationally agreed definition of climate change for statistical purposes.

1.2.2. Defining Environment

Understanding the causes and consequences of climate change, and design of mitigation and adaptation strategies to deal with global warming require knowledge in physical science (*Any of several branches of science, such as physics, chemistry, and astronomy, that study the nature and properties of energy and nonliving matter*), natural science (*It refers to a naturalistic approach to the study of the universe*) and social science (*Any of various disciplines that study human society and social relationships, including sociology, psychology, anthropology, economics, political science, and history*). Different disciplines in these sciences use different approaches for collecting / generating data, analysis of data and development of indicators. Climate change and Global warming have been gaining importance at national and international level. Any substantial change in the climatic system of the earth which extends for a substantial period of time can be termed as 'Climate Change'. A substantial increase in the earth's surface temperature due to Climate Change could be termed as global warming. Carbon Dioxide, Methane and water vapour are the natural greenhouse gases which form a cover over the earth's surface and reflect back the heat emitted by earth earlier absorbed by the earth from Sun. However, before going to the subject of Climate Change, it will be important to understand the terms environment and atmosphere where the phenomenon of climate change occurs.

1.2.3. Environment: It literally means "Surroundings" and may be defined as sum total of all external conditions and influences that affect living organisms. It comprises the following (i) Atmosphere (ii) Hydrosphere (iii) Lithosphere and (iv) Biosphere. The term 'atmosphere' is explained in subsequent para. **Hydrosphere**

forms that part of environment which contains water in the form of sea, oceans, rivers, lakes, ponds etc. It covers almost 75% of the earth's surface. **Lithosphere** is the solid component of the earth consisting of soil, rocks, mountains etc. The uppermost part of the earth's crust contains weathered rocks as well as organic matter and is called soil. This is also the storehouse of minerals and metallic ores. **Biosphere** is that part of the lithosphere, hydrosphere and atmosphere where living organisms interact with these parts and thus live together. A number of natural cyclic process like oxygen, water, nitrogen etc. are taking place in the environment to keep a balance of different materials present in the environment.

1.2.4. Atmosphere: To better understand the intricacies of the phenomenon of climate change and the global warming, one needs to know the structure and composition of the atmosphere surrounded by the planet earth. Earth's atmosphere could be defined as the gaseous mass surrounded and retained by the earth through its gravitational force. Earth's atmosphere is a cover of gases that extend to a height of about 1600 km above the surface of the earth and protect the life on earth from harmful radiation of cosmic rays from the Sun. The atmosphere is divided into five layers, which are

- (a) Troposphere
- (b) Stratosphere or ozonosphere
- (c) Mesosphere
- (d) Thermosphere and
- (e) Exosphere

1.2.4.1.1. Troposphere: It is the lowest layer on the earth's surface, which is otherwise called the boundary layer, having about 70 to 80% of the total mass present in the atmosphere. The height of the layer varies from 7 to 20 km above sea level depending on the latitude and season. The weather occurs in this layer. The air at the bottom of the layer will be warm and gets colder when the height increases. This layer contains about 79% nitrogen, 21% oxygen and only a small concentration of other gases such as argon, Carbon Dioxide etc. Dust particles and water vapour are the other major components in this layer, of which water vapor helps to form clouds. The sunlight warms the earth during day time and the heat is radiated from earth to the atmosphere. The warm air tends to rise in the atmosphere. The top portion of the layer is colder.

1.2.4.2. Stratosphere: The second layer in the atmosphere is known as the stratosphere, which starts a 20 km and extends up to 50 km from the earth's surface. There is a variation of about 8 to 16 km in the bottom of the layer due to the variation in latitude and seasons. The bottom portion of this layer is cooler and temperature increases with the increase in height. This layer plays a vital role in keeping the life on earth as the ozone is abundantly available here. Ozone absorbs the Ultra-Violet (UV) radiations from Sun. Increasing doses of UV radiations may cause skin cancer, eye cataracts, damage to the immune system in animals and human beings and have an adverse impact on the plant growth. Ozone is scattered between 19 to 30 km in the upper layer of stratosphere. The Ozone is formed when the highly energetic solar radiation strikes the molecules of oxygen and splits it into two atoms apart

and the freed atoms conjoin with the oxygen through the process of photolysis, which is a process whereby sunlight causes the chemical bonds in a molecule to break. Ozone is also naturally broken down by sunlight and by a chemical reaction with various compounds containing nitrogen, hydrogen and chlorine. In a pristine atmosphere, there is a balance between the amount of ozone generated and destroyed. The air is quite stable in the stratosphere. Air is thin and dry and no water vapour present in this region. Due to lack of vertical convection, the materials got into this region stays longer periods. The Ozone depleting substances like CFCs could stay here and react with ozone, resulting in depletion in the amount of ozone.

1.2.4.3.Mesosphere: It is the third layer in the atmosphere which starts at 50 km from the earth's surface and goes up to 85 km. The bottom portion of the mesosphere is hotter and the temperature gets colder when height increases. The upper layer of the mesosphere is the coldest with -90°C . The air is so thin in this region that the atoms and molecules of gases hardly ever run into each other.

1.2.4.4.Thermosphere: The fourth layer in the atmosphere is thermosphere. It starts from 85 km to 500 km and extends up to 1000 km. This layer is very hot at about 500°C when the sun is active. A good amount of sun's X-ray and UV radiations were absorbed in this area, making this region very hot. The temperature in the upper layer varies from 500°C to 2000°C or higher depending on the sun's activity. A most common definition says that the space begins with thermosphere at an altitude of 100 km as the air is too thin in this region. The space shuttles and space stations are orbiting around the earth in this region only.

1.2.4.5.Exosphere: It is the fifth layer having a very thin layer of air containing atoms and molecules only. These particles escape into the space from this region only.

1.2.5 .Some Terminologies and Definitions

Precipitation

Precipitation refers to the quantity of water falling to the earth at a specific period of time. The water could be in any form like rain, snow, hail, sleet or mist.

Natural Carbon Sinks

Natural Carbon Sinks are the reservoirs which absorb the carbon and store it for indefinite period. Forests, oceans, soils and atmosphere are better examples of carbon sinks. The plants and other organisms that use photosynthesis to remove carbon from atmosphere by incorporating it into biomass are also carbon sinks.

Carbon Sequestration

This term refers to describing processes that remove carbon from atmosphere.

Biomass

In ecology, Biomass is defined as the mass of living biological organisms in a given area or ecosystem at a given time. This is a renewable energy source and is biological material derived from living or recently living organism such as wood, waste, hydrogen (gas) and alcohol fuels.

Carbon Stock

The quantity of carbon contained in a reservoir or a system which has the capacity to accumulate or release carbon. The forest biomass refers to the amount of carbon stored in the forest ecosystem, mainly in living biomass and soil, but to a lesser extent in dead wood and litter.

Anthropogenic Emission

These are the emissions of greenhouse gases resulting from human activities.

1.2.6. Factors Influencing Climate Change

Climate is a vibrant phenomenon and undergoes continuous changes over centuries. There are natural forces like photosynthesis of the plants, eruption of volcanoes, emission of methane from agricultural activities, vapor emissions etc. The important factors, which are responsible for climate change and are causally contributed by human civilization on earth, are listed below:

- Greenhouse Gases
- Deforestation
- Land-use Change
- Energy Usage
- Vehicular Usage

Greenhouse Gases

Human civilization and industrialization have amplified the emissions of 'Greenhouse Gases', which are considered to be one of the main causal factors accelerating climate change in the post industrialization era. GHGs constitute

- Carbon Dioxide (CO₂),
- Methane (CH₄),
- Nitrous Oxide (N₂O),
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)
- Sulphurhexafluoride (SF₆)

In addition to this, water vapor, which absorbs the heat radiations from Sun and trap such radiations in the atmosphere making the earth warmer, is considered important. Emissions of GHGs beyond certain limits make earth's atmosphere hotter and induce climate change. The extent of GHGs in the atmosphere increased

phenomenally from 280ppm¹ (1750) to 379ppm in 2005 (IPCC-AR4²). The available global data on CO₂ since 1970 indicates that the annual emissions have grown at about 80% from 21 to 38 gigatons, which represents 77% of the total anthropogenic emissions. The global increases in CO₂ concentrations are primarily due to

- Fossil Fuel Use
- Land-use and Land-use Change
- Agricultural activities
- Industrial Development
- Forestry

CO₂ is the most important anthropogenic GHG as it constitutes about 70% of the total emissions. CO₂ originates from burning of fossil fuel (56.6%), deforestation and decay of biomass (17.3%), agriculture etc. The largest growth in GHG emissions between 1970 and 2004 has come from energy supply, transport and industry while deforestation, agriculture and residential/commercial buildings are only minor contributing factors.

India's share of CO₂ in the total emissions in the world is very insignificant in per-capita terms. The per-capita emission of an Indian citizen is 1.2 tons of Carbon dioxide whereas his counterpart in USA contributing 20.6 tons as per UNDP Human Development Report 2007/2008. The per-capita emissions of UK and Japan are 8 and of USA 17 times higher than that of India. India's contribution to the world total is only 4.6% when compared to USA's contribution of 20.9% followed by 17.3% of China.

The energy sector is the major producer of CO₂. 58.6 %* of our energy needs are met from coal, which is abundant, locally available and cheap when compared to alternative fuels. As per Central Electricity Authority CO₂ Baseline Database for the Indian Power Sector, CO₂ emissions in the power sector are continuously increasing in all parts of the country.

The global atmospheric concentration of Methane has increased from pre-industrial value of about 715ppb (Particles per Billion) to 1774ppb in 2005 (The Intergovernmental Panel on Climate Change 4th Annual Report (IPCC-AR4)). Methane is generated due to the following activities :

- Agriculture
- Energy Sources like biomass burning, coal mining and handling and flaring of natural gas systems
- Waste disposal
- Land-use
- Land-use Change
- Forestry
- Shifting Cultivation practice

In India, the Methane emissions in the year 1994 were 18,583 Gg, (Giga

gram)out of which 78% came from agriculture, 16% from energy sources and 6% from waste disposal. The rest is contributed by other activities mentioned above.

Global Nitrous Oxide concentration increased from about 270ppb (1750) to 319ppb (2005). Many halocarbons including hydro-fluro-carbons have also increased from a near-zero level to significant levels primarily due to human activities.

Deforestation

There is considerable reduction in the forest cover due to encroachment and land use change and economic development activities like construction of roads, canals and power stations. Forests are the major source of carbon sequestration and the womb of the biodiversity, which acts as the main artery of any environment and ecosystem. National Action Plan on Climate Change (NAPCC) estimates that 77 to 68% of the forest areas in the country are likely to experience shift in forest types by the end of the 21st century, which needs our immediate attention.

Land-use Change

Land-use change is another major predicament to be viewed seriously. As per the data available, after the enactment of Forest Conservation Act, 1980, a huge portion of forestland is diverted for non-forest use. The reported figure for the year 1981 is 1331 ha whereas the cumulative figure till 2004 is 9,54,839 Ha. A relative growth in the land-use change is also visible in urban and rural areas due to urbanization and industrialization. Fragmentation of forests and habitats are another major reason for loss of biodiversity. There are no data which gives any indication of loss of biodiversity and loss of biomass due to this land use change.

Energy Usage

After the liberalization and globalization, India is on a high growth path and envisages about 7-8% GDP growth rate per annum. The energy generation has grown manifold due to the ever increasing demand for energy since 1992. Coal, Gas and Diesel being the major sources of power in India, the emissions of GHGs are also on the rise. The GHG emission level estimation, however, depends on utilization of installed capacity.

In addition to this, the unorganized sector is also engaged in power generation through low capacity diesel generator sets and coal-fired generators. Data on such activities are not available and extent of pollution caused by such units are still beyond our reach.

Vehicular Usage

The number of vehicles registered in India is on the increase over the last 7 years at an average annual cumulative rate of 10%(data from 2004 to 2011). It indicates the increases in the use of fossil fuel and thereby an increases in GHG

emissions. Data reveals that there has been consistent growth in vehicular registration, however no indication on the emission load is available. The emission load depends on the types of vehicle. In India, we have standard and non-standard vehicular emissions, which also vary from place to place depending on regulatory mechanisms in use by the civic and local authorities in different areas. Some metropolitan cities have standards in consonance with the European Emission standards, but the data are **not captured** according to the types of vehicles and their average usage per annum.

1.2.7. Visible/Perceivable Impacts of Climate Change

The resilience of the ecosystems is likely to be disturbed in the future due to abrupt climatic change which could appear in the form of floods, drought, wildfires, ocean acidification etc., inducing further loss of biodiversity and the earth's latent capacity for mitigation and regeneration. The rise in temperature, change in precipitation patterns, sea level rise, melting of snow cover and mountain glaciers, coastal erosion and occurrence of health hazards and disaster events are perceived as the visible impacts of climate change. The following are the main dimensions/impacts of climate change and some of these are explained in brief in the sub-sections which follow.

- Temperature
- Rainfall (Precipitation)
- Mountain Glaciers
- Sea Level Rise
- Health
- Agriculture
- Coastal Erosion
- Biodiversity Loss
- Storm/Storm Events
- Soil Moisture Availability
- Sea Surface Temperature

Temperature

The temperature increase is wide spread across the globe and is greater at higher northern latitudes. It is estimated that there is a 100-year linear trend of 0.74°C increase. It is observed since 1961 that the average temperature of the global ocean has been taking up over 80% of the heat being added to the climate system. Warming of the climate system induces increase in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level.

In India, an increase in the linear trend of about 0.4°C in the surface air temperature has been observed in the past century. A warming trend is visible along the west coast, central India, interior peninsula and the North-Eastern India, but some cooling trends are also visible in the North-West India and parts of South-India. (NAPCC, 2008). To analyze the comparative change in the Indian peninsula, both sea

level temperature and land surface temperature are required to be recorded on long term basis at different climatic zones of the country.

India Meteorological Department (IMD) is the nodal agency to provide the data on temperature. The time series data on mean temperature of major cities in India are available with this department.

Rainfall (Precipitation)

Indian monsoon rains are the backbone of Indian economy as most of our agricultural activities, rivers and replenishment of ground water sources have a direct dependence on monsoon rains. Monsoon rains are a manifestation of the complex interactions between land, ocean and atmosphere. Rainfall data are collected by the India Meteorological Department (IMD) in respect of the meteorological subdivisions of the country on day-to-day basis. A significantly long series of rainfall data are therefore available to analyze patterns of change in distribution, intensity and duration of rainfall. The All-India rainfall data do not show any significant trend in monsoon rains, however, there are some regional variations. A trend of about 10 to 12% (of the normal) increase in monsoon rains were reported along the west coast, northern Andhra Pradesh and north-western India during the last century. A decreasing trend of about 6 to 8% is observed over the last 100 years over eastern Madhya Pradesh, North-Eastern India and some parts of Gujarat and Kerala (NAPCC, 2008).

Mountain Glaciers

The ice and snow deposits on the Himalayan ranges are lifelines of northern India in many ways. These deposits provide a perennial supply of water through many rivers, which cater to the livelihood, drinking water, and water for industrial purposes. Any recession in the snow cover in the Himalayas is going to affect the life in the Northern parts of India where half of India's population resides. The available data on snowfall in Himalayan ranges show a recession in some parts of the Himalayan ranges. The river systems of the Brahmaputra, the Ganges and the Indus draw water directly from melting of the Himalayas. National Remote Sensing Agency (NRSA) and Snow and Avalanche Studies Establishment (SASE) are responsible for collection and supply of data on **cryosphere** (*the component of earth's system comprising frozen water like snow, permafrost and glaciers*).

Sea Level Rise

IPCC has estimated a sea level rise of 1 to 2 mm per year globally. Due to sea level rise, the fresh water sources near the coastal areas will suffer from salt intrusion and inundation of coastal areas where the density of population and their dependence on sea for livelihood activities are high.

Health

There is a high incidence of occurrence of vector borne diseases like Malaria, Kala-azar, Japanese Encephalitis, filaria, Chikungunia etc., in the immediate past. It

is observed that changes in climatic patterns may alter the distribution of vector species and increase its spread in new areas. An increase in temperature and relative humidity may enlarge the transmission windows. Effluent emissions to water bodies and salination of rivers through sea level rise may increase the incidence of water borne diseases. Deaths due to heat wave are reported from several parts of the country from time to time, particularly during the summer.

Central Bureau of Health Intelligence (CBHI) under Ministry of Health and Family Welfare compiles data on cases/death due to communicable diseases. However, the reasons for variations should be traced in linkage with the climate change over time, so that the impact of climate change could be ascertained on disease patterns.

Agriculture

India is a predominantly agriculture-oriented economy, as 52% of the population directly depends on agriculture either as farmers or agricultural laborers, and their concentration is higher at 76% in the villages. Variation in climate will have a direct impact on the majority of the livelihood of the people. Food production in India is sensitive to climate change like variations in temperature and monsoon rainfall. Rise in temperature has a direct impact on the Rabi crop and every 1⁰C rise will reduce wheat production by 4 to 5 Million Tons. Every small change in temperature and rainfall has significant effect on the quality and quantity of fruits, vegetables, tea, coffee, basmati rice and aromatic and medicinal plants. It is predicted that a loss of 10 to 40% in production may occur by 2100 due to climate change (NAPCC).

Coastal Erosion

Population in coastal regions are vulnerable to natural disasters like cyclones, floods, droughts, soil and land erosion leading to irreparable loss or damage to sown areas in arid and semi-arid zones caused by climate change. About 40 million hectares of land is flood-prone, including river-deltas on three sides of the country stretching over 6000 km of coastal belt, affecting about 30 million people on an average each year. National Institute of Disaster Management and CSO are responsible for the collection and compilation of hazard and disaster data respectively. State governments would also start compiling data on disasters at district levels. All these inputs are to be integrated to assess climate change impacts.

Biodiversity Loss

India is one of the species-rich countries in the world and about 6% of the world's biodiversity is reported from India. The existence of biodiversity helps to keep a balance between the environment and earth through its ecosystem services. A comparison of data on 'Number and status of plant species in India' published in 2001 and 2007 does not give any indication to the extent of change which happened in the last few years due to rapid economic growth, urbanization and land-use change. The existing data do not provide any insight into the loss of biodiversity in the country. The NAPCC also emphasizes on the need for 'creation of biodiversity registers (at national, district and local levels) for documenting genetic diversity and the associated traditional knowledge. Some interesting findings here are the reduction in the number of known species in India of 'Fern & Fernallics' from

1200 to 1135 during the reference period (2001-2007).

Zoological Survey of India, Botanical Survey of India, Forest Survey of India and the State Forest Department are responsible for collection and supply of data related to biodiversity.

Storm/Storm Events

The 'Storm Event' is a rainfall event that produces more than 0.1 inch of precipitation and that, which is separated from the previous storm event by at least 72 hours of dry weather.

Soil Moisture Availability

'Soil moisture' is the ability of the soil to hold water. Soil moisture impacts the distribution and growth of vegetation, soil aeration, soil microbial activity, soil erosion, concentration of toxic substance, the movement of nutrients within the soil and to the roots.

Sea Surface Temperature

Sea surface temperature is the temperature of the water close to the surface of the sea, which is measured by drawing water from one metre below the surface of the sea.

1.2.8. Mitigation and Adaptation

There are two options available to address the problems which may arise out of pollutions caused to the air, water or soil. The term 'mitigation' involves actions that reduce the likelihood of the event or process. In other words, Mitigation refers to measures for reduction of emissions of GHGs that cause climate change like switching from fossil fuel based power generation to alternative sources of renewable energy like solar, wind, nuclear etc. 'Adaptation' involves actions that reduce the impact of the event or process without changing the likelihood that it will occur. The process may include relocating the communities living close to the sea level or switching to crops that can withstand higher temperature etc

Under the ambit of NAPCC, 8 Missions have been initiated to implement the programmes related to mitigation and adaptation. The missions are:

- National Solar Mission
- National Mission for Enhanced Energy Efficiency in Industry
- National Mission on Sustainable Habitat
- National Water Mission
- National Mission for Sustaining the Himalayan Ecosystem
- National Mission for a 'Green India'
- National Mission for Sustainable Agriculture
- National Mission on Strategic Knowledge for Climate Change

These eight Missions form the core of National Action Plan representing multi-

pronged long term and integrated strategy for achieving the goals in the context of climate change. For institutionalizing the National Mission, nodal ministries have been identified for each of the missions.

1.3 Framework of Database for Climate Change

The Expert Committee on the Development of Database on Climate Change under the Chairmanship of Dr. K.S.Rao took up the task of finding out minimum set of indicators which are relevant and could be used for building up a database for the Climate Change in India. The Committee focused on a basic minimum number of indicators which have a direct bearing on climate change as it would not be possible to manage huge data if collected at micro level. The report of NAPCC formed the basis for identifying the indicators for the Climate change and the Mitigation and Adaptation activities undertaken by the Government.

1.3.1. Classification of Data

The availability and periodicity of data could be classified into three categories as per their source, generation and variability. These are:

- (a) Data generated as a routine activity of the organization: An example of such data pertains to the temperature and rain fall data gathered by IMD. These data are captured on a day-to-day basis.
- (b) Data based on estimates: the second category is based on the annual/bi-annual estimates prepared by the respective organizations. The forest data published by Forest Survey of India is an example of generation of such data.
- (c) Data based on studies: The third category of data generation is based on studies conducted by the organizations at specific intervals. The estimation of GHGs is an example of such an activity. The data on GHGs are available in the public domain for the year 1994, which formed part of the First National Communication (NATCOM-I) by the Government to the UNFCCC. *The data for the year 2004 are under compilation and it will be available in the public domain as part of NATCOM-II which is expected to be communicated in the year 2011.* There are 56 various organizations working for the estimation under MOEF, which is the nodal ministry for this purpose.

The Committee considered the data availability with the respective departments and its periodicity of generation at the source level. It was decided that CSO may also maintain the same periodicity and the way in which the data are generated and supplied by the respective departments. However, efforts will be made to maintain a time series data since 1990 till the latest year of the data availability. The Committee decided to include all the relevant indicators irrespective of their data availability.

With respect to the institutional mechanism, the Committee recommended that CSO should take a lead role and act as the nodal agency for collection of the data from the source agencies and compilation of the same. It should act as the single window to provide all the relevant data in respect of the indicators identified by the Committee. The Committee also recommended that CSO should bring out a new publication on Climate Change covering only the data related to the subject.

1.3.2. Framework of Database

The framework as accepted finally by the Committee is given below. The framework describes the details of indicators of Climate Change along with data items, geographical unit for collection of data, periodicity, possible sources and meta-data linkages. The Committee also recommended that the data for those variables which are included in the framework, but not available presently need to be collected.

The Framework for Statistics related to climate change.

I. Indicators for Causal Factors behind Climate Change

Indicator	Variables Needed	Geographical Unit	Periodicity	Possible Source	Metadata links
Greenhouse Gases	Emission of (1) CO ₂ (2) N ₂ O (3) Methane (4) HFCs (5) PFCs (6) SF ₆	National level State-wise depending upon the availability of data	Yearly/ Monthly	(a) Central Pollution Control Board, M/o. Environment & Forests (b) NATCOM (Source wise data) (c) Central Electricity Authority	www.cpcb.nic.in www.cea.nic.in
Ambient air pollutants	(1) Sulphur Dioxide (2) Carbon Monoxide (3) Nitrogen Dioxide (4) SPM (5) RSPM	City wise	Yearly	(a) Central Pollution Control Board (b) State Pollution Control Boards	www.cpcb.nic.in
Solid Waste	(1) Municipal Solid Waste Generation by type- 1) Biodegradable 2) Non-biodegradable (2) Municipal Solid Waste Generation by source	National/ State level	Yearly	Central Pollution Control Board	www.cpcb.nic.in NEERI STUDY. ENVIS Centre, Mumbai.

Ozone	Ozone Depleting substance (1) Chloro-Fluro-Carbons (CFC) (2) Compounds of Halogen (Halons) (3) Carbon Tetrachloride (CTC)	National level	Yearly	Ozone Cell, MOEF	www.moef.nic.in
Forest Cover/Area	Extent of (1) Forest Area/Cover (2) Tree Cover (3) Mangroves	National Level/ State-wise/Region level	Biannual	Forest Survey of India, Ministry of Environment & Forests	www.fsi.org.in
Forest Produce including logging data (Timber, firewood, bamboo)	Different types of forest produce - Production data	National/State level	Biannual	Indian Council of Forestry Research and Education (ICFRE), Forest Survey of India, State Forest Departments	www.icfre.gov.in www.fsi.org.in
Biomass	(1) Above ground (2) Below ground (3) Litter (4) Deadwood (5) Soil organic carbon	National/State Level	Biannual	Forest Survey of India, Ministry of Environment & Forests	www.fsi.org.in
Land Use	1) Land Use Change 2) Land use based on agro climatic zones	National /State Level	Annual	Ministry of Agriculture	www.moa.gov.in
Water	(1) Glacial retreat (2) Surface water (3) Ground water (4) water quality (5) water use	National Level/ State Level/ Riverbasin wise/ Groundwater quality	Annual	(a) Geological Survey of India (b) Central Water	www.portal.gsi.gov.in www.cwc.nic.in www.cqwb.gov.in www.cpcb.nic.in

		station wise		Commission (c) Central Ground Water Board (d) National Remote Sensing Agency, Hyderabad. (e) Central and State Pollution Control Boards (water quality)	
Transport (Road, Rail, Aviation, Inland water Transport)	No. of vehicles (1) Existing (2) Newly Registered - Both fuel usage basis (LPG, CNG, Petrol, Diesel)	State-wise	Annual	Ministry of Road Transport & Highways	www.morth.nic.in
Energy	<u>Energy production through</u> (1) Hydro (2) Coal (3) Diesel (4) Gas (5) Nuclear Renewable Energy (6) Wind (7) Solar (8) Biomass <u>Energy usage sector wise</u> (9) Firewood	National/State level	Annual	(a) Central Electricity Authority (b) Ministry of Petroleum and Natural Gas (c) O/o. Coal Controller (d) M/o. Non-Conventional Energy Sources (e) M/o. New	www.cea.nic.in www.dae.gov.in

	(10) Wooding cakes Others 1) Kerosene 2) Electricity 3) LPG 4) CNG			Renewable Energy (f) Dept. of Atomic Energy (g) NSSO	
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II. Indicators for observed and assessed impact of Climate Change

Indicator	Variables Needed	Geographical Unit	Periodicity	Possible Source	Metadata links
Ocean Level & Temperature	(1) Sea surface temperature (2) Sea level Rise (3) Coastal inundation (4) Coral reef	Region-wise	Annual	(a) National Institute of Oceanography (b) Ministry of Earth Sciences (c) Department of Science & Technology (DST) (d) National Institute of Ocean Management, Chennai. (e) Enviscentre, Cuddalore	www.nio.org www.dod.nic.in www.dst.gov.in
Temperature / Precipitation	(1) Rain Fall (avg) (2) Snowfall (3) Temperature Max/Min/Avg (4) Relative Humidity	State-wise	Month-wise/ season-wise	(a) Indian Meteorological Department, Ministry of Earth Sciences (b) National Remote Sensing Agency (National Remote Sensing Centre) (c) Agro meteorological departments, M/o Agriculture of States	www.imd.nic.in www.nrsc.gov.in
Glacier/lands	(1) Glacier	National	Annual	Geological	www.portal.

lides	Advancement/Retraction (2) Landslide hazards	Level/State level		Survey of India (GSI)	gsi.gov.in
Biodiversity	(1) Total Species (2) Endangered (3) Threatened (4) Rare (5) Endemic (6) Invasive (7) Extinct	Habitat-wise	Annual	(a) Botanical Survey of India (b) Zoological Survey of India	www.bsi.gov.in www.zsi.gov.in
Health	(1) Recurring Endemic Diseases (2) Newly Reported Endemic diseases	(a) Season-wise (b) State-wise	Annual	(a) Ministry of Health & FW (b) National Crime Records Bureau, Ministry of Home Affairs	www.cbhidghs.nic.in www.ndmindia.nic.in
Soil and Land degradation	(1) Soil Degradation a) Soil fertility b) Soil type c) Soil erosion (2) Degraded Land	National/State Level	Annual	(a) All India Soil and Land Use Survey, Ministry of Agriculture (b) National Remote Sensing Agency (NRSA) (c) National Bureau of Soil Survey and Land Use Planning (d) Indian Council of Agricultural Research (ICAR) (e) Indian Institute	www.moa.nic.in www.icar.org.in www.nbssluip.in www.nrsc.gov.in www.iirs.gov.in

				of remote sensing (IIRS), Dehradun	
Agriculture	(1)Yield loss of major crops/ biomass loss due to (a)drought (moderate/severe) (b)cyclone (c) floods (d)heat waves (e)flowering (f)early vegetative (g)early maturity (h)early harvesting	National/State Level	Annual	Indian Council of Agricultural Research (ICAR)	www.icar.org.in
Extreme Events	Accidents/Disasters (Natural/Made) Deaths due to Extreme events- Heat, Cold, Drought, cyclone, etc.	National Level/State Level	Annual	Ministry of Home Affairs, National Disaster Management Authority, National Institute of Disaster Management (NIDM)	www.mha.nic.in www.ndmiindia.nic.in

III. Indicators for Climate Change – Mitigation & Adaptation

Indicator	Variables Needed	Geographical Unit	Periodicity	Possible Source	Metadata links
Solar Energy	(1) Solar Cells (2) Solar Lanterns (3) Solar Water Heater (4) Solar Electricity Generation Plants and Capacity	National/State level	Annual	M/o. New & Renewable Energy	www.mnes.nic.in

Energy Use	(1) Use of fuel like Condensed Natural Gas(CNG), Liquid Petroleum Gas (LPG) (2) Industries adopted fuel efficient technologies (3) Use of Compact Fluorescent Light (CFL)	National/State level	Annual	(a) Ministry of Commerce and Industry (b) Ministry of Transport	www.dipp.nic.in www.morth.nic.in
Dry-land Agriculture	(1) Crop Varieties for drought prone areas (2) Varieties of pest-resistant crops (3) Organic farming a)production b)area	National/State level	Annual	Indian Council of Agricultural Research	www.icar.org.in
Afforestation	Forest Cover/Area	National/State level	Annual	Forest Survey of India	www.fsi.org.in

Abbreviations

CBHI	- Central Bureau of Health Intelligence
CEA	- Central Electricity Authority
CFC	- Chloro-Fluro-Carbons
CH ₄	- Methane
CO	- Carbon Monoxide
CO ₂	- Carbon Dioxide
COCSSO	- Conference of Central and State Statistical Organizations
CPCB	- Central Pollution Control Board
CSO	- Central Statistics Office
CWC	- Central Water Commission
DAC	- Department of Agriculture & Cooperation
DES	- Directorate of Economics & Statistics
DPSIR	-Driving forces-Pressure-State-Impact-Response Framework FDES - Framework for the Development of Environment Statistics
FSI	- Forest Survey of India
GDP	- Gross Domestic Product
GHG	- Greenhouse Gases
GSI	- Geological Survey of India
HFC	- Hydro-fluoro-carbons
ICAR	- Indian Council for Agriculture Research
ICFRE	- Indian Council of Forest Research & Education
IMD	- India Meteorological Department
IPCC	- Inter Governmental Panel on Climate Change
MOEF	- Ministry of Environment and Forest
N ₂ O	- Nitrous Oxide
NAPCC	- National Action Plan on Climate Change
NATCOM	- National Communication
NDMA	- National Disaster Management Authority
NIC	- National Informatics Centre
NRIS	- Natural Resource Information System
NRSA	- National Remote Sensing Agency
ODS	- Ozone Depleting Substances
PFC	- Per-fluro-carbons
SASE	- Snow and Avalanche Studies Establishment
SF ₆	- Sulphur-hexafluoride
TERI	- The Energy Resources Institute
UK	- United Kingdom
UNEP	- United Nations Environment Programme
UNFCCC	- United Nations Framework Convention on Climate Change
UNSD	- United Nations Statistics Division
USA	- United States of America
UV	- Ultra-Violet
WMO	- World Meteorological Organization

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2.1 Greenhouse Gases

Greenhouse Gases are gases in the atmosphere that absorb and emit radiation within the thermal infrared range. This process is the fundamental cause of the greenhouse effect. Greenhouse Gases greatly affect the temperature of the Earth; without them, the Earth's surface would be about 33°C (59 °F) colder than at present. The natural greenhouse gases in the Earth's atmosphere are water vapor, carbon dioxide, methane, nitrous oxide and ozone. Some amounts of GHGs are absorbed by the natural systems such as oceans and plant biomass, which are also referred to as sinks of GHGs. However, when plants are cut down and allowed to decay or are burnt; the GHGs absorbed by them from the atmosphere are released back into the atmosphere. The buildup of GHGs in the atmosphere is therefore the net emission from sources and removal by sinks. Since the time of Industrial revolution in the mid-18th century large scale burning of fossil fuels, land use change and forestry activities have considerably enhanced the concentration of greenhouse gases in the atmosphere. Additionally synthetic greenhouse gases like CFCs, HCFCs and SF₆ are also accumulating in the atmosphere.

Increase in the concentration of greenhouse gases in the atmosphere is considered as one of the main causal factors of climate change. As concentrations of greenhouse gases rise, the average surface temperature of the Earth increases over time. The Earth's rising temperature produces a change in weather patterns and sea levels.

The framework for statistics related to climate change has identified the following variables/indicators for reporting the greenhouse gases.

1. Emission of Greenhouse Gases

- (i) Carbon dioxide
- (ii) Nitrous Oxide
- (iii) Methane
- (iv) Hydro fluorocarbons(HFCs)
- (v) Per fluorocarbons (PFCs)
- (vi) Sulfur Hexafluoride(SF₆)

2. Ambient air pollutants

- (i) Sulfur Dioxide
- (ii) Carbon Monoxide
- (iii) Nitrogen Dioxide
- (iv) SPM
- (v) RSPM

Data tables included in the Report:

The following data tables are included in the Report.

2.1 Greenhouse Gases

2.1.1 Emissions Data for Selected Countries (2008)

2.1.2 Energy-related Cumulative CO₂ Emissions

2.1.3 Summary of greenhouse gas emissions in Gg (thousand tonnes) from India in 1994 by sources and sinks

2.1.4 India's initial national greenhouse gas inventories of anthropogenic emissions by sources and

- 2.1.4 India's initial national greenhouse gas inventories of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol for the base year 1994.
- 2.1.5 Greenhouse gas emission by source and removal by sinks from India in 2007 (thousand metric tonnes)
- 2.1.6 A comparison of emissions by sector between 1994 and 2007 in million tons of CO₂ equivalent
- 2.1.7 Technological Status of Indian Cement Industry as of Dec, 2007
- 2.1.8 Livestock population estimates – India (1951-2007)
- 2.1.9 Methane emission from rice cultivation 2007
- 2.1.10 State wise level of SO₂, NO₂ and RSPM in residential area under national ambient air quality monitoring programme (NAMP) during 2008.
- 2.1.11 State wise level of SO₂, NO₂ and RSPM in industrial area under National Ambient air quality Monitoring Programme (NAMP) during 2008.
- 2.1.12 Ambient Air Quality in major cities
- 2.1.13 Production of Ozone depleting substance (ODS) in India
- 2.1.14 Total consumption of Ozone depleting substances

Data sources

Planning Commission interim Report of the Expert Group on Low Carbon Strategies for Inclusive Growth. The Expert Group was chaired by Dr Kirit Parikh. The Report is available in the website of Planning Commission.

NATCOM-I-India. India's Initial National Communication to the United Nations Framework Convention on Climate Change-2004. The Report is available in the website of ministry of Environment and Forests. Indian Network of Climate Change Assessment (INCCA) Report: India's Greenhouse Gas Emissions 2007. The Report is available in the website of ministry of Environment and Forests.

Central Pollution Control Board (CPCB) has established the National Ambient Air Quality Monitoring

Table 2.1.1 : Emissions data for selected countries (2008)

Region/ Country	Population (Million)	GDP (Billion USD)*	GDP ppp (Billion USD)*	Energy Consumed (MTOE)	CO ₂ Emission (MT CO ₂)	Percapita Energy Cons.(Kg OE)	Energy Intensity (Kg OE/ \$GDPppp)	Kg CO ₂ / \$GDPppp	Per capita Electricity Cons (Kwh)	Per Capita CO ₂ emission (tonnes)
World	6609	39493	61428	12029.0	28962	1.82	0.20	0.47	2752	4.38
China	1327	2623	10156	1970.0	6071	1.48	0.19	0.60	2346	4.58
Brazil	192	808.95	1561	235.6	347	1.23	0.15	0.22	2154	1.80
India	1123	771	4025	421.0	1146	0.53	0.10	0.28	543	1.18
Japan	128	5205	3620	513.5	1236	4.02	0.14	0.34	8475	9.68
S. Africa	48	178	517	134.3	346	2.82	0.26	0.67	5013	7.27
Thailand	64	173	548	104.0	226	1.63	0.19	0.41	2157	3.54
Turkey	74	372	821	100.0	265	1.35	0.12	0.32	2210	3.59
UK	61	1766	1833	211.0	523	3.48	0.12	0.29	6142	8.60
USA	302	11468	11468	2340.0	5769	7.75	0.20	0.50	13616	19.10
France	64	1506	1738	264.0	369	4.15	0.15	0.21	7573	5.81
Germany	82	2065	2315	331.0	798	4.03	0.14	0.34	7185	9.71
Russia	142	130	1651	786.0	1593	5.54	0.48	0.97	6443	11.24

MTOE: Metric Tons of Oil Equivalent; MT CO₂: million tons CO₂; OE - Oil Equivalent; Kwh : Kilo watt hour.

* US Dollar at year 2000 level.; PPP: Purchasing Power Parity.

Source: International Energy Agency 2009 (As reported in page 8 Planning Commission interim Report of the Expert Group on Low Carbon Strategies for Inclusive Growth)

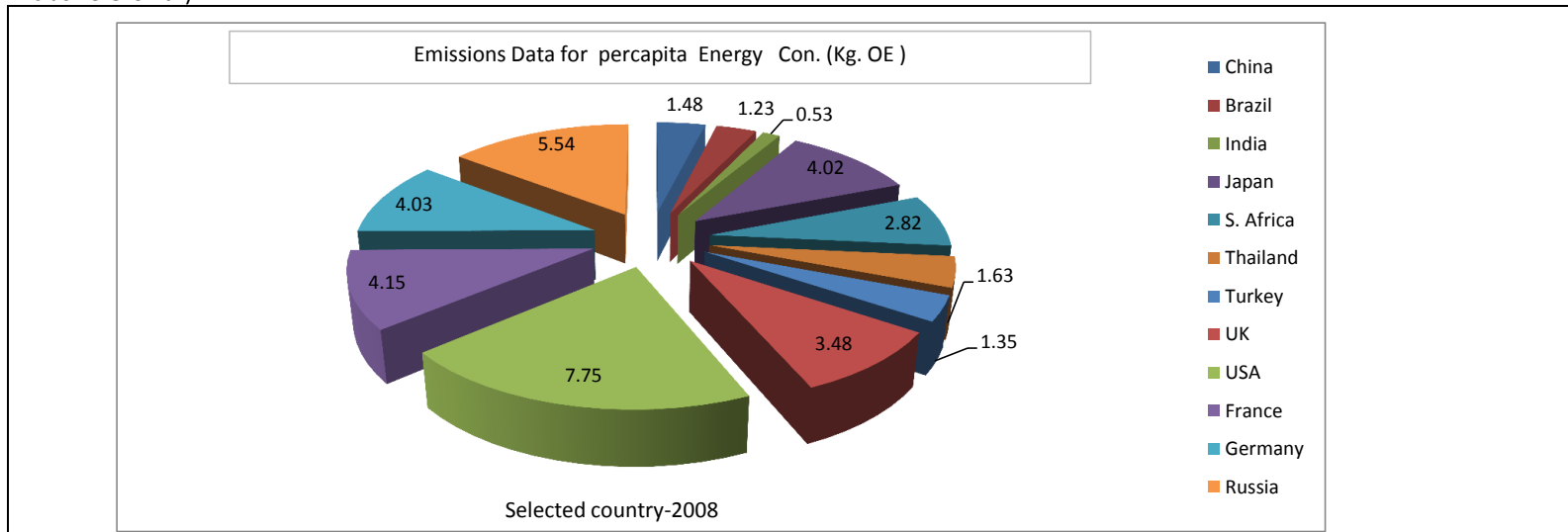


Table 2.1.2: Energy-related Cumulative CO₂ Emissions

Country/Region	1990 - 2006 (MT CO ₂)	1850-2006 (MT CO ₂)	1990-2006(Percent)	1850-2006(Percent)
World	400834	1150702	100.0	100.0
India	15977	27433	4.0	2.4
China	61360	99204	15.3	8.6
Brazil	4925	9457	1.2	0.8
USA	92641	333747	23.1	29.0
Europe	55377	252148	13.8	21.9

MT: Million tonnes

Source: As reported in page 8, Planning Commission interim Report of the Expert Group on Low Carbon Strategies for Inclusive Growth

Table 2.1.3 :Summary of greenhouse gas emissions in Giga grams (thousand tonnes) from India in 1994 by sources and sinks

Greenhouse gas source and sink categories	CO ₂ emissions	CO ₂ Removals	CH ₄ emissions	N ₂ O emissions	CO ₂ equivalent emissions
All energy	679470		2896	11.4	743.82
Industrial Processess	99878		2	9	102.71
Agriculture			14175	151	379.723
Land use, land-use change and forestry	37675	23533	6.5	0.04	14.292
Waste			1003	7	23.233
Total National emission ('000 Ton per year)	817023	23533	18083	178	1228.54

Co₂ - Carbon Dioxide: CH₄ - Methane: N₂O: Nitrous Oxide.

Source: NATCOM-I,2004

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CO₂ - Carbon Dioxide: CH₄. Methane: N₂O: Nitrous Oxide.

Source: NATCOM-I,2004

Table 2.1.4: India's initial national greenhouse gas inventories of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol for the base year 1994.

GHG source and sink categories (Gg per year)	CO ₂ Emissions	CO ₂ Removals	CH ₄	N ₂ O	CO ₂ Eq. emissions *
Total (Net) National Emission	817023	23533	18083	178	1228540
1. All Energy	679470	0	2896	11.4	743820
Fuel combustion					
Energy and transformation industries	353518			4.9	355037
Industry	149806			2.8	150674
Transport	79880		9	0.7	80286
Commercial/institutional	20509			0.2	20571
Residential	43794			0.4	43918
All other sectors	31963			0.4	32087
Biomass burnt for energy			1636	2	34976
Fugitive Fuel Emission					
Oil and natural gas system			601		12621
Coal mining			650		13650
2. Industrial Processes	99878		2	9	102710
Cement production	30767				
Lime production	1901				
Lime stone and dolomite use	5751				
Soda ash use	273				
Ammonia production	14395				
Carbide production	302				
Iron and steel production	44445				
Ferro alloys production	1295				
Aluminium production	749				
3. Agriculture			14175	151	344485
Enteric Fermentation			8972		188412
Manure Management			946	1	20176
Rice Cultivation			4090		85890
Agricultural crop residue			167	4	4747
Emission from Soils				146	45260
4. Land use, Land-use change and Forestry	37675	23533	6.5	0.04	14292
Changes in forest and other woody biomass stock		14252			-14252
Forest and grassland conversion	17987				17987
Trace gases from biomass burning			6.5	0.04	150
Uptake from abandonment of managed lands		9281			-9281
Emissions and removals from soils	19688				19688
5. Other sources as appropriate and to the extent possible					
5a. Waste			1003	7	26606
Municipal solid waste disposal			582		12222
Domestic waste water			359		7539
Industrial waste water			62		1302
Human sewage				7	2170
5b. Emissions from Bunker fuels	3373				3373
Aviation	2880				2880
Navigation	493				493

* Converted by using Global warming potential (GWP) indexed multipliers of 21 and 310 for converting CH₄ and N₂O respectively to CO₂ equivalents.

Source: NATCOM-I, India

Table 2.1.5: Greenhouse gas emission by source and removal by sinks from India in 2007
(thousand metric tons)

	CO ₂ emission	CO ₂ removals	CH ₄	N ₂ O	CO ₂ equivalent
Grand Total	1497029.20	275358.00	20564.20	239.31	1727706.10
Energy	992836.30		4266.05	56.88	1100056.89
Electricity generation	715829.80		8.14	10.66	719305.34
Other energy industries	33787.50		1.72	0.07	33845.32
Transport	138858.00		23.47	8.67	142038.57
Road Transport	121211.00		23.00	6.00	123554.00
Railways	6109.00		0.34	2.35	6844.64
Aviation	10122.00		0.10	0.28	10210.90
Navigation	1416.00		0.13	0.04	1431.13
Residential	69427.00		2721.94	36.29	137838.49
Commercial/Institutional	1657.00		0.18	0.04	1673.18
Agriculture/Fisheries	33277.00		1.20	1.15	33658.70
Fugitive emissions			1509.40		31697.30
INDUSTRY	405862.90		14.77	20.56	412546.53
Minerals	130783.95		0.32	0.46	130933.27
Cement Production	129920.00				129920.00
Glass & Ceramic Production	277.82		0.32	0.46	427.14
Other uses of soda ash	586.12				586.12
Chemicals	27888.86		11.14	17.33	33496.42
Ammonia production	10056.43				10056.43
Nitric acid production				16.05	4975.50
Carbide production	119.58				119.58
Titanium dioxide production	88.04				88.04
Methanol Production	266.18		0.91		285.37
Ethylene Production	7072.52		9.43		7270.64
EDC & VCM production	198.91				198.91
Ethylene Oxide production	93.64		0.19		97.71
Acrylonitrile production	37.84		0.01		37.98
Carbon Black production	1155.52		0.03		1156.07
Caprolactum				1.08	336.22
Other chemical	8800.21		0.56	0.20	8873.97
Metals	122371.43		0.95	1.11	122736.91
Iron & Steel Production	116958.37		0.85	1.09	117315.63
Ferroalloys production	2460.70		0.08		2462.29
Aluminium Production	2728.87		0.01	0.00	2729.91
Lead Production	84.13		0.00	0.01	86.38
Zinc production	76.11		0.00	0.01	77.99
Copper	63.25		0.01	0.00	64.70
Other Industries	123969.17		2.37	1.65	124530.44
Pulp and paper	5222.50		0.05	0.08	5248.35
food processing	27625.53		1.12	0.22	27717.25
Textile and leather	1861.11		0.03	0.02	1867.94
Mining and quarrying	1460.26		0.06	0.01	1464.62
Non-specific industries	87799.77		1.11	1.32	88232.28
Non energy product use	849.49				849.49
Lubricant	776.75				776.75
Paraffin wax	72.75				72.75
AGRICULTURE			13767.80	146.07	334405.50
Enteric fermentation			10099.80		212095.80
Livestock Manure management			115.00	0.07	2436.70
Rice cultivation			3327.00		69867.00
Soils				140.00	42400.00
Burning of crop residue			226.00	6.00	6606.00
LULUCF	98330.00	275358.00			-177028.00

	CO ₂ emission	CO ₂ removals	CH ₄	N ₂ O	CO ₂ equivalent
Forestland		67800.00			-67800.00
Cropland		207520.00			-207520.00
Grassland	10490.00				10490.00
Settlement		38.00			-38.00
Wetland NE NE	NE				NE
Other land	NO				NO
Fuel wood use in forests	87840.00				87840.00
Waste			2515.58	15.80	57725.18
Municipal Solid waste			604.51		12694.71
Domestic waste water			861.07	15.80	22980.47
Industrial waste water			1050.00		22050.00
Bunkers*	3454.00		0.03	0.10	3484.45
Aviation Bunkers	3326.00		0.02	0.09	3355.31
Marine bunkers	128.00		0.01	0.003	129.14
Note: LULUCF: Land Use, Land Use Change & Forestry					
*Not included in the national totals					
NE: Not estimated; NO: Not occurring					
Source: INCCA- India: Greenhouse Gas Emission 2007					

Table 2.1.6: A comparison of emissions by sector between 1994 and 2007 in million tons of CO₂ equivalent

	1994	2007	CAGR (compounded annual growth rate in %)
Electricity	355.03 (28.4%)	719.30 (37.8%)	5.6
Transport	80.28 (6.4%)	142.04 (7.5%)	4.5
Residential	78.89 (6.3%)	137.84 (7.2%)	4.4
Other Energy	78.93 (6.3%)	100.87 (5.3%)	1.9
Cement	60.87 (4.9%)	129.92 (6.8%)	6.0
Iron & Steel	90.53 (7.2%)	117.32 (6.2%)	2.0
Other Industry	125.41 (10.0%)	165.31 (8.7%)	2.2
Agriculture	344.48 (27.5%)	334.41 (17.6%)	-0.2
Waste	23.23 (1.9%)	57.73 (3.0%)	7.3
Total without LULUCF	1251.95	1904.73	3.3
LULUCF	14.29	-177.03	
Total with LULUCF	1228.54	1727.71	2.9

Note: Figure in brackets indicate percentage emissions from each sector with respect to total GHG emissions without LULUCF in 1994 and 2007 respectively

Source: INCCA- India: Greenhouse Gas Emission 2007.

Table 2.1.7: Technological Status of Indian Cement Industry as of December 2007

	Mini-Vertical Shaft Kiln	Mini-Rotary kiln	Wet Process	Semi-Dry	Dry	Grinding Units
No of Plants	193	17	26	4	107	29
Total Capacity (million tones)	1.51	3.11	5.71	1.80	146.56	20.30
Percent of total cement capacity	0.84	1.73	3.18	1.00	81.87	11.34
Average kiln Capacity [TPD]	30 -75	200-800	150-900	600-1300	2400-10,000	*600-2500
Fuel consumption (Kcal/kg. Clinker)	850-1000	900-1000	1200-1400	900-1000	670- 775	Nil (except for captive power plants)
Power Consumption (Kwh/tonne of cement)	110-125	110-125	115-130	110-125	85-92	*35-45
*Grinding capacity						

Source: INCCA (Indian Network for Climate Change Assessment) Greenhouse Gas Emission 2007.

Table 2.1.8: Livestock population -1951 -2007

Species	All India census estimates (in Million Numbers)											
	1951	1956	1961	1966	1972	1977	1982	1987	1992	1997	2003	2007*
Cattle	155.30	158.70	175.60	176.20	178.30	180.00	192.45	199.69	204.58	198.88	185.18	199.08
Adult female cattle	54.40	47.30	51.00	51.80	53.40	54.60	59.21	62.07	64.36	64.43	64.51	72.95
Buffaloes	43.40	44.90	51.20	53.00	57.40	62.00	69.78	75.97	84.21	89.92	97.92	105.34
Adult female buffaloes	21.00	21.70	24.30	25.40	28.60	31.30	32.50	39.13	43.81	46.77	50.97	54.47
Total cattle & buffaloes	198.70	203.60	226.80	229.20	235.70	242.00	262.36	275.82	289.00	288.80	283.10	304.42
Sheep	39.10	39.30	40.20	42.40	40.00	41.00	48.76	45.70	50.78	57.49	61.47	71.56
Goats	47.20	55.40	60.90	64.60	67.50	75.60	95.25	110.21	115.28	122.72	124.36	140.54
Horses & ponies	4.50	1.50	1.30	1.10	0.90	0.90	0.90	0.80	0.82	0.83	0.75	0.61
Camels	0.60	0.80	0.90	1.00	1.10	1.10	1.08	1.00	1.03	0.91	0.63	0.52
Pigs	4.40	4.90	5.20	5.00	6.90	7.60	10.07	10.63	12.79	13.29	13.52	11.13
Mules	0.06	0.04	0.05	0.08	0.08	0.09	0.13	0.17	0.19	0.22	0.18	0.14
Donkeys	1.30	1.10	1.10	1.10	1.00	1.00	1.02	0.96	0.97	0.88	0.65	0.44
Yaks	NC	NC	0.02	0.03	0.04	0.13	0.13	0.04	0.06	0.06	0.06	0.08
Total Livestock	292.80	306.60	335.40	344.10	353.60	369.00	419.59	445.29	470.86	485.39	485.00	529.70
Poultry	73.50	94.80	114.20	115.40	138.50	159.20	207.74	275.32	307.07	347.61	489.01	648.88
Dogs	NC	NC	NC	NC	NC	NC	18.54	17.92	21.77	25.48	29.03	19.09
Rabbits	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	0.48	0.42

Source: Livestock census, Directorate of Economics & Statistics and Animal Husbandary Statistics Division, Department of Animal Husbandary, Dairying & Fisheries , Ministry of Agriculture

NC : Not Collected

* : Provisional derived from village level totals

Table 2.1.9: Methane emission from rice cultivation 2007

Ecosystem	Water regime	Rice Area (thousand ha)	Emission Coeff 2007 (kg per ha)	Methane (thousand tonnes)
Irrigated	CF	6427	162	1042
	SA	8517	66	562.1
	MA	8898	18	160.1
Rainfed	DP	3577	70	635
	FP	9640	190	679
Deep water	DW	1309	190	249
Upland		5234	0	0
Total				3327

Note: CF - Continuously flooded

SA - Single Aeration

MA - Multiple Aeration

DP - Drought Prone

FP - Flood Prone

Source: INCCA- India: Greenhouse Gas Emission 2007

TABLE 2.1.11: State wise level of SO₂, NO₂ and RSPM in industrial area under national ambient air quality monitoring programme (NAMP) during 2008.

SI	Name of the State	SO ₂ µg/m ³			NO ₂ µg/m ³			RSPM µg/m ³		
		(Annual)			(Annual)			(Annual)		
		Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.
1	Andhra Pradesh	2	83	6	6	121	27	9	493	87
2	Chandigarh	2	5	2	4.5	52	20	22	254	123
3	Chhattisgarh	12	22	17	33	51	42	129	288	212
4	Delhi	2	66	8	20	139	61	49	633	225
5	Goa	2	11	3	4.5	28	11	10	212	52
6	Gujarat	9	30	16	12	89	26	43	598	127
7	Haryana	7	23	15	12	89	28	102	598	267
8	Himachal Pradesh	2	6	2	4.5	21	12	17	649	134
9	Jharkhand	12	78	28	30	71	47	44	517	170
10	Karnataka	2	20	10	4.5	69	25	7	442	85
11	Kerala	2	43	6	4.5	48	11	6	320	45
12	Maharashtra	2	104	24	4.5	121	41	3	802	108
13	Madhya Pradesh	2	52	15	4.5	47	18	16	507	160
14	Odisha	2	21	8	10	37	21	19	276	95
15	Punjab	35	48	11	11	66	35	99	666	229
16	Puducherry	3	10	6	4.5	18	13	33	95	54
17	Rajasthan	4	24	8	11	72	31	10	538	135
18	Tamil Nadu	2	90	13	4.5	73	21	14	364	81
19	Uttar Pradesh	5	71	17	4.5	75	27	60	575	197
20	Uttarakhand	16	21	20	19	27	21	88	98	93
21	West Bengal	2	65	10	4.5	162	73	16	604	119

µg/m³: Micrograms per metre cube

Source : Central Pollution Control Board,2008

Table 2.1.12 : Ambient Air Quality in Major cities

											($\mu\text{g}/\text{m}^3$) :micrograms per metre cube
Sulphur dioxide (SO₂)											
City	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2008(P)
Ahmedabad	32.0	25.0	15.1	-	12.2	8.4	10	12.3	16	15.7	12.3
Bangalore	-	20.7	27.9	20.3	38.2	20.7	20	13.4	12	8.5	15.2
Chennai	21.7	8.1	15.9	12.6	11.9	12.5	17	19.9	15	12.2	9.5
Delhi	23.5	17.3	16.3	15.4	17.5	15.2	13	11.3	10	9.89	6.6
Hyderabad	17.2	16.8	16.4	11.8	14	12.4	10	7.27	6	5.63	5.5
Kolkata	35.7	21.3	0	34.3	44.5	17.4	18	11.4	17	9.33	7.7
Mumbai	31.1	18	25.1	11.5	14.9	12.1	16	9.07	8	6.67	8.7
Oxides of Nitrogen (NO_x)											
City	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2008(P)
Ahmedabad	18.8	14.8	20	-	33	28.6	39	31.8	25	24.3	20.0
Bangalore	-	28	20.4	25	27.1	40.2	23	25.5	35	51.8	40.8
Chennai	17.5	9	13	16.7	10.7	14.4	18	18.4	26	16.8	15.4
Delhi	47.2	39.7	34	33.9	35.7	39.9	37	37.3	42	46.1	56.7
Hyderabad	37.8	25	30.7	30.8	24.3	25.2	31	25.5	26	30.3	26.2
Kolkata	29.9	29.3	0	32	30.5	34.8	74	81.7	71	59.7	64.0
Mumbai	64.2	35.3	34.3	19.5	29.6	25.5	23	17.4	21	18.3	39.3
Suspended Particulate Matter (SPM)											
City	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2008(P)
Ahmedabad	251	254	235	-	351	393	343	281	256	244	220
Bangalore	-	176	187	153	146	153	148	149	163	153	273
Chennai	127	115	107	127	88	92	98	132	155	136	142
Delhi	411	402	343	379	388	381	346	427	355	374	433
Hyderabad	178	177	144	213	209	163	157	161	164	196	225
Kolkata	354	498	0	279	308	315	251	256	251	266	225
Mumbai	210	213	298	187	221	252	231	225	224	247	260
Respirable Suspended Particulate Matter (RSPM)											
City				1999	2000	2001	2002	2003	2004	2008(P)	
Ahmedabad				161	237	198	169	154	152	88	
Bangalore				0	89.7	68	64.3	76	69	100	
Chennai				71.7	65	77.6	74.8	86	60	63	
Delhi				172	155	146	158	151	149	214	
Hyderabad				127	98	68.8	71	64	71	85	
Kolkata				140	145	117	128	121	134	103	
Mumbai				115	107	67.2	68.7	70	78	127	
SPM : Suspended particulate matter				(P) : Provisional							
RSPM : Respirable suspended particulate matter											
SO ₂ : Sulphur dioxide				Nox : Oxides of nitrogen							
Source: Central Pollution Control Board											

TABLE 2.1.13: Production of Ozone depleting substance (ODS) in India

(MT: Metric tons)												
Sl. No.	ODS	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
1	2	3	4	5	6	7	8	9	10	11	12	13
1	CFC-11 Trichlorofluoromethane (CFCl ₃)	5634.0	4514.0	3689.0	2609.0	2429.0	1543.4	785.1	424.8	117.6	-	83.500*
2	CFC-12 Dichlorodifluoromethane (CF ₂ Cl ₂)	14777.0	14164.0	13167.0	12373.0	10611.0	9702.2	6104.7	1869.9	549.6	-	234.820*
3	CFC-113 Trichlorotrifluoroethane (C ₂ F ₃ Cl ₃)	5.0	14.0	35.0	32.0	30.0	18.0	373.5	72.6	79.1	-	Nil
4	H-1211 Bromochlorodifluoromethane (CF ₂ BrCl)	-	-	-	-	-	-	-	-	-	-	-
5	H-1301 Bromotrifluoromethane (CF ₃ Br)	-	-	-	-	-	-	-	-	-	-	-
6	CTC Carbon tetrachloride	17509.0	16459.0	18957.0	18239.0	16631.0	17433.3	13877.8	9538.0	12035.7	11248.5	222.818#
7	MCF Methyl chloroform	-	-	-	-	-	-	-	-	-	-	-
8	HCFC-22 Dichlorodifluoromethane (CHF ₂ Cl ₂)	14061	14868	14606	19216	25592.0	24789.2	30386.4	41213.6	45558.2	47657.1	47613.3
9	MBr Methyl bromide	107	85	37914.0	-	-	-	-	-	-	-	-
Total		52093.0	50104.0	88368.0	52469.0	55293.0	53486.1	51527.5	53118.9	58340.2	58905.7	63154.4

* For EUN ; # Recovered and recycled

Source : Ozone cell, Ministry of Environment and Forests

ODS: Ozone Depleting Substances

TABLE 2.1.14: Total consumption of Ozone depleting substances in India

(MT): Metric tons												
Sl. No.	ODS	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
1	2	3	4	5	6	7	8	9	10	11	11	12
1	CFC-11 Trichlorofluoromethane (CFCl ₃)	3002.0	2196	1680.0	829	426	337.3	514.9	274.9	101.6	43.5	78.616
2	CFC-12 Dichlorodifluoromethane (CF ₂ Cl ₂)	2612.0	2315	2210.0	1777	1808	1609	3017.9	723.6	109.7	158.7	212.117
3	CFC-113 Trichlorotrifluoroethane (C ₂ F ₃ Cl ₃)	-	5	29.0	4	10	14.3	-	-	6.6	..	Nil
4	CTC Carbon tetrachloride	11043.0	8471	9510.0	9798	6781	1494.5	3636.8	634	1563.7	34.7	Nil
5	HCF-22 Dichlorodifluoromethane (CHF ₂ Cl ₂)	3583.0	2973	3207.0	3648	7228	8854.3	6137	14576.6	10831.7	9386.4	12503
6	HCF-123	20.0	25	25.0	0	60	15.3	-	27.2	101	238	115.085
7	HCF-141b	483.0	359	1401.0	952	1357	2155.9	-	4711.9	12588.9	7900	7836.8
8	MBr Methyl bromide	-	27	9510.0	-	-	-	-	-	-	..	...
Total		20743	16371	27572.0	17008	17670	14480.6	13306.5	20948.2	25303.2	17761.3	20745.6

Source : Ozone cell, Ministry of Environment and Forests

ODS: Ozone Depleting Substances

2.2 Waste Generation

Rising levels of greenhouse gases in the Earth's atmosphere are causing changes in our climate, and some of these changes can be traced to solid waste. The manufacture, distribution, and use of products—as well as management of the resulting waste—all result in greenhouse gas emissions. Waste prevention and recycling are real ways to help mitigate climate change.

Making smart choices about what we buy, how we use it, and how we dispose of it can make a big difference in the amount of waste we produce and the greenhouse gas emissions associated with our consumption. The manufacture, distribution and use of the goods and food we rely on in our daily lives—as well as management of the resulting waste—all require energy. This energy mostly comes from fossil fuels, which are the largest global source of heat-trapping [greenhouse gas \(GHG\) emissions](#).

What Is the Link Between Solid Waste and Climate Change?

Waste prevention and recycling—jointly referred to as waste reduction—help us better manage the solid waste we generate. But preventing waste and recycling also are potent strategies for reducing greenhouse gases. Together they:

Reduce emissions from energy consumption. Recycling saves energy. That's because making goods from recycled materials typically requires less energy than making goods from virgin materials. And waste prevention is even more effective. Less energy is needed to extract, transport, and process raw materials and to manufacture products when people reuse things or when products are made with less material. When energy demand decreases, fewer fossil fuels are burned and less carbon dioxide is emitted to the atmosphere.

Reduce emissions from incinerators. Diverting certain materials from incinerators through waste prevention and recycling reduces greenhouse gas emissions to the atmosphere.

Reduce methane emissions from landfills. Waste prevention and recycling (including composting) divert organic wastes from landfills, reducing the methane released when these materials decompose.

Increase storage of carbon in trees. Forests take large amounts of carbon dioxide out of the atmosphere and store it in wood, in a process called carbon sequestration. Waste prevention and recycling of paper products can leave more trees standing in the forest, continuing to absorb carbon dioxide from the atmosphere.

The framework for statistics related to climate change has identified Municipal Solid Waste Generation data as a variable/indicator as causal factor of climate change.

The following Tables are included in the Report.

2.2 Waste Generation

- 2.2.1 Quantities and waste generation rates in 59 Cities
- 2.2.2 Waste characterisation in 59 Cities
- 2.2.3 State-wise status of hazardous waste generation
- 2.2.4 Municipal solid waste generation in Metro Cities / State Capitals
- 2.2.5 State-wise municipal solid waste generation in India
- 2.2.6 State wise municipal solid waste generation and treatment data (as on 31st July 2012)
- 2.2.7 Status of sewage generation and treatment capacity in metropolitan cities
- 2.2.8 State wise sewage generation of class-I Cities
- 2.2.9 State wise sewage generation of class-II Towns

Data Sources.

CPCB Report: Status of Municipal Waste Management. The Report is available in the Website of CPCB.
CPCB Hazardous Waste Management Division Report 'National Inventory of Hazardous Wastes Generating Industries & Hazardous Waste Management in India.' February 2009. The Report is available in the CPCB website.

CPCB Report : Status of Sewage Generation – India (2005). The Report is available in the CPCB website.
CPCB: Status of water supply, Waste water generation and treatment – Class-I & II towns. (2009). The Report is available in the CPCB website.

TABLE 2.2.1: Quantities and waste generation rates in 59 Cities

Sl. No.	Name of city	Population (as per 2001 census)	Area (Sq. Km)	Waste Quantity (Tonne per Day)	Waste generation rate (Kg per capita per day)
1	Agartala	189998	63	77	0.40
2	Agra	1275135	140	654	0.51
3	Ahemdabad	3520085	191	1302	0.37
4	Aizwal	228280	117	57	0.25
5	Allahabad	975393	71	509	0.52
6	Amritsar	966862	77	438	0.45
7	Asansol	745439	127	207	0.44
8	Bangalore	4301326	226	1669	0.39
9	Bhopal	1437354	286	574	0.40
10	Bhubaneswar	648032	135	234	0.36
11	Chandigarh	808515	114	326	0.40
12	Chennai	4343645	174	3036	0.62
13	Coimbatore	930882	107	530	0.57
14	Daman	35770	7	15	0.42
15	Dehradun	426674	67	131	0.31
16	Delhi	10306452	1483	5922	0.57
17	Dhanbad	199258	24	77	0.39
18	Faridabad	1055938	216	448	0.42
19	Gandhinagar	195985	57	44	0.22
20	Gangtok	29354	15	13	0.44
21	Greater Mumbai	11978450	437	5320	0.45
22	Guwahati	809895	218	166	0.20
23	Hyderabad	3843585	169	2187	0.57
24	Impal	221492	34	43	0.19
25	Indore	1474968	130	557	0.38
26	Itanagar	35022	22	12	0.34
27	Jabalpur	932484	134	216	0.23
28	Jaipur	2322575	518	904	0.39
29	Jammu	369659	102	215	0.58
30	Jamshedpur	1104713	64	338	0.31

31	Kanpur	2551337	267	1100	0.43
32	Kavarati	10119	4	3	0.30
33	Kochi	595575	98	400	0.67
34	Kohima	77030	30	13	0.17
35	Kolkata	4572876	187	2653	0.58
36	Lucknow	2185927	310	475	0.22
37	Ludhiana	1398467	159	735	0.53
38	Madurai	928868	52	275	0.30
39	Meerut	1068772	142	490	0.46
40	Nagpur	2052066	218	504	0.25
41	Nashik	1077236	269	200	0.19
42	Panjim	69066	69	32	0.54
43	Patna	1366444	107	511	0.37
44	Puducherry	220865	19	130	0.59
45	Port Blair	99984	18	76	0.76
46	Pune	2538473	244	1175	0.46
47	Raipur	605747	56	184	0.30
48	Rajkot	967476	105	207	0.21
49	Ranchi	847093	224	208	0.25
50	Shilong	132867	10	45	0.34
51	Silvassa	50463	17	16	0.32
52	Shimla	142555	20	39	0.27
53	Srinagar	989440	341	428	0.48
54	Surat	2433835	112	1000	0.41
55	Thiruvananthapuram	744983	142	171	0.23
56	Vadodara	1306227	240	357	0.27
57	Varanasi	1091918	80	425	0.39
58	Vijaywada	851282	58	374	0.44
59	Vishakhapatnam	982904	110	584	0.59

Source :Central Pollution Control Board (CPCB)

CPCB with the assistance of NEERI conducted survey of solid waste management in 59 cities (35 metro cities and 24 State capital -2004-05)

Table 2.2.2 : Waste characterisation in 59 Cities

Sr. No.	Name of City	Compostables (%)	Recyclables (%)	C/N Ratio#	HCV* (Kcal/Kg)	Moisture(%)
1	Agartala	58.57	13.68	30.02	2427	60
2	Agra	46.38	15.76	21.56	520	28
3	Ahemdabad	40.81	11.65	29.64	1180	32
4	Aizwal	54.24	20.97	27.45	3766	43
5	Allahabad	35.49	19.22	19.00	1180	18
6	Amritsar	65.02	13.94	30.69	1836	61
7	Asansol	50.33	14.21	14.08	1156	54
8	Bangalore	51.84	22.43	35.12	2386	55
9	Bhopal	52.44	22.33	21.58	1421	43
10	Bhubaneswar	49.81	12.69	20.57	742	59
11	Chandigarh	57.18	10.91	20.52	1408	64
12	Chennai	41.34	16.34	29.25	2594	47
13	Coimbatore	50.06	15.52	45.83	2381	54
14	Daman	29.60	22.02	22.34	2588	53
15	Dehradun	51.37	19.58	25.90	2445	60
16	Delhi	54.42	15.52	34.87	1802	49
17	Dhanbad	46.93	16.16	18.22	591	50
18	Faridabad	42.06	23.31	18.58	1319	34
19	Gandhinagar	34.30	13.20	36.05	698	24
20	Gangtok	46.52	16.48	25.61	1234	44
21	Greater Mumbai	62.44	16.66	39.04	1786	54
22	Guwahati	53.69	23.28	17.71	1519	61
23	Hyderabad	54.20	21.60	25.90	1969	46
24	Impal	60.00	18.51	22.34	3766	40
25	Indore	48.97	12.57	29.30	1437	31
26	Itanagar	52.02	20.57	17.68	3414	50
27	Jabalpur	58.07	16.61	28.22	2051	35
28	Jaipur	45.50	12.10	43.29	834	21
29	Jammu	51.51	21.08	26.79	1782	40
30	Jamshedpur	43.36	15.69	19.69	1009	48
31	Kanpur	47.52	11.93	27.64	1571	46
32	Kavarati	46.01	27.20	18.04	2242	25
33	Kochi	57.24	19.36	18.22	591	50
34	Kohima	57.48	22.67	30.84	2844	65
35	Kolkata	50.56	11.48	31.81	1201	46
36	Lucknow	47.41	15.53	21.41	1557	60
37	Ludhiana	49.80	19.32	52.17	2559	65
38	Madurai	55.32	17.25	32.69	1813	46
39	Meerut	54.54	10.96	19.24	1089	32
40	Nagpur	47.41	15.53	26.37	2632	41
41	Nashik	39.52	25.11	37.20	2762	62
42	Panjim	61.75	17.44	23.77	2211	47
43	Patna	51.96	12.57	18.62	819	36
44	Puducherry	49.96	24.29	36.86	1846	54
45	Port Blair	48.25	27.66	35.88	1474	63
46	Pune	62.44	16.66	35.54	2531	63
47	Raipur	51.40	16.31	22.35	1273	30
48	Rajkot	41.50	11.20	52.56	687	17
49	Ranchi	51.49	9.86	20.23	1060	49
50	Shilong	62.54	17.27	28.86	2736	63
51	Silvassa	71.67	13.97	35.24	1281	42
52	Shimla	43.02	36.64	23.76	2572	60
53	Srinagar	61.77	17.76	22.46	1264	61
54	Surat	56.87	11.21	42.16	990	51
55	Thiruvananthapuram	72.96	14.36	35.19	2378	60
56	Vadodara	47.43	14.50	40.34	1781	25
57	Varanasi	45.18	17.23	19.40	804	44
58	Vijaywada	59.43	17.40	33.90	1910	46
59	Vishakhapatnam	45.96	24.20	41.70	1602	53

Source :Central Pollution Control Board (CPCB)

CPCB with the assistance of NEERI conducted survey of solid waste management in 59 cities (35 metro cities and 24 State Capital -2004-05)

*HCV : High colorific value : # C/N Ratio : Carbon to Nitrogen Ratio

Table 2.2.3 : State-wise status of hazardous waste generation

SI. NO.	STATE/UT	Quantity of Hazardous Waste Generation(Metric Tons Per Annum)			
		Landfillable	Incinerable	Recyclable	Total
1	2	3	4	5	6
1	Andhra Pradesh	211442	31660	313217	556319
2	Assam	3252	0	7480	10732
3	Bihar	3357	9	73	3439
4	Chhattisgarh	5277	6897	283213	295387
5	Delhi (unverified)	3338	1740	203	5281
6	Gujarat	1107128	108622	577037	1792787
7	Goa	10763	8271	7614	26648
8	Haryana	30452	1429	4919	36800
9	Himachal Pradesh	35519	2248	4380	42147
10	Jammu & Kashmir	9946	141	6867	16954
11	Jharkhand	23135	9813	204236	237184
12	Karnataka	18366	3713	54490	76569
13	Kerala	59591	223	23085	82899
14	Madhya Pradesh	34945	5036	127909	167890
15	Maharashtra	568135	152791	847442	1568368
16	Manipur	0	115	137	252
17	Meghalaya	19	697	6443	7159
18	Mizoram	90	0	12	102
19	Nagaland	61	0	11	72
20	Odisha	74351	4052	18427	96830
21	Punjab	13601	14831	89481	117913
22	Rajasthan	165107	23025	84739	272871
23	Tripura	0	30	237	267
24	Tamil Nadu	157909	11145	89593	258647
25	Uttar Pradesh	36370	15697	117227	169294
26	Uttarakhand	17991	580	11	18582
27	West Bangal	120598	12583	126597	259778
	Union Territory				
28	Daman, Diu, Dadra & NH	17219	421	56350	73990
29	Puducherry	132	25	36235	36392
30	Chandigarh	232	0	723	955
	Total	2728326	415794	3088387	6232507

Source: Central Pollution Control Board, Hazardous Waste Management Division Delhi, Feb., 2009

Table 2.2.4 : Municipal solid waste generation in Metro Cities / State Capitals

S. No.	Name of City	* Municipal Solid Waste (Tonnes per day)		
		1999-2000	2004-2005	2010-11
1	Agartala	-	77	102
2	Agra	-	654	520
3	Ahmedabad	1683	1302	2300
4	Aizwal	-	57	107
5	Allahabad	-	509	350
6	Amritsar	-	438	550
7	Asansol	-	207	210
8	Bangalore	2000	1669	3700
9	Bhopal	546	574	350
10	Bhubaneswar	-	234	400
11	Chandigar	-	326	264
12	Cheennai	3124	3036	4500
13	Coimbatore	350	530	700
14	Daman	-	15	25
15	Dehradun	-	131	220
16	Delhi	4000	5922	6800
17	Dhanbad	-	77	150
18	Faridabad	-	448	700
19	Gandhinagar	-	44	97
20	Gangtok	-	13	26
21	Guwahati	-	166	204
22	Hyderabad	1566	2187	4200
23	Imphal	-	43	120
24	Indore	350	557	720
25	Itanagar	-	12	102
26	Jabalpur	-	216	400
27	Jaipur	580	904	310
28	Jammu	-	215	300
29	Jamshedpur	-	338	28
30	Kanpur	1200	1100	1600
31	Kavaratti	-	3	2
32	Kochi	347	400	150
33	Kohima	-	13	45
34	Kolkata	3692	2653	3670
35	Lucknow	1010	475	1200
36	Ludhiana	400	735	850
37	Madurai	370	275	450
38	Meerut	-	490	52
39	Mumbai	5355	5320	6500
40	Nagpur	443	504	650
41	Nashik	-	200	350
42	Panjim	-	35	25
43	Patna	330	511	220

S. No.	Name of City	* Municipal Solid Waste (Tonnes per day)		
		1999-2000	2004-2005	2010-11
44	Puducherry	-	130	250
45	Port Blair	-	76	45
46	Pune	700	1175	1300
47	Raipur	-	184	224
48	Rajkot	-	207	230
49	Ranchi	-	208	140
50	Shillong	-	45	97
51	Shimla	-	39	50
52	Silvassa	-	16	35
53	Srinagar	-	428	550
54	Surat	900	1000	1200
55	Thiruvananthapuram	-	171	250
56	Vadodara	400	357	600
57	Varanasi	412	425	450
58	Vijayawada	-	374	600
59	Vishakhapatnam	300	584	334
	Total MSW	30058	39034	50574

Source: STATUS REPORT ON MUNICIPAL SOLID WASTE MANAGEMENT, CPCB

* Municipal Solid Waste Study conducted by CPCB through;

a) EPTRI (1999-2000) Environment protection training & Research Institute

b) NEERI-Nagpur (2004-2005) c) CIPET during 2010-11

Table 2.2.5: State- wise municipal solid waste generation in India

SI. NO.	STATE/UT	Municipal solid waste Metric Tons/day 1999-2000			Municipal solid waste Metric Tons/day (2009-12)
		Class-I cities	Class-II Towns	Total	
1	2	3	4	5	6
1	Andaman & Nicobar	-	-	-	50.0
2	Andhra Pradesh	3943	433	4376	11500.0
3	Arunachal Pradesh	-	-	-	93.8
4	Assam	196	89	285	1146.3
5	Bihar	1479	340	1819	1670.0
6	Chandigarh	200	-	200	380.0
7	Chhattisgarh	-	-	-	1167.0
8	Daman, Diu, Dadra	-	-	-	41.0
9	Delhi	4000	-	4000	7384.0
10	Goa	-	-	-	193.0
11	Gujarat	-	-	-	7378.8
12	Haryana	3805	427	4232	536.9
13	Himachal Pradesh	623	102	725	304.3
14	Jammu & Kashmir	35	-	35	1792.0
15	Jharkhand	-	-	-	1710.0
16	Karnataka	3118	160	3278	6500.0
17	Kerala	1220	78	1298	8338.0
18	Lasshadweep	-	-	-	21.0
19	Maharashtra	8589	510	9099	19.2
20	Manipur	40	-	40	112.9
21	Meghalaya	35	-	35	284.6
22	Mizoram	46	-	46	4742.0
23	Madhya Pradesh	2286	398	2684	4500.0
24	Nagaland	-	-	-	187.6
25	Odisha	646	9	655	2239.2
26	Puducherry	60	9	69	380.0
27	Punjab	1001	265	1266	2793.5
28	Rajasthan	1768	198	1966	5037.3
29	Sikkim	-	-	-	40.0
30	Tamil Nadu	5021	382	5403	12504.0
31	Tripura	33	-	33	360.0
32	Uttar Pradesh	5515	445	5960	11.6
33	Uttarakhand	-	-	-	752.0
34	West Bangal	4475	146	4621	12557.0
	Total	48134	3991	52125	96726.9

Class I Cities: Populaton > 1,00,000 (393 in number) ; Class II cities: 50,000 - 99,999 (401 in number)

Source: STATUS REPORT ON MUNICIPAL SOLID WASTE MANAGEMENT, CPCB

a) EPTRI

b) As reported by SPCBs/PCCs (during 2009-12)

**Table 2.2.6 :State wise municipal solid waste generation and treatment data
(as on 31st July 2012)**

S.No	State	Quantity Generated (TPD)	Collected (TPD)	Treated (TPD)
1	Andaman & Nicobar	50	43	Nil
2	Andhra Pradesh	11500	10655	3656
3	Arunachal Pradesh	94	NA	Nil
4	Assam	1146	807	72.65
5	Bihar	1670	1670	Nil
6	Chandigarh	380	370	300
7	Chhattisgarh	1167	1069	250
8	Daman Diu & Dadra	41	NA	Nil
9	Delhi	7384	6796	1927
10	Goa	193	NA	NA
11	Gujarat	7379	6744	873
12	Haryana	537	NA	Nil
13	Himachal Pradesh	304	275	153
14	Jammu & Kashmir	1792	1322	320
15	Jharkhand	1710	869	50
16	Karnataka	6500	2100	2100
17	Kerala	8338	1739	1739
18	Lakshadweep	21	21	4.2
19	Madhya Pradesh	4500	2700	975
20	Maharashtra	19,204	19,204	2080
21	Manipur	113	93	2.5
22	Meghalaya	285	238	100
23	Mizoram	4742	3122	Nil
24	Nagaland	188	140	Nil
25	Odisha	2239	1837	33
26	Puducherry	380	NA	Nil
27	Punjab	2794	NA	Nil
28	Rajasthan	5037	NA	Nil
29	Sikkim	40 (capital)	32	32
30	Tamil Nadu	12504	11626	603
31	Tripura	360	246	40
32	Uttar Pradesh	11585	10563	Nil
33	Uttrakhand	752	NA	Nil
34	West Bengal	12557	5054	606.5
	States	127486	89335	15916.85

Source: STATUS REPORT ON MUNICIPAL SOLID WASTE MANAGEMENT, CPCB

TPD : Tonnes per day

NA : Not available

Table 2.2.7 : Status of sewage generation and treatment capacity in metropolitan cities

Sr. No.	State /UT	Sewage generation (in MLD)	Sewage Treatment Capacity (in MLD)	Percent of treatment capacity
1	Hyderabad	426.21	593	100
2	Vishakhapatnam	134.99	-	-
3	Vijayawada	128.39	-	-
4	Patna	279.14	105	37
5	Delhi	3800	2330	61
6	Ahmedabad	472	488	96
7	Surat	432	202	46
8	Rajkot	108.8	44.5	40
9	Vadodara	180	206	100
10	Bangalore	771.75	-	-
11	Indore	204	78	38
12	Bhopal	334.75	22	6
13	Jabalpur	143.34	-	-
14	Mumbai	2671	2130	80
15	Pune	474	305	64
16	Nagpur	380	100	26
17	Nasik	227.84	107.5	47
18	Ludhiana	235.2	311	100
19	Amritsar	192	-	-
20	Jaipur	451.71	54	11
21	Chennai	158	264	100
22	Kanpur	417.35	171	41
23	Lucknow	363.81	42	11
24	Agra	260.36	88	33
25	Kolkata	705.86	172	24
26	Faridabad	164	65	39
27	Jamshedpur	199.43	-	-
28	Asansol	147	-	-
29	Coimbatore	120	-	-
30	Madurai	97.93	-	-
31	Meerut	177.05	-	-
32	Varanasi	230.17	102	44
33	Allahabad	176	60	34
34	Kochi	188.4	-	-
35	Dhandbad	192	-	-
	Total	15644.48	7878	50

Source: Status of sewage treatment in India (CUPS/61/2005-06) Central Pollution Control Board

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Table 2.2.8 : State wise sewage generation of class-I Cities

Sl.No.	State/Union Territory	No. of Cities	Population (in Year 2008)	Sewage Generation (in MLD)	Sewage Treatment Capacity (in MLD)
1	Andaman & Nicobar	1	107200	12.9	-
2	Andhra Pradesh	47	20143050	1760.6	654
3	Assam	5	1417820	380.7	-
4	Bihar	23	5783554	1009.7	135.5
5	Chandigarh	1	994820	429.76	164.79
6	Chhattisgarh	7	2515100	350	69
7	Delhi	1	14858800	3800	2330
8	Goa	1	122330	9.79	-
9	Gujarat	28	14678240	1680.92	782.5
10	Haryana	20	5494110	626.69	312
11	Himachal Pradesh	1	163490	28.94	35.63
12	Jammu & Kashmir	2	1910060	213.93	-
13	Jharkhand	14	4964171	830.47	-
14	Karnataka	33	15102373	1790.4	43.44
15	Kerala	8	3778516	575.17	-
16	Madhya Pradesh	25	10795000	1248.72	186.1
17	Maharashtra	50	40255170	9986.29	4225.25
18	Manipur	1	249870	26.74	-
19	Meghalaya	1	186030	20.84	-
20	Mizoram	1	282550	31.65	-
21	Nagaland	1	171810	19.24	-
22	Odisha	12	3335930	660.73	53
23	Puducherry	2	504130	56.46	-
24	Punjab	19	6329860	1545.3	411
25	Rajasthan	24	9611490	1382.37	54
26	Tamilnadu	42	16852940	1077.21	333.42
27	Tripura	1	214327	24	-
28	Uttar Pradesh	61	25762280	3506.016	1240.13
29	Uttarakhand	6	1249380	176.97	18
30	West Bengal	60	19818471	2345.21	505.92
	Total	498	227652872	35558.12	11553.68
Source: Central Pollution Control Board.					
Status of Water Supply, Wastewater Generation and Treatment in Class-I Cities & Class-II Towns of India					
(CUPS/70/ 2009-10)		MLD : Million liter per day			

Table 2.2.9 : State wise sewage generation of class-II Towns

Sl.No.	State/Union Territory	Population in Year 2008	No of Class -II Towns	Sewage generation of Class-II Towns (in MLD)	Sewage Treatment capacity (in MLD)
1	Andhra Pradesh	3448610	52	217.59	10.42
2	Assam	573290	8	6.46	-
3	Bihar	1113800	14	107.42	2.00
4	Chhattisgarh	566080	7	40.82	
5	Goa	172850	2	13.89	18.18
6	Gujarat	2180590	31	227.55	-
7	Haryana	544040	7	43.52	-
8	Jammu & Kashmir	244990	4	27.86	-
9	Jharkhand	826300	10	78.21	-
10	Karnataka	1800258	26	233.37	12.18
11	Kerala	1686660	26	231.32	-
12	Madhya Pradesh	1745050	23	130.90	9.00
13	Maharashtra	2503080	34	213.73	29.00
14	Meghalaya	81750	1	11.25	-
15	Nagaland	126520	1	1.36	-
16	Odisha	904510	12	78.42	-
17	Puducherry	79690	1	7.98	-
18	Punjab	1109670	14	157.40	42.80
19	Rajasthan	1599260	21	147.79	-
20	Tamilnadu	3254950	42	184.67	29.30
21	Uttar Pradesh	3382520	46	345.70	12.61
22	Uttarakhand	69490	1	9.07	6.33
23	West Bengal	2004440	27	180.42	61.88
	Total	30018398	410	2696.70	233.70
Source: Central Pollution Control Board.					

2.3 Forest cover/Area, Forest Produce and Biomass.

Forest ecosystems provide environmental services that benefit, directly or indirectly, all human communities, including watershed protection, regional climatic regulation, fiber, food, drinking water, air purification, carbon storage, recreation, and pharmaceuticals. Forests harbor an estimated two thirds of all terrestrial species, and a fascinating array of ecological processes. The ecological stability, resistance, resilience, and adaptive capacities of forests depend strongly on their biodiversity. The diversity of genes, species, and ecosystems confers on forests the ability to withstand external pressures, and the capacity to 'bounce back' to their pre-disturbance state or adapt to changing conditions.

Forests present a significant global carbon stock. As per UNFCC report, global forest vegetation stores 283 Gt of carbon in its biomass, 38 Gt in dead wood and 317 Gt in soils (top 30 cm) and litter. The total carbon content of forest ecosystems has been estimated at 638 Gt for 2005, which is more than the amount of carbon in the entire atmosphere. This standing carbon is combined with a gross terrestrial uptake of carbon, which was estimated at 2.4 Gt a year, a good deal of which is sequestration by forests. Forests also have a potentially significant role to play in climate change adaptation planning through maintaining ecosystem services and providing livelihood options.

Deforestation, and especially the destruction of rainforests, is a hugely significant contributor to [climate change](#). Forest loss and other changes to the use of land account contribute to man-made CO₂ emissions. Conversion of Forest land for agricultural or other purposes reduce the carbon stock.

The framework for statistics related to climate change identified the following variables/indicators to be included in the Report.

1. Forest Cover/Area

Extent of (i) Forest Area/Cover (ii) Tree Cover
(iii) Mangroves at National Level/ State- wise/Region level

2. Forest Produce

Different types of forest produce - Production data National/State Level

3. Biomass

(i) Above ground (ii) Below ground (iii) Litter (iv) Deadwood
(v) Soil organic carbon at National/State Level

The following Tables are included in the report.

2.3 Forests

- 2.3.1 State/UT wise forest area (1987-2011)
- 2.3.2 State/UT wise forest cover (1987-2011)
- 2.3.3 State wise tree cover estimates
- 2.3.4 State wise list of mangrove areas
- 2.3.5 State/UT wise mangrove cover assessment (Sq Km)
- 2.3.6 Forest area by ownership (Sq Km)-2000
- 2.3.7 Forest area by composition (Sq Km)-2000

- 2.3.8 (a) State wise production of forest produce(2004-05)
- 2.3.8 (b) State wise production of forest produce(2005-06)
- 2.3.8 (c) State wise production of forest produce - Gums and Resins

2.3.8 State wise production of forest produce - Gums and Resins

2.3.9 Physiographic zone wise tree cover estimate

2.3.10 Physiographic zone wise growing stock

2.3.11 State/UT wise forest cover in hill districts -2011 (Sq Km)

2.3.12 State/UT wise forest cover in tribal districts - 2011

2.3.13 Diversion of forest land for non-forest use since the enforcement of Forest Conservation Act,1980

2.3.14 India's major bio-geographic habitats

2.3.15 State wise Carbon Stock in different forest carbon pools

2.3.16 Forest type and density wise carbon stock in different carbon pools

Data sources

Ministry of Environment and Forests is the main source of Forest related Statistics in India. Forest Survey of India (FSI), Forest Research Institute, and Indian Council of Forestry Research and Education (ICFRE) are the suppliers of all forest related data.

Table 2.3.1 : State/UT wise forest area (1987-2011)

Si. No.	State/UT	Total Forest Area in Sq.Km												
		1987	1988	1989	1991	1995	1997	1999	2001	2003	2005	2007	2009	2011
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Andhra Pradesh	63771	63771	63771	63726	63814	63814	63814	63814	63821	63821	63814	63814	63814
2	Arunachal Pradesh	51540	51540	51540	51540	51540	51540	51540	51540	51540	51540	51540	51540	51540
3	Assam	30708	30708	30708	30708	30708	30708	30708	27018	27018	26832	26832	26832	26832
4	Bihar	29230	29230	29230	29226	29226	29226	29226	6078	6473	6473	6473	6473	6473
5	Chhattisgarh								59285	59772	59772	59772	59772	59772
6	Delhi	42		42	42	42	42	85	85	85	85	85	85	85
7	Goa	1053	1053	1053	1256	1424	1424	1424	1224	1224	1224	1224	1224	1224
8	Gujarat	18777	18777	18777	19388	19393	19393	19393	18999	19113	18962	18927	18927	18927
9	Haryana	1685	1685	1685	1687	1673	1673	1673	1551	1558	1559	1559	1559	1559
10	Himachal Pradesh	21325	21325	21325	37591	35407	35407	35407	37033	37033	37033	37033	37033	37033
11	Jammu & Kashmir	20892	20892	20892	20174	20182	20182	20182	20230	20230	20230	20230	20230	20230
12	Jharkhand								23605	23605	23605	23605	23605	23605
13	Karnataka	38644	38644	38644	38646	38724	38724	38724	38724	43084	38284	38284	38284	38284
14	Kerala	11222	11222	11222	11222	11221	11221	11221	11221	11268	11265	11265	11265	11265
15	Madhya Pradesh	155414	155414	155414	155414	154497	154497	154497	95221	95221	94689	94689	94689	94689
16	Maharashtra	64055	64055	64055	63861	63842	63842	63842	61939	61939	61939	61939	61939	61939
17	Manipur	15155	15155	15155	15154	15154	15154	15154	17418	17418	17418	17418	17418	17418
18	Meghalaya	8514	8514	8514	9496	9496	9496	9496	9496	9496	9496	9496	9496	9496
19	Mizoram	15935	15935	15935	15935	15935	15935	15935	15935	16717	16717	16717	16717	16717
20	Nagaland	8625	8625	8625	8625	8629	8629	8629	8629	8629	9222	9222	9222	9222
21	Odisha	59555	59555	59555	59555	57184	57184	57184	58135	58136	58136	58136	58136	58136
22	Punjab	2803	2803	2803	2842	2901	2901	2901	3059	3084	3084	3084	3058	3084
23	Rajasthan	31151	31151	31151	31559	31700	31700	31700	32494	32488	32488	32639	32639	32639
24	Sikkim	2650	2650	2650	2650	2650	2650	2650	5765	5841	5841	5841	5841	5841
25	Tamil Nadu	22319	22319	22319	22699	22628	22628	22628	22871	22877	22877	22877	22877	22877
26	Tripura	6280	6280	6280	6292	6293	6293	6293	6293	6293	6294	6294	6294	6294
27	Uttar Pradesh	51269	51269	51269	51502	51663	51663	51663	16826	16826	16796	16583	16583	16583
28	Uttarakhand								34662	34662	34651	34651	34651	34651
29	West Bengal	11879	11879	11879	11879	11879	11879	11879	11879	11879	11879	11879	11879	11879
30	A & N Islands	7144	7144	7144	7171	7171	7171	7171	7171	7171	7171	7171	7171	7171
31	Chandigarh	6	6	6	31	31	31	31	32	34	33	34	34	34
32	Dadra and Nagar Haveli	203	203	203	207	203	203	203	203	204	204	204	204	204
33	Daman & Diu	*	*	*	*	*	NA	0.7	1	1	6	8	8	8
34	Lakshadweep	nil	nil	nil	nil	nil	NA	0	0	0	0	0	0	0
35	Puducherry	nil	nil	nil	nil	nil	NA	0	0	0	0	13	13	13
Total		751846	751346	751846	770078	765210	765210	765253	768436	774740	769626	769512	769512	769538

Source: M/o Environment & Forest

* Included in Goa

Table 2.3.2 : State/UT wise forest cover (1987-2011)

Sl. No.	State/UT	Total Forest Cover Sq.Km												
		1987 #	1989 #	1991 #	1993 #	1995 #	1997	1999	2001	2003	2005**	2007	2009***	2011
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Andhra Pradesh	49573	47290	47290	47256	47112	43290	44229	44637	44419	45231	45102	46670	46389
2	Arunachal Pradesh	64132	69002	68757	68661	68621	68602	68847	68045	68019	67472	67353	67484	67410
3	Assam	25160	24832	24751	24508	24061	23824	23688	27714	27826	27758	27692	27692	27673
4	Bihar	28482	26668	26668	26587	26561	4832	4830	5720	5558	6807	6804	6804	6845
5	Chhattisgarh						56435	56693	56448	55998	55929	55870	55678	55674
6	Delhi	15	22	22	22	26	26	88	111	170	177	177	177	176
7	Goa	1240	1255	1255	1250	1247	1252	1251	2095	2156	2156	2151	2212	2219
8	Gujarat	11991	11921	11907	12044	12320	12578	12965	15152	14946	14604	14620	14620	14619
9	Haryana	513	513	513	513	603	604	964	1754	1517	1604	1594	1594	1608
10	Himachal Pradesh	12480	12480	12480	12502	12501	12521	13082	14360	14353	14666	14668	14668	14679
11	Jammu & Kashmir	20905	20499	20499	20443	20433	20440	20441	21237	21267	22689	22686	22537	22539
12	Jharkhand						21692	21644	22637	22716	22722	22894	2894	22977
13	Karnataka	32268	32104	32199	32343	32382	32403	32467	36991	36449	36200	36190	36190	36194
14	Kerala	10292	10292	10292	10336	10336	10334	10323	15560	15577	17284	17324	17324	17300
15	Madhya Pradesh	130099	135541	135541	135396	135164	74760	75137	77265	76429	77739	77700	77700	77700
16	Maharashtra	45616	44044	44044	43859	43843	46143	46672	47482	46865	50661	50650	50650	50646
17	Manipur	17475	17685	17685	17621	17558	17418	17384	16926	17219	16952	17280	17280	17090
18	Meghalaya	16466	15645	15875	15769	15714	15657	15633	15584	16839	17205	17321	17321	17275
19	Mizoram	19084	18170	18853	18697	18576	18775	18338	17494	18430	18600	19240	19183	19117
20	Nagaland	14394	14399	14321	14348	14291	14221	14164	13345	13609	13665	13464	13464	13318
21	Odisha	53253	47227	47205	47145	47107	46941	47033	48838	48366	48755	48855	48855	48903
22	Punjab	943	1338	1343	1343	1342	1387	1412	2432	1580	1660	1664	1664	1764
23	Rajasthan	12758	12884	12889	13099	13280	13353	13871	16367	15826	16012	16036	16036	16087
24	Sikkim	2756	3041	3041	3119	3127	3129	3118	3193	3262	3357	3357	3359	3359
25	Tamil Nadu	17472	16992	16992	17005	17045	17064	17078	21482	22643	23314	23338	23551	23625
26	Tripura	5953	5535	5535	5538	5538	5546	5745	7065	8093	8173	8073	7985	7977
27	Uttar Pradesh	31226	33627	33609	33961	33986	10751	10756	13746	14118	14346	14341	14341	14338
28	Uttarakhand						23243	23260	23938	24465	24493	24495	24495	24496
29	West Bengal	8432	8015	8015	8186	8276	8349	8362	10693	12343	12970	12994	12994	12995
30	A & N Islands	7601	7622	7622	7624	7615	7613	7606	6930	6964	6663	6662	6662	6724
31	Chandigarh	2	5	5	5	7	7	7	9	15	17	17	17	17
32	Dadra and Nagar Haveli	238	206	206	206	204	204	202	219	225	216	211	211	211
33	Daman & Diu	*	*	*	*	3	3		6	8	6	6	6	6
34	Lakshadweep	0	0	0	0	0	0	0	27	23	26	26	26	27
35	Puducherry	0	0	0	0	0	0	0	36	40	42	44	50	50
Total		640819	638804	639364	639386	638879	633397	637293	675538	678333	690171	690899	692394	692027
Percent of Geographical Area		19.49	19.43	19.45	19.45	19.43	19.27	19.39	20.55	20.64	20.99	21.02	21.06	21.05

Source: M/o Environment & Forest

Revised estimate as provided by State Forest Report 1997 by incorporating interpretational corrections

* Included in Goa : ** Revised estimate as provided by State Forest Report 2009 by incorporating interpretational changes due to refinement of methodology

*** Revised estimate as provided by State Forest Report 2011 by incorporating interpretational changes

Note: The forest cover includes all lands which have a tree canopy density of more than ten percent when projected vertically on the horizontal ground, with a minimum areal extent of one hectare. The forest cover reported by FSI does not make any distinction between the origin of tree crops (whether natural or man made) or tree species; and encompasses all type of lands irrespective of their ownership, land use and legal status. A land may be recorded as forest area and under management of forest department but may not have any discernible forest cover. On the other hand, all wooded lands or plantations, delineated as forest cover from satellite data may not be legally recorded as forest area as there could be private plantations or institutional wood lots.

Table 2.3.3: State wise tree cover estimates

Sl. No.	State/UT	Total Tree Cover Sq.Km				
		2001	2003	2005	2007	2009
1	2	3	4	5	6	7
1	Andhra Pradesh	9011	12120	7640	7191	7152
2	Arunachal Pradesh	478	363	446	592	549
3	Assam	1942	935	1484	1590	1564
4	Bihar	3693	1620	2522	2495	2369
5	Chhattisgarh	3535	6723	4492	4027	3866
6	Delhi	40	98	107	123	120
7	Goa	62	136	268	286	286
8	Gujarat	4036	10586	7621	8390	7837
9	Haryana	1526	1415	1565	1409	1395
10	Himachal Pradesh	397	491	709	638	623
11	Jammu & Kashmir	2217	3826	5633	6764	6550
12	Jharkhand	2694	5012	3080	3032	2914
13	Karnataka	7446	5371	5467	5683	5733
14	Kerala	1146	1903	2632	2801	2755
15	Madhya Pradesh	5751	7250	6267	6871	7090
16	Maharashtra	8269	9320	8978	9466	9079
17	Manipur	95	136	142	197	193
18	Meghalaya	140	352	405	542	578
19	Mizoram	95	130	122	172	190
20	Nagaland	70	217	238	300	322
21	Odisha	4364	6381	4598	4435	4301
22	Punjab	1634	1608	1823	1699	1699
23	Rajasthan	5286	8638	8379	8274	8272
24	Sikkim	14	22	27	20	25
25	Tamil Nadu	6054	4991	5621	4968	4718
26	Tripura	68	116	134	171	184
27	Uttar Pradesh	7545	7715	8203	7381	7382
28	Uttarakhand	448	571	658	665	642
29	West Bengal	3264	1731	2269	2458	2335
30	A & N Islands	83	33	53	44	39
31	Chandigarh	2	8	9	11	10
32	Dadra and Nagar Haveli	27	35	28	27	29
33	Daman & Diu	4	6	9	9	9
34	Lakshadweep	0	2	4	4	5
35	Puducherry	35	35	42	34	31
Total		81472	99896	91663	92769	90844
Percent of Geographical Area		2.48	3.04	2.79	2.82	2.76

Source: M/o Environment & Forests

Table 2.3.4: State wise list of Mangrove Areas

SI No.	State/UT	Mangrove Area
1	2	3
1	West Bengal	Sunderbans.
2	Odisha	Bhaitarkanika, Mahandi, Subernarekha, Devi, Dharma, MGRC, Chilka
3	Andhra Pradesh	Coringa, East Godavari, Krishna
4	Tamil Nadu	Pichavaram, Muthupet, Ramnad, Pulicat, Kazhuveli
5	Andman & Nicobar	North Andamans, Nicobar
6	Kerala	Vembanad, Kannur
7	Karnataka	Coondapur, Dakshin Kannada/Honnavar, Mangalore Forest Division, Karwar
8	Goa	Goa
9	Maharashtra	Achra-Ratnagiri, Devgarh-Vijay Durg, Veldur, Kundalika-Revdanda, Mumbra-Diva, Vikroli, Shreevardhan, Vaitarna, Vasasi-Manori, Malvan
10	Gujarat	Gulf of Kutch, Gulf of Khambhat, Dumas-Ubhrat
11	Puducherry	Yanam
12	Daman & Diu	Diu

Source : Annual Report 2010-2011 Ministry of Environment & Forests

Table 2.3.5: State/UT wise mangrove cover assessment (Sq Km)

SI No.	State/UT	Year												
		1987	1989	1991	1993	1995	1997	1999	2001	2003	2005	2007	2009	2011
1	2	3	4	5	6	7	8	9	10	10	11	12	13	14
1	Andhra Pradesh	495	405	399	378	383	383	397	333	329	354	353	353	352
2	Goa	0	3	3	3	3	5	5	5	16	16	17	17	22
3	Gujarat	427	412	397	419	689	901	1031	911	916	991	1046	1046	1058
4	Karnataka	0	0	0	0	2	3	3	2	3	3	3	3	3
5	Maharashtra	140	114	113	155	155	124	108	118	158	186	186	186	186
6	Odisha	199	192	195	195	195	211	215	219	203	217	221	221	222
7	Tamil Nadu	23	47	47	21	21	21	21	23	35	36	39	39	39
8	West Bengal*	2076	2109	2119	2119	2119	2123	2125	2081	2120	2136	2152	2152	2155
9	Andaman & Nicobar	686	973	971	966	966	966	966	789	658	635	615	615	617
10	Puducherry	0	0	0	0	0	0	0	1	1	1	1	1	1
11	Kerala	0	0	0	0	0	0	0	0	8	5	5	5	6
12	Daman & Diu	0	0	0	0	0	0	0	0	1	1	1	1	1.56
Total		4046	4255	4244	4256	4533	4737	4871	4482	4448	4581	4639	4639	4662.56

Source: India State of Forest Report 2009 and 2011

*: As per the West Bengal Forest Department, mangrove area in Sundarban is 4200 sq. km. which is almost double of the area estimated by FSI. This is mainly due to the difference of assessment methods. West Bengal Forest Department includes the intervening water in the mangrove cover, whereas, assessment of FSI takes into account the mangrove cover only, as discerned on the satellite image.

Table 2.3.6: Forest area by ownership (Sq Km)-2000

Sl. No.	State/UT	Forest Department					Others		
		Reserved	Protected	Unclassed	Total	Area under Sanctioned working plans	Revenue Department Forests	Corporate Bodies Forests/ Community Ownership	Private Forest
1	2	3	4	5	6	7	8	9	10
1	Andhra Pradesh	50479	12365	975	63819	Nil	Nil	Nil	Nil
2	Arunachal Pradesh	9552.32	7.8	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.	N.A.
4	Bihar	5051.43	25019.51	7.09	30078.03	30078	12200	10160	Nil
5	Delhi	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
6	Goa	N.A.	N.A.	319.84	319.84	1224	N.A.	N.A.	200
7	Gujarat	13741.25	395.62	4641.13	18778	14083.58	N.A.	N.A.	N.A.
8	Haryana	249	1154	21	1424	427.91	N.A.	N.A.	127
9	Himachal Pradesh	1896	33043	976	35915	24535	N.A.	42	1076
10	Jammu & Kashmir	N.A.	20230	N.A.	20230	20194	N.A.	N.A.	N.A.
11	Karnataka	28689.96	3930.72	5231	37851.68	17102.01	124.2	N.A.	308.42
12	Kerala	9371.3	1752.94	N.A.	11124.23	1028.39	N.A.	N.A.	N.A.
13	Madhya Pradesh	82700.13	66693.79	5112.48	154506.4	1545506.4	N.A.	N.A.	N.A.
14	Maharashtra	43898	8025	3455	55378	41045	2422	3559	558
15	Manipur	1467	4141	11780	17418	N.A.	N.A.	N.A.	N.A.
16	Meghalaya	712.74	12.39	399.48	1124.61	294.41	N.A.	N.A.	N.A.
17	Mizoram	6798	1045	N.A.	7843	Nil	Nil	2622	Nil
18	Nagaland	85.83	507.56	192.47	785.86	Nil	Nil	N.A.	7621.09
19	Odisha	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	N.A.	873.35	831.15
21	Rajasthan	11780.66	17604.03	2924.45	32309.14	N.A.	N.A.	N.A.	N.A.
22	Sikkim	5652.5	N.A.	6760.25	12412.75	N.A.	N.A.	N.A.	N.A.
23	Tripura	35188.18	509.02	2195.47	6292.68	459.6	N.A.	N.A.	N.A.
24	Uttar Pradesh	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
25	West Bengal	7054	3772	1053	11879	11381	N.A.	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	N.A.	209.58	198.76	N.A.	N.A.	N.A.
28	Daman & Diu	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
29	Chandigarh	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
30	Lakshadweep	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
31	Puducherry	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
	Total	361289.24	223905.89	83926.27	669121.4	1754065.19	32551.71	17256.35	10734

Source: Forestry Statistics India 2001 ICFRE(Forest Survey of India)

Table 2.3.7: Forest area by composition (Sq Km)-2000

Sl. No.	State/UT	Coniferous Forest			Broad Leaved Forest				Mixed Coniferous/Broad Leaved	Total
		Chir	Deodar	Others Conifers	Sal	Teak	Mixed Leaved Forest	Mangrove		
1	2	3	4	5	6	7	8	9	10	11
1	Andhra Pradesh	Nil	Nil	Nil	47	9145	54103	519	N.A.	N.A.
2	Arunachal Pradesh	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
3	Assam	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
4	Bihar	Nil	Nil	Nil	22378	8.91	7691.12	Nil	Nil	30078.03
5	Delhi	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
6	Goa	N.A.	N.A.	N.A.	N.A.	92.08	1130.14	1.78	N.A.	1224
7	Gujarat	N.A.	N.A.	N.A.	N.A.	N.A.	6430	3979	N.A.	10409
8	Haryana	23	N.A.	N.A.	30	N.A.	1371	N.A.	N.A.	1424
9	Himachal Pradesh	1436	811	6685	183	N.A.	1079	N.A.	5880	16074
10	Jammu & Kashmir	1825	1075	5369	N.A.	N.A.	1885	N.A.	10076	20230
11	Karnataka	N.A.	N.A.	N.A.	N.A.	N.A.	38224.28	60	N.A.	38284.28
12	Kerala	N.A.	N.A.	N.A.	N.A.	4100	7024.23	N.A.	N.A.	11124.23
13	Madhya Pradesh	Nil	Nil	Nil	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
14	Maharashtra	N.A.	N.A.	N.A.	N.A.	9161	31776	108	N.A.	41045
15	Manipur	Nil	Nil	2442.77	Nil	610.74	9444	Nil	4886.49	17384
16	Meghalaya	N.A.	N.A.	145.14	N.A.	N.A.	732.94	N.A.	N.A.	878.08
17	Mizoram	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
18	Nagaland	Nil	Nil	277.5	Nil	Nil	2269	Nil	Nil	2546.5
19	Odisha	N.A.	N.A.	3.99	16938.25	2030.64	21024.34	215	N.A.	40212.22
20	Punjab	121.75	N.A.	N.A.	N.A.	N.A.	2907.74	N.A.	26.59	3056.08
21	Rajasthan	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
22	Sikkim	N.A.	N.A.	903.45	80.57	N.A.	1799.71	N.A.	N.A.	2783.73
23	Tamil Nadu	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	21	19294	19315
24	Tripura	N.A.	N.A.	N.A.	270.31	1510.15	4163.56	N.A.	N.A.	5944.02
25	Uttar Pradesh	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
26	West Bengal	N.A.	N.A.	89	N.A.	N.A.	N.A.	2109	9681	11879
27	A&N Islands	N.A.	N.A.	N.A.	N.A.	N.A.	6204.69	966	N.A.	7170.69
28	D&N Haveli	N.A.	N.A.	N.A.	N.A.	N.A.	203.58	N.A.	203.58	407.16
29	Daman & Diu	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
30	Chandigarh	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	32.43	32.43
31	Lakshadweep	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
32	Puducherry	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
TOTAL		3405.75	1886	15915.85	39927.13	26658.52	199463.33	7978.78	50080.09	345315.5

Source: Forestry Statistics India 2001 ICFRE (FSI)

Table 2.3.8a: State wise production of forest produce(2004-05)

Sl. No.	State/ Union Territory	Round Wood		Wood Fuel	Saw logs & Veneer logs		Pulp wood		Other Industrial roundwood (poles & Posts)		Sawn wood		Chips & particles	Wood residues	Wood charcoal
		C	NC		C	NC	C	NC	C	NC	C	NC			
		(cum)	(cum)	(cum)	(cum)	(cum)	(cum)	(cum)	(cum)	(cum)	(cum)	MT	MT	MT	MT	MT
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	A & N Islands														
2	Andhra Pradesh	2308.00	0.00	0.00	0.00	0.00	0.00	432331.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	Arunachal Pradesh	19967.46	0.00	13320.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	191.55
4	Assam	0.00	6419.00	365.00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
5	Bihar														
6	Chandigarh														
7	Chhattisgarh	0.00	0.00	97500MT	0.00	161000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	Dadra & Nagar Haveli	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	Daman & Diu														
10	Delhi														
11	Goa	0.00	17352.72	29132.44	0.00	0.00	0.00	0.00	0.00	2727.00	0.00	0.00	0.00	0.00	345384 kgs
12	Gujarat	0.00	18293.85	146553.34(mt)	NA	0.00	NA	NA	NA	18013.16	0	957.16 cm	NA	NA	NA
13	Haryana														
14	Himachal Pradesh	8731.24	103.43	36874.67	13533.85	4482.59	3888.50	728.00	2324.00	0.00	74972.16	2.00	0.00	0.00	10591.60
15	Jammu & Kashmir	35600.00	0.00	24337.00	0.00	0.00	0.00	0.00	0.00	0.00	60650.00	0.00	0.00	0.00	0.00
16	Jharkhand														
17	Karnataka														
18	Kerala														
19	Lakshadweep														
20	Madhya Pradesh	0.00	265000.00	271000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	Maharashtra	0.00	46000.00	130000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	Manipur														
23	Meghalaya														
24	Mizoram	200.00	0.00	236.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	140.03	0.00	236.32
25	Nagaland	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
26	Odisha	0.00	10709.00	4798 MT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27	Puducherry														
28	Punjab	-	91308.00	-	-	-	-	-	-	-	-	-	-	-	-
29	Rajasthan	27715.26	0.00	36752.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	Sikkim														
31	Tamil Nadu														
32	Tripura	0.00	759.49	3717.92	0.00	0.00	0.00	0.00	0.00	1693.80	0.00	0.00	0.00	0.00	0.00
33	Uttar Pradesh	-	133827.00	16269.00	-	-	-	-	-	-	-	-	-	-	-
34	Uttarakhand	62336.00	120311.00	54371.00	-	-	-	53085.00	-	-	21265.35	39.81	-	-	366.63
35	West Bengal	85993.00		167321.00	-	-	156771.00	-	-	-	-	-	-	-	-
	Total	220575.50	703664.48	770011.74	13533.85	4482.59	160659.50	53813.00	2324.00	22433.96	156887.51	41.81	140.03	0.00	11194.55

Source: Indian Council of Forestry Research and Education, Dehradun

C- Coniferous NC-coniferous

Blank cells indicate data not available

* 1 bag=10 to 15 kg.

Table 2.3.8b :State wise production of forest produce (2005-06)

Sl. No.	State/ Union Territory	Round Wood		Wood Fuel (cum)	Saw logs & Veneer logs		Pulp wood		Other Industrial roundwood (poles & Posts)		Sawn wood		Chips & particles MT	Wood residues MT	Wood charcoal MT	
		C	NC		C	NC	C	NC	C	NC	C	NC				
		(cum)	(cum)		(cum)	(cum)	(cum)	(cum)	(cum)	(cum)	MT	MT				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1	A & N Islands															
2	Andhra Pradesh	23028.00	0.00	0.00	0.00	0.00	43323.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	Arunachal Pradesh	40656.43	0.00	12878.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	Assam	0.00	12064.00	510.00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
5	Bihar															
6	Chandigarh															
7	Chhattisgarh	0.00	0.00	70000MT	0.00	123000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	Dadra & Nagar Haveli	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	Daman & Diu															
10	Delhi															
11	Goa															
12	Gujarat	NA	16661.52	62636.24MT	NA	NA	NA	NA	NA	10160.83	NA	1630.97cu m	NA	NA	NA	NA
13	Haryana															
14	Himachal Pradesh	8089.46	66.00	22291.00	13423.06	3705.07	6430.50	0.00	2065.00	0.00	69259.49	0.00	0.00	0.00	0.00	7924.93
15	Jammu & Kashmir	51250.00	0.00	22924.00	0.00	0.00	0.00	0.00	0.00	0.00	35150.00	0.00	0.00	0.00	0.00	0.00
16	Jharkhand															
17	Karnataka															
18	Kerala															
19	Lakshadweep															
20	Madhya Pradesh	0.00	268000.00	296000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	Maharashtra	56049.00	74332.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	Manipur															
23	Meghalaya															
24	Mizoram	250.00	0.00	1203.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	170.02	0.00	0.00	26.37
25	Nagaland	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
26	Odisha	0.00	15827.00	13216MT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27	Puducherry															
28	Punjab	-	134553.00	-	-	-	-	-	-	-	-	-	-	-	-	-
29	Rajasthan	27125.47	0.00	38435.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	Sikkim															
31	Tamil Nadu															
32	Tripura	0.00	351.02	6462.36	0.00	0.00	0.00	0.00	0.00	2472.01	0.00	0.00	0.00	0.00	0.00	0.00
33	Uttar Pradesh	-	159837.00	10148.00	-	-	-	-	-	-	-	-	-	-	-	-
34	Uttarakhand	77775.00	168265.00	63898.00	-	-	-	85279.00	-	-	34262.42	75.52	-	-	-	353.30
35	West Bengal															
	Total	284223.36	849956.54	474750.31	13423.06	126705.07	49753.81	85279.00	2065.00	12632.84	138671.91	75.52	170.02	0.00	0.00	8304.60

Source: Indian Council of Forestry Research and Education, Dehradun

C- Coniferous NC-coniferous

Blank cells indicate data not available

* 1 bag=10 to 15 kg.

Table 2.3.8 C: State wise production of forest produce - Gums and Resins

Sl. No.	State/Union Territory	Gums				Resins			
		(Metric Tonne)				(MetricTonne)			
		2002-03	2003-04	2004-05	2005-06	2002-03	2003-04	2004-05	2005-06
1	2	3	4	5	6	7	8	9	10
1	A & N Islands	NA	NA			NA	NA		
2	Andhra Pradesh	996.10	762.90	9546.00	6953.69	0.00	0.00	0.00	0.00
3	Arunachal Pradesh	0.00	0.00	0.00	0.00	8846.00	0.00	4040.00	141530.00
4	Assam	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	Bihar								
6	Chandigarh	-	-			-	-		
7	Chhattisgarh			128.31	67.68			0.00	0.00
8	Dadra & Nagar Haveli	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	Daman & Diu								
10	Delhi								
11	Goa	0.00	0.00	0.00		0.00	0.00	0.00	
12	Gujarat	67.94	65.1	66.54	78.63	0.00	0.00	-	-
13	Haryana	-	-	-	-	-	-	-	-
14	Himachal Pradesh	7322.4	7257.4	NA	NA	8494.40	84227.00	8797.00	8508.00
15	Jammu & Kashmir	0.00	0.00	0.00	0.00	10783.00	10284.00	3941.00	6748.00
16	Jharkhand	0.00	0.00			0.00	0.00		
17	Karnataka	1.90	1.70			0.00	0.00		
18	Kerala								
19	Lakshadweep								
20	Madhya Pradesh			Quintals 422.0	Quintals 333.9			0.00	0.00
21	Maharashtra	975.00	941.00	Quintals 6954	Quintals 11004	0.00	0.00	0.00	0.00
22	Manipur								
23	Meghalaya	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	Mizoram	0.00	0.00	-	-	0.00	0.00	-	-
25	Nagaland			0.00	0.00			0.00	0.00
26	Odisha	0.07	6.10	0.00	0.00	0.00	0.00	0.00	0.00
27	Puducherry								
28	Punjab	0.00	0.00			0.00	0.00		
29	Rajasthan	0.00	0.00	NA	NA	0.00	0.00	NA	NA
30	Sikkim	0.00	0.00			0.00	0.00		
31	Tamil Nadu								
32	Tripura	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33	Uttar Pradesh	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
34	Uttarakhand	0.00	0.00	-	-	15873.00	17146.00	17983.00	18349.00
35	West Bengal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Source: Indian Council of Forestry Research and Education, Dehradun

Note: Blank cell indicates information is not available

C : Coniferous

NC : Non- coniferous

1 Std.bag= 0.5 Quintals (Approximately)

Table 2.3.9 :Physiographic zone wise tree cover estimate

Sl. No.	Physiographic Zone	Geographic Area (Km ²)	2009		2011	
			Tree Cover		Tree Cover	
			Area (Km ²)	% of Geog. Area	Area (Km ²)	% of Geog. Area
1	2	3	4	5	6	7
1	Western Himalayas	329255	8091	2.46	7859	2.39
2	Eastern Himalayas	74618	324	0.43	356	0.48
3	North East	133990	2243	1.67	2275	1.70
4	Northern Plains	295780	9473	3.20	9366	3.17
5	Eastern Plains	223339	5444	2.44	5168	2.31
6	Western Plains	319098	7497	2.35	7038	2.21
7	Central Highlands	373675	9150	2.45	9886	2.65
8	North Deccan	355988	7559	2.12	7007	1.97
9	East Deccan	336289	11157	3.32	10718	3.19
10	South Deccan	292416	8002	2.74	8012	2.74
11	Western Ghats	72381	3847	5.31	4083	5.64
12	Eastern Ghats	191698	4051	2.11	4420	2.31
13	West Coast	121242	9427	7.78	8863	7.31
14	East Coast	167494	6504	3.88	5791	3.46
Total		3287263	92769	2.82	90844	2.76
Source : India State of Forest Report-2011						

Table 2.3.10 : Physiographic zone wise growing stock

Sl. No.	Physiographic Zone	Area of Phy.Zone (Km ²)	Recorded Forest Area (Km ²)	Growing Stock (volume in million Cum)		
				In Forest	In Tree Outside Forest	Total
1	2	3	4	5	6	7
1	W. Himalayas	329255	91073	1021.94	191.09	1213.03
2	E. Himalayas	74618	47965	473.2	69.35	542.55
3	North East Ranges	133990	79431	341.14	102.85	443.99
4	Northern Plains	295780	13992	142.6	104.27	246.87
5	Eastern Plains	223339	31709	240.53	97.43	337.96
6	Western Plains	319098	13694	7.93	74.36	82.29
7	Central Highlands	373675	80788	109.37	110.86	220.23
8	North Deccan	355988	87260	281.07	83.47	364.54
9	East Deccan	336289	128757	622.18	198.74	820.92
10	South Deccan	292416	49451	224.42	134.28	358.70
11	Western Ghats	72381	32399	461.78	118.68	580.46
12	Eastern Ghats	191698	74418	360.65	75.26	435.91
13	West Coast	121242	20736	106.21	147.87	254.08
14	East Coast	167494	17839	105.63	91.06	196.69
Total		3287263	769512	4498.65	1599.57	6098.22

Source :India State of Forest Report, 2009

Table 2.3.11 : State/UT wise forest cover in hill districts -2011 (Sq Km)

Sl. No.	Name of State/UT	Number of Hill Districts	Geographic Area in Hill Districts	Forest Cover Area						Percent Forest Cover
				Very Dense Forest	Moderately Dense Forest	Open Forest	Total**	Percent Forest Cover**	Total	
1	2	3	4	5	6	7	8	9	10	11
1	Arunachal Pradesh	13	83743	20868	31519	15023	67353	80.43	67410	80.50
2	Assam	3	19153	741	5725	6519	13003	67.89	12985	67.80
3	Himachal Pradesh	12	55673	3224	6381	5074	14668	26.35	14679	26.37
4	Jammu & Kashmir	(a) 14	101388	2814	6269	6953	16309	16.09	16036	15.82
		(b) *	120848	1326	2471	2686	6377	5.28	6483	5.36
5	Karnataka	6	48046	1492	14920	6788	23200	48.29	23200	48.29
6	Kerala	10	29572	1105	7305	5277	13700	46.33	13687	46.28
7	Maharashtra	7	69905	318	7237	7947	15508	22.18	15502	22.18
8	Manipur	9	22327	730	6151	10209	17280	77.40	17090	76.54
9	Meghalaya	7	22429	433	9775	7067	17321	77.23	17275	77.02
10	Mizoram	8	21081	134	6086	12897	19240	91.27	19117	90.68
11	Nagaland	8	16579	1293	4931	7094	13464	81.21	13318	80.33
12	Sikkim	4	7096	500	2161	698	3357	47.31	3359	47.34
13	Tamil Nadu	5	22789	962	3370	2040	6204	27.22	6372	27.96
14	Tripura	4	10486	111	4686	3182	8073	76.95	7979	76.95
15	Uttarakhand	13	53483	4762	14167	5567	24495	45.80	24496	45.80
16	West Bengal	1	3149	714	663	912	2289	72.69	2289	72.69
Total		124	707747	41527	133817	105933	281841	39.82	281277	39.74

Source: India State of Forest Report, 2011

** India State of Forest Report, 2009. data is for 2007.

* : Refers to area outside LOC i.e. under illegal occupation of Pakistan and China.

Table 2.3.12: State/UT wise forest cover in tribal districts - 2011

Sl. No.	State/UT	Number of Tribal Districts	Geographic Area	Forest Cover						Percent Forest Cover
				Very Dense Forest	Moderately Dense Forest	Open Forest	Total**	Percent Forest Cover**	Total	
1	2	3	4	5	6	7	8	9	10	11
1	Andhra Pradesh	8	87090	239	16613	8449	25567	29.36	25301	29.05
2	Arunachal Pradesh	13	83743	20868	31519	15023	67353	80.43	67410	80.50
3	Assam	16	50137	648	4599	6749	12008	23.95	11996	23.93
4	Chhattisgarh	9	92656	3614	24477	11966	40210	43.40	40057	43.23
5	Gujarat	8	48409	322	2944	3500	6767	13.98	6766	13.98
6	Himachal Pradesh	3	26764	950	1067	1214	3231	12.07	3231	12.07
7	Jharkhand	8	44413	1677	6067	6218	13889	31.27	13962	31.44
8	Karnataka	5	26597	1248	7642	4249	13139	49.02	13139	49.02
9	Kerala	9	27228	1073	7017	5006	13039	47.89	13039	47.89
10	Madhya Pradesh	18	139448	5639	20275	16387	42312	30.34	42301	30.33
11	Maharashtra	11	138272	7275	11389	10848	29509	21.34	29512	21.34
12	Manipur	9	22327	730	6151	10209	17280	77.40	17090	76.54
13	Meghalaya	7	22429	433	9775	7067	17321	77.23	17275	77.02
14	Mizoram	8	21081	134	6086	12897	19240	91.27	19117	90.68
15	Nagaland	8	16579	1293	4931	7094	13464	81.21	13318	80.33
16	Odisha	12	86124	5268	14442	13588	33299	38.66	33298	38.66
17	Rajasthan	5	38218	0	2442	3907	6348	16.61	6349	16.61
18	Sikkim	4	7096	500	2161	698	3357	47.31	3359	47.34
19	Tamil Nadu	6	30720	697	2392	3653	6727	21.90	6742	21.95
20	Tripura	4	10486	109	4686	3182	8073	76.95	7977	76.95
21	Uttar Pradesh	1	7680	409	475	435	1320	17.19	1319	17.17
22	West Bengal	11	69403	2962	4475	4863	12299	17.72	12300	17.72
23	Andaman & Nicobar	2	8249	3761	2416	547	6662	80.76	6724	81.51
24	Dadra & Nagar Haveli	1	491	0	114	97	211	42.97	211	42.97
25	Daman & Diu	1	72	0	1	3	4	5.56	4	5.56
26	Lakshadweep	1	32	0	17	10	26	81.25	27	84.38
Total		188	1105744	59849	194173	157859	412625	37.32	411881	37.25

Source: India State of Forest Report 2011

** India State of Forest Report, 2009. data is for 2007.

Table 2.3.13 : Diversion of forest land for non-forest use since the enforcement of forest conservation act,1980

<i>(Area in ha.)</i>			
Sl. No.	Year	Forest Area Diverted	Cummulative Area Diverted
1	1980	Nil	Nil
2	1981	1331.70	1331.70
3	1982	3674.32	5006.02
4	1983	5100.51	10106.53
5	1984	9348.90	19455.43
6	1985	7676.83	27132.26
7	1986	9310.45	36442.71
8	1987	25925.97	62368.68
9	1988	4868.71	67237.39
10	1989	66768.09	134005.48
11	1990	127361.79	261367.27
12	1991	5065.35	266432.62
13	1992	21756.77	288189.39
14	1993	16182.51	304371.90
15	1994	59962.02	364333.92
16	1995	51428.98	415762.90
17	1996	32862.55	448625.45
18	1997	24738.43	473363.88
19	1998	18425.21	491789.09
20	1999	45784.41	537573.50
21	2000	22386.43	559959.93
22	2001	267897.61	827857.54
23	2002	51172.31	879029.85
24	2003	42729.68	921759.53
25	2004	33079.50	954839.03

Source : Forests & Wildlife Statistics, India, 2004,MOEF

Table 2.3.14: India's major biogeographic habitats

No.	Name	Biotic Province	Total Area (sq.km)	%
1	Trans Himalaya		174225	
		Ladakh	98618	3.3
		Tibetan Plateau	75607	2.3
2	Himalaya		210385	
		North-Western	69033	2.1
		Western	52596	1.6
		Central	6575	0.2
		Eastern	82182	2.5
3	Desert		213672	
		Kachchh	36160	1.1
		Thar	177512	5.4
4	Semi-Arid		545686	
		Central India	121629	3.7
		Gujarat-Rajputana	424057	12.9
5	Western Ghats		131491	
		Malabar coast	65745	2.0
		Western Ghat Mountains	65745	2.0
6	Deccan Peninsula		1377363	
		Deccan South Plateau	341875	10.4
		Deccan Central Plateau	410908	12.5
		Eastern Plateau	207098	6.3
		Chhota Nagpur	177512	5.4
		Central Highlands	239970	7.3
7	Gangetic Plain		355024	
		Upper Gangetic	207098	6.3
		Lower Gangetic	147927	4.5
8	Coasts		82182	
		East Coast	62458	1.9
		West Coast	19724	0.6
9	North East		170938	
		Brahmaputra Valley	65745	2.0
		North-Eastern Hills	105192	3.2
10	Island		12971	
		Andaman Islands	6575	0.2
		Nicobar Islands	3287	0.1
		Lakshadweep Islands	3110	0.1
	Marine Influenced Area:		10440	0.3
Grand Total			3287263	

Source: Wildlife Institute of India (Rodgers et al. 2002)/Zoological Survey of India

Table 2.3.15 : State wise Carbon Stock in different forest carbon pools

'(000 tonnes)							
State	Area in Km.	AGB*	BGB**	Dead wood	Litter	SOC***	Total
Andhra Pradesh	44,372	1,57,184	60,967	732	4,851	1,74,299	3,98,033
Arunachal Pradesh	67,777	2,34,110	52,489	3,753	16,080	6,56,444	9,62,876
Assam	27,645	44,543	10,240	1,050	5,411	1,07,680	1,68,924
Bihar	5,579	16,431	6,173	109	417	23,861	46,992
Chhattisgarh	55,863	2,03,701	67,632	2,407	6,435	2,72,032	5,52,207
Delhi	176	199	45	2	9	564	818
Goa	2,164	4,118	1,097	91	311	11,160	16,776
Gujarat	14,715	34,842	12,598	313	982	64,769	1,13,504
Haryana	1,587	3,946	1,356	21	74	7,285	12,681
Himachal pradesh	14,369	63,436	16,718	525	2,367	78,178	1,61,224
Jammu & Kashmir	21,273	96,096	26,259	745	3,106	1,15,505	2,41,711
Jharkhand	22,591	82,419	31,876	423	1,230	97,987	2,13,935
Karnataka	35,251	1,16,562	33,784	1,420	17,056	2,70,612	4,39,433
Kerala	15,595	59,650	15,207	862	6,027	1,17,794	1,99,539
Madhya Pradesh	76,013	2,60,335	99,435	1,535	6,990	3,14,233	6,82,529
Maharashtra	47,476	1,41,161	48,813	1,878	8,681	2,78,009	4,78,542
Manipur	17,086	26,125	8,545	503	3,828	99,152	1,38,154
Meghalaya	16,988	23,191	6,333	789	4,924	1,13,861	1,49,098
Mizoram	18,684	15,851	3,273	656	2,743	75,405	97,928
Nagaland	13,719	16,578	4,273	586	2,547	1,05,894	1,29,878
Odisha	48,374	1,47,088	48,749	1,845	7,541	2,17,860	4,23,082
Punjab	1,558	4,365	1,613	24	58	7,782	13,842
Rajasthan	15,850	32,717	12,806	202	641	42,750	89,115
Sikkim	3,262	10,512	3,012	156	456	25,595	39,731
Tamilnadu	23,044	73,105	24,488	795	4,695	1,08,400	2,11,483
Tripura	8,155	14,142	2,909	515	1,595	39,756	58,917
Uttar Pradesh	14,127	41,682	12,620	388	1,566	57,358	1,13,614
Uttaranchal	24,442	1,06,354	27,499	1,255	5,655	1,44,927	2,85,689
West Bengal	12,413	36,558	11,585	288	1,762	69,564	1,19,757
Andaman & Nicobar	6,629	33,031	10,021	1,321	3,044	52,848	1,00,265
Chandigarh	15	44	15	0	1	78	139
Dadra & Nagar Haveli	221	523	124	13	44	918	1,623
Daman & Diu	9	3	1	0	1	28	33
Lakshdweep	25	50	0	1	4	91	146
Puducherry	41	89	19	1	7	243	358
Total	6,77,088	21,00,739	6,62,573	25,201	1,21,137	37,52,924	66,62,574
*AGB- Above Ground Biomass							
**BGB- Below Ground Biomass							
***SOC- Soil Organic Carbon							
Source - Carbon Stock in India's Forests, Forest Survey of India, 2013.							

Table 2.3.16 : Forest type and density wise carbon stock in different carbon pools

('000 tonnes)

Forest Type Stratum	Density	Area in Sq. Km.	AGB	BGB	Dead wood	Litter	SOC	Total
Tropical Wet Evergreen Forests –North East	VDF	883	4,353	1,506	106	239	10,038	16,242
Tropical Wet Evergreen Forests –North East	MDF	3,343	9,175	2,731	122	1,062	24,357	37,447
Tropical Wet Evergreen Forests –North East	OF	1,763	3,211	1,277	35	504	11,747	16,774
Tropical Wet Evergreen Forests – Western Ghats	VDF	3,596	25,412	8,790	1,474	2,582	34,381	72,640
Tropical Wet Evergreen Forests – Western Ghats	MDF	9,239	43,067	14,898	324	3,240	78,072	1,39,601
Tropical Wet Evergreen Forests – Western Ghats	OF	1,747	2,082	720	46	396	14,240	17,485
Tropical Semi Evergreen Forests	VDF	11,743	68,983	14,188	1,600	3,198	1,57,270	2,45,240
Tropical Semi Evergreen Forests	MDF	38,328	1,15,260	23,707	1,402	9,311	3,30,093	4,79,773
Tropical Semi Evergreen Forests	OF	32,416	30,078	6,186	650	5,812	1,40,071	1,82,797
Tropical Semi Evergreen Forests – Eastern Deccan	VDF	4	15	3	1	15	33	67
Tropical Semi Evergreen Forests – Eastern Deccan	MDF	186	754	155	7	320	952	2,187
Tropical Semi Evergreen Forests – Eastern Deccan	OF	201	511	105	5	287	697	1,605
Tropical Semi Evergreen Forests – Western Ghats	VDF	1,501	7,789	1,602	615	1,228	16,016	27,250
Tropical Semi Evergreen Forests – Western Ghats	MDF	10,214	35,286	7,258	359	7,443	69,901	1,20,246
Tropical Semi Evergreen Forests – Western Ghats	OF	3,902	4,716	970	103	2,670	20,930	29,390
Tropical Moist Deciduous Forests	VDF	10,521	39,096	8,041	1,232	2,888	80,244	1,31,501
Tropical Moist Deciduous Forests	MDF	78,237	1,99,186	40,968	6,448	25,853	4,73,833	7,46,288
Tropical Moist Deciduous Forests	OF	51,430	60,728	12,491	2,056	9,435	2,50,881	3,35,591
Littoral & Swamp Forests	VDF	1,190	8,997	3,112	3	151	9,848	22,111
Littoral & Swamp Forests	MDF	1,969	8,456	2,925	4	134	11,351	22,870
Littoral & Swamp Forests	OF	1,708	2,386	825	4	67	5,624	8,907
Tropical Dry Deciduous Forests	VDF	13,434	83,200	32,669	615	7,888	79,040	2,03,413
Tropical Dry Deciduous Forests	MDF	1,30,339	7,71,107	3,02,783	1,922	7,836	6,92,382	17,76,030
Tropical Dry Deciduous Forests	OF	1,27,519	1,63,454	64,182	1,677	5,249	3,81,376	6,15,938
Tropical Thorn Forests	VDF	103	142	56	4	22	302	526
Tropical Thorn Forests	MDF	3,079	4,067	1,597	76	445	11,480	17,666
Tropical Thorn Forests	OF	8,568	4,270	1,677	107	650	17,565	24,269
Tropical	VDF	1,524	5,362	2,105	139	239	14,097	21,941
Tropical	MDF	8,535	21,552	8,463	312	2,049	69,380	1,01,756
Tropical	OF	10,084	16,465	6,465	202	1,805	69,816	94,753
Subtropical Pine Forests	VDF	1,116	5,620	1,419	133	164	10,175	17,511
Subtropical Pine Forests	MDF	10,235	32,462	8,194	375	1,322	64,629	1,06,981
Subtropical Pine Forests	OF	7,030	13,837	3,493	141	676	36,412	54,559
Montane & Moist Temperate Forests 12	VDF	4,782	30,649	7,736	652	1,537	43,803	84,376
Montane & Moist Temperate Forests 12	MDF	16,603	83,972	21,197	608	4,056	1,22,207	2,32,040
Montane & Moist Temperate Forests 12	OF	11,559	28,666	7,236	232	2,243	64,338	1,02,715
Sub Alpine & Dry Temperate Forests	VDF	2,012	15,907	4,313	241	415	20,077	40,952
Sub Alpine & Dry Temperate Forests	MDF	9,249	42,414	11,499	338	1,030	60,809	1,16,091
Sub Alpine & Dry Temperate Forests	OF	7,040	23,162	6,280	141	504	31,004	61,091
Alpine Scrub	VDF	1,615	13,187	3,575	193	204	13,961	31,120
Alpine Scrub	MDF	1,312	3,991	1,082	48	139	10,204	15,464
Alpine Scrub	OF	1,194	2,700	732	24	98	4,745	8,299
Plantation/TOF	VDF	545	1,723	354	3	121	5,170	7,372
Plantation/TOF	MDF	11,781	35,025	7,197	421	2,835	91,035	1,36,513
Plantation/TOF	OF	23,712	28,264	5,811	0	2,774	98,339	1,35,188
Total		6,77,088	21,00,739	6,62,573	25,201	1,21,137	37,52,924	66,62,574

*AGB- Above Ground Biomass VDF: Very Dense Forest

**BGB- Below Ground Biomass MDF : Moderatly Dense Forest

***SOC- Soil Organic Carbon OF : Other Forests

Source - Carbon Stock in India's Forests, Forest Survey of India, 2013.

2.4 Land Use

Land-use change is related to climate change as both a causal factor and a major way in which the effects of climate change are expressed. As a causal factor, land use influences the flux of mass and energy, and as land-cover patterns change, these fluxes are altered. Projected climate alterations will produce changes in land-cover patterns at a variety of temporal and spatial scales, although human uses of the land are expected to override many effects. A review of the literature dealing with the relationship between land-use change and climate change clearly shows that (1) in recent centuries land-use change has had much greater effects on ecological variables than has climate change; (2) the vast majority of land-use changes have little to do with climate change or even climate; and (3) humans will change land use, and especially land management, to adjust to climate change and these adaptations will have some ecological effects. Therefore, an understanding of the non climatic causes of land-use change (e.g., socioeconomics and politics) are necessary to manage ecological functions effectively on regional and global scales.

Plants absorb carbon dioxide (CO₂) from the atmosphere as they grow, and they store some of the carbon throughout their lifetime. Soils can also store CO₂, depending on how the soil is managed. This storage of carbon in plants and soils is called biological carbon sequestration. Because biological sequestration takes CO₂ out of the atmosphere, it is also called a greenhouse gas "sink." Emissions or sequestration of CO₂ can occur as land uses change. For example, CO₂ is exchanged between the atmosphere and the plants and soils on land as former cropland is converted into grassland, as new areas are cultivated and become cropland, or as forests grow. In addition, using biological feedstock (such as energy crops or wood) for purposes such as electricity generation, input to processes that create liquid fuels, or building materials can lead to emissions or sequestration.

Thus changes in the land use has an impact on the greenhouse gases emission and thus to climate change. The framework for statistics related to climate change identified land use change as an indicator to be included in the Report.

The following are tables included.

2.4 Land Use

- 2.4.1 Agricultural land by use in India (1950-51 to 2010-11)
- 2.4.2 State wise land use classification and irrigated area (1996-97 to 2010-11)
- 2.4.3 Selected categories of land use in India
- 2.4.4 Common Property Resources land(CPR) (in hectares) per household by type of land and percentages of CPR land to total geographical area and to total non-residential geographical area in different climatic zones
- 2.4.5 Net area irrigated from different sources and gross irrigated area - All India
- 2.4.6 Growth of urban agglomerations & towns by size class/category during 1901-2011

Data Sources.

'Report State of Indian Agriculture 2011-12', by Directorate of Economics and Statistics, Department of Agriculture and Cooperation, under Ministry of Agriculture . Report available in the Ministry's Website.

NSS Report No. 452 ; Common Property Resources in India, Jan-June 1998, NSS 54th Round. National Building Organisation (Housing data tables) Ministry of Housing & Urban Poverty Alleviation, Government of India

Government of India.

Table 2.4.1: Agricultural Land by Use in India (1950-51 to 2010-11)

(Million Hectares)											
S.No.	Classification	1950-51	1951-52	1952-53	1953-54	1954-55	1955-56	1956-57	1957-58	1958-59	1959-60
I	Geographical Area for Land Utilisation Statistics	328.73	328.73	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	287.82	290.78	292.00	291.37	292.00	292.17	293.43	293.66	297.25
	1. Forest	40.48	48.88	51.15	51.07	50.43	51.34	51.40	52.17	51.40	54.02
	(%)	14.24	16.98	17.59	17.49	17.31	17.58	17.59	17.78	17.50	18.17
	2. Not available for Cultivation (A+B)	47.52	50.18	49.74	49.65	48.30	48.47	47.40	47.33	47.45	48.32
	(A) Area under non-agricultural uses	9.36	12.70	12.32	13.28	13.78	14.00	14.00	14.10	14.30	14.89
	%	3.29	4.41	4.24	4.55	4.73	4.79	4.79	4.81	4.87	5.01
	(B) Barren & Un-culturable Land	38.16	37.48	37.42	36.37	34.52	34.47	33.40	33.23	33.15	33.43
	%	13.42	13.02	12.87	12.46	11.85	11.80	11.43	11.32	11.29	11.25
	3. Other uncultivated land excluding fallow land (A+B+C)	49.45	40.48	40.06	39.57	39.78	38.88	39.25	39.51	39.27	38.94
	(A) Permanent Pasture & other Grazing Land	6.68	8.60	8.63	10.88	11.21	11.47	12.20	12.83	13.10	13.67
	%	2.35	2.99	2.97	3.73	3.85	3.93	4.18	4.37	4.46	4.60
	(B) Land under miscellaneous tree crops & groves not included in Net Area Sown	19.83	7.88	7.75	5.80	5.77	5.88	5.78	6.08	6.00	5.81
	%	6.97	2.74	2.67	1.99	1.98	2.01	1.98	2.07	2.04	1.95
	(C) Culturable Waste land	22.94	24.00	23.68	22.89	22.80	21.53	21.27	20.60	20.17	19.46
	%	8.07	8.34	8.14	7.84	7.83	7.37	7.28	7.02	6.87	6.55
	4. Fallow Lands (A+B)	28.13	28.95	26.37	24.77	25.00	24.12	23.35	25.32	23.70	22.99
	(A) Fallow Lands other than Current Fallows	17.45	15.15	13.48	12.75	13.04	12.54	12.00	12.62	12.25	11.07
	%	6.14	5.26	4.64	4.37	4.48	4.29	4.11	4.30	4.17	3.72
	(B) Current Fallows	10.68	13.80	12.89	12.02	11.96	11.58	11.35	12.70	11.45	11.92
	%	3.76	4.79	4.43	4.12	4.10	3.97	3.88	4.33	3.90	4.01
	5. Net Area Sown (6-7)	118.74	119.40	123.44	126.81	127.84	129.16	130.85	129.08	131.83	132.94
	%	41.76	41.48	42.45	43.43	43.88	44.23	44.79	43.99	44.89	44.72
	6. Total Cropped Area (Gross Cropped Area)	131.89	133.23	137.67	142.48	144.08	147.31	149.49	145.83	151.63	152.82
	7. Area Sown more than once	13.15	13.83	14.23	15.67	16.24	18.15	18.64	16.75	19.80	19.88
	8. Cropping Intensity*	111.07	111.58	111.53	112.36	112.70	114.05	114.25	112.98	115.02	114.95
III	Net Irrigated Area	20.85	21.05	21.12	21.87	22.09	22.76	22.53	23.16	23.40	24.04
IV	Gross Irrigated Area	22.56	23.18	23.31	24.36	24.95	25.64	25.71	26.63	26.95	27.45

Source: Report State of Indian Agriculture 2011-12, Department of Agriculture and Co-operation

* Cropping Intensity is percentage of the gross cropped area to the net area sown.

Table 2.4.1: Agricultural Land by Use in India (1950-51 to 2010-11)

(Million Hectares)

S.No.	Classification	1960-61	1961-62	1962-63	1963-64	1964-65	1965-66	1966-67	1967-68	1968-69	1969-70
I	Geographical Area for Land Utilisation Statistics	328.73	328.73	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)	298.46	299.18	305.00	305.17	305.25	305.53	305.48	306.12	305.88	303.90
	1. Forest	54.05	54.18	60.53	60.70	60.35	61.54	63.45	64.21	64.80	63.89
	(%)	18.11	18.11	19.85	19.89	19.77	20.14	20.77	20.98	21.18	21.02
	2. Not available for Cultivation (A+B)	50.75	50.72	50.27	50.08	50.24	49.49	47.51	47.30	47.23	46.15
	(A) Area under non-agricultural uses	14.84	14.80	15.11	15.27	15.44	15.17	15.35	15.47	15.64	15.86
	%	4.97	4.95	4.95	5.00	5.06	4.97	5.02	5.05	5.11	5.22
	(B) Barren & Un-culturable Land	35.91	35.92	35.16	34.81	34.80	34.32	32.16	31.83	31.59	30.29
	%	12.03	12.01	11.53	11.41	11.40	11.23	10.53	10.40	10.33	9.97
	3. Other uncultivated land excluding fallow land (A+B+C)	37.62	37.21	36.56	36.62	36.21	35.88	34.69	34.03	33.24	33.22
	(A) Permanent Pasture & other Grazing Land	13.96	14.08	14.10	14.60	14.74	14.81	14.01	13.80	13.31	13.00
	%	4.68	4.71	4.62	4.78	4.83	4.85	4.59	4.51	4.35	4.28
	(B) Land under miscellaneous tree crops & groves not included in Net Area Sown	4.45	4.50	4.56	4.37	4.11	4.07	4.01	4.00	3.87	4.44
	%	1.49	1.50	1.50	1.43	1.35	1.33	1.31	1.31	1.27	1.46
	(C) Culturable Waste land	19.21	18.63	17.90	17.65	17.36	17.00	16.67	16.23	16.06	15.78
	%	6.44	6.23	5.87	5.78	5.69	5.56	5.46	5.30	5.25	5.19
	4. Fallow Lands (A+B)	22.81	21.62	21.24	21.27	20.31	22.44	22.56	20.72	23.27	21.92
	(A) Fallow Lands other than Current Fallows	11.18	10.47	10.19	10.05	9.16	9.26	9.04	8.80	9.18	9.60
	%	3.75	3.50	3.34	3.29	3.00	3.03	2.96	2.87	3.00	3.16
	(B) Current Fallows	11.63	11.15	11.05	11.22	11.15	13.18	13.52	11.92	14.09	12.32
	%	3.90	3.73	3.62	3.68	3.65	4.31	4.43	3.89	4.61	4.05
	5. Net Area Sown (6-7)	133.20	135.39	136.34	136.48	138.12	136.20	137.23	139.87	137.32	138.69
	%	44.63	45.25	44.70	44.72	45.25	44.58	44.92	45.69	44.89	45.64
	6. Total Cropped Area (Gross Cropped Area)	152.77	156.20	156.76	156.96	159.22	155.27	157.35	163.73	159.53	162.26
	7. Area Sown more than once	19.57	20.81	20.42	20.48	21.10	19.07	20.12	23.86	22.21	23.57
	8. Cropping Intensity*	114.69	115.37	114.98	115.01	115.28	114.00	114.66	117.06	116.17	116.99
III	Net Irrigated Area	24.66	24.88	25.67	25.89	26.60	26.34	26.91	27.19	29.01	30.20
IV	Gross Irrigated Area	27.98	28.46	29.45	29.71	30.71	30.90	32.68	33.21	35.48	36.97

Source: Report State of Indian Agriculture 2011-12, Department of Agriculture and Co-operation

* Cropping Intensity is percentage of the gross cropped area to the net area sown.

Table 2.4.1: Agricultural Land by Use in India (1950-51 to 2010-11)

(Million Hectares)

S.No.	Classification	1970-71	1971-72	1972-73	1973-74	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80
I	Geographical Area for Land Utilisation Statistics	328.73	328.73	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)	303.75	304.14	304.00	304.10	304.14	304.33	304.68	304.17	304.68	304.13
	1. Forest	63.83	63.77	65.43	65.72	65.87	66.70	67.15	67.13	67.46	67.50
	(%)	21.01	20.97	21.52	21.61	21.66	21.92	22.04	22.07	22.14	22.19
	2. Not available for Cultivation (A+B)	44.59	44.97	42.47	42.01	41.53	40.23	40.45	39.25	39.34	39.69
	(A) Area under non-agricultural uses	16.47	16.97	16.65	16.80	18.37	18.66	18.93	19.04	19.20	19.54
	%	5.42	5.58	5.48	5.52	6.04	6.13	6.21	6.26	6.30	6.42
	(B) Barren & Un-culturable Land	28.12	28.00	25.82	25.21	23.16	21.57	21.52	20.21	20.14	20.15
	%	9.26	9.21	8.49	8.29	7.61	7.09	7.06	6.64	6.61	6.63
	3. Other uncultivated land excluding fallow land (A+B+C)	35.12	34.69	34.56	33.97	33.65	33.97	33.62	33.23	33.05	32.28
	(A) Permanent Pasture & other Grazing Land	13.26	12.96	12.70	12.78	12.85	12.60	12.53	12.35	12.13	12.11
	%	4.37	4.26	4.18	4.20	4.23	4.14	4.11	4.06	3.98	3.98
	(B) Land under miscellaneous tree crops & groves not included in Net Area Sown	4.36	4.28	4.53	4.13	3.77	3.63	3.62	3.70	3.62	3.52
	%	1.44	1.41	1.49	1.36	1.24	1.19	1.19	1.22	1.19	1.16
	(C) Culturable Waste land	17.50	17.45	17.33	17.06	17.03	17.74	17.47	17.18	17.30	16.65
	%	5.76	5.74	5.70	5.61	5.60	5.83	5.73	5.65	5.68	5.47
	4. Fallow Lands (A+B)	19.31	20.98	24.37	19.94	25.26	21.76	23.95	22.58	21.83	25.71
	(A) Fallow Lands other than Current Fallows	8.72	8.32	9.20	8.65	8.96	9.22	9.38	9.56	9.36	10.02
	%	2.87	2.74	3.03	2.84	2.95	3.03	3.08	3.14	3.07	3.29
	(B) Current Fallows	10.59	12.66	15.17	11.29	16.30	12.54	14.57	13.02	12.47	15.69
	%	3.49	4.16	4.99	3.71	5.36	4.12	4.78	4.28	4.09	5.16
	5. Net Area Sown (6-7)	140.80	139.72	137.15	142.55	137.80	141.66	139.48	141.96	142.98	138.90
	%	46.35	45.94	45.12	46.88	45.31	46.55	45.78	46.67	46.93	45.67
	6. Total Cropped Area (Gross Cropped Area)	165.80	165.18	162.15	170.00	164.20	171.30	167.33	172.23	174.80	169.58
	7. Area Sown more than once	25.00	25.46	25.00	27.45	26.40	29.64	27.85	30.27	31.82	30.68
	8. Cropping Intensity*	117.76	118.22	118.23	119.26	119.16	120.92	119.97	121.32	122.25	122.09
III	Net Irrigated Area	31.10	31.55	31.83	32.55	33.70	34.59	35.15	36.55	38.06	38.52
IV	Gross Irrigated Area	38.20	38.43	39.06	40.28	41.74	43.36	43.56	46.06	48.31	49.21

Source: Report State of Indian Agriculture 2011-12, Department of Agriculture and Co-operation

* Cropping Intensity is percentage of the gross cropped area to the net area sown.

Table 2.4.1: Agricultural Land by Use in India (1950-51 to 2010-11)

(Million Hectares)

S.No.	Classification	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90
I	Geographical Area for Land Utilisation Statistics	328.73	328.73	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)	304.16	304.28	304.10	304.20	304.31	304.70	305.00	304.83	304.82	304.87
	1. Forest	67.46	67.36	67.33	66.59	66.39	67.06	66.87	66.93	66.94	67.40
	(%)	22.18	22.14	22.14	21.89	21.82	22.01	21.92	21.96	21.96	22.11
	2. Not available for Cultivation (A+B)	39.54	39.72	39.96	40.56	40.48	40.72	41.03	41.27	41.20	40.94
	(A) Area under non-agricultural uses	19.59	19.63	19.86	20.23	20.45	20.63	20.87	21.16	21.29	21.25
	%	6.44	6.45	6.53	6.65	6.72	6.77	6.84	6.94	6.98	6.97
	(B) Barren & Un-culturable Land	19.95	20.09	20.10	20.33	20.03	20.09	20.16	20.11	19.91	19.69
	%	6.56	6.60	6.61	6.68	6.58	6.59	6.61	6.60	6.53	6.46
	3. Other uncultivated land excluding fallow land (A+B+C)	32.31	32.02	31.80	31.18	31.44	31.05	31.00	30.76	30.19	30.20
	(A) Permanent Pasture & other Grazing Land	12.00	12.00	11.93	12.00	12.00	11.78	11.83	11.72	11.52	11.30
	%	3.95	3.94	3.92	3.94	3.94	3.87	3.88	3.84	3.78	3.71
	(B) Land under miscellaneous tree crops & groves not included in Net Area Sown	3.57	3.60	3.54	3.62	3.56	3.56	3.63	3.51	3.51	3.80
	%	1.17	1.18	1.16	1.19	1.17	1.17	1.19	1.15	1.15	1.25
	(C) Culturable Waste land	16.74	16.42	16.33	15.56	15.88	15.71	15.54	15.53	15.16	15.10
	%	5.50	5.40	5.37	5.12	5.22	5.16	5.10	5.09	4.97	4.95
	4. Fallow Lands (A+B)	24.54	23.01	24.16	22.57	24.86	24.94	26.49	31.77	24.56	23.96
	(A) Fallow Lands other than Current Fallows	9.72	9.65	9.35	9.27	9.51	10.05	10.25	10.86	10.24	10.27
	%	3.20	3.17	3.07	3.05	3.13	3.30	3.36	3.56	3.36	3.37
	(B) Current Fallows	14.82	13.36	14.81	13.30	15.35	14.89	16.24	20.91	14.32	13.69
	%	4.87	4.39	4.87	4.37	5.04	4.89	5.32	6.86	4.70	4.49
	5. Net Area Sown (6-7)	140.29	142.12	140.81	143.22	140.91	140.90	139.58	134.08	141.89	142.33
	%	46.12	46.71	46.30	47.08	46.30	46.24	45.76	43.99	46.55	46.69
	6. Total Cropped Area (Gross Cropped Area)	172.63	176.75	172.74	179.56	176.33	178.46	176.40	170.73	182.27	182.26
	7. Area Sown more than once	32.34	34.63	31.93	36.34	35.42	37.56	36.82	36.65	40.38	39.93
	8. Cropping Intensity*	123.05	124.37	122.68	125.37	125.14	126.66	126.38	127.33	128.46	128.05
III	Net Irrigated Area	38.72	40.50	40.69	41.95	42.15	41.87	42.57	42.89	46.15	46.70
IV	Gross Irrigated Area	49.78	51.41	51.83	53.82	54.53	54.28	55.76	56.04	61.13	61.85

Source: Report State of Indian Agriculture 2011-12, Department of Agriculture and Co-operation

* Cropping Intensity is percentage of the gross cropped area to the net area sown.

Table 2.4.1: Agricultural Land by Use in India (1950-51 to 2010-11)

(Million Hectares)

S.No.	Classification	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00
I	Geographical Area for Land Utilisation Statistics	328.73	328.73	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)	304.86	305.00	304.85	304.88	304.82	304.87	304.62	304.66	305.00	305.01
	1. Forest	67.80	67.86	67.98	68.27	68.60	68.81	69.13	69.24	69.21	69.16
	(%)	22.24	22.25	22.30	22.39	22.51	22.57	22.69	22.73	22.69	22.67
	2. Not available for Cultivation (A+B)	40.46	40.73	40.89	40.90	41.01	41.36	40.51	40.59	40.86	41.12
	(A) Area under non-agricultural uses	21.08	21.46	21.77	22.21	22.55	22.36	22.55	23.13	23.34	23.59
	%	6.91	7.04	7.14	7.28	7.40	7.33	7.40	7.59	7.65	7.73
	(B) Barren & Un-culturable Land	19.38	19.27	19.12	18.69	18.46	19.00	17.96	17.46	17.52	17.53
	%	6.36	6.32	6.27	6.13	6.06	6.23	5.90	5.73	5.74	5.75
	3. Other uncultivated land excluding fallow land (A+B+C)	30.21	30.06	29.46	29.06	29.02	28.64	28.55	28.51	28.45	28.30
	(A) Permanent Pasture & other Grazing Land	11.40	11.30	11.10	10.96	11.03	11.06	10.88	10.84	10.89	10.84
	%	3.74	3.70	3.64	3.59	3.62	3.63	3.57	3.56	3.57	3.55
	(B) Land under miscellaneous tree crops & groves not included in Net Area Sown	3.81	3.76	3.78	3.70	3.73	3.48	3.65	3.73	3.67	3.72
	%	1.25	1.23	1.24	1.21	1.22	1.14	1.20	1.22	1.20	1.22
	(C) Culturable Waste land	15.00	15.00	14.58	14.40	14.26	14.10	14.02	13.94	13.89	13.74
	%	4.92	4.92	4.78	4.72	4.68	4.62	4.60	4.58	4.55	4.50
	4. Fallow Lands (A+B)	23.36	24.61	23.85	24.20	23.21	23.84	23.51	24.34	23.68	25.33
	(A) Fallow Lands other than Current Fallows	9.66	9.94	9.67	9.83	9.96	10.01	10.19	10.07	10.10	10.28
	%	3.17	3.26	3.17	3.22	3.27	3.28	3.35	3.31	3.31	3.37
	(B) Current Fallows	13.70	14.67	14.18	14.37	13.25	13.83	13.32	14.27	13.58	15.05
	%	4.49	4.81	4.65	4.71	4.35	4.54	4.37	4.68	4.45	4.93
	5. Net Area Sown (6-7)	143.00	141.64	142.61	142.43	142.91	142.20	142.93	141.96	142.75	141.07
	%	46.91	46.44	46.78	46.72	46.88	46.64	46.92	46.60	46.80	46.25
	6. Total Cropped Area (Gross Cropped Area)	185.74	182.24	185.61	186.60	188.00	187.47	189.50	190.00	191.64	188.40
	7. Area Sown more than once	42.74	40.60	43.00	44.17	45.09	45.27	46.57	48.04	48.89	47.33
	8. Cropping Intensity*	129.89	128.66	130.15	131.01	131.55	131.84	132.58	133.84	134.25	133.55
III	Net Irrigated Area	48.02	49.87	50.29	51.34	53.00	53.40	55.11	55.21	57.44	57.53
IV	Gross Irrigated Area	63.20	65.68	66.76	68.26	70.65	71.35	76.03	75.67	78.67	79.22

Source: Report State of Indian Agriculture 2011-12, Department of Agriculture and Co-operation

* Cropping Intensity is percentage of the gross cropped area to the net area sown.

Table 2.4.1: Agricultural Land by Use in India (1950-51 to 2010-11)

(Million Hectares)												
S.No.	Classification	2000-01	2001-02	2002-03#	2003-04	2004-05	2005-06(P)	2006-07(P)	2007-08(P)	2008-09(P)	2009-10(P)&	2010-11(P)
I	Geographical Area for Land Utilisation Statistics	328.73	328.73	328.73	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)	305.18	305.12	305.34	305.56	305.58	305.43	305.64	305.61	305.58	305.61	305.90
	1. Forest	69.84	69.72	69.82	69.96	69.96	70.00	70.00	70.00	70.00	70.00	70.00
	(%)	22.88	22.85	22.87	22.90	22.89	22.92	22.90	22.91	22.91	22.91	22.88
	2. Not available for Cultivation (A+B)	41.23	41.32	41.63	41.97	42.22	42.31	42.72	42.71	42.85	42.95	43.56
	(A) Area under non-agricultural uses	23.75	23.91	24.11	24.51	24.75	24.98	25.43	25.71	26.06	26.17	26.51
	%	7.78	7.84	7.90	8.02	8.10	8.18	8.32	8.41	8.53	8.56	8.67
	(B) Barren & Un-culturable Land	17.48	17.41	17.52	17.46	17.47	17.33	17.29	17.00	16.79	16.78	17.05
	%	5.73	5.71	5.74	5.71	5.72	5.67	5.66	5.56	5.49	5.49	5.57
	3. Other uncultivated land excluding fallow land (A+B+C)	27.73	27.49	27.54	27.10	27.08	27.06	27.04	26.66	26.36	26.34	26.28
	(A) Permanent Pasture & other Grazing Land	10.66	10.52	10.45	10.48	10.45	10.44	10.41	10.19	10.20	10.14	10.30
	%	3.49	3.45	3.42	3.43	3.42	3.42	3.41	3.33	3.34	3.32	3.37
	(B) Land under miscellaneous tree crops & groves not included in Net Area Sown	3.44	3.45	3.44	3.38	3.36	3.40	3.36	3.41	3.41	3.35	3.32
	%	1.13	1.13	1.13	1.11	1.10	1.11	1.10	1.12	1.12	1.10	1.09
	(C) Culturable Waste land	13.63	13.52	13.65	13.24	13.27	13.22	13.27	13.06	12.75	12.85	12.66
	%	4.47	4.43	4.47	4.33	4.34	4.33	4.34	4.27	4.17	4.20	4.14
	4. Fallow Lands (A+B)	25.03	25.87	34.29	25.79	25.66	24.90	26.01	24.83	24.47	26.23	24.59
	(A) Fallow Lands other than Current Fallows	10.26	10.53	11.96	11.31	10.87	10.69	10.51	10.32	10.28	10.48	10.32
	%	3.36	3.45	3.92	3.70	3.56	3.50	3.44	3.38	3.36	3.43	3.37
	(B) Current Fallows	14.77	15.34	22.33	14.48	14.79	14.21	15.50	14.51	14.19	15.75	14.27
	%	4.84	5.03	7.31	4.74	4.84	4.65	5.07	4.75	4.64	5.15	4.66
	5. Net Area Sown (6-7)	141.34	140.70	131.94	140.70	140.65	141.18	139.78	141.01	141.90	139.18	141.58
	%	46.31	46.11	43.21	46.05	46.03	46.22	45.73	46.14	46.44	45.54	46.28
	6. Total Cropped Area (Gross Cropped Area)	185.34	188.28	173.89	189.66	191.11	192.74	192.33	195.22	195.31	188.99	198.97
	7. Area Sown more than once	44.00	47.58	41.95	48.96	50.46	51.56	52.55	54.21	53.41	49.81	57.39
	8. Cropping Intensity*	131.13	133.82	131.79	134.80	135.88	136.52	137.59	138.44	137.64	135.79	140.54
III	Net Irrigated Area	55.13	56.92	53.87	56.96	59.21	60.79	62.70	63.10	63.20	61.93	63.6
IV	Gross Irrigated Area	76.19	78.42	73.41	78.15	81.18	84.26	86.77	87.92	88.42	85.09	89.36

Source: Report State of Indian Agriculture 2011-12, Department of Agriculture and Co-operation

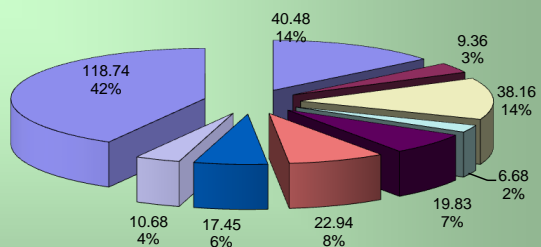
(P): Provisional

#: In 2002-03 there is significant decline in Total cropped area and net area sown due to decline in net sown in the states of Andhra Pradesh, Karnataka, Madhya Pradesh, Maharashtra, Odisha,

& In 2009-10 there is significant decline in total cropped area and net area sown due to decline in net area sown in the states of Andhra Pradesh, Bihar, Jharkhand, Rajasthan, Tamil Nadu, Uttar

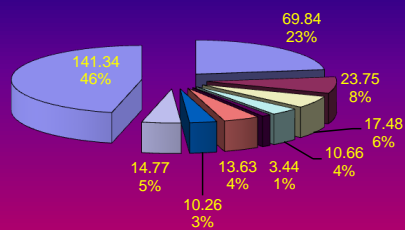
* Cropping Intensity is percentage of the gross cropped area to the net area sown.

Chart 5.1 : Land use in India -1950-51



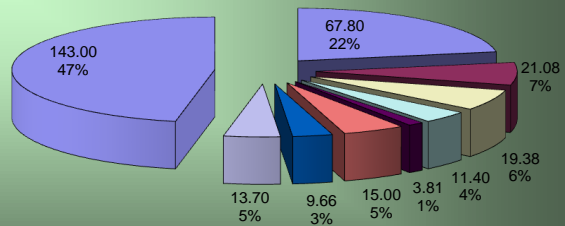
- Forest
- Area under non-agricultural uses
- Barren & Un-culturable Land
- Permanent Pasture & other Grazing Land
- Land under miscellaneous tree crops & groves not included in Net Area Sown
- Culturable Waste land
- Fallow Lands other than Current Fallows
- Current Fallows
- Net Area Sown

Land Use in India-2000-01



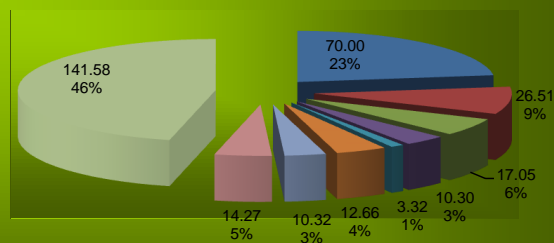
- Forest
- Area under non-agricultural uses
- Barren & Un-culturable Land
- Permanent Pasture & other Grazing Land
- Land under miscellaneous tree crops & groves not included in Net Area Sown
- Culturable Waste land
- Fallow Lands other than Current Fallows
- Current Fallows
- Net Area Sown

Land use in India-1990-91



- Forest
- Area under non-agricultural uses
- Barren & Un-culturable Land
- Permanent Pasture & other Grazing Land
- Land under miscellaneous tree crops & groves not included in Net Area Sown
- Culturable Waste land
- Fallow Lands other than Current Fallows
- Current Fallows
- Net Area Sown

Land use in India-2010-11 (P)



- Forest
- Area under non-agricultural uses
- Barren & Un-culturable Land
- Permanent Pasture & other Grazing Land
- Land under miscellaneous tree crops & groves not included in Net Area Sown
- Culturable Waste land
- Fallow Lands other than Current Fallows
- Current Fallows
- Net Area Sown

Table 2.4.2: State wise Land Use Classification and irrigated area 1996-97

Sl. No.	State/UT	Geographical Area	Reporting area for land utilisation statistics (col. 4+7+11+14+15)	Forest	Land not available for cultivation			Other uncultivated land excluding Fallow Land				Fallow Lands			Net Area Sown (col. 16-17)	Total Cropped Area (Gross Cropped Area)	Area Sown more than once	Cropping Intensity**	Agri.Land/Cultivable Land/Culturable Land (Col.9+10+14+15)	(Thousand Hectares)		
					Area put to non agricultural uses	Barren and unculturable land	Total (col. 5+ col. 6)	Permanent pastures & other grazing lands	Land under Miscellaneous Tree Crops & Groves not included in Net Area Sown	Culturable Waste Land	Total (col. 8+9+10)	Fallow Lands other than Current Fallows	Current Fallows	Total (col. 12+ col.13)						Cultivated Land(Col.13+15)	Uncultivable/Unculturable Land (Col.3-19)	Uncultivated Land (Col.3-20)
1	Andhra Pradesh	27507	27440	6245	2083	2556	4639	763	247	722	1732	1547	2443	3990	10834	13410	2576	123.8	15793	13277	11647	14163
2	Arunachal Pradesh	8374	5498	5154	5	21	26	4	36	37	77	47	30	77	164	214	50	130.6	314	195	5183	5303
3	Assam	7844	7850	1930	1045	1448	2493	170	243	87	500	69	114	183	2744	3981	1237	145.1	3257	2858	4593	4992
4	Bihar	17388	17330	2949	2380	1010	3390	107	337	353	797	962	1895	2857	7337	10141	2804	138.2	10884	9232	6446	8098
5	Chhattisgarh																					
6	Delhi	148	148	1	73	11	84		1	10	11	8	3	11	41	49	8	119.5	63	44	85	104
7	Goa	370	361	126	37		37	1	1	57	59				139	165	26	118.7	197	139	164	222
8	Gujarat	19602	18813	1861	1138	2604	3742	849	4	1974	2827	24	759	783	9600	11001	1401	114.6	12361	10359	6452	8454
9	Haryana	4421	4399	115	392	89	481	24	4	23	51		137	137	3615	6074	2459	168	3779	3752	620	647
10	Himachal Pradesh	5567	4161	1085	226	716	942	1291	98	106	1495	22	51	72	568	968	401	170.6	844	618	3317	3543
11	Jammu & Kashmir	22224	3781	2023	290	291	581	126	72	141	339	8	97	105	733	1077	344	146.9	1051	830	2730	2951
12	Jharkhand																					
13	Karnataka	19179	19050	3062	1269	799	2068	1017	317	441	1775	396	1139	1535	10610	12335	1725	116.3	12903	11749	6147	7301
14	Kerala	3886	3886	1081	318	41	359	1	23	68	92	29	56	85	2269	3021	752	133.1	2445	2325	1441	1561
15	Madhya Pradesh	44344	44347	14715	2486	1727	4213	2643	21	1469	4133	773	719	1492	19794	25451	5657	128.6	22776	20513	21571	23834
16	Maharashtra	30771	30758	5149	1350	1544	2894	1174	308	958	2439	1401	1028	2428	17848	21836	3988	122.3	21542	18876	9216	11882
17	Manipur	2233	1948	1693	26	1	27	1	6	1	8	0	0	0	220	220		100	227	220	1721	1728
18	Meghalaya	2243	2241	935	85	139	224		159	473	632	165	69	234	216	260	44	120.4	1082	285	1159	1956
19	Mizoram	2108	2095	1599		65	65			174	174	163		163	96	96		100	432	96	1663	2000
20	Nagaland	1658	1538	863	61		61		129	70	199	85	105	190	225	246	21	109.3	614	330	924	1208
21	Odisha	15571	15571	5606	866	590	1456	534	774	445	1753	336	452	788	5968	8216	2248	137.7	7975	6420	7596	9151
22	Punjab	5036	5033	288	336	64	400	6	8	21	34	9	79	87	4223	7808	3585	184.9	4339	4302	694	731
23	Rajasthan	34224	34239	2476	1686	2674	4333	1735	14	5044	6793	2020	1827	3847	16790	20693	3903	123.2	25695	18617	8544	15622
24	Sikkim	710	740	319	143	107	250	4	5	2	12	30	5	35	124	136	12	109.8	166	129	573	611
25	Tamil Nadu	13006	12998	2141	1937	481	2418	125	226	345	696	1229	1028	2257	5486	6457	971	117.7	8314	6514	4684	6484
26	Tripura	1049	1050	606	133		133		27	1	28	1	4	5	278	326	48	117.3	311	282	739	768
27	Uttar Pradesh	29441	29794	5150	2538	978	3516	296	513	945	1754	832	1067	1899	17475	26129	8654	149.5	20832	18542	8962	11252
28	Uttarakhand																					
29	West Bengal	8875	8696	1195	1623	36	1659	8	80	50	138	29	212	241	5463	9059	3596	165.8	5834	5675	2862	3021
30	A & N Islands	825	746	717	5		5		1	1	2	4	1	5	17	49	32	288.2	24	18	722	728
31	Chandigarh	11	7		4		4						1		1	2	4	200	3	2	4	5
32	Dadra and Nagar Haveli	49	49	20	4		4	1			1		1	1	23	27	4	117.4	24	24	25	25
33	Daman & Diu	11	2												2	5	3	250	2	2	0	0
34	Lakshadweep	3	3												3	4	1	148.8	3	3	0	0
35	Puducherry	48	49		15		15		1	3	4	3	2	5	25	44	19	176	34	27	15	22
	Total	328726	304621	69103	22554	17964	40518	10880	3655	14021	28555	10192	13323	23515	142931	189502	46571	132.6	184121	156254	120500	148367

Source: Directorate of Economics & Statistics, Ministry of Agriculture.

* Provisional

** Cropping Intensity is percentage of the gross cropped area to the net area sown.

Table 2.4.2: State wise Land Use Classification and Irrigated Area- 1997-98

Sl. No.	State/UT	Geographical Area	Reporting area for land utilisation statistics (col. 4+7+11+14+15)	Forest	Land not available for cultivation			Other uncultivated land excluding Fallow Land				Fallow Lands			Net Area Sown (col. 16-17)	Total Cropped Area (Gross Cropped Area)	Area Sown more than once	Cropping Intensity**	Agri.Land/Cultivable Land/Culturable Land (Col.9+10+14+15)	Cultivated Land(Col.13+15)	Uncultivable/Culturable Land (Col.3-19)	Uncultivated Land (Col.3-20)
					Area put to non agricultural uses	Barren and unculturable land	Total (col. 5+6)	Permanent pastures & other grazing lands	Land under Miscellaneous Trees & Groves not included in Net Area Sown	Culturable Waste Land	Total (col. 8+9+10)	Fallow Lands other than Current Fallows	Current Fallows	Total (col. 12+13)								
1	Andhra Pradesh	27507	27440	6199	2583	2109	4692	693	246	752	1691	1620	3392	5012	9846	12135	2289	123.2	15856	13238	11584	14202
2	Arunachal Pradesh	8374	5498	5154	5	21	26	4	36	37	77	47	30	77	164	222	58	135.5	314	194	5183	5303
3	Assam	7844	7850	1930	1045	1448	2493	170	243	86	499	67	110	177	2751	3994	1243	145.2	3257	2861	4593	4989
4	Bihar	17388	17330	2949	2405	1010	3415	107	343	328	778	931	1845	2776	7411	10014	2603	135.1	10858	9256	6471	8074
5	Chhattisgarh													0			0		0	0		
6	Delhi	148	147	1	73	10	83		1	10	11	8	3	11	41	49	8	135.7	63	44	84	102
7	Goa	370	361	125	37		37	1	1	56	58			0	141	169	28	119.9	198	141	163	220
8	Gujarat	19602	18812	1859	1140	2604	3744	849	4	1980	2833	26	676	702	9674	11156	1482	115.3	12360	10350	6452	8462
9	Haryana	4421	4402	115	355	86	441	25	5	37	67	NA	144	144	3635	6143	2508	169	3821	3779	581	623
10	Himachal Pradesh	5567	4267	1087	225	776	1001	1340	98	104	1542	23	55	78	560	984	424	175.7	840	615	3427	3652
11	Jammu & Kashmir	22224	3781	2023	291	291	582	126	72	140	338	8	94	102	736	1083	347	147.1	1050	830	2731	2951
12	Jharkhand													0					0	0		
13	Karnataka	19179	19050	3063	1284	801	2085	1005	313	439	1757	399	1671	2070	10075	11695	1620	116.1	12897	11746	6153	7304
14	Kerala	3886	3885	1081	320	39	359	1	22	65	88	28	58	86	2271	2969	698	130.7	2444	2329	1441	1556
15	Madhya Pradesh	44344	44346	14712	2515	1713	4229	2621	20	1456	4097	764	719	1483	19826	25955	6129	130.9	22785	20545	21562	23801
16	Maharashtra	30771	30758	5148	1350	1544	2894	1180	330	963	2473	1441	1081	2522	17722	21384	3662	120.7	21537	18803	9222	11956
17	Manipur	2233	1948	1693*	26	1	27	1	6	1	8	0	0	0	207	207	0	100	214	207	1721	1728
18	Meghalaya	2243	2241	932	86	141	227		161	482	643	164	68	232	207	251	44	121.3	1082	275	1159	1966
19	Mizoram	2108	2091	1599		36	36	23	31	121	175	153	31	184	98	98	0	100	434	129	1657	1962
20	Nagaland	1658	1561	863	62		62		130	69	199	83	103	186	251	260	9	103.6	636	354	925	1207
21	Odisha	15571	15571	5606	866	590	1456	534	774	445	1753	336	298	634	6122	8645	2523	141.2	7975	6420	7596	9151
22	Punjab	5036	5033	305	337	57	394	4	5	37	46	5	44	49	4238	7831	3593	184.8	4329	4282	702	750
23	Rajasthan	34224	34264	2528	1699	2622	4321	1723	15	5017	6755	1988	1597	3585	17075	22325	5250	130.7	25692	18672	8572	15592
24	Sikkim	710	738	319	143	107	250	4	5	2	11	30	5	35	122	134	12	109.8	164	127	573	611
25	Tamil Nadu	13006	12903	2140	1952	481	2433	124	230	344	698	1162	984	2146	5486	6558	1072	119.5	8206	6470	4697	6433
26	Tripura	1049	1050	606	133		133		27	1	28	1	4	5	278	318	40	114.3	311	282	739	768
27	Uttar Pradesh	29441	29757	5281	2539	941	3480	294	516	909	1719	760	1041	1801	17476	26044	8568	149	20702	18517	8962	11252
28	Uttarakhand													0			0		0	0		
29	West Bengal	8875	8686	1192	1621	30	1651	8	77	46	131	30	219	249	5664	9259	3595	169.5	6036	5883	2850	3003
30	A & N Islands	825	746	717	5		5		1	1	2	4	1	5	17	45	28	265.3	24	18	722	728
31	Chandigarh	11	7		4		4				0	1		1	2	4	2	200	3	2	4	5
32	Dadra and Nagar Haveli	49	49	20	4		4	1					1	1	23	27	4	117.4	24	24	25	25
33	Daman & Diu	11	2											0	2	5	3	250	2	2		
34	Lakshadweep	3	3								0			0	3	4	1	148.8	3	3		
35	Puducherry	48	49		15		15		1	3	4	3	2	5	25	44	19	176	34	27	15	22
	Total	328726	304611	69245	23120	17458	40578	10838	3713	13932	28483	10192	13323	23515	141950	190020	48069	133.9	183950	156226	120661	148386

* : Provisional

** Cropping Intensity is percentage of the gross cropped area to the net area sown.

Source: Directorate of Economics & Statistics, Ministry of Agriculture.

Table 2.4.2: State wise Land Use Classification and Irrigated Area- 1998-99

Sl. No.	State/UT	Geographical Area	Reporting area for land utilisation statistics (col. 4+7+11+14+15)	Forest	Land not available for cultivation		Other uncultivated land excluding Fallow Land				Fallow Lands			Net Area Sown (col. 16-17)	Total Cropped Area (Gross Cropped Area)	Area Sown more than once	Cropping Intensity**	Agri.Land/Cultivable Land/Culturable Land (Col.9+10+14+15)	Cultivated Land(Col.13+15)	Uncultivable/Unculturable Land (Col.3-19)	Uncultivated Land (Col.3-20)	
					Area put to non agricultural uses	Barren and unculturable land	Total (col. 5+ col. 6)	Permanent pastures & other grazing lands	Land under Miscellaneous Tree Crops & Groves not included in Net Area Sown	Culturable Waste Land	Total (col. 8+9+10)	Fallow Lands other than Current Fallows	Current Fallows									Total (col. 12+ col.13)
1	Andhra Pradesh	27507	27440	6199	2593	2108	4701	686	241	774	1701	1547	2443	3990	10834	13410	2576	123.8	15854	13311	11586	14129
2	Arunachal Pradesh	8374	5498	5154	5	21	26	4	36	37	77	47	30	77	164	222	58	135.1	314	195	5183	5303
3	Assam	7844	7850	1930	1051	1459	2510	167	236	80	483	82	144	226	2701	3941	1240	145.9	3243	2845	4607	5005
4	Bihar	17388	17330	2949	2428	1010	3438	106	344	323	772	926	1814	2740	7431	10053	2622	135.3	10837	9245	6493	8085
5	Chhattisgarh																					
6	Delhi	148	147	1	73	11	84	0	1	10		7	3	10	41	60	19	145.2	63	44	85	103
7	Goa	370	361	125	37		37	1	1	55	57				142	171	29	120.7	97	142	164	219
8	Gujarat	19602	18812	1865	1141	2603	3744	849	4	1973	2826	24	686	710	9667	11144	1476	115.3	12354	10353	6458	8459
9	Haryana	4421	4394	115	350	89	439	24	5	37	66	2	143	145	3628	6320	2692	174.2	3816	3772	578	622
10	Himachal Pradesh	5567	4531	1077	239	910	1148	1493	71	107	1671	28	57	85	549	970	421	176.6	812	606	3719	3924
11	Jammu & Kashmir	22224	3781	2023	291	291	582	126	72	140	338	8	97	105	733	1081	348	147.4	1050	830	2731	2951
12	Jharkhand																					
13	Karnataka	19179	19050	3063	1295	799	2095	987	312	435	1735	401	1266	1668	10489	12312	1822	117.4	12905	11756	6145	7294
14	Kerala	3886	3885	1082	334	28	362	1	20	63	84	32	68	100	2259	2917	658	129.1	2441	2327	1444	1559
15	Madhya Pradesh	44344	44349	14708	2518	1699	4217	2568	18	1505	4041	761	733	1494	19839	26011	6172	131.1	22856	20573	21493	23776
16	Maharashtra	30771	30758	5150	1352	1544	2896	1168	328	959	2454	1286	1132	2418	17841	21589	3748	121	21545	18973	9214	11786
17	Manipur	2233	1944	169.3	26	1	27	1	6	1	8	0	0	0	216	216		100	223	216	1721	1728
18	Meghalaya	2243	2241	932	85	140	225		158	470	628	166	69	235	221	266	44	120.1	1084	290	1157	1951
19	Mizoram	2108	2078	1599	85	9	94	23	31	5	58	180	47	227	101	101		100	363	147	1715	1931
20	Nagaland	1658	1560	875	65		65		124	65	189	77	92	169	261	286	25	109.4	620	353	941	1207
21	Odisha	15571	15571	5606	838	618	1456	534	774	445	1753	336	372	708	6048	8425	2377	139.3	7975	6420	7596	9151
22	Punjab	5036	5033	305	327	55	381	7	10	25	41	4	38	42	4264	7945	3681	186.3	4340	4302	692	731
23	Rajasthan	34224	34265	2557	1705	2603	4308	1718	14	5069	6801	2287	2238	4525	16073	21401	5328	133.1	25682	18311	8583	15954
24	Sikkim	710	719	319	143	107	250	4	5	2	12	30	5	35	103	113	10	109.8	146	108	573	611
25	Tamil Nadu	13006	12998	2140	1968	478	2445	123	240	348	711	1111	956	2066	5635	6627	993	117.6	8289	6590	4709	6408
26	Tripura	1049	1052	606	133		133		27	1	28	1	4	5	280	314	34	112.2	313	284	739	768
27	Uttar Pradesh	29441	297.94	5213	2556	930	3486	296	547	896	1739	742	1029	1771	17585	26162	8577	148.8	20798	18614	8995	11180
28	Uttarakhand																					
29	West Bengal	8875	8687	1192	163.8	30	1667	7	73	45	125	33	229	263	5440	9290	3849	170.8	5821	5670	2866	3017
30	A & N Islands	825	746	717	5		5		1	1	2	4	1	5	17	45	28	265.5	24	18	722	728
31	Chandigarh	11	7		4		4					1		1	2	4	2	200	3	2	4	5
32	Dadra and Nagar Haveli	49	49	20	4	0	4	1		0	1	1	1	1	23	27	4	119	24	24	25	25
33	Daman & Diu	11	2											2	5	3	250		2	2	0	0
34	Lakshadweep	3	3											3	3	1	118.9		3	3	0	0
35	Puducherry	48	49		15	0	15	0	1	3	4	3	1	5	25	43	18	172.9	33	26	15	23
	Total	328726	304982	69214	23304	17542	40845	10894	3697	13874	28465	10107	13587	23694	142763	191688	48925	134.3	184028	156350	120954	148632

* Provisional

** Cropping Intensity is percentage of the gross cropped area to the net area sown.

Source: Directorate of Economics & Statistics, Ministry of Agriculture.

Table2.4.2: State wise Land Use Classification and Irrigated Area- 1999-2000

Sl. No.	State/UT	Geographical Area	Reporting area for land utilisation statistics (col. 4+7+11+14+15)	Forest	Land not available for cultivation		Other uncultivated land excluding Fallow Land				Fallow Lands			Net Area Sown (col. 16-17)	Total Cropped Area (Gross Cropped Area)	Area Sown more than once	Cropping Intensity**	Agri.Land/Cultivable Land/Culturable Land (Col.9+10+14+15)	Cultivated Land(Col.13+15)	Uncultivable/Unculturable Land (Col.3-19)	Uncultivated Land (Col.3-20)	
					Area put to non agricultural uses	Barren and unculturable land	Total (col. 5+ col. 6)	Permanent pastures & other grazing lands	Land under Miscellaneous Trees & Groves not included in Net Area Sown	Culturable Waste Land	Total (col. 8+9+10)	Fallow Lands other than Current Fallows	Current Fallows									Total (col. 12+ col.13)
1	Andhra Pradesh	27507	27440	6199	2606	2107	4713	682	243	781	1706	1452	2761	4213	10610	13023	2413	122.7	15847	13371	11593	14069
2	Arunachal Pradesh	8374	5498	5154	5	21	26	4	36	37	77	47	30	77	164	246	82	148.1	314	195	5183	5303
3	Assam	7844	7850	1932	1070	1461	2531	163	234	80	477	65	110	176	2734	4087	1353	149.5	3224	2845	4626	5005
4	Bihar	17388	17330	2949	2430	1010	3440	105	344	321	771	922	1811	2734	7437	9979	2542	134.2	10836	9248	6494	8081
5	Chhattisgarh																					
6	Delhi	148	147	1	73	11	84	0	1	10	11	7	3	10	41	61	20	147.1	63	44	85	103
7	Goa	370	361	125	37		37	1	1	55	57				142	171	30	121.2	197	142	164	220
8	Gujarat	19602	18812	1865	1141	2604	3745	849	4	1982	2835	13	911	924	9443	10609	1166	112.3	12353	10354	6459	8458
9	Haryana	4421	4400	115	368	96	464	22	5	23	50	0	219	219	3552	6029	2478	169.8	3799	3771	602	630
10	Himachal Pradesh	5567	4532	1094	302	857	1159	1472	64	119	1655	16	56	72	551	957	405	173.5	807	608	3725	3924
11	Jammu & Kashmir	22224	3781	2023	291	291	582	126	72	140	338	8	97	105	733	1078	345	147	1050	830	2731	2951
12	Jharkhand																					
13	Karnataka	19179	19050	3063	1301	796	2098	979	305	433	1716	426	1489	1915	10259	12097	1839	117.9	12910	11747	6140	7303
14	Kerala	3886	3885	1082	354	29	383	0	19	58	77	32	72	104	2239	3002	762	134	2420	2312	1465	1574
15	Madhya Pradesh	44344	44353	14712	2518	1711	4229	2524	15	1501	4041	759	715	1474	19898	26207	6309	131.7	22888	20613	21465	23741
16	Maharashtra	30771	30758	5136	1360	1544	2904	1168	365	959	2491	1350	1215	2565	17662	21382	3720	127.3	21536	18776	9222	11982
17	Manipur	2233	1927	1693*	26	1	27	1	6	1	8	0	0	0	199	199	100	206	199	1721	1728	
18	Meghalaya	2243	2227	950	86	137	222		155	441	596	163	65	228	230	276	46	120	1054	295	1173	1932
19	Mizoram	2108	2091	1599	121	12	133	23	31	5	58	170	50	220	80	80		100	337	130	1754	1961
20	Nagaland	1658	1570	863	65		65		124	65	189	79	90	169	284	317	34	111.8	642	374	928	1196
21	Odisha	15571	15571	5606	838	618	1456	534	774	445	1753	336	345	681	6075	8524	2449	140.3	7975	6420	7596	9151
22	Punjab	5036	5033	280	378	94	472	6	5	21	33	3	35	38	4210	7847	3636	186.4	4274	4245	759	787
23	Rajasthan	34224	34258	2580	1725	2580	4305	1714	14	4987	6716	2511	2637	5148	15509	19286	3777	124.4	25658	18146	8600	16111
24	Sikkim	710	720	319	143	107	250	4	5	2	12	30	5	35	104	114	10	109.8	147	109	519	557
25	Tamil Nadu	13006	12991	2134	1978	476	2454	123	243	349	714	1140	1085	2225	5464	6519	1055	119.3	8281	6550	4710	6442
26	Tripura	1049	1049	606	131	3	134		27	1	28	1	1	2	280	289	9	118	310	281	740	768
27	Uttar Pradesh	29441	29767	5155	2579	920	3499	292	572	872	1737	730	1034	1765	17612	26378	8766	149.8	21552	19377	8946	11121
28	Uttarakhand																					
29	West Bengal	8875	8689	1192	1631	28	1659	5	76	42	124	34	208	243	5472	9545	4074	174.4	5833	5680	2856	3009
30	A & N Islands	825	746	717	5		5		1	1	2	4	1	5	17	43	26	254.9	24	18	722	728
31	Chandigarh	11	7	0	3		3		1		1	0	0	0	2	3	1	170.6	3	2	4	5
32	Dadra and Nagar Haveli	49	49	20	4	0	4	1		0	1	1	0	1	23	29	6	124.2	24	24	25	25
33	Daman & Diu	11	2												2	3	1	140	2	2	0	0
34	Lakshadweep	3	147	1	73	11	84	0	1	10	11	7	3	10	41	61	20	147.1	63	44	85	103
35	Puducherry	48	3												3	3	1	118.9	3	3	0	0
	Total	328726	304946	69164	23586	17511	41098	10798	3744	13735	28277	10302	15048	25350	141058	188428	47371	133.6	184602	156735	121021	148888

Source: Directorate of Economics & Statistics, Ministry of Agriculture.

* Provisional

** Cropping Intensity is percentage of the gross cropped area to the net area sown.

Table 2.4.2: State wise Land Use Classification and Irrigated Area- 2000-01

Sl. No.	State/UT	Geographical Area	Reporting area for land utilisation statistics (col. 4+7+11+14+15)	Forest	Land not available for cultivation		Other uncultivated land excluding Fallow Land				Fallow Lands			Net Area Sown (col. 16-17)	Total Cropped Area (Gross Cropped Area)	Area Sown more than once	Cropping Intensity**	Agri.Land/Cultivable Land/Culturable Land (Col.9+10+14+15)	Cultivated Land(Col.13+15)	Uncultivable/Unculturable Land (Col.3-19)	Uncultivated Land (Col.3-20)	
					Area put to non agricultural uses	Barren and unculturable land	Total (col. 5+ col. 6)	Permanent pastures & other grazing lands	Land under Miscellaneous Trees & Groves not included in Net Area Sown	Culturable Waste Land	Total (col. 8+9+10)	Fallow Lands other than Current Fallows	Current Fallows									Total (col. 12+13)
1	Andhra Pradesh	27507	27440	6199	2624	2100	4725	675	269	728	1673	1417	2312	3729	11115	13545	2431	121.9	15841	13427	11599	14013
2	Arunachal Pradesh	8374	5547	5154		32	32		46	28	74	64	23	87	200	245	45	122.6	361	223	5186	5324
3	Assam	7844	7850	1933	1079	1453	2532	160	209	76	445	67	80	147	2793	4092	1298	146.5	3225	2873	4625	4977
4	Bihar	9416	9360	616	1638	437	2075	18	231	46	295	135	576	711	5663	7992	2330	141.1	6651	6238	2709	3121
5	Chhattisgarh	13519	13787	6303	679	344	1023	852	1	336	1189	229	280	509	4763	5327	564	111.8	5609	5043	8178	8744
6	Delhi	148	147	1	77	13	90	0	1	10	11	7	4	12	34	53	19	155.2	57	38	91	109
7	Goa	370	361	125	37		37	1	1	55	57				141	171	30	121.4	197	141	164	220
8	Gujarat	19602	18639	1706	1129	2600	3729	851	4	1985	2840	13	919	932	9433	10440	1007	110.7	12354	10352	6285	8287
9	Haryana	4421	4402	115	368	102	469	34	7	19	60	0	232	232	3526	6115	2589	173.4	3783	3758	619	645
10	Himachal Pradesh	5567	4547	1094	314	807	1121	1529	57	124	1711	13	54	68	555	948	393	170.9	804	609	3744	3939
11	Jammu & Kashmir	22224	3781	2023	291	291	582	126	72	140	338	8	81	90	748	1115	367	149	1050	830	2731	2951
12	Jharkhand	7972	7970	2333	792	573	1366	88	113	274	476	783	1244	2027	1769	2054	285	116.1	4184	3013	3786	4957
13	Karnataka	19179	19050	3068	1312	794	2106	959	303	427	1689	409	1367	1776	10410	12284	1874	118	12916	11778	6134	7272
14	Kerala	3886	3885	1082	382	29	411	0	15	59	75	34	78	112	2206	3022	816	137	2393	2284	1493	1602
15	Madhya Pradesh	30825	30755	8655	1889	1349	3237	1585	20	1201	2806	575	818	1394	14664	17870	3207	121.9	17278	15482	13477	15273
16	Maharashtra	30825	30755	8655	1889	1349	3237	1585	20	1201	2806	575	818	1394	14664	17870	3207	121.9	17278	15482	13477	15273
17	Manipur	2233	1936	1693*	26	1	27	1	6	1	8	0	0	0	209	209		100	215	209	1721	1728
18	Meghalaya	2243	2227	951	87	136	223		155	441	596	162	65	227	230	277	46	120.1	1053	295	1174	1932
19	Mizoram	2108	2097	1626	122	16	138	23	31	5	58	156	36	192	82	82		100	310	118	1787	1979
20	Nagaland	1658	1590	863	66		66		125	65	190	79	91	170	301	336	35	111.6	661	392	929	1198
21	Odisha	15571	15571	5813	999	843	1842	443	482	392	1317	430	340	770	5829	7878	2049	135.2	7473	6169	8098	9402
22	Punjab	5036	5033	280	409	28	437	4	3	15	22	3	40	44	4250	7941	3691	186.8	4312	4290	721	742
23	Rajasthan	34224	34265	2606	1740	2566	4306	1707	14	4908	6629	2444	2415	4859	15865	19230	3365	121.2	25646	18280	8619	15985
24	Sikkim	710	722	319	143	107	250	4	5	2	12	30	5	35	106	117	10	109.8	149	111	573	611
25	Tamil Nadu	13006	12991	2134	1986	476	2462	123	255	352	730	1228	1134	2362	5303	6338	1035	119.5	8273	6438	4718	6554
26	Tripura	1049	1049	606	131	3	134		27	1	28	1	1	2	280	301	21	107.4	310	281	740	768
27	Uttar Pradesh	24093	24201	1689	2436	617	3054	70	340	535	945	641	1048	1689	16825	25304	8479	150.4	19389	17873	4812	6328
28	Uttarakhand	5348	5672	3465	152	310	462	229	252	385	867	69	38	107	770	1226	456	159.2	1515	808	4157	4863
29	West Bengal	8875	8688	1190	1567	27	1594	4	57	37	98	29	358	387	5417	9117	3699	168.3	5899	5776	2789	2912
30	A & N Islands	825	740	717	1		1		2	1	3	2	1	3	16	44	28	273.3	22	17	718	723
31	Chandigarh	11	7	0	4		4		0		0	0	0	0	2	3	1	170.9	2	2	5	5
32	Dadra and Nagar Haveli	49	49	20	4	0	4	1		0	1	1	1	1	23	30	7	131.1	24	24	25	25
33	Daman & Diu	11	3												3	3	0	110	3	3	0	0
34	Lakshadweep	3	3												3	3	0	100.4	3	3	0	0
35	Puducherry	48	49		15	0	16	0	1	4	5	3	1	4	24	43	19	177.9	33	25	16	24
	Total	328726	305174	69529	23864	17598	41462	10656	3435	13611	27701	10309	14770	25079	141403	185373	43970	131.1	183528	156174	121646	149000

* : Provisional

** Cropping Intensity is percentage of the gross cropped area to the net area sown.

Source: Directorate of Economics & Statistics, Ministry of Agriculture.

Table 2.4.2: State wise Land Use Classification and Irrigated Area- 2001-02

Sl. No.	State/UT	Geographical Area	Reporting area for land utilisation statistics (col. 4+7+11+14+15)	Forest	(Thousand Hectares)																	
					Land not available for cultivation			Other uncultivated land excluding Fallow Land				Fallow Lands			Net Area Sown (col. 16-17)	Total Cropped Area (Gross Cropped Area)	Area Sown more than once	Cropping Intensity**	Agri.Land/Cultivable Land/Culturable Land (Col.9+10+14+15)	Cultivated Land(Col.13+15)	Uncultivable/Unculturable Land (Col.3-19)	Uncultivated Land (Col.3-20)
					Area put to non agricultural uses	Barren and unculturable land	Total (col. 5+6)	Permanent pastures & other grazing lands	Land under Miscellaneous Tree Crops & Groves not included in Net Area Sown	Culturable Waste Land	Total (col. 8+9+10)	Fallow Lands other than Current Fallows	Current Fallows	Total (col. 12+13)								
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
1	Andhra Pradesh	27507	27440	6199	2665	2084	4749	676	277	700	1654	1421	3007	4429	10410	12756	2347	122.5	15816	13417	11624	14023
2	Arunachal Pradesh	8374	5498	5154*	5	21	26	4	36	37	77	47	30	77	164	248	84	150.9	314	195	5183	5303
3	Assam	7844	7850	1933	1081	1453	2533	160	209	77	445	99	164	2774	3984	1209	143.6	3224	2873	4626	4977	
4	Bihar	9416	9360	622	1642	436	2079	18	235	46	299	576	711	5663	7992	2330	141.1	139.4	6651	6238	2709	3121
5	Chhattisgarh	13519	13736	6247	687	342	1029	849	4	334	1186	243	474	4800	5595	796	116.6	116.6	5612	5042	8124	8694
6	Delhi	148	147	1	75	13	88	0	1	10	11	7	10	18	29	52	23	179.1	58	40	89	108
7	Goa	370	361	125	37		37	1	1	55	57				141	168	27	119.1	197	141	164	220
8	Gujarat	19602	18639	1706	1131	2595	3726	850	4	1988	2842	11	733	744	9622	10734	1112	111.6	12357	10354	6282	8285
9	Haryana	4421	4372	45	425	101	526	25	7	30	61	0	173	173	3566	6318	2752	177.2	3776	3739	596	633
10	Himachal Pradesh	5567	4543	1099	317	807	1124	1519	60	122	1701	13	56	69	550	956	406	173.9	801	606	3741	3937
11	Jammu & Kashmir	22224	3781	2023	293	289	582	125	72	140	337	8	82	90	748	1106	358	147.8	1050	831	2731	2950
12	Jharkhand	7972	7970	2239	759	564	1323	110	83	334	527	783	1244	2027	1769	2088	319	118	4184	3013	3786	4957
13	Karnataka	19179	19050	3070	1325	788	2113	956	302	423	1681	426	1728	2154	10031	11670	1638	116.3	12910	11760	6139	7290
14	Kerala	3886	3885	1082	392	30	422	0	14	64	78	34	79	114	2191	2992	802	136.6	2382	2270	1504	1616
15	Madhya Pradesh	30825	30755	8683	1860	1396	3255	1481	18	1218	2718	604	636	1241	14859	19044	4185	128.2	17336	15495	13419	15260
16	Maharashtra	30771	30758	5150	1368	1544	2912	1168	328	959	2454	1195	1222	2417	17619	22381	4762	127	21196	18841	9562	11917
17	Manipur	2233	1993	1742	26	1	27	1	6	1	8	0	0	0	216	216		100	223	216	1721	1728
18	Meghalaya	2243	2227	951	87	136	223		155	441	596	162	65	227	230	278	47	120.6	1053	295	1174	1932
19	Mizoram	2108	2081	1626	123	8	130	11	19	5	35	163	36	199	91	91		100	314	126	1768	1955
20	Nagaland	1658	1608	863	67		67		124	61	184	74	87	161	333	378	45	113.5	678	419	930	1188
21	Odisha	15571	15571	5813	999	843	1842	443	482	392	1317	434	320	754	5845	8799	2954	150.5	7473	6165	8098	9406
22	Punjab	5036	5033	306	402	32	434	3	6	4	13	1	24	26	4254	7941	3687	186.7	4290	4278	743	754
23	Rajasthan	34224	34265	2645	1752	2521	4272	1699	13	4731	6442	2321	1819	4141	16765	20798	4033	124.1	25649	18584	8616	15681
24	Sikkim	710	688	584	6		6		9	3	12	30	5	35	112	123	11	109.8	154	117	573	611
25	Tamil Nadu	13006	12991	2132	1998	477	2476	118	271	387	777	1409	1026	2435	5172	6226	1054	120.4	8265	6198	4726	6793
26	Tripura	1049	1049	606	133		133		26	1	26	1	1	2	280	299	19	106.9	310	281	740	768
27	Uttar Pradesh	24093	24202	1689	2514	595	3109	71	355	518	943	624	1026	1649	16812	25447	8635	151.4	19334	17838	4868	6364
28	Uttarakhand	5348	5672	3465	152	310	462	229	251	386	866	67	36	102	776	1221	445	157.3	1516	812	4156	4860
29	West Bengal	8875	8695	1184	1548	25	1573	4	56	38	98	28	289	318	5522	9779	4257	177.1	5933	5811	2761	2884
30	A & N Islands	825	795	717	21	3	24	6	18	12	37	28	1	3	16	43	27	269.9	22	17	718	723
31	Chandigarh	11	7	0	4		4		0	0	0	2	0	0	2	3	1	170.9	2	2	5	5
32	Dadra and Nagar Haveli	49	49	20	4	0	4	1		0	1	0	1	2	23	30	7	132	24	24	25	25
33	Daman & Diu	11	3		0		0		0	0	0	1			3	3	0	103.3	3	3	0	0
34	Lakshadweep	3	3												3	3	0	103.3	3	3	0	0
35	Puducherry	48	49		16	0	16	0	1	4	5		1	4	24	39	15	162.9	33	25	16	24
	Total	328726	305127	69720	23914	17414	14328	10528	3442	13520	27489	10513	15343	25856	140734	188014	47280	133.6	183552	156077	121575	149050

* : Provisional

** Cropping Intensity is percentage of the gross cropped area to the net area sown.

Source: Directorate of Economics & Statistics, Ministry of Agriculture.

Table 2.4.2: State wise Land Use Classification and Irrigated Area- 2002-03

Sl. No.	State/UT	Geographical Area	Reporting area for land utilisation statistics (col. 4+7+11+14+15)	Forest	(Thousand Hectares)																	
					Land not available for cultivation			Other uncultivated land excluding Fallow Land				Fallow Lands			Net Area Sown (col. 16-17)	Total Cropped Area (Gross Cropped Area)	Area Sown more than once	Cropping Intensity**	Agri.Land/Cultivable Land/Culturable Land (Col.9+10+14+15)	Cultivated Land(Col.13+15)	Uncultivable/Unculturable Land (Col.3-19)	Uncultivated Land (Col.3-20)
					Area put to non agricultural uses	Barren and unculturable land	Total (col. 5+6)	Permanent pastures & other grazing lands	Land under Miscellaneous Tree Crops & Groves not included in Net Area Sown	Culturable Waste Land	Total (col. 8+9+10)	Fallow Lands other than Current Fallows	Current Fallows	Total (col. 12+13)								
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
1	Andhra Pradesh	27507	27440	6199	2703	2084	4787	676	277	701	1654	1679	3507	5186	9615	11559	1944	120.2	15778	13121	11662	14319
2	Arunachal Pradesh	8374	5547	5154		32	32		46	28	74	64	23	87	200	255	55	127.6	361	223	5186	5324
3	Assam	7844	7850	1933	1081	1453	2533	160	209	77	445	66	99	164	2774	3965	1190	142.9	3224	2873	4626	4977
4	Bihar	9416	9360	622	1643	436	2079	18	237	46	301	133	499	632	5725	7957	2232	139	6641	6225	2719	3135
5	Chhattisgarh	13519	13790	6300	614	420	1034	856	1	337	1194	235	273	508	4754	5446	692	114.5	5600	5027	8190	8763
6	Delhi	148	147	1	75	13	88	0	1	10	11	7	10	18	29	45	15	152.2	58	40	89	108
7	Goa	370	361	125	37		37	1	1	55	57				141	164	22	115.8	197	141	164	220
8	Gujarat	19602	18868	1854	1145	2608	3753	850	4	1985	2839	11	930	941	9481	10631	1149	112.1	12411	10411	6457	8457
9	Haryana	4421	4375	45	470	99	569	25	6	35	67	3	233	236	3458	6032	2574	174.4	3735	3691	639	684
10	Himachal Pradesh	5567	4543	1099	319	806	1125	1518	58	122	1698	15	60	75	545	945	401	173.6	800	605	3743	3938
11	Jammu & Kashmir	22224	3781	2023	293	289	582	125	72	142	339	13	91	105	733	1078	345	147.1	1050	824	2731	2957
12	Jharkhand	7972	7970	2333	792	573	1366	88	113	274	476	783	1244	2027	1769	2000	231	113.1	4184	3013	3786	4957
13	Karnataka	19179	19050	3070	1332	788	2120	952	305	421	1678	513	1832	2344	9838	11532	1694	117.2	12908	11669	6142	7381
14	Kerala	3886	3885	1082	393	30	423	0	13	69	83	39	71	110	2189	2970	782	135.7	2381	2259	1505	1626
15	Madhya Pradesh	30825	30756	8681	1890	1417	3307	1394	19	1213	2627	626	997	1622	14518	18078	3560	124.5	17373	15514	13383	15241
16	Maharashtra	30771	30758	5214	1380	1720	3099	1249	247	915	2410	1200	1255	2455	17579	22387	4808	127.4	21196	18834	9562	11924
17	Manipur	2233	1989	1742*	26	1	27	1	6	1	8	0	0	0	212*	212		100	219	212	1721	1728
18	Meghalaya	2243	2227	951	87	136	223		155	441	596	162	65	227	230	285	55	123.7	1053	295	1174	1932
19	Mizoram	2108	2047	1542	124	8	132	9	15	10	34	206	41	247	92	92		100	364	134	1683	1913
20	Nagaland	1658	1599	863	67		67		124	60	184	74	86	161	324	370	45	114	669	411	930	1188
21	Odisha	15571	15571	5813	999	843	1842	443	482	392	1317	434	485	919	5680	7853	2173	138.2	7473	6165	8098	9406
22	Punjab	5036	5033	308	412	31	443	6	5	6	17	1	22	23	4243	7826	3583	184.5	4276	4265	757	768
23	Rajasthan	34224	34266	2651	1765	2514	4279	1703	12	4866	6582	3259	6688	9947	10807	13218	2410	122.3	25633	17495	8633	16771
24	Sikkim	710	724	319	143	107	250	4	5	2	12	30	5	35	108	119	11	109.8	151	113	573	611
25	Tamil Nadu	710	724	319	143	107	250	4	5	2	12	30	5	35	108	119	11	109.8	151	113	573	611
26	Tripura	1049	1049	606	131	3	134		27	1	28	1	1	2	280	309	29	110.4	310	281	740	768
27	Uttar Pradesh	24093	24202	1689	2553	575	3129	69	342	500	911	630	1247	1877	16597	24311	7714	146.5	19315	17844	4887	6358
28	Uttarakhand	5348	5672	3468	152	312	465	229	252	386	868	71	41	112	759	1212	453	159.7	1510	800	4162	4872
29	West Bengal	8875	8687	1194	1605	28	1633	5	55	37	98	26	381	407	5354	9457	4103	176.6	5854	5735	2832	2951
30	A & N Islands	825	740	717	1		1		2	1	3	2	1	3	16	46	30	288.9	22	17	718	723
31	Chandigarh	11	7	0	4		4		0	0	0	0	0	0	2	3	1	170.8	2	2	5	5
32	Dadra and Nagar Haveli	49	49	20	4	0	4	1		0	1	1	1	1	23	30	7	131.5	24	24	25	25
33	Daman & Diu	11	3												3	3	0	100	3	3	0	0
34	Lakshadweep	3	3												3	3	0	100.4	3	3	0	0
35	Puducherry	48	49		17	0	17	0	1	4	5	2	3	5	22	36	15	168.7	32	25	17	24
	Total	328726	305357	69821	24119	17517	41636	10450	3431	13651	27532	11966	22459	34426	131943	173889	41947	131.8	183450	154402	121907	150956

* : Provisional

** Cropping Intensity is percentage of the gross cropped area to the net area sown.

Source: Directorate of Economics & Statistics, Ministry of Agriculture.

Table2.4.2: State wise Land Use Classification and Irrigated Area- 2003-04

Sl. No.	State/UT	Geographical Area	Reporting area for land utilisation statistics (col. 4+7+11+14+15)	Forest	(Thousand Hectares)																	
					Land not available for cultivation			Other uncultivated land excluding Fallow Land				Fallow Lands			Net Area Sown (col. 16-17)	Total Cropped Area (Gross Cropped Area)	Area Sown more than once	Cropping Intensity**	Agri.Land/Cultivable Land/Culturable Land (Col.9+10+14+15)	Cultivated Land(Col.13+15)	Uncultivable/Unculturable Land (Col.3-19)	Uncultivated Land (Col.3-20)
					Area put to non agricultural uses	Barren and unculturable land	Total (col. 5+6)	Permanent pastures & other grazing lands	Land under Miscellaneous Tree Crops & Groves not included in Net Area Sown	Culturable Waste Land	Total (col. 8+9+10)	Fallow Lands other than Current Fallows	Current Fallows	Total (col. 12+13)								
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
1	Andhra Pradesh	27507	27440	6199	2692	2084	4775	676	277	701	1654	1658	3036	4693	10118	12366	2248	122.2	15789	13154	11651	14286
2	Arunachal Pradesh	8374	5547	5154		32	32		46	28	74	64	23	87	200	259	59	129.7	361	223	5186	5324
3	Assam	7844	7850	1933	1081	1453	2533	160	209	77	445	66	99	164	2774	3958	1183	142.7	3224	2873	4626	4977
4	Bihar	9416	9360	622	1645	436	2081	18	238	46	302	130	513	643	5712	7882	2170	138	6640	6225	2720	3134
5	Chhattisgarh	13519	13790	6300	696	343	1039	848	1	344	1192	232	248	480	4779	5707	928	119.4	5604	5027	8186	8763
6	Delhi	148	147	1	75	14	89	0	1	10	11	7	12	19	27	44	18	165	57	39	90	109
7	Goa	370	361	125	37		37	1	1	55	57				141	169	27	119.2	197	141	164	220
8	Gujarat	19602	18868	1854	1145	2607	3753	850	4	1977	2831	11	568	579	9852	11421	1570	115.9	12412	10420	6457	8449
9	Haryana	4421	4374	45	432	100	532	25	6	36	67	4	192	196	3534	6388	2854	180.8	3771	3726	602	648
10	Himachal Pradesh	5567	4544	1099	453	673	1126	1515	62	128	1706	17	56	73	541	956	415	176.8	804	597	3740	3948
11	Jammu & Kashmir	22224	3781	2023	293	289	582	125	72	142	339	12	78	90	747	1102	355	147.6	1050	825	2731	2956
12	Jharkhand	7972	7970	2333	792	573	1366	88	113	274	476	783	1244	2027	1769	2164	395	122.3	4184	3013	3786	4957
13	Karnataka	19179	19050	3071	1336	788	2124	947	301	419	1668	487	1854	2341	9847	11450	1604	116.3	12908	11700	6142	7350
14	Kerala	3886	3885	1082	396	29	425	0	11	67	78	41	69	110	2190	2954	765	134.9	2378	2259	1507	1626
15	Madhya Pradesh	30825	30756	8683	1925	1425	3350	1360	19	1177	2557	621	599	1220	14945	19788	4843	132.4	17362	15544	13394	15212
16	Maharashtra	30771	30758	5214	1390	1725	3115	1249	251	917	2418	1216	1364	2580	17432	22190	4758	127.3	21180	18796	9578	11962
17	Manipur	2233	1945	1742*	26	1	27	1	6	1	8	0	0	0	217	217	100	224	218	1721	1728	
18	Meghalaya	2243	2227	951	87	128	215		161	444	605	167	63	229	227	272	46	120.2	1061	289	1166	1938
19	Mizoram	2108	2085	1594	125	9	134	6	15	6	27	194	38	233	98	98	100	352	136	1733	1949	
20	Nagaland	1658	1583	863	75		75		122	58	179	76	84	160	305	370	65	121.2	645	389	938	1193
21	Odisha	15571	15571	5813	999	843	1842	443	482	392	1317	434	370	804	5795	8637	2842	149	7473	6165	8098	9406
22	Punjab	5036	5033	308	429	21	451	4	4	9	17	0	13	14	4243	7985	3742	188.2	4270	4256	763	777
23	Rajasthan	34224	34266	2661	1760	2499	4259	1708	14	4547	6269	2407	1275	3683	17394	21664	4270	124.5	25638	18670	8628	15596
24	Sikkim	710	726	319	143	107	250	4	5	2	12	30	5	35	110	121	11	109.8	153	115	573	611
25	Tamil Nadu	13006	13027	2122	2113	509	2623	113	283	379	776	1863	954	2817	4689	5316	627	113.4	8168	5643	4858	7384
26	Tripura	1049	1049	606	131	3	134		27	1	28	1	1	2	280	291	11	104	310	281	740	768
27	Uttar Pradesh	24093	24201	1686	2594	548	3143	66	359	468	892	594	1137	1731	16750	25425	8675	151.8	19307	17887	4894	6315
28	Uttarakhand	5348	5668	3465	152	311	463	229	251	386	866	71	43	114	761	1222	461	160.6	1511	804	4157	4865
29	West Bengal	8875	8688	1171	1609	27	1636	5	58	34	97	22	333	355	5428	9661	4234	178	5876	5761	2812	2926
30	A & N Islands	825	740	717	1		1		2	1	3	2	1	3	16	46	30	286.1	22	17	718	723
31	Chandigarh	11	7	0	5		5		0	0	0	0	0	0	1	2	1	147.5	2	1	5	6
32	Dadra and Nagar Haveli	49	49	20	4	0	4	1		0	1	1	1	2	22	30	7	133.2	24	24	25	25
33	Daman & Diu	11	3												3	3	0	103.3	3	3	0	0
34	Lakshadweep	3	3												3	3	0	100.4	3	3	0	0
35	Puducherry	48	49		17	0	17		1	4	5	2	3	6	21	37	17	181.1	31	24	17	25
	Total	32876	30566	69968	24516	17466	41982	10484	3381	13241	27106	11313	14489	25802	140708	189661	48953	134.8	183132	155198	122434	150369

* : Provisional

** Cropping Intensity is percentage of the gross cropped area to the net area sown.

Source: Directorate of Economics & Statistics, Ministry of Agriculture.

Table 2.4.2: State wise Land Use Classification and Irrigated Area- 2004-05

Sl. No.	State/UT	Geographical Area	Reporting area for land utilisation statistics (col. 4+7+11+14+15)	Forest	(Thousand Hectares)																	
					Land not available for cultivation			Other uncultivated land excluding Fallow Land				Fallow Lands			Net Area Sown (col. 16-17)	Total Cropped Area (Gross Cropped Area)	Area Sown more than once	Cropping Intensity**	Agri.Land/Cultivable Land/Culturable Land (Col.9+10+14+15)	Cultivated Land(Col.13+15)	Uncultivable/Unculturable Land (Col.3-19)	Uncultivated Land (Col.3-20)
					Area put to non agricultural uses	Barren and unculturable land	Total (col. 5+ col. 6)	Permanent pastures & other grazing lands	Land under Miscellaneous Tree Crops & Groves not included in Net Area Sown	Culturable Waste Land	Total (col. 8+9+10)	Fallow Lands other than Current Fallows	Current Fallows	Total (col. 12+ col.13)								
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
1	Andhra Pradesh	27507	27336	6199	2608	2084	4691	676	278	694	1648	1651	2819	4469	10327	12519	2191	121.2	15769	13146	11567	14190
2	Arunachal Pradesh	8374	5547	5154		32	32		46	28	74	64	23	87	200	260	60	130.2	361	223	5186	5324
3	Assam	7844	7850	1933	1081	1453	2533	160	209	77	445	66	99	164	2774	3756	982	135.4	3224	2873	4626	4977
4	Bihar	9416	9360	622	1646	436	2082	17	239	46	303	133	648	781	5572	7399	1827	132.8	6639	6220	2721	3139
5	Chhattisgarh	13519	13790	6300	698	347	1045	850	1	337	1188	250	238	487	4770	5716	946	119.8	5595	5008	8194	8782
6	Delhi	148	147	1	74	14	88	0	1	10	11	7	12	19	28	45	18	165.1	58	39	90	108
7	Goa	370	361	125	37		37	1	1	55	57		8	8	134	169	36	126.6	197	142	164	219
8	Gujarat	19602	18868	1854	1145	2607	3753	850	4	1977	2831	11	568	579	9852	11009	1158	111.7	12412	10420	6457	8449
9	Haryana	4421	4374	44	429	96	524	25	6	35	65	11	201	213	3527	6425	2898	182.2	3780	3728	593	645
10	Himachal Pradesh	5567	4544	1099	453	673	1126	1515	62	128	1706	17	56	73	541	984	443	182	804	597	3740	3948
11	Jammu & Kashmir	22224	3781	2023	293	289	582	125	71	141	338	12	73	85	752	1102	349	146.4	1050	826	2731	2955
12	Jharkhand	7972	7970	2333	792	573	1366	88	113	274	476	783	1244	2027	1769	2068	299	116.9	4184	3013	3786	4957
13	Karnataka	19179	19050	3070	1340	788	2128	945	297	420	1663	443	1247	1689	10499	12807	2308	122	12906	11746	6143	7304
14	Kerala	3886	3885	1082	430	29	459	0	10	70	81	41	69	110	2155	2996	841	139	2345	2224	1541	1662
15	Madhya Pradesh	30825	30756	8688	1924	1440	3364	1341	20	1175	2536	596	596	1192	14975	20203	5228	134.9	17362	15571	13394	15185
16	Maharashtra	30771	30758	5213	1393	1726	3119	1251	249	918	2417	1204	1316	2520	17490	22368	4878	127.9	21176	18806	9582	11953
17	Manipur	2233	1966	1693*	26	1	27	1	6	1	8	0	0	0	238	238		100	245	239	1721	1728
18	Meghalaya	2243	2227	942	90	138	228		157	452	609	166	63	230	219	265	46	121	1057	282	1170	1945
19	Mizoram	2108	2075	1594	126	9	134	5	10	5	21	181	50	231	96	96		100	342	146	1733	1929
20	Nagaland	1658	1584	863	76		76		121	57	178	75	82	157	309	380	71	123.1	645	391	939	1193
21	Odisha	15571	15571	5813	999	843	1842	443	482	392	1317	434	426	860	5739	8718	2979	151.9	7473	6165	8098	9406
22	Punjab	5036	5033	308	429	21	451	4	4	9	17	0	13	14	4243	8069	3826	190.2	4270	4256	763	777
23	Rajasthan	34224	34266	2661	1776	2491	4267	1709	14	4603	6325	2162	2302	4464	16549	21062	4514	127.3	25630	18851	8636	15415
24	Sikkim	710	728	319	143	107	250	4	5	2	12	30	5	35	112	123	11	109.8	155	117	573	611
25	Tamil Nadu	13006	13027	2122	2125	509	2634	114	290	374	778	1704	692	2396	5097	5889	792	115.5	8157	5789	4869	7238
26	Tripura	1049	1049	606	131	3	134		27	1	28	1	1	2	280	297	17	106	310	281	740	768
27	Uttar Pradesh	24093	24201	1688	2649	530	3178	64	344	454	862	574	1217	1791	16683	24578	7895	147.3	19272	17900	4930	6301
28	Uttarakhand	5348	5670	3465	152	312	464	229	249	386	864	68	42	110	767	1235	468	161	1512	808	4158	4862
29	West Bengal	8875	8687	1175	1674	26	1700	5	59	36	99	25	314	339	5374	9523	4149	177.2	5808	5688	2879	2999
30	A & N Islands	825	740	717	1		1		2	1	3	2	1	3	16	47	31	291.6	22	17	718	723
31	Chandigarh	11	7	0	5		5		0		0	0	0	0	1	2	1	150	2	1	5	6
32	Dadra and Nagar Haveli	49	49	20	4	0	4	1			0	1	1	1	23	29	6	126.8	24	24	25	25
33	Daman & Diu	11	3												3	3	0	100	3	3	0	0
34	Lakshadweep	3	3												3	3	0	100.4	3	3	0	0
35	Puducherry	48	49		17	0	17	0	1	4	5	3	3	5	21	39	18	184.5	31	24	17	25
	Total	328726	305587	69960	24760	17468	42229	10452	3362	13272	27086	10878	14792	25670	140642	191103	50461	135.9	182946	155434	122641	150152
	* : Provisional																					
	** Cropping Intensity is percentage of the gross cropped area to the net area sown.																					
	Source: Directorate of Economics & Statistics, Ministry of Agriculture.																					

Table 2.4.2: State wise Land Use Classification and Irrigated Area- 2005-06

Sl. No.	State/UT	Geographical Area	Reporting area for land utilisation statistics (col. 4+7+11+14+15)	Forest	(Thousand Hectares)																		
					Land not available for cultivation			Other uncultivated land excluding Fallow Land				Fallow Lands			Net Area Sown (col. 16-17)	Total Cropped Area (Gross Cropped Area)	Area Sown more than once	Cropping Intensity**	Agri.Land/Cultivable Land/Culturable Land (Col.9+10+14+15)	Cultivated Land(Col.13+15)	Uncultivable/Unculturable Land (Col.3-19)	Uncultivated Land (Col.3-20)	
					Area put to non agricultural uses	Barren and unculturable land	Total (col. 5+6)	Permanent pastures & other grazing lands	Land under Miscellaneous Tree Crops & Groves not included in Net Area Sown	Culturable Waste Land	Total (col. 8+9+10)	Fallow Lands other than Current Fallow	Current Fallow	Total (col. 12+13)									
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22		
1	Andhra Pradesh	27507	27440	6199	2709	2084	4793	676	278	692	1646	1623	2434	4057	10745	13362	2617	124.4	15772	13179	11668	14261	
2	Arunachal Pradesh	8374	5547	5154		32	32			46	28	74	64	23	87	200	267	67	133.4	361	223	5186	5324
3	Assam	7844	7850	1933	1081	1453	2533	160	209	77	445	66	99	164	2774	3731	957	134.5	3224	2873	4626	4977	
4	Bihar	9416	9360	622	1646	436	2082	17	239	46	303	133	648	781	5572	7405	1832	132.9	6639	6220	2721	3139	
5	Chhattisgarh	13519	13790	6353	678	314	992	855	2	339	1196	235	250	485	4764	5746	982	120.6	5590	5014	8200	8776	
6	Delhi	148	147	1	74	14	88	0	1	10	11	8	12	19	28	44	16	159.2	58	39	90	108	
7	Goa	370	361	125	37		37	1	1	53	55		7	7	137	170	34	124.5	197	144	164	217	
8	Gujarat	19602	18868	1854	1145	2607	3753	850	4	1977	2831	11	568	579	9852	11304	1453	114.7	12412	10420	6457	8449	
9	Haryana	4421	4372	44	423	95	518	25	12	31	68	6	169	175	3566	6504	2938	182.4	3784	3735	587	636	
10	Himachal Pradesh	5567	4544	1099	453	673	1126	1515	62	128	1706	17	56	73	541	940	399	173.9	804	597	3740	3948	
11	Jammu & Kashmir	22224	3781	2023	293	289	582	125	71	141	338	12	73	85	752	1090	338	144.9	1050	826	2731	2955	
12	Jharkhand	7972	7970	2333	792	573	1366	88	113	274	476	783	1244	2027	1769	2116	347	119.6	4184	3013	3786	4957	
13	Karnataka	19179	19050	3072	1349	788	2137	936	292	419	1647	452	1233	1684	10509	13027	2517	124	12905	11742	6145	7308	
14	Kerala	3886	3886	1082	455	26	481	0	10	66	76	45	70	115	2132	2986	853	140	2323	2203	1563	1684	
15	Madhya Pradesh	30825	30756	8692	1946	1442	3389	1339	19	1161	2519	595	591	1185	14971	19608	4637	131	17337	15562	13419	15194	
16	Maharashtra	30771	30758	5212	1407	1720	3127	1252	249	914	2415	1204	1327	2531	17473	22556	5083	129.1	21167	18800	9591	11958	
17	Manipur	2233	1950	1693*	26	1	27	1	6	1	8	0	0	0	223	223		100	230	223	1721	1728	
18	Meghalaya	2243	2227	942	90	137	227		158	453	611	169	66	235	212	258	46	121.9	1058	278	1169	1949	
19	Mizoram	2108	1951	1594	125	9	134	5	10	5	21	82	24	106	97	97		100	218	121	1733	1831	
20	Nagaland	1658	1582	863	75		75		120	56	177	76	82	158	309	387	78	125.2	644	391	938	1191	
21	Odisha	15571	15571	5813	999	843	1842	443	482	392	1317	434	426	860	5739	8716	2977	151.9	7473	6165	8098	9406	
22	Punjab	5036	5033	308	429	21	451	4	4	9	17	0	13	14	4243	8085	3842	190.6	4270	4256	763	777	
23	Rajasthan	34224	34266	2675	1823	2439	4262	1708	21	4590	6319	2264	1910	4174	16836	21699	4863	128.9	22739	18746	11527	15520	
24	Sikkim	710	728	319	143	107	250	4	5	2	12	30	5	35	112	123	11	109.8	155	117	573	611	
25	Tamil Nadu	13006	13027	2111	2139	503	2642	110	274	369	753	1518	759	2277	5244	6033	789	115	8164	6003	4863	7024	
26	Tripura	1049	1049	606	131	3	134		27	1	28	1	1	2	280	299	19	106.6	310	281	740	768	
27	Uttarakhand	5348	5670	3465	152	312	464	229	249	386	864	68	42	110	767	1266	499	165.1	1512	808	4158	4862	
28	Uttar Pradesh	24093	24201	1688	2649	530	3178	64	344	454	862	574	1217	1791	16683	25105	8422	150.5	19272	17900	4930	6301	
29	West Bengal	8875	8683	1175	1728	25	1753	6	63	43	111	30	319	349	5295	9533	4238	180	5749	5614	2934	3069	
30	A & N Islands	825	740	717	1		1		2	1	3	2	1	3	16	46	30	285.4	22	17	718	723	
31	Chandigarh	11	7	0	5		5		0		0	0	0	0	1	2	1	151.5	2	1	5	6	
32	Dadra and Nagar Haveli	49	49	20	4	0	4	1		0	1	1	1	1	23	28	5	121	24	24	25	25	
33	Daman & Diu	11	3												3	3	0	103.3	3	3	0	0	
34	Lakshadweep	3	3												3	3	0	100.4	3	3	0	0	
35	Puducherry	48	49		18	0	18		1	4	5	3	2	5	21	36	16	175.7	31	23	18	26	
	Total	328726	305269	69785	25027	17476	42503	10415	3376	13123	26914	10504	13672	24176	141891	192796	50904	135.9	182566	155563	122703	149706	

* : Provisional

** Cropping Intensity is percentage of the gross cropped area to the net area sown.

Source: Directorate of Economics & Statistics, Ministry of Agriculture.

Table 2.4.2: State wise Land Use Classification and Irrigated Area- 2006-07

Sl. No.	State/UT	Geographical Area	Reporting area for land utilisation statistics (col. 4+7+11+14+15)	Forest	(Thousand Hectares)																	
					Land not available for cultivation			Other uncultivated land excluding Fallow Land				Fallow Lands			Net Area Sown (col. 16-17)	Total Cropped Area (Gross Cropped Area)	Area Sown more than once	Cropping Intensity**	Agri.Land/Cultivable Land/Culturable Land (Col.9+10+14+15)	Cultivated Land(Col.13+15)	Uncultivable/Unculturable Land (Col.3-19)	Uncultivated Land (Col.3-20)
					Area put to non agricultural uses	Barren and unculturable land	Total (col. 5+6)	Permanent pastures & other grazing lands	Land under Miscellaneous Tree Crops & Groves not included in Net Area Sown	Culturable Waste Land	Total (col. 8+9+10)	Fallow Lands other than Current Fallows	Current Fallows	Total (col. 12+13)								
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
1	Andhra Pradesh	27507	27505	6210	2683	2098	4781	602	320	695	1618	1583	3166	4749	10147	12811	2664	126.3	15911	13313	11593	14191
2	Arunachal Pradesh	8374	5659	5154*	23	42	65	18	37	67	122	73	37	109	209	271	62	129.7	422	246	5237	5413
3	Assam	7844	7850	1954	1065	1447	2512	160	209	77	445	59	126	186	2753	3763	1010	136.7	3224	2879	4626	4971
4	Bihar	9416	9360	622	1647	436	2083	17	241	46	303	120	566	686	5665	7719	2054	136.3	6638	6232	2722	3128
5	Chhattisgarh	13519	13790	6355	683	313	996	857	1	350	1208	238	271	509	4722	5732	1010	121.4	5581	4993	8209	8797
6	Delhi	148	147	1	76	16	92	0	1	10	11	8	12	19	23	43	20	185.9	54	35	94	112
7	Goa	370	361	125	37		37	1	1	53	55		7	7	137	172	35	125.6	197	144	164	217
8	Gujarat	19602	18866	1833	1163	2595	3758	853	4	1976	2832	19	623	642	9801	11807	2007	120.5	12422	10424	6444	8443
9	Haryana	4421	4372	39	421	103	524	27	12	65	104	8	141	149	3556	6394	2838	179.8	3782	3697	590	675
10	Himachal Pradesh	5567	4545	1101	473	658	1131	1491	66	137	1694	15	64	78	541	944	403	174.5	821	604	3724	3941
11	Jammu & Kashmir	22224	3781*	2023*	293	289	582	128	72	146	345	16	74	89	742	1126	385	151.9	1048	815	2733	2966
12	Jharkhand	7972	7970	2239	758	564	1322	110	93	334	537	966	1402	2368	1504	1649	145	109.6	4299	2906	3671	5064
13	Karnataka	19179	19050	3072	1363	788	2151	934	292	416	1643	515	1565	2080	10105	12438	2333	123.1	12894	11670	6156	7380
14	Kerala	3886	3886	1082	449	26	475	0	9	90	100	47	82	129	2101	2918	816	138.8	2329	2183	1557	1703
15	Madhya Pradesh	30825	30756	8699	1992	1406	3397	1348	19	1177	2544	612	769	1381	14735	20113	5378	136.5	17312	15504	13444	15251
16	Maharashtra	30771	30758	5214	1412	1719	3131	1252	249	914	2415	1199	1325	2524	17475	22571	5096	129.2	21162	18800	9596	11958
17	Manipur	2233	2002	1742*	26	1	27	1	6	1	8	0	0	0	225	225		100	232	225	1770	1777
18	Meghalaya	2243	2227	942	91	137	228		158	450	608	169	68	237	213	246	33	115.7	1057	280	1170	1947
19	Mizoram	2108	2106	1594	125	9	134	5	69	5	79	166	41	208	91	91		100	373	133	1733	1973
20	Nagaland	1658	1595	863	75		75		120	57	177	76	82	158	322	406	84	125.9	657	405	938	1190
21	Odisha	15571	15571	5813	1298	840	2138	494	342	375	1211	229	526	755	5654	8960	3306	158.5	7126	6180	8445	9391
22	Punjab	5036	5033	298	477	27	504	2	4	4	10	1	35	36	4184	7861	3676	187.9	4229	4219	804	813
23	Rajasthan	34224	34265	2698	1835	2427	4262	1706	20	4611	6337	2265	1939	4204	16764	21534	4770	128.5	25600	18703	8665	15562
24	Sikkim	710	693	584*	11		11		8	3	11	4	5	9	77	123	46	159.5	98	82	595	610
25	Tamil Nadu	13006	13027	2106	2160	502	2662	110	268	354	733	1493	907	2400	5126	5843	717	114	8148	6033	4879	6994
26	Tripura	1049	1049	629	139		139	4	14	4	22	1	3	4	255	276	21	108.1	277	258	772	791
27	Uttar Pradesh	24093	24170	1657	2729	507	3236	64	373	440	877	542	1285	1827	16573	25415	8841	153.3	19213	17858	4958	6312
28	Uttarakhand	5348	5667	3465	161	312	472	220	269	367	856	64	44	108	765	1210	445	158.1	1509	809	4158	4858
29	West Bengal	8875	8684	1174	1733	21	1754	5	58	34	97	22	341	363	5296	9635	4339	181.9	5751	5637	2933	3047
30	A & N Islands	825	795	717	22	3	24	6	18	12	37	3	1	4	13	14	2	111.8	47	14	748	781
31	Chandigarh	11	7	0	5		5		0		0	0	0	0	1	2	1	151.5	2	1	5	6
32	Dadra and Nagar Haveli	49	49	20	4	0	4	1		0	1	1	2	3	21	29	8	136	24	23	25	25
33	Daman & Diu	11	3		0			0	0	0	0	0	0	0	2	2	0	100	3	2	0	0
34	Lakshadweep	3	3										3	3	0	3	100.7	3	0	0	0	0
35	Puducherry	48	49		18	0	18		1	4	5	3	2	5	20	36	15	175.5	31	23	18	26
	Total	328726	305650	70025	25444	17287	42731	10418	3351	13274	27042	10516	15512	26028	139823	192381	52558	137.6	182476	155335	123174	150315

* : Provisional

** Cropping Intensity is percentage of the gross cropped area to the net area sown.

Source: Directorate of Economics & Statistics, Ministry of Agriculture.

Table 2.4.2: State wise Land Use Classification and Irrigated Area- 2007-08

Sl. No.	State/UT	Geographical Area	Reporting area for land utilisation statistics (col. 4+7+11+14+15)	Forest	(Thousand Hectares)																	
					Land not available for cultivation			Other uncultivated land excluding Fallow Land				Fallow Lands			Net Area Sown (col. 16-17)	Total Cropped Area (Gross Cropped Area)	Area Sown more than once	Cropping Intensity**	Agri.Land/Cultivable Land/Culturable Land (Col.9+10+14+15)	Cultivated Land(Col.13+15)	Uncultivable/Unculturable Land (Col.3-19)	Uncultivated Land (Col.3-20)
					Area put to non agricultural uses	Barren and unculturable land	Total (col. 5+ col. 6)	Permanent pastures & other grazing lands	Land under Miscellaneous Tree Crops & Groves not included in Net Area Sown	Culturable Waste Land	Total (col. 8+9+10)	Fallow Lands other than Current Fallows	Current Fallows	Total (col. 12+ col.13)								
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
1	Andhra Pradesh	27507	27505	6210	2725	2059	4784	571	306	659	1535	1500	2719	4219	10756	13567	2811	126.1	15939	13475	11565	14030
2	Arunachal Pradesh	8374	5660	5154*	25	39	64	19	37	67	122	69	41	110	210	272	62	129.8	423	251	5237	5409
3	Assam	7844	7850	1853	1218	1408	2626	160	196	77	432	59	126	186	2753	3839	1086	139.4	3211	2879	4639	4971
4	Bihar	9416	9360	622	1653	432	2085	16	241	46	303	119	569	688	5662	7765	2102	137.1	6637	6231	2723	3129
5	Chhattisgarh	13519	13790	6350	687	312	999	857	1	344	1201	258	255	513	4727	5748	1020	121.6	5585	4982	8206	8808
6	Delhi	148	147	1	76	16	92	0	1	10	11		12	20	23	44	21	189.7	54	35	93	113
7	Goa	370	361	125	37		37	1	1	53	55		10	10	134	170	35	126.3	197	144	164	217
8	Gujarat	19602	18866	1834	1171	2552	3723	851	4	1960	2815	19	510	529	9966	12211	2246	122.5	12458	10476	6408	8391
9	Haryana	4421	4372	40	457	103	561	26	12	28	66	8	104	112	3594	6458	2864	179.7	3746	3698	626	674
10	Himachal Pradesh	5567	4550	1103	467	656	1123	1500	68	136	1704	18	60	78	542	954	412	176	824	602	3726	3947
11	Jammu & Kashmir	22224	3781*	2023*	302	289	592	126	66	147	339	26	67	93	734	1134	400	154.5	1040	801	2741	2980
12	Jharkhand	7972	7970	2239	754	564	1319	110	93	333	536	913	1428	2341	1536	1675	139	109.1	4302	2964	3668	5006
13	Karnataka	19179	19050	3072	1369	788	2157	930	290	415	1635	505	1262	1767	10419	12893	2474	123.7	12891	11681	6159	7369
14	Kerala	3886	3886	1082	463	26	488	0	6	93	99	45	83	128	2089	2761	672	132.2	2316	2172	1570	1714
15	Madhya Pradesh	30825	30756	8703	2012	1379	3392	1352	20	1170	2541	643	790	1433	14687	20416	5729	139	17310	15477	13446	15278
16	Maharashtra	30771	30758	5213	1428	1718	3146	1249	248	916	2413	1188	1327	2515	17473	22655	5183	129.7	21151	18799	9607	11959
17	Manipur	2233	2012	1742*	26	1	27	1	6	1	8	0	0	0	235	235		100	242	236	1770	1777
18	Meghalaya	2243	2227	944	91	136	227		160	434	594	161	67	227	235	283	48	120.4	1056	302	1171	1925
19	Mizoram	2108	2112	1594	125	9	134	5	67	5	77	166	45	211	96	96		100	379	141	1733	1971
20	Nagaland	1658	1618	863	74	4	78		111	64	175	87	100	186	316	400	84	126.6	677	415	940	1202
21	Odisha	15571	15571	5813	1298	840	2138	494	342	375	1211	229	556	785	5624	9016	3392	160.3	7126	6180	8445	9391
22	Punjab	5036	5033	287	483	24	507	3	3	3	10	1	41	42	4187	7870	3683	188	4236	4228	797	805
23	Rajasthan	34224	34270	2727	1847	2418	4264	1703	16	4573	6292	2167	1724	3891	17096	22208	5113	129.9	25576	18820	8694	15450
24	Sikkim	710	693	584*	11		11		8	3	11	4	5	9	77	118	41	152.7	98	82	595	610
25	Tamil Nadu	13006	13027	2106	2169	492	2661	110	261	347	718	1499	981	2479	5062	5815	753	114.9	8149	6043	4877	6984
26	Tripura	1049	1051	629	139		139	3	14	3	21	2	4	6	255	276	21	108.1	279	259	772	792
27	Uttar Pradesh	24093	24170	1658	2761	507	3268	65	374	440	879	540	1408	1948	16417	25320	8903	157.3	19179	17825	4991	6345
28	Uttarakhand	5348	5673	3484	217	224	441	199	384	302	885	72	36	108	755	1187	432	154.2	1549	791	4123	4882
29	West Bengal	8875	8684	1174	1762	22	1783	6	61	33	100	20	311	331	5296	9752	4456	184.1	5721	5607	2963	3078
30	A & N Islands	825	757	717	8	2	10	4	4	3	11	3	2	5	15	16	2	112.7	26	16	731	741
31	Chandigarh	11	7	0	5		5		0	0	0	0	0	0	1	2	1	151.5	2	1	5	6
32	Dadra and Nagar Haveli	49	49	20	4	0	4	1		0	1	2	2	4	20	27	7	132.9	24	23	25	26
33	Daman & Diu	11	3		0		0	0	0	0	0	0	0	0	2	2		100	3	2	0	0
34	Lakshadweep	3	3												3	3	0	100.7	3	3	0	0
35	Puducherry	48	49		18	0	18		1	4	6	2	3	5	20	35	15	174.6	30	22	18	26
	Total	328726	305667	69965	25881	17020	42901	10362	3400	13044	26806	10333	14646	24979	141016	195223	54207	138.4	182439	155662	123228	150005

* : Provisional

** Cropping Intensity is percentage of the gross cropped area to the net area sown.

Source: Directorate of Economics & Statistics, Ministry of Agriculture.

Table 2.4.2: State wise Land Use Classification and Irrigated Area- 2008-09

Sl. No.	State/UT	Geographical Area	Reporting area for land utilisation statistics (col. 4+7+11+14+15)	Forest	(Thousand Hectares)																	
					Land not available for cultivation			Other uncultivated land excluding Fallow Land				Fallow Lands			Net Area Sown (col. 16-17)	Total Cropped Area (Gross Cropped Area)	Area Sown more than once	Cropping Intensity**	Agri.Land/Cultivable Land/Culturable Land (Col.9+10+14+15)	Cultivated Land(Col.13+15)	Uncultivable/Unculturable Land (Col.3-19)	Uncultivated Land (Col.3-20)
					Area put to non agricultural uses	Barren and unculturable land	Total (col. 5+6)	Permanent pastures & other grazing lands	Land under Miscellaneous Tree Crops & Groves not included in Net Area Sown	Culturable Waste Land	Total (col. 8+9+10)	Fallow Lands other than Current Fallows	Current Fallows	Total (col. 12+13)								
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
1	Andhra Pradesh	27507	27505	6210	2742	2056	4797	569	299	650	1517	1488	2624	4111	10868	13830	2962	127.3	15928	13492	11576	14013
2	Arunachal Pradesh	8374	5659	5154*	25	39	64	19	37	65	120	70	40	110	211	276	65	130.6	422	251	5237	5409
3	Assam	7844	7850	1853	1218	1408	2626	160	196	77	432	50	79	128	2810	3999	1188	142.3	3211	2889	4639	4961
4	Bihar	9416	9360	622	1670	432	2102	16	243	45	304	122	655	777	5554	7671	2117	138.1	6620	6209	2740	3150
5	Chhattisgarh	13519	13790	6349	696	308	1004	855	1	347	1203	258	265	523	4710	5683	973	120.7	5581	4975	8209	8814
6	Delhi	148	147	1	76	16	92	0	1	10	11		12	20	23	43	20	187.8	54	35	94	113
7	Goa	370	361	125	37		37	1	1	53	54		9	9	135	166	31	123.3	197	144	164	217
8	Gujarat	19602	19069	1834	1171	2552	3723	851	4	1960	2815	16	379	395	10302	11637	1335	113	12661	10681	6408	8388
9	Haryana	4421	4371	40	470	103	573	30	12	29	72	5	105	111	3576	6484	2908	181.3	3728	3681	644	691
10	Himachal Pradesh	5567	4550	1103	468	654	1122	1503	68	135	1706	20	59	79	539	946	407	175.4	822	599	3728	3951
11	Jammu & Kashmir	22224	3781*	2023*	297	288	585	128	67	150	346	23	65	88	739	1137	398	153.9	1044	803	2737	2978
12	Jharkhand	7972	7970	2239	764	569	1332	110	93	336	539	962	1394	2355	1504	1689	185	112.3	4289	2898	3681	5072
13	Karnataka	19179	19050	3072	1375	788	2163	923	290	413	1626	516	1500	2016	10174	12368	2195	121.6	12892	11673	6158	7376
14	Kerala	3886	3886	1082	475	25	500	0	6	96	102	46	68	114	2089	2695	606	129	2305	2157	1581	1730
15	Madhya Pradesh	30825	30756	8696	2050	1351	3401	1337	19	1160	2516	621	582	1202	14941	20657	5716	138.3	17322	15523	13434	15233
16	Maharashtra	30771	30758	5213	1433	1718	3151	1246	248	918	2411	1188	1372	2561	17422	22454	5032	128.9	21149	18795	9610	11964
17	Manipur	2233	2013	1742*	26	1	27	1	6	1	8	0	0	0	236	236	100	243	237	1770	1777	
18	Meghalaya	2243	2227	948	91	134	226		160	393	553	157	59	215	284	337	53	118.7	1053	343	1174	1884
19	Mizoram	2108	2080	1594	124	9	133	5	17	5	27	171	60	231	95	95		100	348	155	1732	1925
20	Nagaland	1658	1621	863	95	3	98		121	60	181	89	73	163	316	402	86	127.2	659	389	961	1231
21	Odisha	15571	15571	5813	1298	840	2138	494	342	375	1211	229	576	805	5604	9071	3467	161.9	7126	6180	8445	9391
22	Punjab	5036	5033	295	492	24	516	7	5	3	15	0	37	37	4169	7912	3743	189.8	4215	4207	818	826
23	Rajasthan	34224	34270	2728	1970	2295	4265	1699	18	4336	6052	2108	1565	3673	17551	22771	5220	129.7	25578	19117	8692	15153
24	Sikkim	710	693	584*	11		11		8	3	11	4	5	9	77	118	40	152.3	98	82	595	610
25	Tamil Nadu	13006	13027	2106	2173	492	2665	110	259	333	702	1498	1013	2511	5043	5824	781	115.5	8146	6056	4880	6970
26	Tripura	1049	1049	629	139		139	3	14	4	21	2	3	4	256	263	8	103.1	278	258	771	791
27	Uttar Pradesh	24093	24170	1662	2779	499	3278	65	365	437	867	539	1263	1802	16562	25471	8909	158.3	19166	17825	5005	6345
28	Uttarakhand	5348	5673	3486	217	224	441	199	384	303	886	71	35	106	754	1193	439	153.8	1547	789	4126	4884
29	West Bengal	8875	8684	1174	1793	21	1814	7	55	32	94	22	287	309	5294	9802	4507	185.1	5689	5581	2995	3103
30	A & N Islands	825	759	717	9	2	11	5	4	3	11	3	3	6	14	16	2	113.6	27	17	733	742
31	Chandigarh	11	7	0	5		5		0	0	0	0	0	0	1	2	1	151.5	2	1	5	6
32	Dadra and Nagar Haveli	49	49	20	4	0	4	1		0	1	2	2	4	20	26	6	128.2	24	22	25	26
33	Daman & Diu	11	4		0		0	0	0	0	1	0	0	0	3	3		100	4	3	0	1
34	Lakshadweep	3	3		0		0								3*		0	105.1	3	3	0	0
35	Puducherry	48	49		18	0	18		1	4	6	2	3	5	19	33	14	170.6	30	22	18	26
	Total	328726	305823	69978	26210	16851	43061	10344	3343	12735	26423	10290	14192	24482	141899	195314	53414	137.6	182459	156092	123384	149752

* : Provisional

** Cropping Intensity is percentage of the gross cropped area to the net area sown.

Source: Directorate of Economics & Statistics, Ministry of Agriculture.

Table 2.4.2: State wise Land Use Classification and Irrigated Area- 2009-10

Sl. No.	State/UT	Geographical Area	Reporting area for land utilisation statistics (col. 4+7+11+14+15)	Forest	(Thousand Hectares)																	
					Land not available for cultivation			Other uncultivated land excluding Fallow Land				Fallow Lands			Net Area Sown (col. 16-17)	Total Cropped Area (Gross Cropped Area)	Area Sown more than once	Cropping Intensity**	Agri.Land/Cultivable Land/Culturable Land (Col.9+10+14+15)	Cultivated Land(Col.13+15)	Uncultivable/Unculturable Land (Col.3-19)	Uncultivated Land (Col.3-20)
					Area put to non agricultural uses	Barren and unculturable land	Total (col. 5+6)	Permanent pastures & other grazing lands	Land under Miscellaneous Tree Crops & Groves not included in Net Area Sown	Culturable Waste Land	Total (col. 8+9+10)	Fallow Lands other than Current Fallows	Current Fallows	Total (col. 12+13)								
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
1	Andhra Pradesh	27507	27505	6210	2765	2043	4808	566	295	647	1508	1627	3361	4987	9991	12560	2569	125.7	15921	13352	11584	14152
2	Arunachal Pradesh	8374	5661	5154*	26	38	64	18	38	64	120	70	40	110	212	276	64	130.2	424	252	5237	5409
3	Assam	7844	7850	1853	1218	1408	2626	160	196	77	432	50	79	128	2811	4099	1289	145.9	3211	2889	4639	4961
4	Bihar	9416	9360	622	1690	432	2121	16	244	45	305	122	858	980	5332	7296	1964	136.8	6601	6189	2759	3170
5	Chhattisgarh	13519	13790	6349	703	309	1012	859	1	351	1211	262	272	535	4683	5561	878	118.7	5570	4956	8220	8834
6	Delhi	148	147	1	76	16	93	0	1	10	11		12	20	22	46	23	204.3	53	34	94	113
7	Goa	370	361	125	37		37	1	1	53	54		12	12	132	160	29	121.8	197	144	164	217
8	Gujarat	19602	19069	1834	1171	2552	3723	851	4	1960	2815	16	379	395	10302	11085	783	107.6	12661	10681	6408	8388
9	Haryana	4421	4371	40	470	104	574	28	12	29	70	5	133	138	3550	6351	2801	178.9	3730	3684	641	688
10	Himachal Pradesh	5567	4550	1103	468	654	1122	1503	68	135	1706	20	59	79	539	946	407	173.9	822	599	3728	3951
11	Jammu & Kashmir	22224	3781*	2023*	306	274	580	120	63	149	333	26	84	110	735	1145	409	155.7	1058	819	2723	2962
12	Jharkhand	7972	7970	2239	764	569	1332	110	93	336	539	1045	1564	2609	1250	1399	149	111.9	4288	2814	3682	5156
13	Karnataka	19179	19050	3072	1386	788	2174	914	288	413	1615	484	1301	1785	10404	12873	2469	123.7	12891	11705	6159	7344
14	Kerala	3886	3886	1082	479	22	501	0	4	98	103	45	77	122	2079	2669	590	128.4	2303	2156	1583	1731
15	Madhya Pradesh	30825	30756	8689	2091	1341	3432	1338	24	1147	2508	608	547	1155	14972	21411	6440	143	17298	15519	13458	15237
16	Maharashtra	30771	30758	5215	1443	1729	3172	1242	250	917	2409	1189	1373	2562	17401	22612	5211	129.8	21130	18773	9628	11985
17	Manipur	2233	2011	1742*	26	1	27	1	6	1	8	0	0	0	234	234		100	240	234	1770	1777
18	Meghalaya	2243	2229	946	98	133	231		162	394	556	155	58	145.9	283	336	53	118.9	1052	341	1177	1888
19	Mizoram	2108	2101	1585	87	8	95	5	39	7	51	181	66	136.8	123	123		100	415	189	1686	1912
20	Nagaland	1658	1621	861	87	2	89		107	43	150	101	59	160	361	486	126	134.8	671	420	950	1201
21	Odisha	15571	15536	5814*	1230	1076	2306	518	218	487	1223	573	859	1432	4761	5510	749	115.7	6898	5620	8638	9916
22	Punjab	5036	5033	295	503	25	528	4	5	3	11	4	37	40	4158	7875	3717	189.4	4206	4195	827	838
23	Rajasthan	34224	34270	2735	1976	2292	4268	1697	17	4475	6190	2048	2055	4103	16974	21745	4770	128.1	25569	19030	8701	15240
24	Sikkim	710	693	584*	11		11		8	3	11	4	5	9	77	144	67	186	98	82	595	610
25	Tamil Nadu	13006	13033	2127	2176	490	2666	110	253	326	689	1542	1117	2659	4892	5572	680	113.9	8131	6009	4903	7024
26	Tripura	1049	1049	629	141		141	2	14	4	20	2	2	4	256	267	11	104.4	277	258	772	792
27	Uttar Pradesh	24093	24170	1662	2801	494	3295	65	360	431	856	537	1232	1769	16589	25440	8851	153.4	19148	17821	5022	6350
28	Uttarakhand	5348	5672	3485	216	225	441	198	383	309	891	82	37	119	737	1166	430	158.4	1548	773	4124	4899
29	West Bengal	8875	8684	1174	1799	22	1820	6	55	31	92	20	323	342	5256	9530	4274	181.3	5684	5579	3000	3106
30	A & N Islands	825	757	717	7	2	9	4	4	3	11	3	3	6	15	17	2	112.4	28	17	730	740
31	Chandigarh	11	7	0	5		5		0	0	0	0	0	0	1	2	1	151.5	2	1	5	6
32	Dadra and Nagar Haveli	49	49	20	4	0	4	1		0	1	2	2	4	20	24	4	122	24	22	25	26
33	Daman & Diu	11	4		0		0	0	0	0	1	0	0	0	3	3		100	4	3	0	1
34	Lakshadweep	3	3		0		0								3	3	0	101.3	3	3	0	0
35	Puducherry	48	49		18	0	19		1	4	6	3	3	6	19	32	13	170.3	30	22	19	27
	Total	328726	305834	69988	26276	17047	43323	10339	3214	12952	26505	10833	16008	26842	139177	188991	49814	135.8	182184	155185	123650	150649

* : Provisional

** Cropping Intensity is percentage of the gross cropped area to the net area sown.

Source: Directorate of Economics & Statistics, Ministry of Agriculture.

Table 2.4.2: State wise Land Use Classification and Irrigated Area- 2010-11

Sl. No.	State/UT	Geographical Area	Reporting area for land utilisation statistics (col. 4+7+11+14+15)	Forest	(Thousand Hectares)																	
					Land not available for cultivation			Other uncultivated land excluding Fallow Land				Fallow Lands			Net Area Sown (col. 16-17)	Total Cropped Area (Gross Cropped Area)	Area Sown more than once	Cropping Intensity**	Agri.Land/Cultivable Land(Col.9+10+14+15)	Cultivated Land(Col.13+15)	Uncultivable/Unculturable Land (Col.3-19)	Uncultivated Land (Col.3-20)
					Area put to non agricultural uses	Barren and unculturable land	Total (col. 5+6)	Permanent pastures & other grazing lands	Land under Miscellaneous Tree Crops & Groves not included in Net Area Sown	Culturable Waste Land	Total (col. 8+9+10)	Fallow Lands other than Current Fallows	Current Fallows	Total (col. 12+13)								
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
1	Andhra Pradesh	27507	27505	6230	2872	2026	4899	554	290	626	1471	1490	2229	3719	11186	14512	3326	129.7	15821	13415	11683	14089
2	Arunachal Pradesh	8374	5661	5154*	26	38	64	18	37	64	120	70	40	109	213	278	65	130.5	424	253	5237	5408
3	Assam	7844	7850	1853	1218	1408	2626	160	196	77	432	50	79	128	2811	4160	1349	148	3211	2889	4639	4961
4	Bihar	9416	9360	622	1700	432	2131	16	245	45	306	122	920	1042	5259	7194	1935	136.8	6591	6179	2769	3181
5	Chhattisgarh	13519	13790	6336	713	306	1019	855	1	355	1211	275	253	528	4697	5671	975	120.8	5580	4949	8210	8840
6	Delhi	148	147	1	76	16	93	0	1	10	11	8	12	20	22	44	22	200.9	53	34	94	113
7	Goa	370	361	125	37		37	1	1	53	54		13	13	131	160	29	122.1	197	144	164	217
8	Gujarat	19602	19069	1834	1171	2552	3723	851	4	1960	2815	16	379	395	10302	12247	1946	118.9	12661	10681	6408	8388
9	Haryana	4421	4370	39	522	102	624	27	11	27	65	3	122	125	3518	6505	2987	184.9	3681	3640	690	730
10	Himachal Pradesh	5567	4550	1103	468	654	1122	1503	68	135	1706	20	59	79	539	949	410	175.9	822	599	3728	3951
11	Jammu & Kashmir	22224	3781*	2023*	301	277	578	119	66	135	321	26	101	127	732	1140	408	155.8	1061	833	2720	2948
12	Jharkhand	7972	7970	2239	764	569	1332	110	93	336	539	1045	1729	2774	1085	1249	164	115.1	4288	2814	3682	5156
13	Karnataka	19179	19050	3072	1430	787	2217	912	286	414	1613	426	1199	1626	10523	13062	2540	124.1	12849	11722	6201	7328
14	Kerala	3886	3886	1082	490	20	510	0	4	92	96	52	76	128	2072	2647	576	127.8	2295	2148	1591	1739
15	Madhya Pradesh	30825	30756	8697	2089	1335	3424	1328	28	1088	2444	568	503	1072	15119	22046	6926	145.8	17307	15623	13449	15133
16	Maharashtra	30771	30758	5216	1449	1731	3179	1242	250	919	2412	1179	1366	2545	17406	24069	6663	138.3	21121	18772	9637	11986
17	Manipur	2233	2125	1742*	26	1	27	1	6	1	8	0	0	0	348	348	100	355	348	1770	1777	
18	Meghalaya	2243	2235	946	105	133	238		163	392	555	155	58	213	284	338	54	119	1052	342	1184	1894
19	Mizoram	2108	2109	1585	87	8	95	5	37	7	49	182	67	249	130	133	3	102	423	197	1686	1912
20	Nagaland	1658	1625	863	87	2	89		103	52	155	100	55	155	362	452	90	124.9	673	417	952	1208
21	Odisha	15571	15472	5814*	1247	1032	2279	513	220	520	1253	567	877	1444	4682	5429	747	116	6866	5559	8606	9913
22	Punjab	5036	5033	294	508	25	533	4	4	4	12	4	33	37	4158	7883	3725	189.6	4202	4191	830	842
23	Rajasthan	34224	34270	2743	1889	2379	4268	1694	21	4233	5949	1726	1235	2962	18349	26002	7653	141.7	25565	19584	8705	14686
24	Sikkim	710	693	584*	11		11		8	3	11	4	5	9	77	152	74	195.7	98	82	595	610
25	Tamil Nadu	13006	13033	2125	2177	489	2666	110	252	331	693	1580	1015	2595	4954	5753	799	116.1	8132	5969	4901	7065
26	Tripura	1049	1049	629	141		141	2	14	4	20	2	2	4	256	350	94	136.9	277	258	772	792
27	Uttar Pradesh	24093	24170	1658	2835	486	3321	66	354	426	846	538	1215	1753	16593	25383*	8790	153	19126	17808	5045	6363
28	Uttarakhand	5348	5673	3485	218	225	442	199	386	310	894	84	43	128	723	1170	447	161.7	1547	766	4126	4906
29	West Bengal	8875	8684	1174	1823	17	1840	5	53	29	87	18	574	592	4991	9563*	4572	191.6	5666	5565	3018	3119
30	A & N Islands	825	757	717	7	2	9	4	4	3	11	3	3	6	15	19	4	128.8	28	17	730	740
31	Chandigarh	11	7	0	5		5		0	0	0	0	0	0	1	2	1	151.5	2	1	5	6
32	Dadra and Nagar Haveli	49	49	20	4	0	4	1		0	1		0	0	0	3	3	124.8	4	3	0	1
33	Daman & Diu	11	4		0		0		0	0	1	0	0	0	3	3		100	4	3	0	1
34	Lakshadweep	3	3		0		0								3	3	0	101.3	3	3	0	0
35	Puducherry	48	49		19	0	19		1	5	6	2	3	6	19	31	13	169.3	30	22	19	27
	Total	328726	305903	70006	26513	17051	43564	10301	3207	12657	26165	10321	14267	24589	141579	198969	57390	140.5	182032	155847	123871	150056

* : Provisional

** Cropping Intensity is percentage of the gross cropped area to the net area sown.

Source: Directorate of Economics & Statistics, Ministry of Agriculture.

Table 2.4.3: Selected categories of land use in India

(Million Hectares)						
Year	Net area sown	Total cropped area	Area sown more than once (3-2)	Net Irrigated Area	Gross Irrigated Area	Area Irrigated more than once (6-5)
1	2	3	4	5	6	7
1950-51	118.75	131.89	13.15	20.85	22.56	1.71
1951-52	119.40	133.23	13.83	21.05	23.18	2.13
1952-53	123.44	137.68	14.23	21.12	23.31	2.18
1953-54	126.81	142.48	15.67	21.87	24.36	2.49
1954-55	127.85	144.09	16.24	22.09	24.95	2.86
1955-56	129.16	147.31	18.16	22.76	25.64	2.88
1956-57	130.85	149.49	18.64	22.53	25.71	3.17
1957-58	129.08	145.83	16.75	23.16	26.63	3.47
1958-59	131.83	151.63	19.80	23.40	26.95	3.55
1959-60	132.94	152.82	19.89	24.04	27.45	3.42
1960-61	133.20	152.77	19.57	24.66	27.98	3.32
1961-62	135.40	156.21	20.81	24.88	28.46	3.58
1962-63	136.34	156.76	20.42	25.67	29.45	3.79
1963-64	136.48	156.96	20.48	25.89	29.71	3.82
1964-65	138.12	159.23	21.11	26.60	30.71	4.11
1965-66	136.20	155.28	19.08	26.34	30.90	4.56
1966-67	137.23	157.36	20.12	26.91	32.68	5.78
1967-68	139.88	163.74	23.86	27.19	33.21	6.01
1968-69	137.31	159.53	22.22	29.01	35.48	6.47
1969-70	138.70	162.27	23.57	30.20	36.97	6.78
1970-71	140.86	165.79	24.93	31.10	38.20	7.09
1971-72	139.72	165.19	25.47	31.55	38.43	6.88
1972-73	137.14	162.15	25.01	31.83	39.06	7.22
1973-74	142.42	169.87	27.46	32.55	40.28	7.74
1974-75	137.79	164.19	26.40	33.71	41.74	8.03
1975-76	141.65	171.30	29.64	34.59	43.36	8.77
1976-77	139.48	167.33	27.86	35.15	43.55	8.40
1977-78	141.95	172.23	30.28	36.55	46.08	9.53
1978-79	142.98	174.80	31.82	38.06	48.31	10.25
1979-80	138.90	169.59	30.69	38.52	49.21	10.69
1980-81	140.29	172.63	32.34	38.72	49.78	11.06
1981-82	142.12	176.75	34.63	40.50	51.41	10.91
1982-83	140.81	172.75	31.94	40.69	51.83	11.14
1983-84	143.21	179.56	36.35	41.95	53.82	11.88
1984-85	140.90	176.33	35.43	42.15	54.53	12.38
1985-86	140.90	178.46	37.56	41.87	54.28	12.42
1986-87	139.58	176.41	36.83	42.57	55.76	13.19
1987-88	134.09	170.74	36.65	42.89	56.04	13.14
1988-89	141.89	182.28	40.39	46.15	61.13	14.98
1989-90	142.34	182.27	39.93	46.70	61.85	15.15
1990-91	143.00	185.74	42.74	48.02	63.20	15.18
						Cont..

Table 2.4.3: Selected categories of land use in India (Concluded)						
	(Million Hectares)					
Year	Net area sown	Total cropped area	Area sown more than once (3-2)	Net Irrigated Area	Gross Irrigated Area	Area Irrigated more than once (6-5)
1	2	3	4	5	6	7
1991-92	141.63	182.24	40.61	49.87	65.68	15.81
1992-93	142.72	185.70	42.98	50.29	66.76	16.47
1993-94	142.34	186.58	44.25	51.34	68.26	16.92
1994-95	142.96	188.05	45.09	53.00	70.65	17.65
1995-96	142.20	187.47	45.27	53.40	71.35	17.95
1996-97	142.93	189.50	46.57	55.11	76.03	20.91
1997-98	141.95	189.99	48.04	55.21	75.67	20.46
1998-99	142.75	191.65	48.90	57.44	78.67	21.23
1999-00	141.06	188.40	47.33	57.53	79.22	21.69
2000-01	141.36	185.34	44.00	55.13	76.19	21.05
2001-02	140.73	188.01	47.28	56.92	78.42	21.50
2002-03#	132.47	173.89	41.94	53.87	73.41	19.54
2003-04	140.76	189.66	48.95	56.96	78.15	21.19
2004-05(p)	141.17	191.10	50.46	59.21	81.18	21.98
2005-06(p)	141.46	192.73	51.76	60.79	84.26	23.47
2006-07(p)	140.00	192.38	52.56	62.70	86.77	24.06
2007-08(p)	140.90	195.23	54.20	63.10	87.92	24.82
2008-09(p)	141.36	195.31	53.41	63.20	88.42	25.22
2009-10(p)@	139.17	188.99	49.84	61.93	85.09	23.15
2010-11(p)	141.58	198.97	57.39	63.60	89.36	25.76
Source: Directorate of Economics & Statistics, Department of Agriculture & Cooperation.						
(p): Provisional						
# : In 2002-03 there is significant decline in Total Cropped Area and Net Area Sown due to decline in net area sown in the States of Andhra Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Tamil Nadu, West Bengal and Haryana. This was mainly due to deficient rainfall.						
@ : : In 2009-10 there is significant decline in Total Cropped Area and Net Area Sown due to decline in net area sown in the States of Andhra Pradesh, Bihar, Jharkhand, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal. This was mainly due to deficient rainfall.						

Table 2.4.4: Common property resources (CPR) land (ha) per household by type of land and percentages of CPR land to total geographical area and to total non-residential geographical area in different climatic zones

State / UT	Zone	Type of land			All	Ratio of CPR area to		Estd. No. hhs.(00)	Estd. area CPR (00 ha)
		Grazing	Village forest	Others		Total geo. area	Non-resi. geo. area		
1	2	3	4	5	6	7	8	9	10
Andhra Pradesh	DP	0.03	0.02	0.15	0.2	0.08	0.09	62917	12483
	EG	0.02	0	0.12	0.14	0.12	0.15	65416	8063
	all	0.02	0.01	0.13	0.17	0.09	0.11	11933	20546
Arunachal Pradesh	EHm	0.29	0.64	0.22	1.15	-	-	1625	1874
Assam	Ehm	0.02	0.01	0.01	0.05	0.07	0.09	35114	1613
Bihar	MG	0	0.01	0.03	0.04	0.05	0.06	118105	4994
	EHg	0.08	0.02	0.13	0.24	0.13	0.15	32153	7633
	all	0.02	0.02	0.05	0.08	0.08	0.1	15025	12627
Gujarat	GC	0.2	0.03	0.49	0.72	0.27	0.33	54468	39165
Haryana	UG	0.01	0.01	0.02	0.05	0.03	0.04	25388	1221
Himachal Pradesh	WHm	0.07	0.16	0.1	0.33	0.12	0.13	10226	3404
Jammu & Kashmir	WHm	0.05	0	0.09	0.14	-	-	7907	1133
Karnataka	WHg	0.04	0.03	0.21	0.28	0.09	0.1	29588	8337
	DP	0.14	0.02	0.08	0.23	0.12	0.14	28125	6555
	WC	0.11	0.03	0.08	0.22	0.07	0.08	11980	2614
	all	0.09	0.02	0.14	0.25	0.1	0.11	68693	17505
Kerala	WC	0.05	0.02	0.05	0.12	-	-	45411	5392
Madhya Pradesh	EHg	0.25	0.18	0.53	0.97	0.34	0.39	28441	27704
	CHg	0.22	0.16	0.3	0.69	0.2	0.23	69192	47858
	WHg	0.15	0	0.26	0.42	0.11	0.13	9850	4154
	all	0.22	0.15	0.36	0.74	0.22	0.26	10748	79715
Maharashtra	CHg	0.15	0.02	0.06	0.31	0.14	0.16	9543	2950
	EHg & WHg	0.09	0.12	0.08	0.3	0.11	0.11	88053	26006
	WC	0.04	0.05	0.22	0.31	0.16	0.18	13651	4218
	all	0.09	0.1	0.1	0.3	0.11	0.12	11124	33174
Manipur	EHm	0.05	0.08	0.04	0.17	-	-	2505	430
Meghalaya	EHm	0.16	0.28	0.28	0.72	-	-	3457	2487
Mizoram	EHm	0.06	3.43	0.87	4.37	-	-	718	3137
Nagaland	EHm	0.14	0.57	0.78	1.48	0.08	0.02	871	1301
Odisha	EHg	0.15	0.15	0.11	0.41	0.12	0.14	36892	15116
	EG	0.04	0.02	0.02	0.09	0.07	0.07	26559	2370
	all	0.11	0.1	0.07	0.28	0.11	0.12	63451	17487

Cont.../

State / UT	Zone	Type of land			All	Ratio of CPR area to		Estd. No. hhs.(00)	Estd. area CPR (00 ha)
		Grazing	Village forest	Others		Total geo. area	Non-resi. geo. area		
1	2	3	4	5	6	7	8	9	10
Punjab	UG	0	0	0.01	0.02	0.01	0.01	27971	490
Rajasthan	CHg	0.25	0.09	0.37	0.72	0.22	0.26	42048	30154
	TD	0.21	0.04	4.51	4.77	0.38	0.28	20329	96941
	all	0.24	0.08	1.72	2.04	0.32	0.27	62377	127094
Sikkim	Ehm	0.05	-	0.2	0.25	0.14	0.19	848	213
Tamil Nadu	DP	0.01	0.02	0.08	0.12	0.09	0.1	41395	4970
	EG	0.03	0.01	0.015	0.2	0.14	0.17	50708	10031
	WC	0.02	0	0.01	0.03	0.06	0.07	4184	128
	all	0.02	0.02	0.12	0.16	0.12	0.13	96287	15129
Tripura	EHm	0.01	0.01	0	0.01	0.01	0.01	5602	77
Uttar Pradesh	WHm	0.35	0.19	0.16	0.71	0.61	0.68	19429	13742
	MG	0.01	0.01	0.08	0.1	0.12	0.13	86236	8751
	TG	0	0	0.06	0.07	0.05	0.07	117526	7809
	CHg	0.02	0.04	0.14	0.21	0.09	0.1	6809	1404
	all	0.04	0.02	0.08	0.14	0.12	0.15	23000	31705
West Bengal	EHm	0	0	0	0.01	0.01	0.01	11521	98
	LG	0	0	0.01	0.02	0.01	0.01	76328	1536
	Ehg	0.01	0.03	0.03	0.07	0.08	0.09	22530	1551
	all	0	0.01	0.02	0.03	0.02	0.02	110379	3186
A. & N. Islands	Isl	0.05	0.07	0.02	0.13	0.09	0.1	426	57
India	WHm	0.21	0.15	0.13	0.49	0.33	0.37	37562	18279
	EHm	0.04	0.09	0.05	0.18	0.05	0.03	62261	11231
	LG	0	0	0.01	0.02	0.01	0.01	76328	1536
	MG	0.01	0.01	0.05	0.07	0.08	0.09	204342	13745
	TG	0	0	0.06	0.07	0.05	0.07	117526	7809
	UG	0.01	0.01	0.02	0.03	0.02	0.02	56390	1717
	Ehg	0.13	0.12	0.2	0.44	0.19	0.23	124987	55346
	CHg	0.22	0.12	0.3	0.65	0.2	0.23	127592	82365
	WHg	0.09	0.07	0.13	0.29	0.1	0.1	122520	35154
	DP	0.05	0.02	0.11	0.18	0.09	0.1	132436	24007
	EG	0.03	0.01	0.11	0.15	0.12	0.14	134378	20468
	WC	0.06	0.02	0.08	0.16	0.1	0.11	76662	12359
	GC	0.2	0.03	0.48	0.71	0.27	0.33	54858	39193
	TD	0.21	0.04	4.51	4.77	0.38	0.28	20329	96941
	Isl	0.04	0.06	0.02	0.12	0.09	0.1	465	57
	all	0.07	0.05	0.19	0.31	0.15	0.16	1348687	420219

Note: The villages where area under non-residential geographical area are not available, the total geographical area for such villages had been deducted from the total geographical area of respective region

Source: Report No. 452 ; Common Property Resources in India, Jan-June 1998, NSS 54th Round.

Note: Zone abbreviations

WHm : Western Himalayas

Ehm: Eastern Himalayas (include N.E. Hills) and Brahmaputra Valley

Islands : All Islands

LG: Lower Gangetic Plains

MG : Middle Gangetic Plains

UG: Upper Gangetic Plains

Ehg : Eastern Plateau and Hills

CHg : Central Plateau and Hills

DP : Southern Plateau and Hills

EG :East Coast Plains and Hills

GC: Gujarat Coast Plains and Hills

WC : West Coast Plains and Hills

TD : Western Dry Region

Table 2.4.5 :Net area irrigated from different sources and gross irrigated area - All India

(Thousand Hectares)

Year	Source of Irrigation							Net Irrigated Area (Col.4 to 8)	Gross Irrigated Area	Area Irrigated More than once (col. 10-9)
	Canals			Tanks	Tube-Wells	Other Wells	Other source			
	Government	Private	Total							
1	2	3	4	5	6	7	8	9	10	11
1950-51	7158	1137	8295	3613	*	5978	2967	20853	22563	1710
1951-52	7490	1193	8683	3489	*	6517	2360	21049	23180	2131
1952-53	7511	1350	8861	3303	*	6521	2437	21122	23305	2183
1953-54	7545	1314	8859	4228	*	6685	2097	21869	24363	2494
1954-55	7832	1235	9067	4025	*	6726	2270	22088	24948	2860
1955-56	8025	1360	9385	4423	*	6739	2211	22758	25642	2884
1956-57	7916	1357	9273	4492	*	6566	2202	22533	25707	3174
1957-58	8303	1349	9652	4536	*	6818	2150	23156	26628	2472
1958-59	8391	1279	9670	4759	*	6686	2286	23401	26948	3547
1959-60	8809	1305	10114	4631	*	7083	2209	24037	27454	3417
1960-61	9170	1200	10370	4561	135	7155	2240	24461	27980	3519
1961-62	9339	1163	10502	4612	258	7094	2418	24884	28460	3576
1962-63	9686	1146	10832	4781	901	6748	2403	25665	29453	3788
1963-64	9862	1160	11022	4599	1028	6756	2483	25888	29707	3819
1964-65	10080	1143	11223	4780	1087	6988	2522	26600	30705	4105
1965-66	9859	1099	10958	4258	1293	7360	2475	26344	30901	4557
1966-67	10221	1026	11247	4424	1706	7489	2041	26907	32683	5776
1967-68	20295	948	21243	4493	2112	6999	2346	37193	33207	-3986
1968-69	10985	907	11892	3926	3087	7714	2390	29009	35483	6474
1969-70	11724	881	12605	4059	3739	7438	2356	30197	36974	6777
1970-71	11972	866	12838	4112	4461	7426	2266	31103	38195	7092
1971-72	12246	869	13115	3734	4745	7535	2417	31546	38430	6884
1972-73	12134	862	12996	3619	5393	7571	2255	31834	39055	7221
1973-74	12196	869	13065	3900	5604	7679	2298	32546	40283	7737
1974-75	12657	857	13514	3544	6583	7646	2422	33709	41741	8032
1975-76	12933	858	13791	3972	6843	7601	2386	34593	43363	8770
1976-77	13016	845	13861	3901	7432	7655	2300	35149	43552	8403
1977-78	13734	842	14576	3904	7641	7943	2482	36546	46080	9534
1978-79	14304	845	15149	3937	8159	8270	2544	38059	48307	10248
1979-80	13931	843	14774	3481	9307	8557	2405	38524	49214	10690
1980-81	14450	842	15292	3182	9531	8164	2551	38720	49775	11055
1981-82	15456	490	15946	3376	10334	8403	2444	40503	51412	10909
1982-83	15716	469	16185	2936	10770	8577	2223	40691	51830	11139
1983-84	16294	470	16764	3533	10922	8470	2260	41949	53824	11875
1984-85	15805	470	16275	3021	11566	8828	2455	42145	54529	12384
1985-86	15715	465	16180	2765	11903	8515	2502	41865	54283	12418
1986-87	16039	456	16495	2677	12298	8524	2575	42569	55759	13190
1987-88	15286	460	15746	2523	13185	8611	2827	42892	56036	13144
1988-89	16640	462	17102	2996	13716	9498	2836	46148	61125	14977
1989-90	16646	478	17124	2941	14049	9837	2751	46702	61852	15150
1990-91	16973	480	17453	2944	14257	10437	2932	48023	63204	15181
1991-92	17327	464	17791	2991	15168	10869	3048	49867	65680	15813
1992-93	16503	483	16986	3179	15815	11105	3211	50296	66761	16465
1993-94	16653	485	17138	3170	16376	11220	3435	51339	68254	16915
1994-95	1679	480	2159	3276	17189	11722	3533	37879	70646	32767
1995-96	16561	559	17120	3118	17910	11787	3467	53402	71352	17950
1996-97	16889	220	17109	2821	19338	12457	3388	55113	76025	20912
1997-98	17186	211	17397	2597	19680	12431	3106	55211	75670	20459
1998-99	17099	212	17311	2795	21394	12606	3329	57435	78670	21235
1999-00	17247	194	17441	2539	22042	12597	2912	57531	79216	21685
2000-01	15809	203	16012	2466	22566	11252	2909	55205	76187	20982

Cont..

Year	Source of Irrigation							Net Irrigated Area (Col.4 to 8)	Gross Irrigated Area	Area Irrigated More than once (col. 10-9)
	Canals			Tanks	Tube-Wells	Other Wells	Other source			
	Government	Private	Total							
1	2	3	4	5	6	7	8	9	10	11
2001-02	14993	209	15202	2196	23245	11952	4342	56937	78371	21434
2002-03	13867	206	14073	1811	25627	8728	3659	53898	73056	19158
2003-04	14251	206	14457	1916	26691	9694	4299	57057	78043	20986
2004-05	14553	214	14767	1734	25235	9956	7538	59230	81079	21849
2005-06	16490	227	16717	2083	26026	10045	5966	60837	84281	23444
2006-07(p)	16802	224	17026	2078	26942	10699	5999	62744	86753	24009
2007-08(p)	16531	217	16748	1973	28497	9865	6107	63190	88062	24872
2008-09(p)	16686	195	16881	1981	28367	10390	6020	63639	88900	25261
2009-10(p)	14789	188	14977	1587	28368	9993	7013	61938	85093	23155
2010-11(p)	15496	171	15667	2004	28550	10510	6871	63602	89360	25758

Source: Directorate of Economics & Statistics, Department of Agriculture & Cooperation.

(*) : Included under "Other Wells" as separate figures were not collected during these years.

(p): Provisional

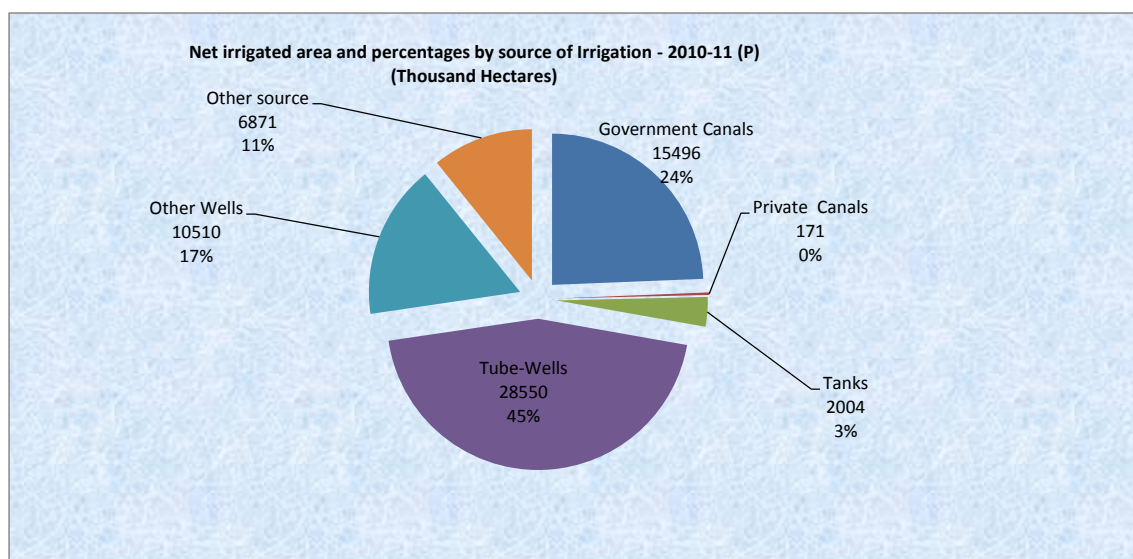
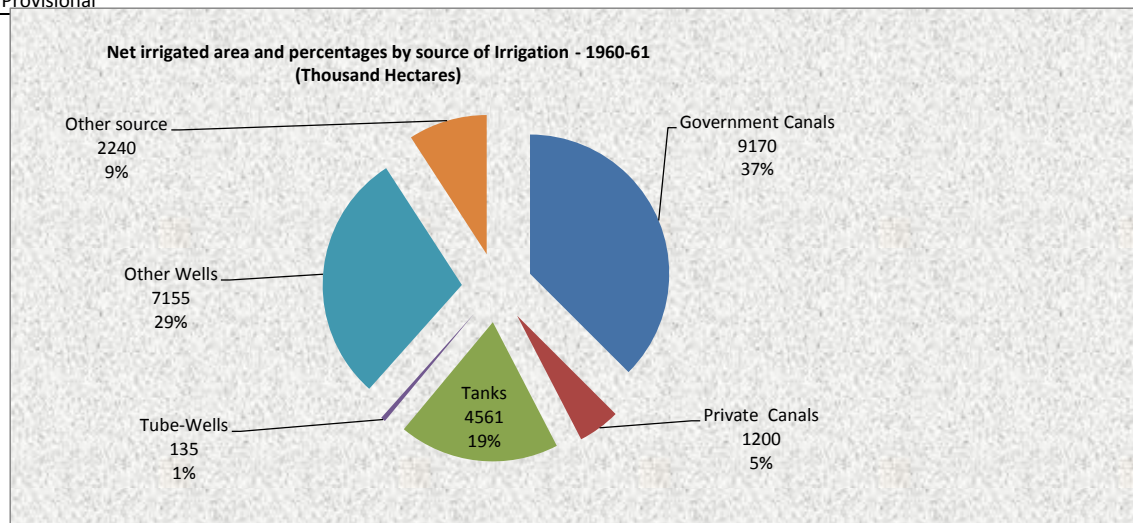


Table 2.4.6 : Growth of Urban Agglomerations & Towns by size class/category during 1901-2011

(in Number)

Year	Class/Category of Cities/Town						
	All Classes	Class-I	Class-II	Class-III	Class-IV	Class-V	Class-VI
1901	1917	25	44	144	427	771	503
1911	1909	26	38	158	388	750	546
1921	2047	29	49	172	395	773	626
1931	2219	31	59	218	479	849	580
1941	2424	49	88	273	554	979	478
1951	3060	76	111	274	675	1195	629
1961	2700	107	139	518	820	848	268
1971	3126	151	219	652	988	820	296
1981*	3949	226	325	883	1247	920	348
1991**	4615	322	421	1161	1451	973	287
2001	5161	441	496	1388	1561	1041	234
2011	7935	468	-	-	-	-	-

Source: National Building Organisation (Housing data tables) Ministry of Housing & Urban Poverty Alleviation, GOI.

Note: Size class by Population

I - 100000 & above

II - 5000- 99999

III -20000-49999

IV - 10000 -19999

V - 5000- 9999

* Excludes figures for Assam where census of 1981 was not held.

** Excludes figures of Jammu & Kashmir where census of 1991 was not conducted.

2.5 Water

Water is the primary medium through which climate change influences the Earth's ecosystems and therefore people's livelihoods and well-being. Already, water-related climate change impacts are being experienced in the form of more severe and more frequent droughts and floods. Higher average temperatures and changes in precipitation and temperature extremes are projected to affect the availability of water resources through changes in rainfall distribution, soil moisture, glacier and ice/snow melt, and river and groundwater flows; these factors are expected to lead to further deterioration of water quality as well. The poor, who are the most vulnerable, are also likely to be affected the most.

The following variables/indicators are included in the framework for statistics related to climate change.

- (i) Glacial retreat
- (ii) Surface water
- (iii) Ground water

The following tables are given.

2.5 Water

- 2.5.1 Water availability in India
- 2.5.2 Water availability –Basin wise
- 2.5.3 State wise details of Inland water resources of various type .
- 2.5.4 Catchment area of major river basins
- 2.5.5 Ground water resources availability utilization and stage of development
- 2.5.6 Ground water resource potential as per basin (prorata basis)
- 2.5.7 Water quality in Indian rivers – 2002 to 2011
- 2.5.8 (a,b,c) Ground water resources 2009 to 2012
- 2.5.9 State wise river water quality
- 2.5.10 Water flow in stream
- 2.5.11 Waste water generation, collection, treatment in Metro Cities : Status
- 2.5.12 Sediment load in major river basins 2009-10
- 2.5.13 Water supply of Class-I cities and Class-II towns (in aggregate)

Data sources

Central Water Commission, Ministry of Water resources: CWC publishes regular data on water resources. Reports are available in CWC Website.

Annual reports of Central Ground Water board. The Reports are available in the Board's website.

Central Pollution Control Board- for data on water quality and waste water treatment.

Table 2.5.1 : Water availability in India

Sl.No	Items	Quantity
1	Annual Precipitation (including snowfall)	4000 BCM
2	Average Annual Availability	1869 BCM
3	(i) Per Capita Water Availability (2001) in cubic metres	1816Cu.M
	(ii) Per Capita Water Availability (2010) in cubic metres	1588Cu.M
4	Estimated Utilizable Water Resources	1123 BCM
	(i)Surface Water Resources	690 BCM
	(ii) Ground Water Resources	433 BCM

BCM: Billion Cubic Meters; CuM: Cubic Meter.

Source: Central Water Commission-2010

Table 2.5.2: Water availability -Basinwise

Sl.No	Name of the River Basin	Average Annual Availability (cubic km/year)
1	Indus (up to Border)	73.31
2	a) Ganga	525.02
	b) Brahmaputra, Barak & Others	585.6
3	Godavari	110.54
4	Krishna	78.12
5	Cauvery	21.36
6	Pennar	6.32
7	East Flowing Rivers Between Mahanadi & Pennar	22.52
8	East Flowing Rivers Between Pennar and Kanyakumari	16.46
9	Mahanadi	66.88
10	Brahmani & Baitarni	28.48
11	Subernarekha	12.37
12	Sabarmati	3.81
13	Mahi	11.02
14	West Flowing Rivers of Kutch, Sabarmati including Luni	15.1
15	Narmada	45.64
16	Tapi	14.88
17	West Flowing Rivers from Tapi to Tadri	87.41
18	West Flowing Rivers from Tadri to Kanyakumari	113.53
19	Area of Inland drainage in Rajasthan desert	Negligible
20	Minor River Basins Draining into Bangladesh & Burma	31
Total		1869.35

Source: Ministry of Water Resources, 2006

Table 2.5.3 : State wise details of Inland water resources of various types

Sl. No.	Name of the State/UT.	Rivers & Canals (Length in kms.)	Reservoirs(Lakh Hectares)	Tanks, Lakes & Ponds(Lakh Hectares)	Floodplain Lakes & Derelict Water (Lakh Hectares)	Brackish Water (Lakh Hectares)	Total (Lakh Hectares)
1	2	3	4	5	6	7	8
1	Andhra Pradesh	11514	2.34	5.17	-	0.60	8.11
2	Arunachal Pradesh	2000	-	2.76	0.42	-	3.18
3	Assam	4820	0.02	0.23	1.10	-	1.35
4	Bihar	3200	0.60	0.95	0.05	-	1.60
5	Chhattisgarh	3573	0.84	0.63	-	-	1.47
6	Goa	250	0.03	0.03	-	NEG	0.06
7	Gujarat	3865	2.43	0.71	0.12	1.00	4.26
8	Haryana	5000	NEG	0.10	0.10	-	0.20
9	Himachal Pradesh	3000	0.42	0.01	-	-	0.43
10	Jammu & Kashmir	27781	0.07	0.17	0.06	-	0.30
11	Jharkhand	4200	0.94	0.29	-	-	1.23
12	Karnataka	9000	4.40	2.90	-	0.10	7.40
13	Kerala	3092	0.30	0.30	2.43	2.40	5.43
14	Madhya Pradesh	17088	2.27	0.60	-	-	2.87
15	Maharashtra	16000	2.79	0.59	-	0.10	3.48
16	Manipur	3360	0.01	0.05	0.04	-	0.10
17	Meghalaya	5600	0.08	0.02	NEG	-	0.10
18	Mizoram	1395	-	0.02	-	-	0.02
19	Nagaland	1600	0.17	0.50	NEG	-	0.67
20	Odisha	4500	2.56	1.14	1.80	4.30	9.80
21	Punjab	15270	NEG	0.07	-	-	0.07
22	Rajasthan	5290	1.20	1.80	-	-	3.00
23	Sikkim	900	-	-	0.03	-	0.03
24	Tamil Nadu	7420	5.70	0.56	0.07	0.60	6.93
25	Tripura	1200	0.05	0.13	-	-	0.18
26	Uttar Pradesh	28500	1.38	1.61	1.33	-	4.32
27	Uttarakhand	2686	0.20	0.01	0.00	-	0.21
28	West Bengal	2526	0.17	2.76	0.42	2.10	5.45
Union Territories							
29	Andaman & Nicobar Islands	115	0.01	0.03	-	1.20	1.24
30	Chandigarh	2	-	NEG	NEG	-	0.00
31	Dadra & Nagar Haveli	54	0.05	-	-	-	0.05
32	Daman & Diu	12	-	NEG	-	NEG	0.00
33	Delhi	150	0.04	-	-	-	0.04
34	Lakshadweep	-	-	-	-	-	0.00
35	Puducherry	247	-	NEG	0.01	NEG	0.01
TOTAL		195210	29.07	24.14	7.98	12.40	73.59

Source : Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture (Annual Report 2011-12)

NEG: Negligible

Table 2.5.4 : 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	2525	861452 (1186000)
	b) Brahmaputra	Kailash Range (Tibet)	916 (2900)	194413 (580000)
	c) Barak & other	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	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, Water year book -2008

Note : Figures within bracket indicate the total river basin in India and neighbouring countries.

Table 2.5.5 : Ground water resources availability, utilization and stage of development

Unit:BCM/Yr							
States	Annual Replenishable Ground Water Resource	Natural Discharge during non-Monsoon season	Net Annual Ground Water Availability	Annual Ground Water Draft			Stage of Ground Water Development (%)#
				Irrigation	Domestic and Industrial Uses	Total	
1	2	3	4	5	6	7	8
Andhra Pradesh	33.83	3.07	30.76	12.61	1.54	14.15	46
Arunachal Pradesh	4.45	0.45	4	0.002	0.001	0.00	0
Assam	30.35	2.537	27.813	5.333	0.69	6.02	22
Bihar	28.63	2.42	26.21	9.79	1.56	11.35	43
Chhattisgarh	12.22	0.64	11.58	3.08	0.52	3.60	31
Delhi	0.31	0.02	0.29	0.14	0.26	0.40	138
Gujarat	0.221	0.088	0.133	0.014	0.03	0.04	33
Goa	18.43	1.08	17.35	11.93	1.05	12.98	75
Haryana	10.48	0.68	9.8	11.71	0.72	12.43	127
Himachal Pradesh	0.59	0.06	0.53	0.23	0.08	0.31	58
Jammu & Kashmir	3.7	0.37	3.33	0.15	0.58	0.73	22
Jharkhand	5.96	0.55	5.41	1.17	0.44	1.61	30
Karnataka	16.81	2	14.81	9.01	1	10.01	68
Kerala	6.62	0.59	6.03	1.3	1.5	2.80	46
Madhya Pradesh	33.95	1.7	32.25	16.66	1.33	17.99	56
Maharashtra	35.73	1.93	33.8	15.91	1.04	16.95	50
Manipur	0.44	0.04	0.4	0.0033	0.0007	0.00	1
Meghalaya	1.2343	0.1234	1.1109	0.0015	0.0002	0.00	0
Mizoram	0.044	0.004	0.04	0	0.0004	0.00	1
Nagaland	0.42	0.04	0.38	-	0.008	0.01	2
Odisha	17.78	1.09	16.69	3.47	0.89	4.36	26
Punjab	22.56	2.21	20.35	33.97	0.69	34.66	170
Rajasthan	11.86	1.07	10.79	12.86	1.65	14.51	134
Sikkim	-	-	0.046	0.003	0.007	0.01	22
Tamil Nadu	22.94	2.29	20.65	14.71	1.85	16.56	80
Tripura	2.97	0.23	2.74	0.09	0.07	0.16	6
Uttar Pradesh	75.25	6.68	68.57	46	3.49	49.49	72
Uttarakhand	2.17	0.1	2.07	1.01	0.03	1.04	50
West Bengal	30.5	2.92	27.58	10.11	0.79	10.90	40
Total States	430.45	34.98	395.47	221.27	21.82	243.08	61
Union Territories							
Andaman & Nicobar	0.31	0.012	0.298	0.0006	0.01	0.01	4
Chandigarh	0.022	0.002	0.02	0	0	0.00	0
Dadar & Nagar Haveli	0.059	0.003	0.056	0.001	0.007	0.008	14
Daman & Diu	0.012	0.001	0.011	0.008	0.003	0.011	100
Lakshadweep	0.0105	0.007	0.0035	0	0.0026	0.0026	74
Puducherry	0.171	0.017	0.154	0.121	0.029	0.150	97
Total UTs	0.5845	0.042	0.5425	0.1306	0.0516	0.18	34

Source: Central Ground Water Board Annual Report 2010-11.

Total may not tally due to rounding off.

BCM: Billion Cubic Meter

: The stage of Ground water development is to be computed as give below:

$$\text{Stage of development} = \frac{\text{Existing Gross draft for all uses}}{\text{Net Annual availability}} \times 100$$

Table 2.5.6: Ground water resource potential as per basin (prorata basis)

Sl. No.	Basin	Total Replenishable Ground Water Resource	Provision of Domestic Industrial & Other Uses	Available for Irrigation	Net Draft	Balance for future Use	% Level of G.W. Development
		(M.C.M/Yr)	(M.C.M/Yr)	(M.C.M/Yr)	(M.C.M/Yr)	(M.C.M/Yr)	
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	Krishna	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
MCM/yr : Million Cubic Meter/Year

Table2.5.7: Water Quality in Indian Rivers – 2002 to 2011

Name of the River	Length (Km)	No of Monitoring locations	Year	Observed Range of Water Quality Parameters						
				Temp.(°C) (Min-Max)	pH	Conductivity(µmhos/cm)	DO(mg/l)	BOD(mg/l)	Total Coliform (MPN/100 ml)	Faecal Coliform (MPN/100 ml)
Ganga	2525	34	2002	3-34	6.4-9.0	19-2720	2.7-11.5	0.5 – 16.8	300-25x10 ⁵	20-11x10 ⁵
			2003	4-34	6.8-8.9	49-1323	4-11	0.8-27	47-45x10 ⁵	26-12x10 ⁵
			2004	5-35	7-8.8	72-4080	0.3-13.2	0.7-14.4	11-45x10 ⁵	11-7x10 ⁵
			2005	4-39	6.1-9	23-1696	3.2-12.8	0.1-15.2	13-45x10 ⁵	13-11x10 ⁵
			2006	9-33	7.0-8.88	97-5620	2.2-11.9	0.1-16.4	1-25x10 ⁵	17-11x10 ⁵
			2007	4-33	6.1-8.8	23-5040	1.4-11	0-14	0-28x10 ⁵	0-7 x10 ⁵
			2008	2.5-35.5	6.1-8.9	39-6320	1.2 - 11.6	0.5-21.0	0- 101 x10 ⁵	0 - 85 x10 ⁵
			2009	4-37	6.5-8.9	68-4460	4.3-11.2	0.2-16	2-65 x10 ⁴	0-4 x10 ⁴
			2010	4-35	6.7-9.0	21-5250	3.6-12	0.2-15	3-14 x10 ⁵	2-4 x10 ⁵
			2011	3-37	6.7-9.1	49-10240	4-14.3	0.2-11	5-25 x10 ⁵	5-11 x10 ⁵
Yamuna	1376	23	2002	3-34	6.7-9.8	56-1959	0.1-22.7	1.0 – 36	27-26.3x10 ⁶	11-17.2x10 ⁵
			2003	2-38	6.6-10	45-3500	0.3-22.8	1-58	110-171x10 ⁷	40-203x10 ⁶
			2004	7-35	6.8-9	76-2150	0.3-19.5	1-40	21-1103x10 ⁶	18-62x10 ⁶
			2005	11-37	6.8-9.1	90-2290	0.5-17.3	0.8-59	14-307x10 ⁶	11-52x10 ⁵
			2006	4-34	7.14-9.5	220-1876	1.3-18.8	1.0-144	7-231x10 ⁷	2-13x10 ⁶
			2007	6.5-34	5-8.4	57-1940	0-17.7	0-93	0-32 x10 ⁷	0-23 x10 ⁶
			2008	7.5-32	6.8 - 9.5	40-3340	0.0 - 20.6	0.4-70.0	0 - 103x10 ⁶	11 -109x10 ⁵
			2009	5-35	7.0 - 8.8	80 - 3040	0.0 - 17.9	0.2 - 103	4 - 23 x10 ⁹	9 - 21 x10 ⁸
			2010	5-35	6.1-9.4	100-2220	0.0-21.1	08-84	13 - 39x10 ⁷	9 - 29x10 ⁶
			2011	4-38	6.9-8.8	60-1905	0-17	0.2-41	10-16 x10 ⁷	4-11 x10 ⁸
Mahi	583	7	2002	19-34	7.1-9.2	175-5720	0.2-8.5	0.1 – 3.0	3-2400	3-75
			2003	18-34	7-8.8	97-750	2.9-10.1	0.5-3.9	4-2400	2-28
			2004	20-34	7.4-9.2	166-650	2.7-8.7	0.3-4.9	4-1600	2-28
			2005	20-32	7.5-9	182-7080	4.1-11.1	0.2-5.9	3-14x10 ³	2-1x10 ³
			2006	16-28	7.2-8.9	263-580	7.3-12.1	1.1-8.5	3-180	2-9
			2007	20-31	7.6-8.89	234-3720	0.4-10.7	0.3-5.7	4-160	0-11
			2008	20- 32	7.2-8.9	225-1660	4.6-13	0.2-6.8	0-210	0- 18
			2009	22-32	7.1-10	160-766	3.5-8.6	0.1-4.0	3-170	0-9
			2010	20 - 34	7.4 – 8.7	230-7234	3.5 – 9.9	0.22- 4.0	4 - 110	0 -7
			2011	18-36.5	7.1-9.1	256 -1310	3.2-8.9	0.6 -8.0	7-28	2-9

Name of the River	Length (Km)	No of Monitoring locations	Year	Observed Range of Water Quality Parameters						
				Temp.(°C)	pH	Conductivity(µmhos/cm)	DO(mg/l)	BOD(mg/l)	Total Coliform (MPN/100 ml)	Faecal Coliform (MPN/100 ml)
Tapi	724	10	2002	20-40	7.4-9.0	76-700	4.8-8.8	0.6 – 10.0	40-2100	2-210
		10	2003	18-36	3.1-9.2	119-1130	3.1-10.4	1-10	30-930	2-230
		10	2004	13-39	3.1-9.5	190-790	1.2-8.7	0.7-36	3-5X10 ⁵	2-9X10 ⁴
		13	2005	26-30	7.2-9.4	186-1084	4-8.4	1-25.1	2-46X10 ⁴	2-15X10 ⁴
		13	2006	14-31	7.7-9.28	161-923	4.6-9.7	0.3-24	5-11X10 ⁴	2-11X10 ⁴
		14	2007	23-39	7.3-8.5	210-581	3.7-8.7	1.1-25	17-46 x10 ³	7-15 x10 ³
		14	2008	19-41	6.6-8.9	132-26000	2.1- 8.8	0.1-21	0-46 X10 ⁴	0-24 X10 ⁴
		14	2009	18-42	6.2-8.9	173-45400	3.7-8.2	0.6-12	14-39000	0-14000
		14	2010	15 - 42	7.0-8.7	125- 39400	1 -8.1	0.4 - 16	9- 9300	0 - 4300
		14	2011	24-41.5	7.0-8.7	172-41836	3.2-7.6	1.2-10	22-24000	9 -9000
Narmada	1312	14	2002	-	6.9-9.3	102-1341	5.8-9.8	0.1 – 3.8	9-2400	2-64
		14	2003	12-31	7.1-8.5	95-441	4.5-9.5	0.4-3.3	4-1600	1-110
		14	2004	15-34	7-8.6	181-815	5.5-9.6	0.2-3.8	3-2400	2-15
		15	2005	21-30	7.3.9	190-1746	4.8-10.9	0.6-4.5	3-2400	2-210
		15	2006	9-32	7.1-8.6	188-682	6.2-11	0.4-3.7	3-2400	0-39
		15	2007	19-31	7.5-8.8	244-1629	6.2-10.4	1.2-3.5	7-1600	0-15
		21	2008	14-32	6.8-10	180-853	4.9- 13	0.2 -11.4	0-2400	0-140
		21	2009	17-33	6.5-8.9	178-1930	4.2-11.5	0.2-30	2-1600	0-90
		21	2010	19 - 39	7.2 – 8.5	194 -727	4.8 - 11	0.21- 5.4	4 - 11000	0 - 4600
		26	2011	14.7-38	7.1- 8.6	217-651	6.2- 9.9	0.8- 5.0	4-1600	0-17
Godavari	1465	11	2002	22-35	7.0-9.0	118-1400	3.1-10.9	0.5 – 78.0	8-5260	2-3640
		11	2003	22-37	7.1-8.7	115-1350	3.2-9.3	1.7-53	70-68200	3-1400
		11	2004	21-35	6.5-9	86-1290	2.4-9.2	0.2-15	4-22 x 10 ⁴	2-5 x 10 ⁴
		18	2005	23-32	6.7-9.1	121-1300	0.8-8.7	0.5-20	2-33 x 10 ³	1-10 x 10 ³
		18	2006	19-34	6.65-9.11	75-691	1.1-9.6	1.2-32	2-31 x 10 ³	2-6 x 10 ³
		18	2007	20-37	5.9-8.9	126-918	3.2-7.5	0.2-36	0-2200	5-36 x10
		35	2008	13-35	5.2-9.6	114-3994	1.2-11.3	0.2-20	3-28 x10 ³	0-800
		35	2009	15-41	6-9.2	115-3169	3.2-12.3	0.0-26	5-16000	0-340
		35	2010	12-40	5.4-8.9	91-1670	1.8-14.2	0.3-60	2-2400	1-1600
		35	2011	18-40	6.4-9.1	132-1959	1.2-12.2	0.0-37	7-2400	1-500

Name of the River	Length (Km)	No of Monitoring locations	Year	Observed Range of Water Quality Parameters						
				Temp.(°C)	pH	Conductivity(µmhos/cm)	DO(mg/l)	BOD(mg/l)	Total Coliform (MPN/100 ml)	Faecal Coliform (MPN/100 ml)
Krishna	1401	17	2002	18-33	6.8-9.5	28-11050	2.9-10.9	0.2 – 10.0	17-33300	3-1 x 10 ³
			2003	18-35	6.7-8.9	36-40000	0.7-12.6	0.5-17	6-7 x 10 ⁴	2-2 x 10 ⁴
			2004	18-38	6.7- 9	71-44000	0.4-9.2	0.3-9	15-124 x 10 ³	3-28 x 10 ³
			2005	24-37	6.5-9.9	69-43300	1.4-8.8	0.4-40	17-84 x 10 ³	1-34 x 10 ³
			2006	15-40	6.32-9.30	76-2580	3.0-8.5	0.4-14.8	4-86 x 10 ³	1-6 x 10 ³
			2007	13-38	6.2-9.1	69-23400	3.0-10	0.1-9.8	0-71x10 ³	0-1600 ³
			2008	17.3-39	5.8-8.9	44-14290	1.1-9.8	0.2-17.6	8-16 x 10 ³	0-3 x 10 ³
			2009	18.4-41	6.7-9.0	75-19960	0-12.6	0.3-9.6	8-170000	0-1400
			2010	17-39	6.5-9.1	42-16720	1.5-11.8	0-10	2-4000	0-1600
			2011	19.2-38	6.9-8.7	99-8570	1.7-15.8	0.4-16	4-16000	2-9000
Cauvery	800	20	2002	21-37	2.0-9.2	31-53100	0.1-12.6	0.1 – 26.6	39-16 x 10 ³	2-28 x 10 ³
			2003	8-34	7-9.2	42-57200	2.1-13.5	0.2-10	4-22 x 10 ³	2-4 x 10 ³
			2004	19- 35	6.6-9	35-39720	3.3-9.9	1-9	2-5 x 10 ⁴	2-17 x 10 ³
			2005	20-37	6.2-9.5	28-48700	0.3-9.8	1-12	2-9500	1-3 x 10 ³
			2006	20-34	7.0-9.3	26-1694	2.7-8.9	1-6	90-3500	3-1400
			2007	19-32	6.5-8.8	28-56500	0-12.4	0.1-38	40-28 x10 ³	4-17 x10 ³
			2008	20-35	6.5-8.8	27-28700	0.6-14	0.1-23	27-5400	0-3500
			2009	20-34	6.5-8.9	65-81800	1.5-10.3	0.1-17	7-9200	2-5400
			2010	21-30	6.5-8.9	18-8430	0.4-12.2	0.1-27	70-15000	20-12000
			2011	20-34	4.3-8.9	7-3640	1.7-10.9	0.1-7.2	90-6200	20-2200
Mahanadi	851	16	2002	18-38	7.3-8.9	114-15940	1.3-10.4	1.0 – 7.6	15-30000	50-17000
			2003	17-37	6.5-8.6	77-83600	4.7-10.1	0.3-5.6	4-35X10 ³	50-28X10 ³
			2004	17- 34	6.3-8.8	105-20700	4.4- 9.4	0.2-4	3-92X10 ³	27-24X10 ³
			2005	22-34	6.1-8.7	75-36279	4.5-10	0.2-16	3-92X10 ³	78-54X10 ³
			2006	20-32	6.97-8.9	113-34587	4.7-8.5	0.2-3.8	14-92X10 ³	68-54X10 ³
			2007	26-33	7.3-8.54	102-813	6.2-8.9	1.2-3.6	27-35 x10 ³	700-17 x10 ³
			2008	18-36	6.7-8.8	109-29400	0.8-8.9	0.2-4.6	15-16 x10 ⁴	310- 54 x10 ³
			2009	17-39	6.7-8.8	103-48830	0.2-11	0.2-7.1	5-1600000	110-160000
			2010	17-39	7.0 – 9.3	92 - 42350	4.4-11	0.2 – 14.3	10 - 160000	45 - 92000
			2011	18-36	7.1-8.5	90 - 13190	4.9-10.5	0.6-3.6	10- 160000	78-160000

Name of the River	Length (Km)	No of Monitoring locations	Year	Observed Range of Water Quality Parameters						
				Temp.(°C)	pH	Conductivity(µmhos/cm)	DO(mg/l)	BOD(mg/l)	Total Coliform (MPN/100 ml)	Faecal Coliform (MPN/100 ml)
Brahamani	799	11	2002	20-38	7.0-8.4	81-376	5.2-9.8	1.5 – 6.0	80-90000	40-60000
		11	2003	17-35	6.6-8.4	69-501	6.1-10.2	0.2-6	90-24x10 ³	60-14x10 ³
		11	2004	16-28	6.3-8.4	47-402	6-9.6	0.2-7	490-28x10 ³	22-13x10 ³
		11	2005	16-34	6.3-8.7	65-850	5.1-13.8	0.3-5.2	490-16x10 ⁴	330-16x1
		11	2006	18-32	6.9-8.4	102-380	4.6-8.9	0.3-5.4	940-5400	630-2400
		15	2007	20-40	6.7-8.5	91-582	1.9-8.9	0.3-4.9	210-54 x10 ³	110-22 x10 ³
		16	2008	18-38	6.4-8.4	93- 664	5.3- 9.7	0.4-6.2	750-21 x10 ³	110- 14 x10 ³
		16	2009	12-40	6.6-8.5	70-431	4.5-18.3	0.2-5.8	940-22000	460-13000
		16	2010	17-37	6.6-8.5	97-623	5.6-12	0.4-5.6	330-92000	130-35000
		16	2011	15-38	6.7–8.5	93 - 458	5.0 -9.9	0.6 - 6.6	330-92000	170-35000
Baitarni		5	2002	24-36	7.3-8.3	54-78400	6.8-9.3	2.0 – 6.8	900-22000	700-11000
-		5	2003	18-36	6.7-7.8	75-54802	5.4-11.3	0.3-3.5	330-16x10 ³	230-9x10 ³
		5	2004	18-32	6.6-8.1	64-29118	5.9-9.8	0.4-2.6	640-92000	310-35x10 ²
		5	2005	24-34	7-8.6	68-42257	5.2-8.8	0.4-4.3	790-24x10 ³	3330-11x10 ³
		5	2006	15-25	7.6-8.4	90-2287	7.4-8.0	0.3-1.8	1400-4300	790-1700
		5	2007	22-35	7.3-8.2	136-19450	5.6-8.8	0.4-2.2	330-5400	170-2200
		5	2008	22-36	7.5-8.2	75-48400	6.3-9.2	0.8-2	940-5400	700-3500
		5	2009	25-38	6.7-8.4	69-28400	6.1-9.0	0.6-3.4	630-5400	230-2800
		5	2010	18 - 36	6.6-8.3	98 - 33320	5.6 – 8.8	0.4 – 2.6	470 - 16000	210 - 5400
		5	2011	15-36	7.1-8.4	83- 32540	5.2-11.9	0.3- 3.2	350 - 54000	140 - 24000
Subarnarek	395	6	2002	18-36	6.5-8.0	113-355	5.2-8.5	0.2 – 12.0	150-1800	70-540
		6	2003	22-35	7.3-8.3	133-346	6.4-8.4	1-2	300-7900	130-3300
		6	2004	24-28	7.8-8.3	152-623	7.1-7.5	0.4-2.5	470-2200	270-700
		6	2005	20-36	6.8-8.3	130-405	5.5-8.6	1.0-4.7	110-1400	78-700
		6	2006	19-34	6.9-7.9	192-15013	5.8-8.2	0.3-4.6	2200	1300
		6	2007	19-37	6-8.1	134-740	4.6-8.7	0.9-8.0	540-2400	200-920
		12	2008	19-35.5	6.5-8.0	119-332	5.1-8.9	0.0-10.5	540-3500	200-1700
		12	2009	19.5-40	6.4-8.4	164-717	4.0-8.5	0.4-6.3	280-2400	70-1300
		12	2010	19-38	6.8-8.0	152-244	5.9-8.2	0.4-2.8	-	-
		12	2011	15-38	6.5-8.4	126-408	3.0-8.6	0.2-7.0	750-43000	110-15000

Name of the River	Length (Km)	No of Monitoring locations	Year	Observed Range of Water Quality Parameters						
				Temp.(°C)	pH	Conductivity(µmhos/cm)	DO(mg/l)	BOD(mg/l)	Total Coliform (MPN/100 ml)	Faecal Coliform (MPN/100 ml)
Brahmaputra	916	6	2002	15-32	6.5-9.0	104-684	1.1-10.5	0.1 – 3.9	360-240000	300-24000
		6	2003	14-32	6.4-8.4	77-570	1.2-11.5	0.4-3.5	360-24x10 ⁴	300-24x10 ⁴
		6	2004	15-34	5.2-9	91-445	1.1-9.4	0.4-4.3	360-24x10 ⁴	300-24x10 ⁴
		10	2005	-	5.9-7.6	20-408	2-10.5	0.3-6.2	300-24x10 ⁴	150-24x10 ⁴
		10	2006	18-30	6.9-8.0	55-485	4.2-10.2	0.3-5.7	1-24x10 ⁴	300-24x10 ⁴
		10	2007	18-32	5.9-7.9	76-645	5.1-10	0.1-3.4	0-24 x10 ⁴	0-24 x10
		10	2008	12-32	6.1-8.1	75-460	3.3-9.6	0.4-5.4	1-24 x10 ⁴	0-24 x10 ³
		10	2009	17-31	6.1-8.1	69-303	4.4-10.5	0.3-5.4	1-24000	0-1100
		10	2010	18-32	6.5-8.1	49-371	3.6-9.4	0.6-6.3	0-3000	0-360
		10	2011	17-32	6.1-8.5	68-238	4.4-30	0.3-9.2	0-15000	0-1500
Satluj	1078	20	2002	9-32	6.8-8.8	131-819	3.8-11.4	0.1 – 45.0	8-35000	2-3500
		20	2003	5-30	6.9-8.9	164-1226	3.4-11.5	0.1-24	3-3x10 ⁴	1-1300
		20	2004	9-29	7.1-8.3	144-694	1.6-10.3	0.1-64	7-2x10 ⁵	2-9x10 ⁴
		21	2005	10-28	7.1-8.3	150-818	2.8-14.2	0.1-40	1-35x10 ⁴	1-11x10 ⁴
		21	2006	7-28	7.1-8.26	160-958	2.8-10.6	0.1-32	1-17x10 ⁴	1-5x10 ⁴
		21	2007	2-26	7-8.6	145-865	3.2-11.9	0-28	3-17 x10 ⁴	0-9 x10 ⁴
		21	2008	4.5-23	7.0-8.5	162-843	1.2 - 12.4	0.0-48	12- 11 x10 ⁴	0 - 10 x10 ³
		22	2009	7.5-26	6.3-8.5	124-932	0.6-11.4	0.1-55	4-250000	0-110000
		23	2010	4-27	4.2-8.6	155-982	4.1-11.1	0.1-40	6 -1 x10 ⁵	2-5 x10 ⁴
		23	2011	1.8-25	6.8-8.69	87-1022	3.8-12	0.1-32	4-90000	2 - 50000
Beas	460	19	2002	3-32	7.1-8.7	53-517	5.2-11.5	0.3 – 5.0	2-2400	2-1600
		19	2003	4-29	7.3-8.9	76-559	7-12	0.1-6	2-2400	2-1600
		19	2004	2-29	6.9-8.5	60-396	6.8-11.8	0.2-4.8	2-5x10 ⁴	2-3500
		19	2005	4-27	7-8.8	54-395	4.8-13	0.2-10	2-11x10 ³	2-1100
		19	2006	4-27	7.0-8.2	94-395	5.8-11.0	0.2-3.2	2-11x10 ³	2-1100
		19	2007	2-22	6.2-8.9	86-470	5.9-12.8	0.1-2.9	0-2400	0-2400
		19	2008	1.5-22	7.0-8.4	53-432	3.8-12.5	0.1-7.6	2-1600	2-1600
		23	2009	5- 26	7.1-8.5	46-338	6.4-11.8	0.1-4.3	7-2400	2-1600
		23	2010	5-26	6.2-8.8	63-548	5.8-11.2	0.1-2.8	7-39000	2-7000
		23	2011	2.5-24	6.5-8.87	49-638	5-12.5	0.1-1.5	8-2400	0 - 920

BOD : Biological Oxygen Demand ; DO- Dissolved Oxygen.

(µmhos/cm) : Micromhos per centimeter; MPN: Most Probable Number

Source: Central Pollution Control Board.

Table 2.5.8(a) : Ground water resources 2009-10

States	Annual Replenishable Ground Water Resources				Total	Natural Discharge during non-monsoon season	Net Annual Ground Water Availability	Annual Ground Water Draft			Projected Demand for Domestic and Industrial uses upto 2025	Ground Water availability for future irrigation	Stage of Ground Water Development (%)#
	Monsoon Season		Non-monsoon Season					Irrigation	Domestic and Industrial uses	Total			
	Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other source*									
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Andhra Pradesh	16.040	8.930	4.200	7.330	36.500	3.550	32.950	13.880	1.020	14.900	2.670	17.650	45.000
Arunachal Pradesh	1.570	0.000	0.980	0.000	2.560	0.260	2.300	0.001	0.000	0.001	0.009	2.290	0.040
Assam	23.650	1.990	1.050	0.540	27.230	2.340	24.890	4.850	0.590	5.440	0.980	19.060	22.000
Bihar	19.450	3.960	3.420	2.360	29.190	1.770	27.420	9.390	1.370	10.770	2.140	16.010	39.000
Chhattisgarh	12.070	0.430	1.300	1.130	14.930	1.250	13.680	2.310	0.480	2.800	0.700	10.670	20.000
Delhi	0.130	0.060	0.020	0.090	0.300	0.020	0.280	0.200	0.280	0.480	0.570	0.000	170.000
Goa	0.220	0.010	0.010	0.040	0.290	0.020	0.270	0.040	0.030	0.070	0.040	0.190	27.000
Gujarat	10.590	2.080	0.000	3.150	15.810	0.790	15.020	10.490	0.990	11.490	1.480	3.050	76.000
Haryana	3.520	2.150	0.920	2.720	9.310	0.680	8.630	9.100	0.350	9.450	0.600	-1.070	109.000
Himachal Pradesh	0.330	0.010	0.080	0.020	0.430	0.040	0.390	0.090	0.030	0.120	0.040	0.250	30.000
Jammu & Kashmir	0.610	0.770	1.000	0.320	2.700	0.270	2.430	0.100	0.240	0.330	0.420	1.920	14.000
Jharkhand	4.260	0.140	1.000	0.180	5.580	0.330	5.250	0.700	0.380	1.060	0.560	3.990	20.000
Karnataka	8.170	4.010	1.500	2.250	15.930	0.630	15.300	9.750	0.970	10.710	1.410	6.480	70.000
Kerala	3.790	0.010	1.930	1.110	6.840	0.610	6.230	1.820	1.100	2.920	1.400	3.070	47.000
Madhya Pradesh	30.590	0.960	0.050	5.590	37.190	1.860	35.330	16.080	1.040	17.120	1.740	17.510	48.000
Maharashtra	20.150	2.510	1.940	8.360	32.960	1.750	31.210	14.240	0.850	15.090	1.510	15.100	48.000
Manipur	0.200	0.005	0.160	0.010	0.380	0.040	0.340	0.002	0.001	0.002	0.020	0.310	0.650
Meghalaya	0.790	0.030	0.330	0.005	1.150	0.120	1.040	0.000	0.002	0.002	0.100	0.940	0.180
Mizoram	0.030	0.000	0.020	0.000	0.040	0.004	0.040	0.000	0.000	0.000	0.001	0.040	0.900
Nagaland	0.280	0.000	0.080	0.000	0.360	0.040	0.320	0.000	0.009	0.009	0.030	0.300	3.000
Odisha	12.810	3.560	3.580	3.140	23.090	2.080	21.010	3.010	0.840	3.850	1.220	16.780	18.000
Punjab	5.980	10.910	1.360	5.540	23.780	2.330	21.440	30.340	0.830	31.160	1.000	-9.890	145.000
Rajasthan	8.760	0.620	0.260	1.920	11.560	1.180	10.380	11.600	1.390	12.990	2.720	-3.940	125.000
Sikkim	-	-	-	-	0.080	0.000	0.080	0.000	0.010	0.010	0.020	0.050	16.000
Tamil Nadu	4.910	11.960	4.530	1.670	23.070	2.310	20.760	16.770	0.880	17.650	0.910	3.080	85.000
Tripura	1.100	0.000	0.920	0.170	2.190	0.220	1.970	0.080	0.090	0.170	0.200	1.690	9.000
Uttar Pradesh	38.630	11.950	5.640	20.140	76.350	6.170	70.180	45.360	3.420	48.780	5.300	19.520	70.000
Uttarakhand	1.370	0.270	0.120	0.510	2.270	0.170	2.100	1.340	0.050	1.390	0.060	0.680	66.000
West Bengal	17.870	2.190	5.440	4.860	30.360	2.900	27.460	10.830	0.810	11.650	1.240	15.330	42.000
Total States	247.870	69.510	41.840	73.150	432.430	33.730	398.700	212.370	18.050	230.410	29.090	161.060	58.000
Union Territories													
Andaman & Nicobar	-	-	-	-	0.330	0.005	0.320	0.000	0.010	0.010	0.008	0.303	4.000
Chandigarh	0.016	0.001	0.005	0.001	0.023	0.002	0.020	0.000	0.000	0.000	0.000	0.020	0.000
Dadar & Nagar Haveli	0.059	0.005			0.063	0.003	0.060	0.001	0.008	0.009	0.008	0.051	14.000
Daman & Diu	0.006	0.002	0.000	0.001	0.009	0.000	0.008	0.007	0.002	0.009	0.003	-0.002	107.000
Lakshadweep	-	-	-	-	0.012	0.009	0.004	0.000	0.002	0.002	-	-	63.000
Puducherry	0.057	0.067	0.007	0.029	0.160	0.016	0.144	0.121	0.030	0.151	0.031	-0.008	105.000
Total Uts	0.138	0.075	0.012	0.031	0.597	0.036	0.556	0.129	0.052	0.181	0.050	0.365	33.000
Grand Total	248.010	69.590	41.850	73.180	433.020	33.770	399.250	212.500	18.100	230.590	29.140	161.430	58.000

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Table 2.5.8(b) : Ground water resource 2010-11

Unit:BCM/Yr

States	Annual Replenishable Ground Water Resources				Total	Natural Discharge during non-monsoon season	Net Annual Ground Water Availability	Annual Ground Water Draft			Projected Demand for Domestic and Industrial uses upto 2025	Ground Water availability for future irrigation	Stage of Ground Water Development (%)#
	Monsoon Season		Non-monsoon Season					Irrigation	Domestic and Industrial uses	Total			
	Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other source*									
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Andhra Pradesh	16.040	8.930	4.200	7.330	36.500	3.550	32.950	13.880	1.020	14.900	2.670	17.650	45.000
Arunachal Pradesh	1.570	0.000	0.980	0.000	2.560	0.260	2.300	0.001	0.000	0.001	0.009	2.290	0.040
Assam	23.650	1.990	1.050	0.540	27.230	2.340	24.890	4.850	0.590	5.440	0.980	19.060	22.000
Bihar	19.450	3.960	3.420	2.360	29.190	1.770	27.420	9.390	1.370	10.770	2.140	16.010	39.000
Chhattisgarh	12.070	0.430	1.300	1.130	14.930	1.250	13.680	2.310	0.480	2.800	0.700	10.670	20.000
Delhi	0.130	0.060	0.020	0.090	0.300	0.020	0.280	0.200	0.280	0.480	0.570	0.000	170.000
Goa	0.220	0.010	0.010	0.040	0.290	0.020	0.270	0.040	0.030	0.070	0.040	0.190	27.000
Gujarat	10.590	2.080	0.000	3.150	15.810	0.790	15.020	10.490	0.990	11.490	1.480	3.050	76.000
Haryana	3.520	2.150	0.920	2.720	9.310	0.680	8.630	9.100	0.350	9.450	0.600	-1.070	109.000
Himachal Pradesh	0.330	0.010	0.080	0.020	0.430	0.040	0.390	0.090	0.030	0.120	0.040	0.250	30.000
Jammu & Kashmir	0.610	0.770	1.000	0.320	2.700	0.270	2.430	0.100	0.240	0.330	0.420	1.920	14.000
Jharkhand	4.260	0.140	1.000	0.180	5.580	0.330	5.250	0.700	0.380	1.060	0.560	3.990	20.000
Karnataka	8.170	4.010	1.500	2.250	15.930	0.630	15.300	9.750	0.970	10.710	1.410	6.480	70.000
Kerala	3.790	0.010	1.930	1.110	6.840	0.610	6.230	1.820	1.100	2.920	1.400	3.070	47.000
Madhya Pradesh	30.590	0.960	0.050	5.590	37.190	1.860	35.330	16.080	1.040	17.120	1.740	17.510	48.000
Maharashtra	20.150	2.510	1.940	8.360	32.960	1.750	31.210	14.240	0.850	15.090	1.510	15.100	48.000
Manipur	0.200	0.005	0.160	0.010	0.380	0.040	0.340	0.002	0.001	0.002	0.020	0.310	0.650
Meghalaya	0.790	0.030	0.330	0.005	1.150	0.120	1.040	0.000	0.002	0.002	0.100	0.940	0.180
Mizoram	0.030	0.000	0.020	0.000	0.040	0.004	0.040	0.000	0.000	0.000	0.001	0.040	0.900
Nagaland	0.280	0.000	0.080	0.000	0.360	0.040	0.320	0.000	0.009	0.009	0.030	0.300	3.000
Odisha	12.810	3.560	3.580	3.140	23.090	2.080	21.010	3.010	0.840	3.850	1.220	16.780	18.000
Punjab	5.980	10.910	1.360	5.540	23.780	2.330	21.440	30.340	0.830	31.160	1.000	-9.890	145.000
Rajasthan	8.760	0.620	0.260	1.920	11.560	1.180	10.380	11.600	1.390	12.990	2.720	-3.940	125.000
Sikkim	-	-	-	-	0.080	0.000	0.080	0.000	0.010	0.010	0.020	0.050	16.000
Tamil Nadu	4.910	11.960	4.530	1.670	23.070	2.310	20.760	16.770	0.880	17.650	0.910	3.080	85.000
Tripura	1.100	0.000	0.920	0.170	2.190	0.220	1.970	0.080	0.090	0.170	0.200	1.690	9.000
Uttar Pradesh	38.630	11.950	5.640	20.140	76.350	6.170	70.180	45.360	3.420	48.780	5.300	19.520	70.000
Uttarakhand	1.370	0.270	0.120	0.510	2.270	0.170	2.100	1.340	0.050	1.390	0.060	0.680	66.000
West Bengal	17.870	2.190	5.440	4.860	30.360	2.900	27.460	10.830	0.810	11.650	1.240	15.330	42.000
Total States	247.870	69.510	41.840	73.150	432.430	33.730	398.700	212.370	18.050	230.410	29.090	161.060	58.000
Union Territories													
Andaman & Nicobar	-	-	-	-	0.330	0.005	0.320	0.000	0.010	0.010	0.008	0.303	4.000
Chandigarh	0.016	0.001	0.005	0.001	0.023	0.002	0.020	0.000	0.000	0.000	0.000	0.020	0.000
Dadar & Nagar Haveli	0.059	0.005			0.063	0.003	0.060	0.001	0.008	0.009	0.008	0.051	14.000
Daman & Diu	0.006	0.002	0.000	0.001	0.009	0.000	0.008	0.007	0.002	0.009	0.003	-0.002	107.000
Lakshadweep	-	-	-	-	0.012	0.009	0.004	0.000	0.002	0.002	-	-	63.000
Puducherry	0.057	0.067	0.007	0.029	0.160	0.016	0.144	0.121	0.030	0.151	0.031	-0.008	105.000
Total Uts	0.138	0.075	0.012	0.031	0.597	0.036	0.556	0.129	0.052	0.181	0.050	0.365	33.000
Grand Total	248.010	69.590	41.850	73.180	433.020	33.770	399.250	212.500	18.100	230.590	29.140	161.430	58.000

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Table 2.5.8(c) : Ground water resource 2011-12

Unit:BCM/Yr

States	Annual Replenishable Ground Water Resources				Total	Natural Discharge during non-monsoon season	Net Annual Ground Water Availability	Annual Ground Water Draft			Projected Demand for Domestic and Industrial uses upto 2025	Ground Water availability for future irrigation	Stage of Ground Water Development (%)#
	Monsoon Season		Non-monsoon Season					Irrigation	Domestic and Industrial uses	Total			
	Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other source*									
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Andhra Pradesh	15.120	6.520	5.490	6.700	33.830	3.070	30.760	12.610	1.540	14.150	2.690	15.890	46.000
Arunachal Pradesh	3.410	0.000	1.040	0.000	4.450	0.450	4.010	0.002	0.001	0.003	0.010	4.000	0.070
Assam	18.950	2.200	8.620	0.590	30.350	2.537	27.810	5.333	0.690	6.026	0.977	21.500	22.000
Bihar	18.920	3.920	3.400	2.380	28.630	2.420	26.210	9.790	1.560	11.360	2.560	13.850	43.000
Chhattisgarh	9.850	0.560	0.910	0.900	12.220	0.640	11.580	3.080	0.520	3.600	0.640	7.850	31.000
Delhi	0.110	0.100	0.020	0.080	0.310	0.020	0.290	0.140	0.260	0.400	0.260	0.010	138.000
Goa	0.135	0.008	0.006	0.072	0.221	0.088	0.133	0.014	0.030	0.044	0.037	0.082	33.000
Gujarat	12.210	2.760	0.000	3.460	18.430	1.080	17.350	11.930	1.050	12.990	1.470	5.320	75.000
Haryana	3.530	2.690	1.010	3.250	10.480	0.680	9.800	11.710	0.720	12.430	0.790	-2.700	127.000
Himachal Pradesh	0.400	0.020	0.120	0.040	0.590	0.060	0.530	0.230	0.080	0.310	0.080	0.220	58.000
Jammu & Kashmir	1.450	1.690	0.360	0.190	3.700	0.370	3.330	0.150	0.580	0.730	0.820	2.350	22.000
Jharkhand	4.460	0.140	1.110	0.260	5.960	0.550	5.410	1.170	0.440	1.610	0.620	3.620	30.000
Karnataka	6.300	4.280	2.730	3.510	16.810	2.000	14.810	9.010	1.000	10.010	1.260	6.180	68.000
Kerala	4.770	0.060	0.640	1.150	6.620	0.590	6.030	1.300	1.500	2.810	1.710	3.020	47.000
Madhya Pradesh	27.490	1.100	0.800	4.560	33.950	1.700	32.250	16.660	1.330	17.990	1.830	13.760	56.000
Maharashtra	22.040	2.670	1.900	9.120	35.730	1.930	33.810	15.910	1.040	16.950	2.000	16.320	50.000
Manipur	0.240	0.010	0.190	0.010	0.440	0.040	0.400	0.003	0.001	0.004	0.050	0.350	1.000
Meghalaya	1.019	0.000	0.215	0.000	1.234	0.123	1.111	0.002	0.000	0.002	0.096	1.013	0.150
Mizoram	0.030	Negligible	0.020	Negligible	0.044	0.004	0.039	0.000	0.000	0.000	0.001	0.039	1.000
Nagaland	0.280	-	0.140	-	0.420	0.040	0.380	-	0.008	0.008	0.010	0.360	2.140
Odisha	11.290	2.530	1.330	2.630	17.780	1.090	16.690	3.470	0.890	4.360	1.270	11.940	26.000
Punjab	5.860	10.570	1.340	4.780	22.560	2.210	20.350	33.970	0.690	34.660	0.950	-14.570	170.000
Rajasthan	8.760	0.670	0.320	2.110	11.860	1.070	10.790	12.860	1.650	14.520	1.840	0.750	135.000
Sikkim	-	-	-	-	-	-	0.046	0.003	0.007	0.010	0.012	0.031	21.000
Tamil Nadu	7.540	11.050	2.160	2.180	22.940	2.290	20.650	14.710	1.850	16.560	1.970	4.700	80.000
Tripura	1.660	0.000	0.730	0.570	2.970	0.230	2.740	0.090	0.070	0.160	0.230	2.420	6.000
Uttar Pradesh	40.780	11.370	5.410	17.700	75.250	6.680	68.570	46.000	3.490	49.480	5.360	17.220	72.000
Uttarakhand	1.260	0.240	0.200	0.460	2.170	0.100	2.070	1.010	0.030	1.050	0.080	0.980	51.000
West Bengal	18.170	2.160	5.430	4.740	30.500	2.920	27.580	10.110	0.790	10.910	1.020	16.750	40.000
Total States	246.050	67.320	45.630	71.450	430.450	34.990	395.520	221.290	21.830	243.140	30.650	153.260	61.000
Union Territories													
Andaman & Nicobar	0.245	-	0.065	-	0.310	0.012	0.298	0.001	0.010	0.011	0.015	0.283	4.000
Chandigarh	0.015	0.001	0.005	0.001	0.022	0.002	0.020	0.000	0.000	0.000	0.000	0.020	0.000
Dadar & Nagar Haveli	0.043	0.003	0.009	0.005	0.059	0.003	0.056	0.001	0.007	0.009	0.009	0.047	15.000
Daman & Diu	0.010	0.001	0.000	0.002	0.012	0.001	0.011	0.008	0.003	0.011	0.004	-0.001	99.000
Lakshadweep	-	-	-	-	0.011	0.007	0.004	0.000	0.003	0.003	0.000	0.000	74.000
Puducherry	0.086	0.056	0.008	0.022	0.171	0.017	0.154	0.121	0.029	0.150	0.032	0.050	98.000
Total UT's	0.400	0.060	0.090	0.030	0.590	0.040	0.540	0.130	0.050	0.180	0.060	0.400	34.000
Grand Total	246.450	67.380	45.710	71.480	431.030	35.030	396.060	221.420	21.890	243.320	30.710	153.660	61.000

Source: Central Ground Water Board, Hydrology Project, Ministry of Water Resource (Note: Total may not tally due to rounding off.) Ground water year book-2011-12

* Ground water recharge due to return flow from irrigation, seepage from canals, recharge from tanks and ponds and recharge from water conservation structures.

: The stage of Ground water development is to be computed as give below:

$$\text{Stage of development} = \frac{\text{Existing Gross draft for all uses}}{\text{Net Annual availability}} \times 100$$

Table 2.5.9 : State wise river water quality

Sl.No.	State	Water body	Dissolved Oxygen (mg/l)			pH			Conductivity (µmhos/cm)		
			MIN	MAX	MEAN	MIN	MAX	MEAN	MIN	MAX	MEAN
1	Andhra Pradesh	RIVER	0	11.7	6.6	2	9.6	7.8	76	14920	641
2	Assam	RIVER	0	18	7.2	5.8	8.1	7.2	43	868	193
3	Bihar	RIVER	2.6	9.4	8.4	7.1	8.6	8	162	476	329
4	Chhattisgarh	RIVER	0.8	8.5	7.3	7	8.8	7.7	85.5	755	258
5	Daman Diu	RIVER	-	-	-	7.2	8.1	7.6	202	348	277
6	Delhi	RIVER	0	10.5	2.6	7.1	8.3	7.7	230	1590	767
7	Goa	RIVER	3.6	8.1	6.5	6.6	8	7.2	8.2	1370	118
8	Gujarat	RIVER	0	12.8	6.1	6.8	8.9	8	138	55300	2627
9	Haryana	RIVER	0.42	10.6	7.3	4.5	8.7	7.6	150	3640	665
10	Himachal Pradesh	RIVER	2.2	13.3	8.8	7	8.7	7.8	53	1495	324
11	Jammu & Kashmir	RIVER	1.8	9.8	7.5	6.7	8.8	7.6	163	548	247
12	Jharkhand	RIVER	5.1	8.9	7.6	6	7.8	7	-	-	-
13	Karnataka	RIVER	0.7	14	7.1	6	8.9	7.9	20	2400	482
14	Kerala	RIVER	0	8	6.2	5.4	8.2	6.6	24	44000	923
15	Madhya Pradesh	RIVER	0	16	7.1	6.8	10	7.8	104	9340	734
16	Maharashtra	RIVER	0	9.9	5.8	5.8	8.9	7.6	44	55830	651
17	Manipur	RIVER	3.8	9.6	7.2	6.5	8	7.4	141	735	404
18	Meghalaya	RIVER	1.4	10	6.8	2.9	7.4	6.2	123	950	294
19	Mizoram	RIVER	4.3	8.7	6.8	7.5	8.3	7.9	70	220	148
20	Nagaland	RIVER	2.4	9.2	6.2	4.7	8.7	7.8	62	400	160
21	Odisha	RIVER	3.4	9.7	7.7	6.7	8.5	7.8	17.4	48400	1384
22	Puducherry	RIVER	6.6	7.6	7	6.7	8.4	7.6	398	715	593
23	Punjab	RIVER	1.2	8.9	6.2	6.5	7.9	7.4	162	1600	575
24	Rajasthan	RIVER	3.2	7.8	5.7	7.2	8.7	8.1	250	880	453
25	Sikkim	RIVER	8	12.5	10.8	6	7.2	6.6	210	290	255
26	Tamilnadu	RIVER	0.6	9.3	6.9	5.7	8.8	7.4	42	28700	556
27	Tripura	RIVER	4.2	6.9	5.8	7.1	8.1	7.6	110	180	141
28	Uttar Pradesh	RIVER	0	20.6	6.7	7	9.5	7.9	122	8010	610
29	Uttarakhand	RIVER	5.6	10.2	8.5	6.5	8.4	7.3	40	398	154
30	West Bengal	RIVER	2.5	15.2	6.7	6.8	8.7	7.9	60	68700	1244

cont..

Table 2.5.9 : State wise river water quality

(concluded)

Sl.No.	State	Water body	BOD (mg/l)			Total Coliform (MPN/100ml)			Fecal Coliform (MPN/100ml)		
			MIN	MAX	MEAN	MIN	MAX	MEAN	MIN	MAX	MEAN
1	Andhra Pradesh	RIVER	0.1	50	2.7	3	28000	1888	0	800	44
2	Assam	RIVER	0.3	32	1.9	1	240000	3816	0	24000	653
3	Bihar	RIVER	1.7	2.9	2.3	700	90000	11707	300	50000	4823
4	Chhattisgarh	RIVER	0.2	3.4	1.6	4	1100	110	0	0	0
5	Daman Diu	RIVER	-	-	-	-	-	-	-	-	-
6	Delhi	RIVER	1	70	19.9	19000	103000000	12024579	500	10900000	1256411
7	Goa	RIVER	0.7	4.7	2	4	5400	511	2	1300	168
8	Gujarat	RIVER	0.1	50	4.4	0	2100000	31885	0	460000	12567
9	Haryana	RIVER	1	590	18.8	112000	6600000	804484	180	760000	76726
10	Himachal Pradesh	RIVER	0.1	7.6	0.7	2	4400000	127730	0	430000	6349
11	Jammu & Kashmir	RIVER	0.1	40	2.4	-	-	-	-	-	-
12	Jharkhand	RIVER	0.4	10.5	2.9	750	2400	1516	110	930	287
13	Karnataka	RIVER	0.1	7	1.7	1	160000	4791	0	90000	2031
14	Kerala	RIVER	0.1	11	1.1	0	56000	2318	0	44000	1236
15	Madhya Pradesh	RIVER	0.2	50	4.4	0	2400	349	0	280	7
16	Maharashtra	RIVER	1.2	50	7.6	0	1800	439	0	1600	100
17	Manipur	RIVER	-	-	-	5	415	101	-	-	-
18	Meghalaya	RIVER	1	7.7	3.3	31	2200	552	23	1700	402
19	Mizoram	RIVER	0.3	1.7	0.9	3	15	5	-	-	-
20	Nagaland	RIVER	0.4	2.8	1.1	-	-	-	-	-	-
21	Odisha	RIVER	0.4	6.4	1.9	630	1600000	18088	230	160000	6293
22	Puducherry	RIVER	0	1	0.3	-	-	-	-	-	-
23	Punjab	RIVER	0	50	9.9	35	2500000	81441	0	500000	13787
24	Rajasthan	RIVER	0.1	6.2	1.7	4	210	32	3	14	4
25	Sikkim	RIVER	2	3.8	2.8	80	350	238	40	220	118
26	Tamilnadu	RIVER	0.1	23	1.7	21	5400	574	13	3500	375
27	Tripura	RIVER	0.5	4	2.3	180	620	483	17	560	356
28	Uttar Pradesh	RIVER	1	364	9.2	160	140000000	1808500	20	1790000	90302
29	Uttarakhand	RIVER	0.9	7.6	1.8	0	10100000	559977	1	380000	27016
30	West Bengal	RIVER	0	6.8	2.3	540	1400000	139135	280	850000	62013

Source: Central Pollution Control Board.

Note : BOD : Bio chemical Oxygen demand

(µmhos/cm) : Micromhos per centimeter; MPN: Most Probable Number

Table 2.5.10 : Water flow in stream

(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	2003-2004	4000	1677	0.00	1.80
				6	2009-2010	657.9	465.4	0.00	5.20
2	Tapi	Dedtalai	Ghala	12	2003-2004	1839	1286	0.00	16.63
3	Narmada	Dindori	Garudeshwar	25	2002-2003	666.3	2070	0.85	0.00
				19	2009-2010	772.4	10684	5.01	11.50
4	Godavari	Ghargaon	Polavaram	56	2005-2006	635.8	43703	0.00	13.23
5	Cauvery	Kudige	Musiri	31	2004-2005	1388	632.3	1.06	0.00
				34	2009-2010	677.1	5.92	490.80	3.18
6	Krishna	Karad	Vijaywada	57	2002-2003	1121	158.7	0.00	2.87
				36	2009-2010	1258	27660	0.00	27.61
7	Mahanadi	Baronda	Tikarpara	21	2002-2003	406.7	12306	0.00	154.10
				19	2009-2010	685.4	0	1841.0	146.70
8	Subarnarekha	Muri	Ghatsila	3	2002-2003	7457	2037	0.42	11.33
				8	2009-2010	118	0.17	315.9	0.40
9	Godavari	Dhalegaon	Polavaram	47	2009-2010	320.4	11249	0	74.69
10	Sabarmati	Vautha	Jotsan	6	2009-2010	972.9	10.19	133.7	0.00

Cusecs: Cubic Feet per second

Sources : Water year Books of different River Basins.(Central Water Commission)

Table 2.5.11 : Waste water generation, collection, treatment in Metro Cities : Status

Sl. No.	Name of Metro City	Total Population	Municipal Population	Volume of Waste Water Generated (Million Litre per day)			Waste Water Collected		Capacity Million Litre per day	Treatment		Mode of Disposal
				Domestic	Industrial	Total	Volume (Million Litre per day)	%		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	Bengaluru	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	Mumbai	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	Chennai	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	Agriculture
18	Patna	1099647	917243	219.0	--	219.0	164.0	74.9	105.0	Y	N	River, Fisheries
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

mld - Million Litre per day

Table 2.5.12 : Sediment load in major river basins 2009-10

Sl. No	Name of Basin/River	Monsoon Flow (Million Metric tonnes)		Non-Monsoon Flow (Million Metric tonnes)		Annual Flow (Million Metric tonnes)		Basin Range (Million Metric tones)		
		Site Name/ Value	Site Name/ Value	Site Name/ Value	Site Name/ Value	Site Name/ Value	Site Name/ Value	Monsoon	Non-monsoon	Annual
		Highest flow	Lowest flow	Highest flow	Lowest flow	Highest flow	Lowest flow			
1	2	3	4	5	6	7	8	9	10	11
1	Mahanadi	Keesinga (14.770)	Kantamal (0.000)	Tikarapara (0.051)	Manendragarh (0.000)	Keesinga (14.770)	Kantamal (0.000)	0.000 - 14.770	0.000 - 0.051	0.000 - 14.770
2	Brahmani	Panposh (4.573)	Tilga (1.469)	Pamposh (0.010)	Tilga (0.000)	Panposh (4.583)	Tilga (1.469)	1.469 - 4.573	0.000 - 0.010	1.469 - 4.583
3	Godavari	Polavaram (12.067)	Saigaon (0.001)	Polavaram (0.027)	Pathsguden (0.000)	Polavaram (12.094)	Saigaon (0.001)	0.001 - 12.067	0.000 - 0.027	0.001 - 12.094
4	Krishna	Yadgir (13.191)	Karad (0.105)	wadenpalli (0.620)	Takali (0.000)	Yadgir (13.195)	Karad (0.109)	0.105 - 13.191	0.000 - 0.620	0.109 - 13.195
5	Cauvery	Biligundulu (0.238)	Thengudi (0.003)	Kudimodi (0.038)	Thengidi (0.002)	Biligundulu (0.279)	Thengudi (0.005)	0.003 - 0.268	0.002 - 0.038	0.005 - 0.279
6	West Flowing River	Kumbidi (0.385)	Ambarampal ayam (0.009)	Ramamangla m (0.008)	Kalampur (0.000)	Kumbidi (0.389)	Ambarampala yam (0.011)	0.009 - 0.385	0.000 - 0.008	0.011 - 0.389
7	Tapi	Sarankheda (5.015)	Gopalkheda (0.508)	Berhampur (0.011)	Gopalkheda (0.000)	Sarankheda (5.015)	Gopalkheda (0.508)	0.508 - 5.015	0.000 - 0.011	0.508 - 5.015
8	Narmada	Sandia (47.17)	Chandwads (0.047)	Handia (0.239)	Chandwada (0.000)	Sandia (47.212)	Chandwads (0.137)	0.047 - 47.17	0.000 - 0.383	0.137 - 47.212
9	Mahi, Sabarmati & Others	Mataji (2.311)	Detrol Bridge (0.000)	Kanpur (0.000)	Detrol Bridge (0.000)	Mataji (2.311)	Detrol Bridge (0.000)	0.000 - 2.311	0.000 - 0.000	0.000 - 2.311

Source : Integrated Hydrological Data Book (Non- Classified River Basin), September 2012 ,Central Water Commission

Note: The sediment delivered - and transported by a stream is its sediment load. This can be classified in - three types, depending on sediment size and the competence of the river. The coarsest sediment, consisting of boulders and cobbles as well as sand, moves on or near the bed of the stream and is the bed load of the river. The finer particles, silts and clays, are carried in suspension by the turbulent action of flowing water; and these fine particles, which are moved long distances at the velocity of the flowing water, constitute the suspended load of the river. The remaining component of the - tal sediment load is the dissolved load, which is composed of chemical compounds taken in - solution by the water moving on or in the soils of the drainage basin. These three types of sediment constitute the - tal sediment load of the stream.

Table 2.5.13 : Water supply of Class-I Cities and Class-II Towns (in aggregate)

Sr. No.	State /UT	Total no. of Class-I cities and Class-II town	Total Population (including Class-I cities and Class-II town)	Total Water supply (in MLD)	Per capita water supply
1	Andhra Pradesh	1	107200	15.00	139.93
2	Arunachal Pradesh	99	23591660	2477.03	105.00
3	Assam	13	1991110	503.28	252.76
4	Bihar	37	6897354	1396.43	202.46
5	Chandigarh	1	994820	537.20	540.00
6	Chhattisgarh	14	3081180	489.12	158.74
7	Goa	3	295180	29.53	100.04
8	Delhi	1	14858800	4346.00	292.49
9	Gujarat	59	16858830	2385.64	141.51
10	Haryana	27	6038150	833.07	137.97
11	Himachal Pradesh	1	163490	36.18	221.30
12	Jammu & Kashmir	6	2155050	302.26	140.26
13	Jharkhand	24	5790471	1135.86	196.16
14	Karnataka	59	16902631	2529.78	149.67
15	Kerala	34	5465176	883.03	161.57
16	Madhya Pradesh	48	12540050	1724.55	137.52
17	Maharashtra	84	42758250	12750.05	298.19
18	Manipur	1	249870	43.43	173.81
19	Meghalaya	2	267780	40.12	149.82
20	Mizoram	1	282550	39.56	140.01
21	Nagaland	2	298330	41.76	139.98
22	Odisha	24	4240440	923.97	217.89
23	Puducherry	3	583820	80.56	137.99
24	Punjab	33	7439530	2033.94	273.40
25	Rajasthan	45	11210750	1912.72	170.61
26	Tamil Nadu	84	20107890	1577.40	78.45
27	Tripura	1	214327	30.00	139.97
28	Uttar Pradesh	107	29144800	4814.77	165.20
29	Uttrakhand	7	1318840	232.55	176.33
30	West Bengal	87	21822911	3949.09	180.96
	Total	908	257671240	48093.88	186.65

Source: Status of water supply, wastewater generation and treatment in class-I cities & class -II towns of India, Series CUPS/70/2009-10, Central Pollution Control Board

2.6 Transport

The environmental impact of Transport is significant because it is a major user of energy, and burns most of the world's petroleum. This creates air pollution, including nitrous oxides and particulates, and is a significant contributor to global warming through emission of carbon dioxide, for which transport is the fastest-growing emission sector. By subsector, road transport is the largest contributor to global warming.

Environmental regulations have reduced the individual vehicles emission; however, this has been offset by an increase in the number of vehicles, and more use of each vehicle. Some pathways to reduce the carbon emissions of road vehicles considerably have been studied. Energy use and emissions vary largely between modes, causing environmentalists to call for a transition from air and road to rail and human-powered transport, and increase transport electrification and energy efficiency.

The number of vehicles registered in India is on the increase over the years. It indicates the increases in the use of fossil fuel and thereby an increases in GHG emissions. Transport predominantly relies on a single fossil resource, petroleum that supplies most of the total energy used by transport. Transport activity will continue to increase in the future as economic growth fuels transport demand and the availability of transport drives development, by facilitating specialization and trade.

Freight transport has been growing even more rapidly than passenger transport and is expected to continue to do so in the future. Urban freight movements are predominantly by truck, while international freight is dominated by ocean shipping.

GHG emission reduction will be only one of several key issues in transport during the coming decades. In developing countries especially, increasing demand for private vehicles is outpacing the supply of transport infrastructure – including both road networks and public transit networks. The result is growing congestion and air pollution and a rise in traffic fatalities.

Moreover, there is no shortage of alternative energy sources, including oil sands, shale oil, coal-to-liquids, biofuels, electricity and hydrogen. Among these alternatives, unconventional fossil carbon resources would produce less expensive fuels most compatible with the existing transport infrastructure, but lead to increased carbon emissions.

It was observed in the report of the expert committee on development of database on climate change that there has been consistent growth in vehicular registration; however no indication on the emission load is available. The emission load depends on the types of vehicle. In India, we have standard and non-standard vehicular emissions, which also vary from place to place depending on regulatory mechanisms in use by the civic and local authorities in different areas. Some metropolitan cities have standards in consonance with the European Emission standards, but the data are not captured according to the types of vehicles and their average usage per annum.

The variables/indicators identified by the framework for statistics related to climate change are No. of vehicles (1) Existing (2) Newly Registered - Both fuel usage basis State level.

The Following are the tables included.

2.6 Transport

- 2.6.1 Total registered motor vehicles in India by States/Uts
- 2.6.2 Total registered motor vehicles in million plus cities of India
- 2.6.3 Cargo Movement for National Waterways -1,2 & 3, Goa and Mumbai
Waterways 2007-08 to 2011-12

waterways 2007-08 to 2011-12

- 2.6.4 Growth of Indian Shipping
- 2.6.5 Freight Movement by Road Transport & Railways :1999-2000 to 2010-11
- 2.6.6 Passenger Movement by Road Transport & Railways :1999-2000 to 2010-11
- 2.6.7 Annual total domestic traffic and operating statistics of Indian carriers for last ten years

Data Sources

Road Transport year book- Annual publication of , Transport Research Wing, Ministry of Road Transport & Highways. Reports are available in the Ministry's website.

Air Transport Statistics for the year 2011-12 from Director General of Civil Aviation, Ministry of Civil Aviation.

Table 2.6.1 : Total registered motor vehicles in India by States/UT's
(as on 31st March,2010)

Sl. No.	States/UT	Transport					
		Multi-axled/Articulated Vehicles/Trucks & Lorries	Light Motor Vehicles (Goods)	Buses	Taxis	Light Motor Vehicles (Passengers)	Total Transport
1	2	3	4	5	6	7	8
1	Andhra Pradesh	236211	219332	56664	103290	434448	1049945
2	Arunachal Pradesh##	2355	601	682	343	1449	5430
3	Assam	124132	32473	13859	24088	51185	245737
4	Bihar	66485	0	21209	38204	74968	200866
5	Chhattisgarh	78488	38434	7658	7499	15047	147126
6	Goa (c)	37040	8218	8332	13143	4238	84134*
7	Gujarat	259231	367113	60023	67740	464862	1218969
8	Haryana	249991	102541	33520	15081	83745	484878
9	Himachal Pradesh	49582	42877	5714	21993	2771	122937
10	Jammu & Kashmir	35109	43238	23480	15939	10958	128724
11	Jharkhand	156196	160778	12256	259542	160778	766936*
12	Karnataka	200316	177179	53874	115410	237295	887999^^
13	Kerala	68777	251471	383229	84792	491879	1394162^^
14	Madhya Pradesh	105025	72029	35105	99241	67488	378888
15	Maharashtra	374705	521692	83816	168307	626332	1774852
16	Manipur	7639	2871	2769	1595	7266	22140
17	Meghalaya	21372	4955	4007	12607	5348	48290*
18	Mizoram	3507	4003	1036	6465	2219	17230
19	Nagaland	65729	16345	5041	6428	13403	106946
20	Odisha	109804	86729	19335	41828	57456	315152
21	Punjab	149367	20186	27146	15837	57879	270415
22	Rajasthan	198089	148892	73257	67542	112986	600766
23	Sikkim	3214	795	524	7569	0	12102
24	Tamil Nadu	404652	280388	123999	209689	238682	1257410
25	Tripura	10432	6199	2194	3199	15749	37773
26	Uttarakhand	18026	16393	7527	18660	11622	72229*
27	Uttar Pradesh	137436	131181	28124	38629	123706	459076
28	West Bengal	222716	5	31996	73696	48370	376778
	Total States (1)	3395629	2756913	1126376	1538356	3422129	12487890
1	A & N Islands	2366	0	825	489	2950	6630
2	Chandigarh	2210	15466	3062	3017	0	23755
3	Dadra & Nagar Haveli	8048	2761	295	142	605	11851
4	Daman & Diu	3112	3130	461	45	1173	7921
5	Delhi	85384	140872	43250	55530	182784	507820
6	Lakshadweep	0	494	0	105	321	920
7	Puducherry	7745	7799	2373	1892	5124	24933
	UT's (2)	108865	170522	50266	61220	192957	583830
	Grand Total (1+2)	350491	2927435	1176642	1599576	3615086	13071720

cont...

**Table 2.6.1 : Total registered motor vehicles in India by States/UT's
(as on 31st March,2011)**

Sl. No.	States/UT	Transport					
		Multi-axled/Articulated Vehicles/Trucks & Lorries	Light Motor Vehicles (Goods)	Buses	Taxis	Light Motor Vehicles (Passengers)	Total Transport
1	2	3	4	5	6	7	8
1	Andhra Pradesh	241,663	257,147	60,622	114,923	513,266	1,187,621
2	Arunachal Pradesh##	...	...	...	...	...	...
3	Assam	136,090	35,788	14,741	28,161	59,742	274,522
4	Bihar	73,472	...	22,703	43,623	92,390	232,188
5	Chhattisgarh	83,674	43,936	8,596	8,723	17,566	162,495
6	Goa (c)	39,422	9,402	8,907	13,306	4,309	90,751 *
7	Gujarat	276,290	402,514	62,386	74,512	511,270	1,326,972
8	Haryana	275,162	114,384	35,646	19,978	94,770	539,940
9	Himachal Pradesh	51,899	47,395	6,186	23,791	2,805	132,076
10	Jammu & Kashmir	35,414	46,792	25,858	21,307	12,420	141,791
11	Jharkhand	172,371	180,934	12,847	296,771	180,934	863,333 *
12	Karnataka	217,113	198,378	58,012	129,272	259,429	973,110 ^^
13	Kerala	72,534	288,447	390,430	96,666	544,485	1,507,041 *, ^^
14	Madhya Pradesh	112,954	82,673	36,647	110,730	76,207	419,211
15	Maharashtra	389,941	583,847	89,861	168,496	640,700	1,872,845
16	Manipur	8,249	3,207	2,776	1,896	9,954	26,082
17	Meghalaya	23,064	6,058	4,116	14,507	6,000	53,746 *
18	Mizoram	3,844	4,862	1,088	7,246	2,477	19,517
19	Nagaland	77,968	25,158	5,573	6,716	14,284	129,699
20	odisha	119,145	100,546	20,616	44,585	62,830	347,722
21	Punjab##	149,367	20,186	27,146	15,837	57,879	270,415
22	Rajasthan	222,959	162,837	77,980	76,317	123,328	663,421
23	Sikkim	3,547	823	586	8,011	0	12,967
24	Tamil Nadu	433,579	311,084	134,887	243,425	291,605	1,414,580
25	Tripura	10,934	7,568	2,295 3,468 18,074 42,339	3,468	18,074	42,339
26	Uttarakhand	19,474	19,695	8,066	20,896	13,820	81,951
27	Uttar Pradesh	150,670	156,388	31,922	47,364	146,351	532,695
28	West Bengal	248,776	5	34,184	80,012	58,633	421,605
	Total States (1)	3,649,575	3,110,049	1,184,677	1,720,539	3,815,528	13,740,635
1	A & N Islands	2,429	...	846	489	3,248	7,012
2	Chandigarh	2,490	21,841	3,684	3,275	0	31,290
3	Dadra & Nagar Haveli	8,591	3,036	314	146	620	12,707
4	Daman & Diu	3,646	3,274	474	46	1,216	8,668 *
5	Delhi	86,301	156,030	45,757	62,839	190,693	541,620
6	Lakshadweep	0	590	0	140	366	1,096
7	Puducherry	7,832	8,811	2,493	1,943	5,217	26,296
	UT's (2)	111,289	193,582	53,568	68,878	201,360	628,689
	Grand Total (1+2)	3,760,864	3,303,631	1,238,245	1,789,417	4,016,888	14,369,324

Cont..

Table 2.6.1 : Total registered motor vehicles in India by States/UT's
(as on 31st March,2010)

Sl. No.	States/UT	Non-Transport								Grand Total (Transport +Non- Tpt.)
		Two Wheelers	Cars	Jeeps	Omni Buses	Tractors	Trailers	Others	Total Non- Tpt.	
1	2	9	10	11	12	13	14	15	16	17
1	Andhra Pradesh	6,514,593	777,746	29,587	49,130	261,509	229,149	11,480	7,873,194	8,923,139
2	Arunachal Pradesh##	11,112	2,595	2,284	0	345	155	180	16,671	22,101
3	Assam	830,836	232,546	20,742	1,225	16,177	10,805	25,653	1,137,984	1,383,721
4	Bihar	1,606,613	188,031	66,132	...	175,500	104,272	15,572	2,156,120	2,356,986
5	Chhattisgarh	1,964,769	108,326	13,277	30,879	91,621	72,839	6,936	2,288,647	2,435,773
6	Goa (c)	502,042	133,717	^	0	2,562	...	4,587	642,908	727,042
7	Gujarat	8,716,981	1,057,383	152,985	...	410,516	278,921	36,818	10,653,604	11,872,573
8	Haryana	2,975,418	720,441	115,852	0	490,828	0	4,408	4,306,947	4,791,825
9	Himachal Pradesh	283,081	95,791	20,693	634	9,292	1,836	4,077	415,404	538,341
10	Jammu & Kashmir	407,928	172,071	11,601	1,219	11,640	2,861	2,861	610,181	738,905
11	Jharkhand	1,738,566	174,320	52,155	...	35,431	...	...	2,000,472	2,767,408
12	Karnataka	6,404,905	1,005,291	40,225	105,503	318,844	215,575	65,634	8,155,977	9,043,976
13	Kerala	2,900,238	826,538	137,547	3,748	10,665	3,653	121,101	4,003,490	5,397,652
14	Madhya Pradesh	5,165,023	314,464	41,396	...	458,445	215,333	17,027	6,211,688	6,590,576
15	Maharashtra	11,181,762	1,790,259	373,958	18,752	331,694	270,078	27,066	13,993,569	15,768,421
16	Manipur	139,650	15,113	11,472	1,524	3,155	680	718	172,312	194,452
17	Meghalaya	51,709	37,981	14,328	1	609	2,713	2,482	109,823	158,113
18	Mizoram	39,902	10,382	8,813	0	227	90	3,812	63,226	80,456
19	Nagaland	55,208	47,984	25,888	497	2,260	1,020	929	133,786	254,483 &
20	Odisha	2,302,694	133,529	36,726	3,451	64,354	55,370	20,556	2,616,680	2,931,832
21	Punjab	3,956,279	484,064	54,798	...	497,551	966	10,181	5,003,839	5,274,254
22	Rajasthan	5,230,454	455,924	203,692	...	605,539	69,287	...	6,564,896	7,165,662
23	Sikkim	6,308	8,905	4,869	1,393	49	0	...	21,524	33,626
24	Tamil Nadu	11,156,048	1,204,156	57,417	19,957	150,432	62,260	153,853	12,804,123	14,061,533
25	Tripura	97,895	10,095	12,340	...	976	326	714	122,346	160,119
26	Uttarakhand	583,927	119,859	8,103	1,289	42,921	1,508	1,536	759,143	831,372
27	Uttar Pradesh	9,493,677	873,251	159,128	18,740	953,959	15,373	15,145	11,529,273	11,988,349
28	West Bengal	1,864,861	435,352	^	...	51,233	...	18,914	2,370,360	2,747,138
	Total States(1)	86,182,479	11,436,114	1,676,008	257,942	4,998,334	1,615,070	572,240	106,738,187	119,239,828
1	A & N Islands	43,762	10,988	^	^	^	^	394	55,144	61,774
2	Chandigarh	686,316	239,014	...	130	149	0	...	925,609	949,364
3	Dadra & Nagar Haveli	38,635	17,507	549	20	152	77	41	56,981	68,832
4	Daman & Diu	43,991	19,332	477	42	300	195	84	64,421	72,342
5	Delhi	4,107,912	1,956,574	79,418	89,367	5,294	99	364	6,239,028	6,746,848
6	Lakshadweep	6,206	64	95	0	72	0	498	6,935	7,855
7	Puducherry	488,490	69,813	3,881	2,958	900	1,732	6,422	574,196	599,129
	UT's (2)	5,415,312	2,313,292	84,420	92,517	6,867	2,103	7,803	7,922,314	8,506,144
	Grand Total (1+2)	91,597,791	13,749,406	1,760,428	350,459	5,005,201	1,617,173	580,043	114,660,501	127,745,972

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Table 2.6.1 : Total registered motor vehicles in India by States/UT's
(as on 31st March,2011)

Sl. No.	States/UT	Non-Transport								Grand Total (Transport +Non- Tpt.)
		Two Wheelers	Cars	Jeeps	Omni Buses	Tractors	Trailers	Others	Total Non- Tpt.	
1	2	9	10	11	12	13	14	15	16	17
1	Andhra Pradesh	7,488,771	880,817	29,652	53,531	292,427	242,270	14,258	9,001,726	10,189,347
2	Arunachal Pradesh##	..	..	..	..	..	..	..	..	144,534
3	Assam	958,935	269,605	20,861	1,243	18,714	11,620	26,628	1,307,606	1,582,128
4	Bihar	1,899,017	136,845	75,878	...	196,555	115,214	17,512	2,441,021	2,673,209
5	Chhattisgarh	2,232,929	131,862	15,062	33,739	102,699	78,940	8,311	2,603,542	2,766,037
6	Goa (c)	541,934	149,869	...	0	2,890	...	4,631	699,324	790,075
7	Gujarat	9,507,556	1,218,030	160,800	...	442,737	294,885	42,155	11,666,163	12,993,135
8	Haryana	3,370,426	855,596	113,384	0	487,321	0	10,336	4,837,063	5,377,003
9	Himachal Pradesh	331,418	116,176	22,756	949	9,576	1,853	6,910	489,638	621,714
10	Jammu & Kashmir	446,791	198,238	118,301	1,818	13,538	3,242	3,242	785,170	926,961
11	Jharkhand	1,947,572	201,269	59,892	...	41,116	...	...	2,249,849	3,113,182
12	Karnataka	7,033,045	1,131,201	41,229	109,075	341,559	233,297	67,967	8,957,373	9,930,483
13	Kerala	3,294,953	985,736	137,547	3,798	11,209	3,656	128,079	4,564,978	6,072,019
14	Madhya Pradesh	5,783,120	366,674	49,566	...	498,997	219,731	18,403	6,936,491	7,355,702
15	Maharashtra	12,429,011	2,027,080	394,647	18,677	371,075	293,576	27,188	15,561,254	17,434,099
16	Manipur	145,286	17,019	11,901	1,600	3,185	715	714	180,420	206,502
17	Meghalaya	56,790	43,901	15,011	1	665	2,765	2,858	121,991	175,737
18	Mizoram	47,978	11,583	9,211	0	252	92	4,015	73,131	92,648
19	Nagaland	61,085	50,249	26,313	501	2,340	1,023	1,443	142,954	272,653
20	odisha	2,614,980	161,024	41,966	3,668	74,439	65,016	29,223	2,990,316	3,338,038
21	Punjab##	3,956,279	484,064	54,798	...	497,551	966	10,181	5,003,839	5,274,254
22	Rajasthan	5,859,719	520,385	227,910	...	644,305	70,525	...	7,322,844	7,986,265
23	Sikkim	6,843	12,264	5,251	1,399	59	0	...	25,816	38,783
24	Tamil Nadu	12,393,788	1,350,722	58,080	19,957	167,066	66,269	167,783	14,223,665	15,638,245
25	Tripura	117,486	11,224	14,434	...	1,010	349	831	145,334	187,673
26	Uttarakhand	117,486	11,224	14,434	...	1,010	349	831	145,334	187,673
27	Uttar Pradesh	10,563,850	984,937	176,398	21,559	978,627	15,126	14,040	12,754,537	13,287,232
28	West Bengal	2,260,657	492,454	^	...	57,505	#	28,403	2,839,019	3,260,624
	Total States (1)	96,058,814	12,956,415	1,889,724	272,817	5,303,581	1,721,969	636,954	118,840,274	132,725,443
1	A & N Islands	48,819	12,863	...	...	...	...	406	62,088	69,100
2	Chandigarh	711,007	265,135	...	287	173	0	...	976,602	1,007,892
3	Dadra & Nagar Haveli	43,010	19,687	561	22	177	77	116	63,650	76,357
4	Daman & Diu	47,247	20,501	499	42	313	205	113	68,920	77,588
5	Delhi	4,395,086	2,116,107	79,488	89,368	5,384	99	519	6,686,051	7,227,671
6	Lakshadweep	6,888	87	99	0	84	0	499	7,657	8,753
7	Puducherry	553,711	76,678	3,882	3,045	993	1,759	6,439	646,507	672,803
	UT's (2)	5,805,768	2,511,058	84,529	92,764	7,124	2,140	8,092	8,511,475	9,140,164
	Grand Total (1+2)	101,864,582	15,467,473	1,974,253	365,581	5,310,705	1,724,109	645,046	127,351,749	141,865,607

Source : Road Transport year book-2009-10 & 2010-11, Transport Research Wing, Ministry of Road Transport & Highways

...: Not reported.

^: Included in cars.

: Included in tractors

:Data relates to 2009-10

§ : Included in Multi-axled/Articulated Vehicles/Trucks & Lorries.

* : includes Motor Cycles on hire

^^: includes other vehicles not covered in 'transport vehicles'

&: Includes 13751 Government Vehicles(for which category-wise break-up is not available.)

Note: **Motor Vehicle** means any mechanically propelled vehicle adapted for use upon road whether the power of propulsion is transmitted there to from an external or internal source and includes a chassis to which a body has not been attached and a trailer; but does not include a vehicle running upon fixed rails or a vehicle of a special type adapted for use only in a factory (or in any other enclosed premises) or a vehicle having less than four wheels fitted with engine capacity or not exceeding thirty five cubic centimeters.

Transport vehicle means a public service vehicle or a goods vehicle.

**Table 2.6.2: Total registered motor vehicles in Million plus cities of India
(as on 31st March,2010)**

Sl. No.	Million Plus Cities	Transport					Total Transport
		Multi-exied/Articulated Vehicles/Trucks & Lorries	Light Motor Vehicles (Goods)	Buses	Taxies	Light Motor Vehicles (Passengers)	
1	2	3	4	5	6	7	8
1	Agra	3,803	11,116	1,620	2,899	8,024	27,462
2	Allahabad	7,942	6,388	1,159	440	7,510	23,439
3	Aurangabad	3,219	9,300	2,661	895	9,736	25,811
4	Bengaluru	68,401	63,782	26,283	40,407	110,578	342,584 ^^
5	Bhopal	6,149	9,563	3,387	15,810	11,867	46,776
6	Chennai	92,054	72,326	36,205	63,738	83,162	347,485
7	Coimbatore	7,055	10,505	4,932	11,718	10,252	44,462
8	Delhi	85,384	140,872	43,250	55,530	182,784	507,820
9	Dhanbad	3,752	4,446	246	4,464	3,593	18,674 *
10	Ghaziabad	4,584	10,305	1,664	2,522	13,735	32,810
11	Greater Mumbai	16,877	52,261	13,281	60,279	107,853	250,551
12	Gwalior	7,268	4,585	5,962	6,726	8,179	32,720
13	Hyderabad	106,968	76,137	22,602	26,351	85,035	317,093
14	Indore	40,227	20,397	6,919	29,029	12,879	109,451
15	Jabalpur	9,106	8,650	1,512	8,759	6,169	34,196
16	Jaipur	57,549	13,361	20,714	17,589	20,491	129,704
17	Jamshedpur	4,380	5,676	246	17,862	6,528	36,865 *
18	Jodhpur	33,301	6,758	5,935	7,189	12,000	65,183
19	Kanpur	20,079	6,738	283	240	6,749	34,089
20	Kochi	3,393	15,954	5,160	7,592	14,588	46,687
21	Kolkata**	14,210	\$	4,009	27,914	17,740	63,873
22	Kota	15,687	801	2,926	2,384	8,745	30,543
23	Lucknow	6,666	12,333	2,930	5,055	7,410	34,394
24	Madurai	10,177	6,939	4,875	11,632	11,704	45,327
25	Meerut	4,067	1,979	1,296	490	2,213	10,045
26	Nagpur	15,077	17,542	4,583	2,388	16,058	55,648
27	Nashik	4,366	9,508	950	1,800	16,904	33,528
28	Patna	22,643	\$	5,366	7,911	51,157	87,077
29	Pune	35,132	46,433	14,030	14,331	61,531	171,457
30	Raipur	24,599	9,918	1,586	1,877	4,810	42,790
31	Srinagar	12,022	7,247	6,701	5,587	9,888	41,445
32	Tiruchirapalli	8,233	10,079	2,463	4,526	5,184	30,485
33	Varanasi	8,008	10,105	2,252	2,904	10,955	34,224
34	Vijayawada	25,818	10,920	2,760	5,266	16,810	61,574
35	Visakhapatnam	12,267	7,890	1,434	7,119	25,716	54,426
	TOTAL	800,463	700,814	262,182	481,223	988,537	3,270,698

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**Table 2.6.2: Total registered motor vehicles in Million plus cities of India
(as on 31st March, 2011)**

Sl. No.	Million Plus Cities	Transport					Total Transport
		Multi-axied/Articulated Vehicles/Trucks & Lorries	Light Motor Vehicles (Goods)	Buses	Taxis	Light Motor Vehicles (Passengers)	
1	2	3	4	5	6	7	8
1	Agra	3,895	12,476	1,752	3,370	8,501	29,994
2	Allahabad	8,316	5,847	1,404	679	7,465	23,711
3	Aurangabad	3,311	10,500	2,921	768	9,817	27,317
4	Bengaluru	71,983	69,758	28,261	41,190	121,241	368,953 ^^
5	Bhopal	6,707	10,742	3,627	17,945	12,693	51,714
6	Chennai	94,395	76,678	37,205	72,446	101,868	382,592
7	Coimbatore	8,483	12,303	5,744	14,220	11,720	52,470
8	Delhi	86,301	156,030	45,757	62,839	190,693	541,620
9	Dhanbad	4,174	6,383	514	6,816	4,779	25,100 *
10	Ghaziabad	4,851	11,083	1,831	2,872	17,036	37,673
11	Greater Mumbai	8,079	52,217	12,841	50,914	108,715	232,766
12	Gwalior	8,013	5,166	6,056	7,440	8,991	35,666
13	Hyderabad	114,544	84,736	25,311	29,548	93,004	347,143
14	Indore	43,230	24,096	7,215	32,215	15,643	122,399
15	Jabalpur	9,834	9,865	1,537	9,938	6,740	37,914
16	Jaipur	64,809	13,733	22,143	20,421	22,240	143,346
17	Jamshedpur	4,900	6,383	386	22,249	7,071	43,423 *
18	Jodhpur	37,184	7,184	6,304	7,778	12,195	70,645
19	Kanpur	21,703	8,044	464	270	7,212	37,693
20	Kochi	4,375	20,264	6,105	9,445	18,444	58,633
21	Kolkata**	13,773	\$	4,249	30,840	18,808	67,670
22	Kota	16,204	1,027	2,979	2,580	9,616	32,406
23	Lucknow	6,869	12,825	3,035	5,354	7,318	35,401
24	Madurai	11,186	8,401	5,214	12,799	16,350	53,950
25	Meerut	4,071	2,355	1,456	535	2,760	11,177
26	Nagpur	15,829	19,040	4,883	2,661	16,417	58,830
27	Nashik	4,731	10,920	1,110	1,925	16,937	35,623
28	Patna	25,525	\$	5,668	9,092	57,473	97,758
29	Pune	38,863	50,664	15,008	15,911	62,867	183,313
30	Raipur	25,424	11,177	1,714	2,148	5,595	46,058
31	Srinagar	12,334	7,989	6,822	6,311	9,982	43,438
32	Tiruchirapalli	9,288	11,181	3,031	5,854	6,278	35,632
33	Varanasi	8,564	11,676	2,347	3,561	13,086	39,234
34	Vijayawada	28,416	12,854	3,135	5,845	20,144	70,394
35	Visakhapatnam	13,661	9,083	1,536	7,954	30,851	63,085
	TOTAL	843,825	772,680	279,565	526,733	1,080,550	3,544,741

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Table 2.6.2: Total registered motor vehicles in Million plus cities of India
(as on 31st March,2010)

Sl. No.	Million Plus Cities	Non-Transport								Grand Total (Transport +Non- Tpt.)
		Two Wheelers	Cars	Jeeps	Omni Buses	Tractors	Trailers	Others	Total Non- Tpt.	
1	2	9	10	11	12	13	14	15	16	17
1	Agra	466,981	44,581	2,744	2,837	34,056	113	1,622	552,934	580,396
2	Allahabad	444,551	49,431	6,094	3	7,299	59	2,477	509,914	533,353
3	Aurangabad	177,593	11,595	6,649	294	6,095	4,085	994	207,305	233,116
4	Bengaluru	2,431,372	634,730	7,114	45,557	6,887	5,284	17,037	3,147,981	3,490,565
5	Bhopal	540,622	68,564	1,482	...	11,047	4,516	1,049	627,280	674,056
6	Chennai	2,182,794	543,999	12,236	8,769	2,459	11,709	39,249	2,801,215	3,148,700
7	Coimbatore	920,489	119,543	5,290	303	7,330	486	11,862	1,065,303	1,109,765
8	Delhi	4,107,912	1,956,574	79,418	89,367	5,294	99	364	6,239,028	6,746,848
9	Dhanbad	7,824	3,486	522	...	531	...	...	12,363	31,037
10	Ghaziabad	289,248	67,515	1,075	1,866	16,063	0	0	375,767	408,577
11	Greater Mumbai	967,479	514,591	23,840	3,931	1,362	985	5,235	23,176,974	
12	Gwalior	323,885	25,301	4,784	...	15,913	6,503	2,527	378,913	411,633
13	Hyderabad	1,928,897	436,641	8,551	22,982	6,194	1,472	6,349	2,411,086	2,728,179
14	Indore	845,528	112,422	4,383	...	15,088	8,974	2,346	988,741	1,098,192
15	Jabalpur	428,862	33,093	2,080	...	11,304	2,967	3,561	481,867	516,063
16	Jaipur	1,144,561	185,762	46,316	...	39,166	3,028	55	1,418,888	1,548,592
17	Jamshedpur	11,735	5,230	1,565	...	354	...	...	18,884	55,749
18	Jodhpur	404,487	40,309	16,097	0	42,240	7,875	1,227	512,235	577,418
19	Kanpur	802,414	88,245	6,060	3,497	5,521	0	0	905,737	939,826
20	Kochi	170,326	90,673	5,832	5,346	176	8	3,218	275,579	322,266
21	Kolkata**	165,799	180,644	^	...	#	81	628	347,152	411,025
22	Kota	341,885	29,250	8,730	0	20,218	8,363	647	409,093	439,636
23	Lucknow	890,442	145,996	14,910	667	16,464	1,182	3,400	1,073,061	1,107,455
24	Madurai	435,924	32,406	1,542	77	5,245	1,836	7,487	484,517	529,844
25	Meerut	275,668	40,773	645	485	57,958	0	1,925	377,454	387,499
26	Nagpur	905,327	79,641	26,183	842	5,292	5,166	1,102	1,023,553	1,079,201
27	Nashik	272,293	29,791	7,978	44	8,448	5,464	635	324,653	358,181
28	Patna	397,187	72,127	...	...	12,277	8,475	4,170	494,236	581,313
29	Pune	1,418,582	246,215	39,520	950	17,234	9,831	3,922	1,736,254	1,907,711
30	Raipur	365,943	30,202	710	5,084	6,205	15,979	2,546	426,669	469,459
31	Srinagar	74,974	48,286	3,772	...	1,748	...	1,331	130,111	171,556
32	Tiruchirapalli	331,333	29,315	990	70	3,387	1,241	3,351	369,687	400,172
33	Varanasi	397,458	36,179	6,423	336	13,060	9,322	363	463,141	497,365
34	Vijayawada	413,323	34,144	1,187	1,547	6,062	4,823	626	461,712	523,286
35	Visakhapatnam	461,552	54,923	3,387	2,073	2,942	4,908	1,566	531,351	585,777
	TOTAL	25,745,250	6,122,177	358,109	196,927	410,919	134,834	132,871	33,101,087	36,371,785

Cont..

**Table 2.6.2: Total registered motor vehicles in Million plus cities of India
(as on 31st March,2011)**

Sl. No.	States/UT	Non-Transport								Grand Total (Transport +Non- Tpt.)
		Two Wheelers	Cars	Jeeps	Omni Buses	Tractors	Trailers	Others	Total Non- Tpt.	
1	2	9	10	11	12	13	14	15	16	17
1	Agra	515,154	51,168	3,103	3,219	35,616	120	1,654	610,034	640,028
2	Allahabad	584,248	56,027	7,653	18	8,682	64	2,611	659,303	683,014
3	Aurangabad	193,878	12,494	7,168	134	6,494	4,292	1,022	225,482	252,799
4	Bengaluru	2,624,707	710,852	7,254	46,344	7,424	5,738	20,046	3,422,365	3,791,318
5	Bhopal	602,793	81,360	1,482	...	12,001	4,527	1,206	703,369	755,083
6	Chennai	2,398,366	598,708	12,358	8,769	2,526	11,727	40,743	3,073,197	3,455,789
7	Coimbatore	1,023,414	137,728	5,379	303	7,709	663	13,430	1,188,626	1,241,096
8	Delhi	4,395,086	2,116,107	79,488	89,368	5,384	99	519	6,686,051	7,227,671
9	Dhanbad	8,765	5,327	898	...	822	...	...	15,812	40,912
10	Ghaziabad	332,101	79,822	1,270	2,067	17,148	0	0	432,408	470,081
11	Greater Mumbai	1,044,829	562,526	23,892	3,943	639	204	1,512	1,637,545	1,870,311
12	Gwalior	353,490	29,102	5,208	...	16,636	6,576	2,579	413,591	449,257
13	Hyderabad	2,144,410	491,361	8,746	25,904	6,704	1,579	6,892	2,685,596	3,032,739
14	Indore	930,223	127,644	4,397	...	16,390	9,316	2,596	1,090,566	1,212,965
15	Jabalpur	462,632	37,955	2,081	...	11,923	2,996	3,655	521,242	559,156
16	Jaipur	1,248,076	208,475	49,668	...	41,324	3,028	55	1,550,626	1,693,972
17	Jamshedpur	13,145	7,102	2,396	...	822	...	...	23,465	66,888
18	Jodhpur	446,131	47,803	17,333	0	44,886	7,884	1,459	565,496	636,141
19	Kanpur	849,098	98,194	6,310	3,856	6,630	0	3	964,091	1,001,784
20	Kochi	221,157	113,269	5,832	5,353	249	8	4,021	349,889	408,522
21	Kolkata**	182,087	194,178	^	...	#	82	701	377,048	444,718
22	Kota	367,900	33,276	9,595	0	20,855	8,391	726	440,743	473,149
23	Lucknow	970,897	165,589	15,513	850	17,809	1,318	3,512	1,175,488	1,210,889
24	Madurai	493,575	38,412	1,550	77	5,652	1,953	7,683	548,902	602,852
25	Meerut	306,202	45,940	639	494	58,690	0	0	411,965	423,142
26	Nagpur	967,838	89,479	28,244	842	5,385	5,263	1,153	1,098,204	1,157,034
27	Nashik	300,877	34,151	8,132	44	11,406	6,835	757	362,202	397,825
28	Patna	448,104	84,620	...	...	13,660	9,314	4,200	559,898	657,656
29	Pune	1,551,968	285,235	40,192	950	17,883	9,887	4,462	1,910,577	2,093,890
30	Raipur	412,707	35,894	710	5,318	6,705	17,075	2,840	481,249	527,307
31	Srinagar	79,146	54,196	3,827	...	1,753	...	1,412	140,334	183,772
32	Tiruchirapalli	376,887	34,431	991	70	3,898	1,306	3,528	421,111	456,743
33	Varanasi	426,522	40,132	8,411	357	13,631	9,329	400	498,782	538,016
34	Vijayawada	340,614	39,764	1,204	1,731	6,745	5,108	724	395,890	466,284
35	Visakhapatnam	469,784	63,137	3,434	2,268	2,960	10,016	1,954	553,553	616,638
	TOTAL	28,086,811	6,811,458	374,358	202,279	437,041	144,698	138,055	36,194,700	39,739,441

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

... : not reported

^ : Included in cars

§ : Included in Multi-axled/Articulated vehicles

** : Live vehicles after cancellation of vehicles registered prior to 1.1.1993

^^ : Includes other vehicles which are not covered in 'Transport Vehicles'

: Included in Trailers

* Includes motor cycles on hire

Note: The Urban Agglomerations(UAs)/Towns are grouped on the basis their population in Census of India. The UAs/Towns which have at least 1,00,000 persons as population are categorised as Class I UA/Town. Out of UAs/Towns belonging to Class I category, the UAs/Towns each having a population of one million or above each are known as Million Plus UAs/Cities.

Table 2.6.3 : Cargo Movement for National Waterways -1,2 & 3, Goa and Mumbai Waterways 2007-08 to 2011-12

STRETCH		2007-08	2008-09	2009-10	2010-11	2011-12	Type of cargo moved
National Waterways-1 The Ganga	MT	1497964	1348385	1811070	1871178	3309839	Cement, Fly Ash, Iron Ore Fines,
	TKM	709153891	705570044	1047703720	1227702794	1454368323	Coal, Steel Shed, Tyres, Iron fines,
	BTKM	0.709	0.705	1.048	1.228	1.454	Iron Ingots, Galvanized Steel Plain
National Waterways-2 The Brahmaputra	MT	2140491	2179435	2114895 ^	2163745 ^	2406448 ^	Bamboo, Bamboo products, Coal,
	TKM	56874896	55171401	59126385	57335351	61327453	Plant & machinery, Cement,
	BTKM	0.057	0.055	0.059	0.057	0.061	Building material, fertilizer, Food
National Waterways-3 West Coast Canal	MT	673127	766214	667197	885694	1343770	Phosphoric Acid, Sulphur, Zinc,
	TKM	8872101	10912125	9750256	14227990	13251939	Furnace oil, Rock Phosphate,
	BTKM	0.009	0.011	0.01	0.014	0.013	Various commodities in
Sub Total of National Waterways	MT	4311582	4294034	4593162	4920617	7060057	
	TKM	774900888	771653570	1116580361	1299266135	1528947714	
	BTKM	0.775	0.772	1.117	1.299	1.529	
The GOA Waterways	MT	38500000	45580000	53030000	54500000	43279347	Iron ore, iron ore pellets, coal & pig iron.
	TKM	1925000000	2279000000	2651500000	2725000000	2163967350	
	BTKM	1.925	2.279	2.651	2.725	2.164	
Mumbai Waterways	MT	12906154	10155962	11991109	14875355	19947750	Coal, cement, bauxite, iron ore pellets, stone, HR steel, project cargo and related raw material,
	TKM	696932316	548421948	647519886	803269170	1077178521	
	BTKM	0.697	0.548	0.648	0.803	1.077	
Grand Total	MT	55717736	60029996	69614271	74295972	70287155	
	TKM	3396833204	3599075518	4415600247	4827535305	4770093586	
	BTKM	3.397	3.599	4.416	4828	4.77	

Source: Annual Report 2011-12, Ministry of Shipping and Road Transport.

Note: 1. These figures are collected by IWAI field offices from IWT operators.

2. Average IWT distance of 50 Km in Goa and 54 Km in Mumbai waterways considered.

3. ^ Provisional data subject to receipt of final report from IWTD, Govt of Assam. Data extrapolated considering average of previous 3 years.

MT : Million tonne

TKM : Tonne Kms

BTKM : Billion Tonnes Km

**Table 2.6.4 :Growth of Indian Shipping
(as on 31 December 2012)**

('000 GRT)

Year	Coaster			Overseas			Total		
	No. of Vessels	Gross Registered tonnage	Average GRT	No. of Vessels	Gross Registered tonnage	Average GRT	No. of Vessels	Gross Registered tonnage	Average GRT
1980	58	253	4.4	325	5426	16.7	383	5679	14.8
1985	95	296	3.1	273	5654	20.7	368	5950	16.2
1990	162	523	3.2	256	5504	21.5	418	6027	14.4
1991	169	561	3.3	246	5378	21.9	415	5939	14.3
1992	187	640	3.4	254	5678	22.4	441	6288	14.3
1993	202	642	3.2	241	5625	23.3	443	6267	14.1
1994	206	681	3.3	231	5665	24.5	437	6346	14.5
1995	219	698	3.2	251	6304	25.1	470	7002	14.9
1996	231	705	3.1	253	6347	25.1	484	7052	14.6
1997	232	654	2.8	244	6224	25.5	476	6878	14.4
1998	247	654	2.6	237	6131	25.9	484	6785	14.0
1999	269	680	2.5	241	6373	26.4	510	7053	13.8
2000	312	709	2.3	237	6244	26.3	549	6953	12.7
2001	329	731	2.2	228	6237	27.4	557	6968	12.5
2002	424	805	1.9	193	5402	28.0	617	6207	10.1
2003	429	806	1.9	196	5817	29.7	625	6623	10.6
2004	454	808	1.8	215	6893	32.1	669	7701	11.5
2005	485	816	1.7	236	7427	31.5	721	8243	11.4
2006	526	841	1.6	250	7576	30.3	776	8417	10.8
2007	573	893	1.6	277	8136	29.4	850	9030	10.6
2008	616	964	1.6	296	8346	28.2	912	9310	10.2
2009	662	980	1.5	312	8499	27.2	974	9479	9.7
2010	700	1013	1.4	340	9152	26.9	1040	10165	9.8
2011	750	1048	1.4	372	10013	26.9	1122	11061	9.9
2012	804	1086	1.4	350	9331	26.7	1154	10417	9.0

Source: Indian Shipping Statistics 2012, Ministry of Road and Transport & Highways (Transport research wing)

Table 2.6.5 :Freight Movement by Road Transport & Railways :1999-2000 to 2010-11

(Billion Tonnes Kilometers)

Year	Road Transport	Railways
1999-2000	467 (60.5)	305.2 (39.5)
2000-01	494 (61.3)	312.4 (38.7)
2001-02	515.0 (60.7)	333.2 (39.3)
2002-03	545.0 (60.70)	353.2 (39.3)
2003-04	595.0 (61.0)	381.2 (39.0)
2004-05	646.0 (61.1)	411.3 (-38.9)
2005-06	658.9 (59.9)	441.8 (40.1)
2006-07	766.2 (61.4)	481.0 (38.6)
2007-08	851.7 (62.0)	521.3 (38.0)
2008-09	920.2 (62.5)	551.4 (37.5)
2009-10	1012.9 (62.8)	600.5 (37.2)
2010-11	1115.0	NA

Note: Figures for Road Transport form 2007-08 to 2010-11 have been estimated by Transport Research Wing, Ministry of Road Transport & Highways, Govt. of India on the basis of actual GDP growth rate and elasticity of road transport with respect to GDP.

Figures in parantheses indicate percentages

N.A. : Not available.

1. Working group report on Road Transport for twelfth five years plan
2. Railways year book, Ministry of Railways.

Transport vehicle means a public service vehicle or goods vehicle

Source: Road Transport Year Book- (2009-10 & 2010-11)

Table 2.6.6 :Passenger Movement by Road Transport & Railways :1999-2000 to 2010-11**(Billion Tonnes Kilometres)**

Year	Road Transport	Railways
1999-2000	1831.6 (81.0)	430.7 (19.0)
2000-01	2075.5 (82.0)	457.0 (18.0)
2001-02	2413.1 (83.1)	490.9 (16.9)
2002-03	2814.7 (84.5)	515.0 (15.5)
2003-04	3070.2 (85.0)	541.2 (15.0)
2004-05	3469.3 (85.8)	575.7 (14.2)
2005-06	4251.7 (87.4)	615.6 (12.6)
2006-07	4545.8 (86.7)	694.8 (13.3)
2007-08	4860.3 (86.3)	770.0 (13.7)
2008-09	5196.5 (86.1)	838.0 (13.9)
2009-10	5196.5 (85.2)	903.4 (14.8)
2010-11	5555.9	NA

Note: Figures for Road Transport from 2007-08 to 2010-11 have been estimated by Transport Research Wing, Ministry of Road Transport & Highways, Govt. of India on the basis of actual N.A. : Not available.

Figures in parantheses indicate percentages

1. Working group report on Road Transport for twelfth five years plan
2. Railways year book, Ministry of Railways.

Transport vehicle means a public service vehicle or goods vehicle

Source: Road Transport Year Book- (2009-10 & 2010-11)

Table 2.6.7 : Annual -Total domestic traffic and operating statistics of Indian carriers for last ten years

Year	AIRCRAFT FLOW		PASSENGERS		AVAILABLE SEAT KMS.(MILLION)	PAX. LOAD FACTOR (%)	CARGO CARRIED (TONNE)**			TONNE KMS. PERFORMED (MILLION)				AVAILABLE TONNE KMS. (MILLION)	WEIGHT LOAD FACTOR (%)
	HOURS (NO)	KMS.(000)	CARRIED (NO)	KMS. PERFORMED (MILLION)			FREIGHT	MAIL	TOTAL	PAX.	FREIGHT	MAIL	TOTAL		
2002-03	295173	165827	13951034	12848	22833	56.3	156254	23331	179585	1086	164	23	1273	2380.8	53.5
2003-04	343795	189336	15676948	14566	24936	58.4	176611	20879	197490	1257	191	19	1467	2551.3	57.5
2004-05	398714	213618	19445043	18030	27790	64.9	218004	27147	245151	1558	229	29	1816	2840.2	63.9
2005-06	475352	252668	25204988	23709	35077	67.6	224958	31523	256481	2067	238	35	2340	3488	67.1
2006-07	648408	347912	35792747	33519	48702	68.8	245652	20769	266421	2910	252	23	3185	4750	67.1
2007-08	805934	439378	44384302	41718	60590	68.9	282288	20277	302565	3637	272	21	3930	5984	65.7
2008-09	808442	426099	39467072	37704	59160	63.7	252971	24637	277608	3260	236	24	3520	5908	59.6
2009-10	820991	412594	45337263	43959	61091	72.0	298245	29659	327904	3706	286	29	4021	6129	65.6
2010-11	892630	438559	53842538	52707	68216	77.3	360766	21279	382045	4363	374	20	4757	6778	70.2
2011-12	987925	500233	60837455	59084	78639	75.1	345248	15464	360712	5066	375	18	5459	8033	68

SOURCE: Director General of Civil Aviation, Air Transport Statistics for the year 2011-12.

NOTE:- ** Cargo carried by Blue Dart and Deccan Cargo Express & Logistics as scheduled cargo operators have not been indicated. Here cargo carried by Scheduled domestic Airlines(Indian Carriers) has been given.

2.7 Energy

Climate change, and more specifically the carbon emissions from energy production and use, is one of the more vexing problems facing society today. The energy sector particularly closely associated with climate change because energy is central both to the problem and to its resolution. Energy-related emissions (including energy used in transportation) account for over two thirds of anthropogenic greenhouse gas (GHG) emissions and contribute well over 80% of worldwide emissions of CO₂, the main GHG, as a direct result of fossil fuel combustion. Energy also accounts for around one third of the global emissions of methane, the second largest source of GHGs, in fugitive emissions, mainly from natural gas production; transportation; and coal production. In addition, energy contributes a small share of global emissions of N₂O, the third largest source, principally from biomass burning.

After the liberalization and globalization, India is on a high growth path and with about 7-8% GDP growth rate per annum. The energy generation has grown manifold due to the ever increasing demand for energy since 1992. Coal, Gas and Diesel being the major sources of power in India, the emissions of GHGs are also on the rise. The GHG emission level estimation, however, depends on utilization of installed capacity. In addition to this, the unorganized sector is also engaged in power generation through low capacity diesel generator sets and coal-fired generators. The framework for statistics related to climate change included the following indicators/ variables.

Energy

- (i) Hydro (ii) Coal (iii) Diesel (iv) Gas
- (v) Nuclear (vi) Renewable (Annual data National/state wise.)

The following are the tables included in this report.

2.7 Energy

- 2.7.1 Installed capacity of power utilities – 2010,2012 and 2013.
- 2.7.2 Electricity generation (in gigawatt-hrs)
- 2.7.3 Growth of installed generating capacity in India (Megawatt) (1947-2013)
- 2.7.4 Annual gross generation of power by source
- 2.7.5 State wise production of coal and lignite
- 2.7.6 Production of coal from opencast ,working by mechanization and overburden removed
- 2.7.7 Inventory of geological reserves of coal by type
- 2.7.8 Domestic production of petroleum products in India
- 2.7.9 Industry wise off- take of natural gas in India

Data sources

Central Electricity Authority (CEA) under the Ministry of Power provide all data on electricity generation and distribution. The website of CEA has the relevant data.

Indian Bureau of Mines (IBM) Nagpur provide data on Coal and Lignite.

Directorate General of Coal Safety, Dhanbad provides data on coal mines.

Coal Controller of India for data on coal inventory.

Ministry of Petroleum and Natural Gas for data on Domestic production of petroleum products and natural gas.

Table 2.7.1: Installed capacity of power utilities on 31st March, 2013

Sl. No.	State/Union Territory	Thermal			Total Thermal	Nuclear	Hydro Renewable	RES** (MNRE)	Grand Total
		Coal	Gas	Diesel					
		3	4	5					
1	2	3	4	5	6	7	8	9	10
I	Northern Region	32413.5	4781.26	12.99	37207.75	1620	15467.75	5589.25	59884.75
1	Delhi	135	1550.4	0	1685.4	0	0	0	1685.4
1	Haryana	3160	25	3.92	3188.92	0	884.51	70.1	4143.53
3	Himachal Pradesh	0	0	0.13	0.13	0	393.6	587.91	981.64
4	Jammu & Kashmir	0	175	8.94	183.94	0	780	130.53	1094.47
5	Punjab	2630	25	0	2655	0	2230.23	244.5	5129.73
6	Rajasthan	3615	553.8	0	4168.8	0	987.96	30.25	5187.01
7	Uttar Pradesh	4923	0	0	4923	0	524.1	25.1	5472.2
8	Uttaranchal	0	0	0	0	0	1252.15	174.82	1426.97
9	Chandigarh	0	0	0	0	0	0	0	0
10	Private sector	6450	108	0	6558	0	2148	4326.04	13032.04
11	Central sector	11500.5	2344.06	0	13844.56	1620	6267.2	0	21731.76
II	Western Region	49257.01	8988.31	17.48	58262.8	1840	7447.5	8986.93	76537.23
1	Goa	0	0	0	0	0	0	0.05	0.05
2	Daman & Diu	0	0	0	0	0	0	0	0
3	Gujarat	4470	1594.72	17.28	6082	0	772	32.9	6886.9
4	Madhya Pradesh	2995	0	0	2995	0	1703.66	86.16	4784.82
5	Chhattisgarh	2280	0	0	2280	0	120	52	2452
6	Maharashtra	8400	672	0	9072	0	2884.84	303.75	12260.59
7	Dadra & Nagar Haveli	0	0	0	0	0	0	0	0
8	Private sector	19374	3188	0.2	22562.2	0	447	8512.07	31521.27
9	Central sector	11738.01	3533.59	0	15271.6	1840	1520	0	18631.6
III	Southern Region	25032.5	4962.78	939.32	30934.6	1320	11353.03	12251.85	55859.48
1	Andhra Pradesh	5092.5	0	0	5092.5	0	3734.53	223.03	9050.06
2	Karnataka	2720	0	127.92	2847.92	0	3599.8	901.35	7349.07
3	Kerala	0	0	234.6	234.6	0	1881.5	174.73	2290.83
4	Tamil Nadu	4170	523.2	0	4693.2	0	2137.2	118.55	6948.95
5	NLC	0	0	0	0	0	0	0	0
6	Puducherry	0	32.5	0	32.5	0	0	0	32.5
7	Private sector	2910	4047.5	576.8	7534.3	0	0	10834.19	18368.49
8	Central sector	10140	359.58	0	10499.58	1320	0	0	11819.58
IV	Eastern Region	23457.88	190	17.2	23665.08	0	3981.12	454.91	28101.11
1	Bihar	430	0	0	430	0	0	70.7	500.7
2	Jharkhand	1190	0	0	1190	0	130	4.05	1324.05
3	West Bengal	4970	100	12.06	5082.06	0	977	143.4	6202.46
4	D.V.C.	0	0	0	0	0	0	0	0
5	Odisha	420	0	0	420	0	2061.92	64.3	2546.22
6	Sikkim	0	0	5	5	0	0	52.11	57.11
7	Private sector	5771.38	0	0.14	5771.52	0	0	120.35	5891.87
8	Central sector	10676.5	90	0	10766.5	0	812.2	0	11578.7
V	North-Eastern Region	60	1187.5	142.74	1390.24	0	1242	252.68	2884.92
1	Assam	60	276.2	20.69	356.89	0	100	31.11	488
2	Arunachal Pradesh	0	0	15.88	15.88	0	0	103.91	119.79
3	Meghalaya	0	0	2.05	2.05	0	282	31.03	315.08
4	Tripura	0	148.5	4.85	153.35	0	0	16.01	169.36
5	Manipur	0	0	45.41	45.41	0	0	5.45	50.86
6	Nagaland	0	0	2	2	0	0	28.67	30.67
7	Mizoram	0	0	51.86	51.86	0	0	36.47	88.33
8	Private sector	0	24.5	0	24.5	0	0	0.03	24.53
9	Central sector	0	738.3	0	738.3	0	860	0	1598.3
	State	0	0	70.02	70.02	0	0	6.1	76.12
	Andaman & State	0	0	40.05	40.05	0	0	5.25	45.3
	Lakshadweep State	0	0	9.97	9.97	0	0	0	9.97
	Private sector	0	0	20	20	0	0	0.85	20.85
	Central sector	0	0	0	0	0	0	0	0
	All INDIA	130220.9	20109.85	1199.75	151530.5	4780	39491.4	27541.72	223343.6

Source : Central Electricity Authority

RES**: Renewable Energy Sources

Table 2.7.1 : Installed capacity of power utilities on 31st March, 2012

Sl. No.	State/Union Territory	Thermal			Total Thermal	Nuclear	Hydro Renewable	RES** (MNRE)	Grand Total
		Coal	Gas	Diesel					
		3	4	5					
1	2	3	4	5	6	7	8	9	10
I	Northern Region	28357.50	4421.26	12.99	32791.75	1620.00	15122.75	4391.40	53925.90
1	Delhi	135	1300.4	0	1435.4	0	0	0	1435.4
1	Haryana	3160	25	3.92	3188.92	0	884.51	70.1	4143.53
3	Himachal Pradesh	0	0	0.13	0.13	0	393.6	527.66	921.39
4	Jammu & Kashmir	0	175	8.94	183.94	0	780	130.53	1094.47
5	Punjab	2630	25	0	2655	0	2230.23	244.5	5129.73
6	Rajasthan	3615	443.8	0	4058.8	0	987.96	30.25	5077.01
7	Uttar Pradesh	4267	0	0	4267	0	524.1	25.1	4816.2
8	Uttaranchal	0	0	0	0	0	1252.15	170.82	1422.97
9	Chandigarh	0	0	0	0	0	0	0	0
10	Private sector	4050	108	0	4158	0	2078	3192.44	9428.44
11	Central sector	10500.5	2344.06	0	12844.56	1620	5992.2	0	20456.76
II	Western Region	38924.5	8254.81	17.48	47196.79	1840	7447.5	7909.95	64394.24
1	Goa	0	0	0	0	0	0	0.05	0.05
2	Daman & Diu	0	0	0	0	0	0	0	0
3	Gujarat*	4220	1243.72	17.28	5481	0	772	32.9	6285.9
4	Madhya Pradesh	2807.5	0	0	2807.5	0	1703.66	86.76	4597.92
5	Chhattisgarh	2060	0	0	2060	0	120	20.25	2200.25
6	Maharashtra	8650	672	0	9322	0	2884.84	286.73	12493.57
7	Dadra & Nagar Haveli	0	0	0	0	0	0	0	0
8	Private sector	12389	2805.5	0.2	15194.7	0	447	7483.26	23124.96
9	Central sector	8798	3533.59	0	12331.59	1840	1520	0	15691.59
III	Southern Region	22882.5	4690.78	939.32	28512.6	1320	11338.03	11569.3	52739.93
1	Andhra Pradesh	5092.5	0	0	5092.5	0	3734.53	221.83	9048.86
2	Karnataka	2720	0	127.92	2847.92	0	3599.8	823.65	7271.37
3	Kerala	0	0	234.6	234.6	0	1881.5	162.66	2278.76
4	Tamil Nadu	2970	523.2	0	3493.2	0	2122.2	118.55	5733.95
5	NLC	0	0	0	0	0	0	0	0
6	Puducherry	0	32.5	0	32.5	0	0	0	32.5
7	Private sector	2460	3775.5	576.8	6812.3	0	0	10242.61	17054.91
8	Central sector	9640	359.58	0	9999.58	1320	0	0	11319.58
IV	Eastern Region	21797.88	190	17.2	22005.08	0	3882.12	398.71	26285.91
1	Bihar	430	0	0	430	0	0	64.3	494.3
2	Jharkhand	1190	0	0	1190	0	130	4.05	1324.05
3	West Bengal	5030	100	12.06	5142.06	0	977	143.4	6262.46
4	D.V.C.	0	0	0	0	0	0	0	0
5	Odisha	420	0	0	420	0	2061.92	64.3	2546.22
6	Sikkim	0	0	5	5	0	0	52.11	57.11
7	Private sector	4551.38	0	0.14	4551.52	0	0	70.55	4622.07
8	Central sector	10176.5	90	0	10266.5	0	713.2	0	10979.7
V	North-Eastern Region	60	824.2	142.74	1026.94	0	1200	228	2454.94
1	Assam	60	276.2	20.69	356.89	0	100	31.11	488
2	Arunachal Pradesh	0	0	15.88	15.88	0	0	79.23	95.11
3	Meghalaya	0	0	2.05	2.05	0	240	31.03	273.08
4	Tripura	0	148.5	4.85	153.35	0	0	16.01	169.36
5	Manipur	0	0	45.41	45.41	0	0	5.45	50.86
6	Nagaland	0	0	2	2	0	0	28.67	30.67
7	Mizoram	0	0	51.86	51.86	0	0	36.47	88.33
8	Private sector	0	24.5	0	24.5	0	0	0.03	24.53
9	Central sector	0	375	0	375	0	860	0	1235
	State	0	0	70.02	70.02	0	0	6.1	76.12
	Andaman & State	0	0	40.05	40.05	0	0	5.25	45.3
	Lakshadweep State	0	0	9.97	9.97	0	0	0	9.97
	Private sector	0	0	20	20	0	0	0.85	20.85
	Central sector	0	0	0	0	0	0	0	0
	All INDIA	112022.38	18381.05	1199.75	131603.18	4780.00	38990.40	24503.46	199877.04

Source : Central Electricity Authority

RES**: Renewable Energy Sources

Table 2.7.1 : Installed capacity of power utilities on 31st March, 2010

Sl. No.	State/Union Territory	Thermal			Total Thermal	Nuclear	Hydro Renewable	RES** (MNRE)	Grand Total
		Coal	Gas	Diesel					
1	2	3	4	5	6	7	8	9	10
I	Northern Region	21275.00	3563.26	12.99	24851.25	1620.00	13310.75	2407.33	42189.33
1	Delhi	135.00	600.40	0.00	735.40	0.00	0.00	0.00	735.40
1	Haryana	2615.00	0.00	3.92	2618.92	0.00	884.51	68.70	3572.13
3	Himachal Pradesh	0.00	0.00	0.13	13.00	0.00	393.60	275.83	669.56
4	Jammu & Kashmir	0.00	175.00	8.94	183.94	0.00	780.00	129.33	1093.27
5	Punjab	2630.00	0.00	0.00	2630.00	0.00	2230.23	220.65	5080.88
6	Rajasthan	3365.00	443.80	0.00	3808.80	0.00	987.96	30.25	4827.01
7	Uttar Pradesh	4072.00	0.00	0.00	4072.00	0.00	524.10	25.10	4621.20
8	Uttaranchal	0.00	0.00	0.00	0.00	0.00	1252.15	132.92	1385.07
9	Chandigarh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	Private sector	435.00	0.00	0.00	435.00	0.00	786.00	1524.55	2745.55
11	Central sector	8023.00	2344.06	0.00	10367.06	1620.00	5472.20	0.00	17459.26
II	Western Region	28145.50	8143.81	17.48	36306.79	1840.00	7447.50	4630.74	50225.03
1	Goa	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05
2	Daman & Diu	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	Gujarat	4190.00	892.72	17.28	5100.00	0.00	772.00	29.90	5901.90
4	Madhya Pradesh	2807.50	0.00	0.00	2807.50	0.00	1703.66	71.76	45982.92
5	Chhattisgarh	2060.00	0.00	0.00	2060.00	0.00	120.00	19.05	2199.05
6	Maharashtra	7300.00	912.00	0.00	8212.00	0.00	2884.84	233.72	11330.66
7	Dadra & Nagar Haveli	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	Private sector	4810.00	2805.50	0.20	7615.70	0.00	447.00	4276.26	12338.96
9	Central sector	6978.00	3533.59	0.00	10511.59	1840.00	1520.00	0.00	13871.59
III	Southern Region	17822.50	4392.78	949.29	23164.57	1100.00	11107.03	7938.87	43310.47
1	Andhra Pradesh	3882.50	0.00	0.00	3882.50	0.00	3617.53	188.43	7688.46
2	Karnataka	1970.00	0.00	127.92	2097.92	0.00	3599.80	527.15	6224.87
3	Kerala	0.00	0.00	234.60	324.60	0.00	1781.50	85.55	2154.86
4	Tamil Nadu	2970.00	523.20	0.00	3493.20	0.00	2108.20	110.55	5686.95
5	NLC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	Puducherry	0.00	32.50	0.00	32.50	0.00	0.00	0.00	32.50
7	Lakshadweep	0.00	0.00	9.97	9.97	0.00	0.00	0.00	9.97
8	Private sector	1110.00	3477.50	576.80	5164.30	0.00	0.00	6998.98	12163.28
9	Central sector	7890.00	359.58	0.00	8249.58	1100.00	0.00	0.00	9349.58
IV	Eastern Region	16895.38	190.00	77.25	17162.63	0.00	3882.12	340.01	21384.76
1	Bihar	530.00	0.00	0.00	530.00	0.00	0.00	54.60	584.60
2	Jharkhand	1190.00	0.00	0.00	1190.00	0.00	130.00	4.05	1324.05
3	West Bengal	4780.00	100.00	12.06	4892.06	0.00	977.00	144.50	6013.56
4	D.V.C.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	Odisha	420.00	0.00	0.00	420.00	0.00	2061.92	64.30	2546.22
6	Sikkim	0.00	0.00	5.00	5.00	0.00	0.00	47.11	52.11
7	A. & N. Islands	0.00	0.00	60.05	60.05	0.00	0.00	5.25	65.30
8	Private sector	1701.38	0.00	0.14	1701.52	0.00	0.00	20.20	1721.72
9	Central sector	8274.00	90.00	0.00	8364.00	0.00	713.20	0.00	9077.20
V	North-Eastern Region	60.00	766.00	142.74	968.74	0.00	1116.00	204.16	2288.90
1	Assam	60.00	239.00	20.69	319.69	0.00	100.00	27.11	446.80
2	Arunachal Pradesh	0.00	0.00	15.88	15.88	0.00	0.00	67.42	83.30
3	Meghalaya	0.00	0.00	2.05	2.05	0.00	156.00	31.03	189.08
4	Tripura	0.00	127.50	4.85	132.35	0.00	0.00	16.01	148.36
5	Manipur	0.00	0.00	45.41	45.41	0.00	0.00	5.45	50.86
6	Nagaland	0.00	0.00	2.00	2.00	0.00	0.00	28.67	30.67
7	Mizoram	0.00	0.00	51.86	51.86	0.00	0.00	28.47	80.33
8	Private sector	0.00	24.50	0.00	24.50	0.00	0.00	0.02	24.50
9	Central sector	0.00	375.00	0.00	375.00	0.00	860.00	0.00	1235.00
	All-India	84198.38	17055.85	1199.75	102453.98	4560.00	36863.40	15521.11	159398.49

Source : Central Electricity Authority

RES**: Renewable Energy Sources

Table 2.7.2 : Electricity generation (in gigawatt-hrs)

Parameter	2004-05	2005-06	2006-07	2007-08	2008-09	2009-2010	2010-11
1	2	3	4	5	6	7	8
Public sector	535839.94	562056.45	603851.13	641693.47	651369.69	679932.71	703870.97
Private sector	58616.26	61763.08	66803.03	80932.03	89797.67	119917.89	140877.24
Total (Utilities)	594456.20	623819.53	670654.16	722625.50	741167.36	799850.60	844748.21

Source : Central Electricity Authority

Table 2.7.3 : Growth of installed generating capacity in India (Megawatt)

Sr. No.	As on	Hydro	Thermal				Nuclear	RES#	Grand Total
			Coal	Gas	Diesel	Total			
1	31.12.47	508	756	0	98	854	0	0	1362
2	31.12.50	560	1004	0	149	1153	0	0	1713
3	31.03.56	1061	1597	0	228	1825	0	0	2886
4	31.03.61	1917	2436	0	300	2736	0	0	4653
5	31.03.66	4124	4417	134	352	4903	0	0	9027
6	31.03.69	5907	6640	134	276	7050	0	0	12957
7	31.03.74	6966	8652	165	241	9058	640	0	16664
8	31.03.79	10833	14875	168	164	15207	640	0	26680
9	31.03.80	11384	15991	268	165	16424	640	0	28448
10	31.03.85	14460	26311	542	177	27030	1095	0	42585
11	31.03.90	18307	41236	2343	165	43744	1565	0	63616
12	31.03.92	19194	44791	3095	168	48054	1785	32	69065
13	31.03.97	21658	54154	6562	2947	63663	2225	902	88448
14	31.03.02	26269	62131	11163	1135	74429	2720	1628	105046
15	31.03.03	26767	63951	11633	1178	76762	2720	1628	107877
16	31.03.04	29507	64957	11840	1172	77969	2720	2488	112684
17	31.03.05	30942	67791	11910	1202	80903	2770	3811	118426
18	31.03.03	32326	68518	12690	1202	82410	3360	6191	124287
19	31.03.07	34654	71121	13692	1202	86015	3900	7760	132329
20	31.03.08	35909	76049	14656	1202	91907	4120	11125	143061
21	31.03.09	36846	77649	14876	1200	93725	4120	13242	147933
22	31.03.10 *	36863	84198	17056	1200	102454	4560	15521	159398
23	31.03.12	38990	112022	18381	1200	131603	4780	24504	199877
24	31.03.13	39491	130221	20110	1200	151531	4780	27542	223344

Source: Central Electricity Authority

RES: Renewable Energy Sources

: RES:- Renewable Energy Sources includes Hydro capacity of 25.00 MW and below (as on 31.01.2010)

* : After accounting for derations/uprations etc. and reconciliation with utilities, the installed capacity figure of 36863 MW would work out to 38990 as on 31.03.2012.

Table 2.7.4: Annual gross generation of power by source**(in MU units)**

Sl. No.	Year	Hydro	Steam	Diesel & Wind	Gas	Nuclear	Total
1	2	3	4	5	6	7	9
1	1980-81	46542	60714	62	522	3001	110840
2	1985-86	51021	112540	51	1757	4982	170350
3	1990-91	71641	178322	111	8113	6141	264329
4	1991-92	72757	197163	134	11450	5524	287029
5	1992-93	69869	211124	162	13480	6726	301362
6	1993-94	70463	233151	311	14728	5398	324050
7	1994-95	82712	243110	545	18475	5648	350490
8	1995-96	72759	273744	714	24858	7982	380057
9	1996-97	68901	289378	1554	26985	9071	395889
10	1997-98	74582	300731	1929	34423	10083	421747
11	1998-99	82690	308056	2136	43480	12015	448367
12	1999-00	80637	377814	3989	49773	13267	480680
13	2000-01	74481	357006	3822	48311	16928	499548
14	2001-02	73580	370884	6403	47099	19475	517439
15	2002-03	64014	389550	7052	52687	19390	532693
16	2003-04	75243	407284	6867	57928	17780	565102
17	2004-05	84495	424083	2519	59474	16845	587416
18	2005-06	103057	435097	1988	60128	17239	617510
19	2006-07	116369	461340	2489	63719	18607	662523
20	2007-08	128702	486763	3297	68931	16777	704469
21	2008-09	118981	512527	4709	72865	14713	723794
22	2009-10	112038	539982	4243	96651	18636	771551
23	2010-11	119868	561757	2994	100257	26266	811143
24	2011-12	135794	612880	2461	93464	32287	876887

Source: Monthly Generation Report of Central Electricity Authority

MU : Million Units

Table 2.7.5 : State wise production of coal and lignite

(Million tonnes)

Sl. No.	States	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09(P)	2009-10(P)	2010-11(P)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
I.	Coal														
1	Andhra Pradesh	28.9	27.3	29.6	30.3	30.8	33.2	33.9	35.3	36.1	37.7	40.6	44.5	50.4	51.3
2	Arunachal Pradesh	—	—	—	—	—	—	—	—	—	—	—	0.1	0.2	0.3
3	Assam	0.7	0.6	0.6	0.7	0.6	0.6	0.7	0.6	1.1	1.1	1.1	1.2	1.1	1.1
4	Chhattisgarh	—	—	—	50.2	53.6	56.8	61.5	69.3	76.4	83.0	90.2	101.9	110.0	113.8
5	Jharkhand	81.0	76.2	76.5	75.4	76.8	78.6	79.5	78.0	85.4	88.8	90.9	96.3	105.9	108.9
6	Meghalaya	-	4.2	4.1	4.1	5.1	4.4	5.4	5.3	5.6	5.8	6.5	5.7	5.8	7.0
7	Madhya Pradesh	84.4	84.9	87.9	42.5	44.2	45.7	49.8	52.5	55.6	60.0	67.8	71.3	74.07	71.1
8	Maharashtra	26.2	25.3	27.7	28.8	30.8	31.4	32.9	34.5	36.1	36.2	36.4	38.7	41.0	39.3
9	Odisha	42.0	43.5	43.6	44.8	47.8	52.2	60.1	66.6	70.5	81.2	89.5	98.4	106.4	102.6
10	Uttar Pradesh	15.7	15.6	16.2	16.9	16.5	17.8	15.8	16.8	15.7	12.2	11.4	12.0	14.0	15.5
11	West Bengal	17.5	18.8	18.0	20.1	21.4	20.5	21.5	23.6	24.5	24.9	22.5	22.9	23.1	21.7
	Total	296.7	296.5	304.1	313.7	327.8	341.2	361.2	382.6	407.0	430.8	457.0	492.8	532.1	532.7
II.	Lignite														
1	Gujarat	4.9	5.0	4.4	5.9	6.2	6.9	6.7	8.3	8.9	9.7	11.8	10.1	10.5	13.1
2	Rajasthan	-	0.2	0.2	0.2	0.3	0.5	0.7	0.5	0.7	0.5	0.6	1.0	1.2	1.5
3	Tamil Nadu	18.1	18.2	17.6	18.2	18.4	18.6	20.6	21.6	20.4	21.0	21.6	21.3	22.3	23.1
	Total	23.1	23.4	22.2	24.2	24.8	26.0	28.0	30.5	30.1	31.1	34.0	32.4	34.1	37.7

Source : Indian Bureau of Mines

(P) :Provisional

Table 2.7.6 : Production of coal from opencast ,working by mechanisation and overburden removed

(Tonnes)

Sl. No.	States	2007				2010			
		Total Opencast Output	Output by Mechanisation		Overburden Removed (in '000 Cubic meters)	Total Opencast Output	Output by Mechanisation		Overburden Removed (in '000 Cubic meters)
			Fully Mechanised	Manual/ Semi Mechanised			Fully Mechanised	Manual/ Semi Mechanised	
1	2	3	4	5	6	7	8	9	10
I	COAL	384811855	384433804	378051	4417028	494324349	494324349	c	984529
1	Andhra Pradesh	30619998	30619998	0	905890	52367817	52367817	0	263924
2	Assam	892569	892569	0	640634	1063456	1063456	0	10587
3	Chhattisgarh	75723917	75723917	0	55692	109416349	109416349	0	91162
4	Jharkhand	78441157	78441157	0	965546	105490071	105490071	0	224933
5	Jammu & Kashmir	101	0	101	0	0	0	0	0
6	Madhya Pradesh	39614889	39512889	102000	119826	46683235	46683235	0	135354
7	Maharashtra	31234651	30958701	275950	404209	35480221	35480221	0	82989
8	Odisha	82072022	82072022	0	55692	101553878	101553878	0	65088
9	Uttar Pradesh	23040000	23040000	0	65672	28405000	28405000	0	80784
10	West Bengal	13137283	13137283	0	1197407	13864322	13864322	0	29708
11	Meghalaya	10035268	10035268	0	6460	0	0	0	0
II	LIGNITE	34009726	34009726	0	200746	37333796	37333796	0	220789
1	Gujarat	11195637	11195637	0	43664	13611067	13611067	0	56878
2	Rajasthan	493509	493509	0	8494	1496274	1496274	0	11218
3	Tamil Nadu	22320580	22320580	0	148588	22226455	22226455	0	152693

Source : Directorate General of Mines Safety, Dhanbad

Table 2.7.7 : 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	1-1-2003	4614	699	0	5313
		1-1-2004	4614	699	0	5313
		1-1-2005	4614	699	0	5313
		1-1-2006	4614	699	0	5313
		1-4-2007	4614	699	0	5313
		1-4-2008*	4614	699	0	5313
		1-4-2009	4614	699	0	5313
		1-4-2010	4614	699	0	5313
		1-4-2011	4614	699	0	5313
1-4-2012		4614	699	0	5313	
	II. Medium coking	1-1-2003	11325	11839	1889	25053
		1-1-2004	11325	11839	1889	25053
		1-1-2005	11417	11765	1889	25070
		1-1-2006	11445	11751	1881	25077
		1-4-2007	11853	11601	1880	25334
		1-4-2008*	12308	12136	1880	26324
		1-4-2009	12448	12064	1880	26393
		1-4-2010	12573	11940	1880	26393
		1-4-2011	12573	12001	1880	26454
		1-4-2012	12837	11951	1800	26669
	III. Blendable/semi-coking	1-1-2003	482	907	222	1610
		1-1-2004	482	1003	222	1707
		1-1-2005	482	1003	222	1707
		1-1-2006	482	1003	222	1707
		1-4-2007	482	1003	222	1707
		1-4-2008*	482	1003	222	1707
		1-4-2009	482	1003	222	1707
		1-4-2010	482	1003	222	1707
		1-4-2011	482	1003	222	1707
		1-4-2012	482	1003	222	1707
2	Non-coking (Including High Sulphur)	1-1-2003	73664	99168	35940	208772
		1-1-2004	75096	102736	35787	213619
		1-1-2005	76447	103623	35686	215756
		1-1-2006	78858	106210	35195	220263
		1-4-2007	81624	107362	36042	225027
		1-4-2008*	84425	110378	36388	231191
		1-4-2009	88175	109804	35819	233798
		1-4-2010	92129	117012	34257	243398
		1-4-2011	96333	123768	32287	252388
		1-4-2012	100211	128515	31082	259808
	Total	1-1-2003	90085	112613	38050	240748
		1-1-2004	91517	116277	37898	245692
		1-1-2005	92960	117090	37797	247847
		1-1-2006	95399	119663	37298	252360
		1-4-2007	98573	120665	38144	257382
		1-4-2008*	101829	124216	38490	264535
		1-4-2009	105720	123570	37921	267211
		1-4-2010	109798	130654	36359	276811
		1-4-2011	114002	137471	34389	285862
		1-4-2012	118145	142169	33183	293497

Source : Office of the Coal Controller, Kolkata
* Including Sikkim

Note: The coal resources of India are available in older Gondwana Formations of peninsular India and younger Tertiary formations of north- eastern region. Based on the results of Regional Promotional Exploration, where the boreholes are normally placed 1-2 Km apart, the resources are classified into 'Indicated' or 'Inferred' category. Subsequent deailed exploration in selected blocks, were boreholes are less than 400 meter apart, upgrades the resources into more reliable 'Proved' category

Table 2.7.8 : Domestic production of petroleum products in India

('000 Tonne)

Sl. No.	Year	Light Distillates			Middle Distillates			
		Liquified Petroleum Gas @	Motor Gasoline (Petrol)	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	1481
32	2001-02	4778	9699	9180	9681	2595	39899	1703
33	2002-03	4903	10361	9650	10028	3053	40207	2079
34	2003-04	5348	10999	11317	10187	4289	43316	1659
35	2004-05	5570	11057	14100	9298	5201	45903	1546
36	2005-06	5525	10502	14509	9078	6196	47572	923
37	2006-07	6315	12539	16660	8491	7805	53465	803
38	2007-08*	6732	14167	16440	7794	9107	58361	671
39	2008-09	6996	16020	14826	8223	8071	62889	606
40	2009-10	8091	22537	17105	8545	9296	73281	472
41	2010-11(P)	7538	26135	17531	7702	9570	78053	578

@ : Excludes LPG production from natural gas.

(contd...)

Source : Ministry of Petroleum & Natural Gas.

* : Estimated from calendar year figures

(P) : Provisional

Table 2.7.8 : Domestic production of petroleum products in India - Concl'd.

(’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	17860
4	1973-74	3931	318	131	1093	1072	19495
5	1974-75	4243	387	137	873	668	19611
6	1975-76	5083	342	160	697	436	20829
7	1976-77	4728	368	163	945	511	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	4518	95614
32	2001-02	12227	651	2784	2561	4246	100004
33	2002-03	12167	684	2659	2941	5408	104140
34	2003-04	13372	666	2743	3397	6170	113463
35	2004-05	14970	646	3162	3349	3777	118579
36	2005-06	14305	677	3182	3576	3705	119750
37	2006-07	15697	825	3779	3891	4990	135260
38	2007-08 *	15804	881	4129	4507	6337	144930
39	2008-09	17684	874	4241	4713	5373	150516
40	2009-10	18346	950	4889	3709	12547	179768
41	2010-11(P)	20519	737	4478	2632	14891	190364

Source : Ministry of Petroleum & Natural Gas.

* : Estimated from calendar year figures

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

(P) : Provisional

Table 2.7.9 : Industry wise off- take of natural gas in India

(Million Cubic Meter)

Sl No.	Year	Energy Purposes					Others**	Total	Non-Energy Purposes		Grand Total
		Power Generation	Industrial Fuel	Tea Plantation	Domestic fuel	Captive Use/LPG shrinkage			Fertilizer Industry	Others	
1	2	3	4	5		6			7	8	9
1	1970-71	261	116	15	-	68	-	460	187	-	647
2	1971-72	313	129	19	-	61	-	522	196	-	718
3	1972-73	339	148	20	Neg	63	-	570	201	-	771
4	1973-74	323	157	22	Neg	81	-	583	179	-	762
5	1974-75	354	164	29	6	80	-	633	318	-	951
6	1975-76	368	143	33	13	104	-	661	463	2	1126
7	1976-77	344	155	38	15	142	-	694	663	24	1381
8	1977-78	372	165	39	13	171	-	760	673	31	1464
9	1978-79	560	175	43	13	176	-	967	721	23	1711
10	1979-80	514	158	39	16	174	-	901	755	25	1681
11	1980-81	492	163	45	14	176	-	890	611	21	1522
12	1981-82	612	166	47	15	364	-	1204	991	27	2222
13	1982-83	1025	185	51	14	499	-	1774	1155	28	2957
14	1983-84	1209	230	58	16	572	-	2085	1283	33	3401
15	1984-85	1454	250	62	18	721	-	2505	1603	33	4141
16	1985-86	1299	223	78	21	795	-	2416	2500	34	4950
17	1986-87	2041	257	96	25	1295	-	3714	3335	26	7075
18	1987-88	2721	281	99	34	1313	-	4448	3490	30	7968
19	1988-89	1823	526	87	42	1329	-	3807	5334	109	9250
20	1989-90	2140	695	78	41	1526	-	4480	6578	114	11172
21	1990-91	3634	827	89	50	1775	-	6375	5612	779	12766
22	1991-92	4774	766	108	72	2165	-	7885	5509	1048	14442
23	1992-93	4967	1450	105	187	1916	-	8625	6672	819	16116
24	1993-94	4785	1794	121	189	2277	-	9166	6499	675	16340
25	1994-95	5229	1927	134	190	2230	-	9710	6936	691	17337
26	1995-96	6836	2301	111	178	589	-	10015	7602	474	18091
27	1996-97	6935	2631	130	184	618	-	10498	7625	509	18632
28	1997-98	8114	3106	117	206	569	-	12112	8752	649	21513
29	1998-99	8714	3005	147	193	911	-	12970	8869	650	22489
30	1999-00	8829	2329	140	250	4840	36	16424	8592	1869	26885
31	2000-01	8801	2870	151	335	5004	38	17199	8480	2181	27860
32	2001-02	9214	2979	147	485	5339	70	18234	7957	1846	28037
33	2002-03	10510	2939	119	654	5409	136	19767	7955	2242	29964
34	2003-04	11478	3099	142	93	4865	1263	20940	7889	2077	30906
35	2004-05	12099	3569	142	343	4944	231	21328	8173	1274	30775
36	2005-06	11878	3780	151	75	5048	1120	22052	7762	1211	31025
37	2006-07	11963	3205	170	443	5034	40	20855	8497	2016	31368
38	2007-08	12037	3324	160	38	1804	1324	18687	9822	2070	30579
39	2008-09	12603	5912	154	102	1885	1535	22191	9082	1716	32989
40	2009-10	21365	2322	167	246	5433	1838	31371	13168	1967	46506
41	2010-11	27415	2317	193	29	4543	1222	35719	13429	2281	51429
42	2011-12(P)	20333	1618	175	2845	784	934	26689	11330	7886	45905

Source : Ministry of Petroleum & Natural Gas.

(P) :Provisional

** Sponge iron use.

3.1 Ocean

Rise in Sea Level and Sea surface Temperature is one of the major impact of Climate Change that affect a major proportion of mankind. IPCC has estimated a sea level rise of 1 to 2 mm per year globally. Although only 2 percent of the world's land lies at or below 10 meters of elevation, these areas contain 10 percent of the world's human population—634 million people that are directly threatened by sea level rise. The small island nations of the Pacific Ocean are the most immediately vulnerable to the impacts of climate change and particularly to sea level rise. For example, nearly 50,000 of the 100,000 people in Kiribati live within 3 meters above sea level.

In India The Kavaratti island which is the Capital of Lakshadweep Islands is 2 to 5 m above the mean sea level on the western side and 2 to 3 m on the eastern side has a population of 11300 (2009). The Maldives, consisting of over 1,100 islands to the west of India, is the world's lowest-lying nation. On average the islands are only 1.3 meters above sea level. The 325,000 (plus 100,000 expatriate workers who are not counted in the census) residents of the islands are threatened by rising sea levels.

The survival of coral reefs, mangroves, sea grasses, and other critical habitat-forming species hinges on their ability to move into shallower waters. Slow-growing species are most unlikely to be able to keep pace with the rising sea level. Critical coastal habitats—for instance, sea turtle nesting beaches—are lost as the sea level rises. Natural and manmade barriers such as cliffs, sea walls, and coastal developments stand in the way of migrating further inland.

Measures of sea level refer to the level of the ocean's surface halfway between high and low tide. For centuries, sea level was measured using tide gauges. Since the mid-20th century, and especially over the last decade, satellites have played an increasingly significant role in measuring sea level. In addition to monitoring current sea levels, scientists have been trying to understand the history of changes in the height of the oceans. Using archeological information gleaned from salt marshes and coral reefs, past sea levels can be established.

Since the beginning of the 20th century, the seas have continued to rise at an average rate of 1.7 ± 0.5 mm per year, according to the IPCC. This increase, however, has not happened at a constant rate. The first noted increase was over the period of 1961 to 2003, when the average rate of sea level rise was 1.8 ± 0.5 mm per year

Factors Driving Sea Level Rise

Sea level rise is due to a number of causes, some of which may exert a more regional influence than others. These include:

Thermal expansion – As seawater becomes warmer it expands. Heat in the upper layer of the ocean is released quickly into the atmosphere. However, heat absorbed by the deeper layers of the ocean will take much longer to be released and therefore, be stored in the ocean much longer and have significant impacts on future ocean warming.

An increase in freshwater inputs from mountain glaciers, ice sheets, ice caps, and sea ice, as well as other atmospheric and hydrologic cycles due to rising global surface and ocean temperatures

Physical forces – Subsidence and lifting are associated with tectonic activity and the extraction of water and resources such as gas and oil. These types of forces don't actually change the volume of the ocean, only the relative sea level. However, these changes do affect movement over land, as well as estimates from satellite altimetry.

Ocean current variations – Large, regional ocean currents which move large quantities of water from one location to another also affect relative sea level without changing the actual volume of the ocean. For example, el Niño moves water from one side of the Pacific to the other every three or four years. These large-scale variations also affect the relative sea level of certain areas.

Global mean ocean temperature has been rising because about 10% the heat energy produced by greenhouse gases during the past half-century has been trapped in the oceans. Loss of mass from

glaciers world-wide, as well as from the ice sheets of Greenland and Antarctica contributes another 1.2 ± 0.64 mm to sea level rise per year.

Impacts of Sea Level Rise

As the world's oceans rise, low-lying coastal areas will disappear. Flooding of coastal areas will become more common and more severe as storm surges have easier access to these lower-lying areas. The occurrence of extreme high water events related to storm surges, high tides, surface waves, and flooding rivers will also increase. Flooding and loss of land will have significant impacts on humans, wildlife, and entire ecosystems.

Ecosystem Impacts

Migratory marine organisms will most likely be able to adapt. However, the rate of sea level rise will hamper the successful migration of a number of organisms. As ocean levels rise, coastal and low-lying areas and ecosystems will be flooded. Higher sea levels will likely have significant impacts on the structure, function, and capacity of coastal and inland ecosystems, influencing their capabilities to perform ecosystem services.

Coastal development also creates obstacles to plant and animal life as they are trying to adapt to changes in the ecosystem. For example mangrove forests, which act as buffers to storm surges and tidal waves, are being submerged by rising sea levels. The mangroves would normally re-establish themselves at the new low-tide zone, however, buildings and other types of development on the coast are blocking them. These changes in coastal and terrestrial ecosystems and resources will consequentially impact ocean circulation as well as sediment and nutrient flow in coastal areas

The framework for statistics related to climate change has identified the following variables/indicators .

Ocean Level & Temperature

- (i) Sea surface temperature
- (ii) Sea level Rise

Data related is available with the National Institute of Oceanography. Only one table on coral reefs is included in this publication.

Table 3.1.1 :Region wise area of different classes of Coral Reefs in India

Lakshadweep			Gulf of Kachchh		
Sr. No	Class Name	Area Km ²	Sr. No	Class Name	Area Km ²
1	Shallow Lagoon	107.15	1	Turbid Water	7.62
2	Deep Lagoon	135.88	2	Mud	90.01
3	Inlet	0.48	3	Sand	13.13
4	Lagoonal Patch Reef	1.6	4	Matty Algae	3.82
5	Beach/Exposed Sand	9.78	5	Algae with Mud and Sand	30.04
6	Lagoon(Shallow Sandy)	110.21	6	Inner Reef (Live Corals with Algae)	77.11
7	Sea Grass/Algae	9.77	7	Outer Reef (Live Corals with Algae)	26.77
8	Boulders/Dead Corals	7.31	8	Algal Ridge (live Corals with Algae)	14.81
9	Live Corals Zone (Open/Scattered)/Aligned Coral Zone	29.77	9	Sea Grass/Algae	5.74
10	Live Corals Zone (Dense)/Aligned Coral Zone	7.24	10	Live Corals (More than 80%)	16.25
11	Coralline shelf	118	11	Deep Water Live Corals	5.46
12	Live Corals Zone (Deep Lagoon)	57.17	12	Deep Corals with sand and Algae	1.01
13	Live Corals Zone (Intermediate Depth)	4.48	13	Dead Corals	2.28
14	Coral Knolls	2.47	14	Sandy Substrate	2.52
15	Reef Front (Live Corals)	3.48	15	Reef Slope (No Live Corals)	0.19
			16	Windward Reef Front	3.6
Gulf of Manner			Andaman & Nicobar Islands		
S. No.	Class Name	Area Km ²	S. No.	Class Name	Area Km ²
1	Sand	1.65	1	Sandy Beach	16.71
2	Sandy substrate	18.56	2	Sandy Substrate (<5 m)	49.07
3	Sandy substrate Deep	34.12	3	Sandy Substrate Deep (>5 m)	67.23
4	Sea Grass	11.16	4	Rock with sandy substrate	25.52
5	Rubbles Zone	1.01	5	live Corals with Rocks	5.74
6	Live Corals Zone with sea grass	9.15	6	Live Corals with Sand	3.12
7	Dead Corals	2.45	7	Exposed Rocky Land	5.2
8	Windward Reef Front	3.22	8	Sea Grass	0.04
9	Algal Ridge	0.32	9	Dead Corals	0.12

Source: State of Forest Report 2011, MOEF

3.2 : Temperature and Precipitation.

There is a scientific consensus that climate change is occurring, and that human activities are the primary driver. Evidence of climate change includes the instrumental temperature record, rising sea levels, and decreased snow cover in the Northern Hemisphere. According to the Intergovernmental Panel on Climate Change (IPCC), most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in human greenhouse gas concentrations. Further There is a direct influence of global warming on precipitation. Increased heating leads to greater evaporation and thus surface drying, thereby increasing the intensity and duration of drought. However, the water holding capacity of air increases by about 7% per 1°C warming, which leads to increased water vapor in the atmosphere. Hence, storms, whether individual thunderstorms, extra-tropical rain or snow storms, or tropical cyclones, supplied with increased moisture, produce more intense precipitation events.

The temperature increase is wide spread across the globe and is greater at higher northern latitudes. It is estimated that there is a 100-year linear trend of 0.740C increase. It is observed since 1961 that the average temperature of the global ocean has been taking up over 80% of the heat being added to the climate system. Warming of the climate system induces increase in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level.

In India, an increase in the surface air temperature has been observed in the past century. A warming trend is visible along the west coast, central India, interior peninsula and the North-Eastern India, but some cooling trends are also visible in the North-West India and parts of South-India. (NAPCC, 2008). To analyze the comparative change in the Indian peninsula, both sea level temperature and land surface temperature are required to be recorded on long term basis at different climatic zones of the country.

Indian monsoon rains are the backbone of Indian economy as most of our agricultural activities, rivers and replenishment of ground water sources have a direct dependence on monsoon rains. Monsoon rains are a manifestation of the complex interactions between land, ocean and atmosphere. Rainfall data are collected by the India Meteorological Department (IMD) in respect of the meteorological subdivisions of the country on day-to-day basis. A significantly long series of rainfall data are therefore available to analyze patterns of change in distribution, intensity and duration of rainfall.

The framework for statistics related to climate change included the following variables/indicators .

Temperature /Precipitation

- (i) Rain Fall Max/Min./Avg
- (ii) Snowfall
- (iii) Temperature Max/Min/Avg
- (iv) Relative Humidity.

The following are the tables included.

3.2 Temperature and Precipitation

3.2.1 Annual and seasonal minimum and maximum temperature(°C) - INDIA (1901-2012)

- 3.2.1 Annual and seasonal minimum and maximum temperature (°C) - India (1901-2012)
- 3.2.2 Annual and seasonal mean temperature (°C) - India(1901-2012)
- 3.2.3 All India area weighted monthly and annual rainfall (in mm) (1901-2012)
- 3.2.4 Season-wise distribution of rainfall in India

Data Sources

India Meteorological Department (IMD) under Ministry of Earth Sciences is the source of Temperature and Precipitation data.

Table: 3.2.1 Annual and seasonal minimum and maximum temperature(°C) - INDIA (1901-2012)

YEAR	ANNUAL		JAN-FEB		MAR-MAY		JUN-SEP		OCT-DEC	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
1901	19.51	28.96	14.16	23.27	20.67	31.46	23.38	31.27	16.59	27.25
1902	19.44	29.22	13.64	25.75	21.12	31.76	23.28	31.09	16.50	26.49
1903	19.25	28.47	13.87	24.24	20.25	30.71	23.40	30.92	16.29	26.26
1904	19.22	28.49	13.71	23.62	20.72	30.95	22.96	30.67	16.44	26.40
1905	19.03	28.30	12.81	22.25	19.97	30.00	23.43	31.33	16.39	26.57
1906	19.51	28.73	13.71	23.03	20.76	31.11	23.45	30.86	16.88	27.29
1907	19.08	28.65	14.46	24.23	19.88	29.92	22.99	30.81	16.14	27.36
1908	19.09	28.83	13.67	24.42	20.61	31.43	23.19	30.72	15.70	26.64
1909	19.13	28.39	13.33	23.52	20.40	31.02	22.97	30.33	16.61	26.88
1910	19.01	28.53	13.68	24.20	20.35	31.14	23.15	30.48	15.72	26.20
1911	19.31	28.62	13.80	23.90	20.41	30.70	23.26	31.14	16.66	26.31
1912	19.27	28.95	14.56	24.88	20.54	31.10	23.12	31.15	16.02	26.57
1913	19.09	28.67	13.91	24.25	20.24	30.90	22.96	30.92	16.24	26.42
1914	19.41	28.66	14.03	24.59	20.34	30.73	23.47	30.84	16.66	26.40
1915	19.64	28.94	13.73	23.22	21.00	31.06	23.72	31.51	16.79	27.18
1916	19.34	28.82	13.64	24.57	20.96	31.88	23.31	30.52	16.23	26.32
1917	19.02	28.11	13.60	24.52	19.72	30.06	23.29	30.24	16.25	25.74
1918	19.02	28.66	13.24	23.57	20.15	30.68	23.06	31.11	16.33	26.77
1919	19.37	28.66	14.22	23.71	20.53	31.17	23.33	30.80	16.36	26.60
1920	19.07	28.76	13.79	23.64	20.15	30.40	23.02	31.08	16.26	27.45
1921	19.54	28.86	13.85	23.91	21.16	32.05	23.18	30.81	16.34	26.43
1922	19.32	28.80	14.31	24.43	20.56	31.21	23.27	30.90	16.03	26.38
1923	19.36	28.74	13.88	23.73	20.83	31.40	23.24	30.98	16.37	26.43
1924	19.52	28.80	14.11	23.94	20.86	31.44	23.42	30.96	16.56	26.49
1925	19.24	28.67	13.05	23.57	20.91	31.47	23.18	30.67	16.43	26.59
1926	19.37	28.70	14.63	24.73	20.36	30.21	23.69	31.14	15.92	26.61
1927	19.30	28.59	13.81	23.76	20.30	30.72	23.18	30.80	16.80	26.72
1928	19.61	28.98	14.57	24.21	20.86	31.51	23.23	31.14	16.90	26.73
1929	19.40	28.76	13.72	23.53	21.00	31.72	23.17	31.03	16.55	26.27
1930	19.21	28.65	13.27	23.20	20.70	30.94	23.10	30.98	16.51	26.90
1931	19.73	29.15	14.52	24.55	21.01	31.71	23.44	31.16	16.97	26.97
1932	19.32	29.09	13.72	24.51	20.65	31.17	23.36	31.25	16.33	27.18
1933	19.35	28.49	14.08	24.13	20.25	30.42	23.34	30.41	16.63	26.92
1934	19.22	29.03	13.78	24.53	20.50	31.28	23.37	31.22	16.16	26.94
1935	19.21	28.76	13.84	23.41	20.39	31.15	23.07	30.85	16.41	26.88
1936	19.53	28.71	13.96	24.11	20.88	31.17	23.18	30.68	17.03	26.69
1937	19.25	28.70	14.11	24.13	20.39	30.84	23.40	31.22	16.02	26.26
1938	19.28	28.70	13.61	23.31	21.25	31.74	23.14	30.59	15.95	26.71
1939	19.16	28.85	13.95	24.25	20.08	30.76	23.23	31.06	16.29	27.05

Table: 3.2.1 ANNUAL AND SEASONAL MINIMUM AND MAXIMUM TEMPERATURE(°C) - INDIA (1901-2012)**(...cont)**

YEAR	ANNUAL		JAN-FEB		MAR-MAY		JUN-SEP		OCT-DEC	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
1940	19.24	28.88	13.57	24.46	20.31	30.66	23.25	30.93	16.62	27.24
1941	19.85	29.46	14.25	24.37	21.53	32.12	23.52	31.37	17.00	27.62
1942	19.45	28.98	14.10	24.03	21.19	31.80	23.37	30.99	16.20	27.23
1943	19.06	28.80	13.75	24.02	20.33	30.80	23.10	30.83	16.02	27.33
1944	19.18	28.89	13.45	23.62	20.39	31.03	23.29	31.25	16.38	27.16
1945	18.88	28.97	12.93	23.86	20.26	31.19	23.36	31.48	15.51	26.82
1946	19.38	29.37	13.55	25.49	20.73	31.50	23.25	31.23	16.78	27.30
1947	19.23	28.84	13.57	23.99	21.05	31.78	23.46	31.20	16.08	26.70
1948	19.49	28.73	14.03	23.62	20.81	31.27	23.32	30.84	16.70	26.77
1949	19.28	28.89	13.87	24.49	21.01	31.27	23.29	30.88	15.80	26.79
1950	18.95	28.47	13.39	24.02	20.28	30.72	23.26	30.48	15.72	26.58
1951	19.36	29.09	13.20	24.16	20.27	30.67	23.24	31.13	17.16	27.77
1952	19.51	29.16	14.53	25.17	20.91	31.13	23.39	31.11	16.26	27.26
1953	19.71	29.43	14.22	24.71	21.55	32.19	23.52	31.12	16.46	27.56
1954	19.33	28.92	14.02	24.20	21.11	31.89	23.28	30.90	15.84	26.46
1955	19.19	28.76	14.02	24.90	20.29	30.88	23.23	30.72	16.13	26.59
1956	19.29	28.63	13.25	24.40	21.09	31.53	23.07	30.25	16.46	26.37
1957	19.30	28.64	13.60	23.87	20.09	30.41	23.23	31.07	17.06	26.82
1958	19.92	29.33	14.58	25.43	21.18	31.73	23.64	31.23	17.26	27.01
1959	19.60	29.02	13.82	24.03	20.93	31.69	23.48	30.99	16.96	27.03
1960	19.27	29.31	13.99	25.48	20.25	31.16	23.39	31.29	16.32	27.36
1961	19.27	28.72	13.79	24.17	20.76	31.47	23.38	30.75	15.96	26.30
1962	19.20	28.89	13.52	24.24	20.53	31.31	23.21	31.08	16.32	26.65
1963	19.27	29.04	13.39	24.73	20.22	30.94	23.14	31.28	17.08	27.00
1964	19.11	29.09	13.38	24.29	20.87	31.89	23.01	30.82	15.96	27.20
1965	18.97	29.16	13.76	24.67	19.76	30.73	22.80	31.37	16.57	27.62
1966	19.31	29.41	14.32	25.54	20.46	31.69	23.12	31.24	16.40	27.26
1967	19.08	29.14	13.57	25.31	20.07	31.04	23.08	31.32	16.44	26.90
1968	18.83	29.07	12.82	23.68	20.02	31.24	22.94	31.54	16.18	27.19
1969	19.32	29.61	13.40	24.99	20.76	32.02	23.17	31.55	16.69	27.71
1970	19.16	29.47	13.92	25.19	20.77	32.03	23.11	31.16	15.76	27.50
1971	18.76	29.15	13.12	24.99	20.16	31.58	22.72	30.91	15.84	27.17
1972	18.90	29.31	12.67	24.49	20.10	31.49	22.91	31.66	16.53	27.21
1973	19.38	29.44	14.12	25.35	20.88	32.19	23.34	31.28	16.09	26.97
1974	18.76	29.26	12.77	24.34	20.57	31.92	22.67	31.39	15.73	27.03
1975	18.61	28.89	13.26	24.12	20.03	31.62	22.50	30.66	15.58	26.99
1976	18.90	29.27	13.18	24.61	19.83	31.45	22.66	31.09	16.76	27.76
1977	19.31	29.41	13.51	25.15	20.42	31.65	23.09	31.22	17.02	27.59
1978	19.24	29.23	13.50	24.36	20.42	31.57	23.07	31.11	16.79	27.64
1979	19.55	29.63	13.94	24.99	20.30	31.70	23.27	31.87	17.56	27.67

Table: 3.2.1 ANNUAL AND SEASONAL MINIMUM AND MAXIMUM TEMPERATURE(°C) - INDIA (1901-2012)**(...cont)**

YEAR	ANNUAL		JAN-FEB		MAR-MAY		JUN-SEP		OCT-DEC	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
1980	19.53	27.51	29.58	14.07	25.21	20.97	32.20	23.22	31.36	16.82
1981	19.25	27.24	29.32	13.94	24.90	20.67	31.64	23.14	31.34	16.17
1982	19.21	27.26	29.12	13.77	24.51	20.06	30.79	23.10	31.55	16.81
1983	19.14	29.11	13.57	24.62	20.10	30.84	23.41	31.48	16.20	27.24
1984	19.25	29.28	13.62	24.11	20.90	32.12	23.12	31.09	16.18	27.46
1985	19.30	29.61	13.93	25.29	20.94	32.51	22.98	31.28	16.33	27.35
1986	19.09	29.33	13.61	24.64	20.31	31.58	22.92	31.44	16.43	27.40
1987	19.42	29.72	13.81	25.07	20.32	31.37	23.52	32.24	16.80	27.82
1988	19.33	29.55	14.07	25.39	20.72	31.75	23.17	31.34	16.33	27.76
1989	18.95	29.18	13.02	24.51	20.18	31.35	22.90	31.11	16.41	27.57
1990	19.29	29.14	13.91	24.99	20.24	30.84	23.18	31.18	16.74	27.50
1991	19.29	29.32	13.73	24.74	20.63	31.46	23.29	31.45	16.34	27.40
1992	19.15	29.23	13.58	24.60	20.07	31.32	23.14	31.28	16.62	27.49
1993	19.34	29.55	13.91	25.31	20.41	31.61	23.25	31.47	16.69	27.74
1994	19.48	29.46	14.45	25.09	20.76	31.85	23.32	31.31	16.43	27.52
1995	20.39	30.18	14.99	25.68	21.47	32.40	24.16	32.01	17.84	28.52
1996	19.55	29.58	15.28	26.30	20.93	32.07	23.29	31.19	16.24	27.29
1997	19.21	29.05	13.13	24.64	20.13	31.26	23.45	31.77	17.21	26.65
1998	19.84	29.70	14.49	24.97	20.97	31.89	23.67	31.75	17.03	27.83
1999	19.53	29.81	14.43	25.11	20.86	32.45	23.24	31.55	16.65	27.95
2000	19.48	29.75	13.84	24.82	20.77	32.22	23.25	31.25	16.88	28.53
2001	19.49	29.99	13.60	25.88	21.04	32.61	23.36	31.61	16.95	28.13
2002	19.78	30.23	13.93	25.37	21.38	33.06	23.40	32.02	16.79	28.36
2003	19.70	29.75	14.32	25.32	21.00	32.05	23.56	31.72	16.76	27.70
2004	19.69	29.79	14.39	25.49	21.30	32.69	23.27	31.42	16.84	27.65
2005	19.58	29.60	14.62	24.96	20.84	31.81	23.46	31.84	16.43	27.50
2006	20.07	30.06	15.48	27.44	20.96	32.08	23.44	31.39	17.56	27.78
2007	19.69	29.84	14.47	25.73	21.06	32.32	23.59	31.40	16.62	28.03
2008	19.60	29.64	13.60	24.72	20.82	32.11	23.30	31.25	17.43	28.29
2009	19.94	30.29	14.95	26.50	21.15	32.57	23.59	32.24	17.20	27.96
2010	20.15	30.12	14.51	25.96	22.09	33.46	23.57	31.43	17.42	27.78
2011	19.58	29.82	13.84	25.33	20.68	32.07	23.56	31.55	17.16	28.23
2012	19.54	29.81	13.68	25.03	20.78	32.33	23.68	31.77	16.80	27.88

Source: IMD, June 2013

Table 3.2.2: Annual and seasonal mean temperature (°C) - India(1901-2012)

YEAR	ANNUAL	JAN-FEB	MAR-MAY	JUN-SEP	OCT-DEC
1901	24.23	18.71	26.06	27.30	21.92
1902	24.33	19.70	26.44	27.18	21.49
1903	23.80	19.05	25.47	27.17	21.27
1904	23.86	18.66	25.84	26.83	21.43
1905	23.71	17.58	24.99	27.37	21.48
1906	24.12	18.37	25.93	27.15	22.08
1907	23.87	19.35	24.89	26.89	21.76
1908	23.95	19.04	26.02	26.95	21.17
1909	23.78	18.42	25.71	26.53	21.75
1910	23.77	18.93	25.74	26.81	20.96
1911	23.95	18.85	25.53	27.18	21.47
1912	24.11	19.72	25.81	27.13	21.29
1913	23.88	19.09	25.56	26.93	21.32
1914	24.03	19.31	25.53	27.15	21.52
1915	24.29	18.47	26.03	27.60	22.01
1916	24.08	19.10	26.41	26.91	21.27
1917	23.56	19.05	24.89	26.75	21.01
1918	23.83	18.40	25.39	27.07	21.54
1919	24.01	18.96	25.85	27.06	21.48
1920	23.91	18.72	25.27	27.05	21.85
1921	24.33	19.06	26.60	26.99	21.39
1922	24.05	19.40	25.88	27.07	21.20
1923	24.05	18.80	26.12	27.11	21.40
1924	24.15	19.02	26.14	27.18	21.52
1925	23.95	18.31	26.18	26.92	21.51
1926	24.04	19.68	25.28	27.41	21.26
1927	23.94	18.77	25.51	26.98	21.75
1928	24.29	19.39	26.19	27.18	21.81
1929	24.08	18.62	26.36	27.09	21.42
1930	23.93	18.23	25.81	27.04	21.71
1931	24.44	19.54	26.36	27.29	21.97
1932	24.21	19.12	25.91	27.32	21.75
1933	23.92	19.10	25.34	26.87	21.77
1934	24.13	19.15	25.89	27.29	21.55
1935	23.98	18.62	25.77	26.96	21.65
1936	24.12	19.03	26.02	26.94	21.86
1937	23.98	19.11	25.61	27.32	21.14
1938	23.98	18.46	26.50	26.86	21.31
1939	24.01	19.10	25.41	27.16	21.67

Table 3.2.2: Annual and seasonal mean temperature (°C) - India(1901-2012)

YEAR	ANNUAL	JAN-FEB	MAR-MAY	JUN-SEP	OCT-DEC
1940	24.06	19.03	25.49	27.08	21.91
1941	24.65	19.31	26.87	27.45	22.30
1942	24.22	19.07	26.49	27.18	21.72
1943	23.93	18.89	25.57	26.97	21.68
1944	24.03	18.54	25.70	27.27	21.76
1945	23.92	18.35	25.71	27.43	21.16
1946	24.42	19.52	26.12	27.24	22.13
1947	24.04	18.78	26.42	27.32	21.39
1948	24.11	18.83	26.04	27.08	21.73
1949	24.08	19.18	26.14	27.08	21.29
1950	23.71	18.71	25.50	26.87	21.14
1951	24.22	18.68	25.47	27.19	22.45
1952	24.34	19.86	26.04	27.25	21.77
1953	24.57	19.47	26.87	27.33	22.01
1954	24.13	19.11	26.50	27.09	21.15
1955	23.97	19.46	25.58	26.98	21.35
1956	23.96	18.83	26.31	26.66	21.41
1957	23.97	18.73	25.25	27.15	21.94
1958	24.62	20.01	26.45	27.43	22.13
1959	24.30	18.93	26.31	27.19	22.00
1960	24.29	19.72	25.70	27.34	21.84
1961	24.00	18.98	26.11	27.06	21.16
1962	24.04	18.91	25.91	27.14	21.47
1963	24.15	19.07	25.57	27.21	22.04
1964	24.10	18.83	26.38	26.90	21.58
1965	24.07	19.22	25.24	27.08	22.10
1966	24.36	19.93	26.07	27.17	21.83
1967	24.11	19.44	25.55	27.19	21.68
1968	23.94	18.25	25.62	27.22	21.69
1969	24.46	19.18	26.39	27.35	22.20
1970	24.26	19.56	26.39	27.06	21.55
1971	23.91	19.05	25.78	26.75	21.48
1972	24.10	18.57	25.78	27.27	21.88
1973	24.41	19.74	26.53	27.30	21.53
1974	24.00	18.54	26.24	27.02	21.38
1975	23.74	18.69	25.77	26.57	21.30
1976	24.06	18.87	25.61	26.86	22.25
1977	24.35	19.35	26.03	27.13	22.30
1978	24.23	18.95	25.94	27.10	22.22
1979	24.57	19.47	25.97	27.54	22.59

Table 3.2.2: Annual and seasonal mean temperature (°C) - India(1901-2012)

YEAR	ANNUAL	JAN-FEB	MAR-MAY	JUN-SEP	OCT-DEC
1980	24.55	19.64	26.58	27.26	22.17
1981	24.27	19.42	26.14	27.22	21.68
1982	24.15	19.14	25.41	27.31	22.02
1983	24.12	19.09	25.45	27.43	21.71
1984	24.26	18.85	26.51	27.10	21.82
1985	24.45	19.61	26.72	27.12	21.84
1986	24.20	19.12	25.94	27.17	21.90
1987	24.57	19.42	25.85	27.88	22.29
1988	24.42	19.70	26.24	27.22	22.00
1989	24.03	18.76	25.69	26.98	21.94
1990	24.21	19.44	25.55	27.18	22.11
1991	24.28	19.21	26.02	27.32	21.87
1992	24.15	19.06	25.64	27.15	22.05
1993	24.43	19.61	25.98	27.34	22.21
1994	24.46	19.76	26.30	27.30	21.97
1995	25.29	20.33	26.94	28.07	23.19
1996	24.55	20.79	26.49	27.22	21.76
1997	24.10	18.87	25.68	27.60	21.89
1998	24.76	19.72	26.41	27.69	22.42
1999	24.67	19.75	26.66	27.38	22.29
2000	24.60	19.33	26.47	27.23	22.68
2001	24.73	19.75	26.82	27.47	22.52
2002	25.00	19.65	27.22	27.71	22.58
2003	24.72	19.82	26.52	27.64	22.23
2004	24.74	19.93	27.06	27.33	22.24
2005	24.58	19.79	26.33	27.64	21.93
2006	25.06	21.36	26.52	27.40	22.66
2007	24.77	20.10	26.69	27.49	22.32
2008	24.61	19.16	26.46	27.26	22.86
2009	25.11	20.72	26.86	27.89	22.58
2010	25.13	20.20	27.83	27.50	22.60
2011	24.66	19.54	26.38	27.54	22.71
2012	24.69	19.34	26.55	27.71	22.35

Source: IMD, Ministry of Earth Sciences

Mean temperature (°C)- India

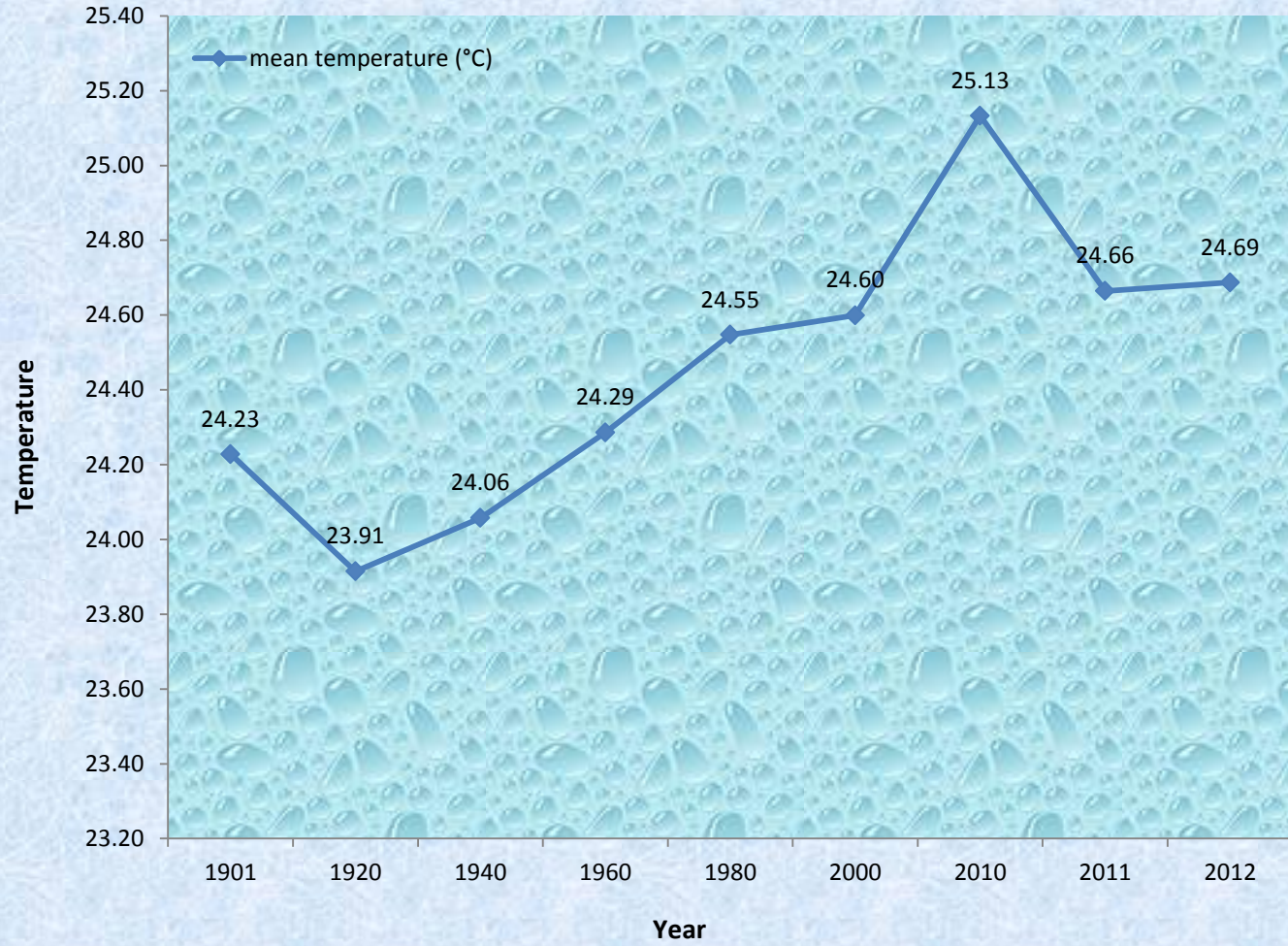


Table 3.2.3 All India area weighted monthly and annual rainfall (in mm) (1901-2012)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1901	34.7	38.6	17.8	38.9	50.6	113.2	241.4	271.6	124.7	52.4	38.7	8.2	1030.8
1902	7.4	4.2	19.0	44.1	48.8	111.7	284.9	201.0	200.2	62.5	29.4	25.2	1038.4
1903	16.7	8.0	31.1	17.1	59.5	120.3	293.2	274.0	198.1	119.5	40.3	18.0	1195.9
1904	14.9	9.7	31.4	33.7	73.8	165.5	260.3	207.7	130.8	69.8	11.2	16.4	1025.1
1905	24.7	20.3	41.8	33.8	55.8	93.7	253.0	201.7	178.1	54.9	9.6	10.1	977.5
1906	21.4	49.9	31.4	15.8	37.2	177.0	286.5	251.4	183.9	50.6	17.7	26.3	1149.2
1907	16.0	45.5	37.4	62.0	32.7	153.1	225.4	308.3	95.4	23.0	23.1	12.9	1034.8
1908	19.9	17.1	8.3	31.0	45.4	125.6	320.5	306.0	150.8	38.4	6.8	7.4	1077.4
1909	22.7	15.2	6.6	61.6	51.2	207.2	302.3	228.7	157.7	37.5	10.0	27.9	1128.5
1910	13.5	10.3	13.7	29.0	40.8	211.9	247.2	283.4	185.9	108.2	34.6	5.4	1183.9
1911	40.4	5.5	43.0	23.1	48.2	191.3	163.1	209.9	178.5	71.5	42.4	12.1	1028.9
1912	20.3	21.6	19.9	37.9	43.8	107.1	326.3	259.2	119.2	58.2	51.7	5.3	1070.4
1913	6.3	38.1	23.7	25.7	72.9	214.8	269.8	192.6	109.6	68.6	16.8	23.2	1061.8
1914	5.0	26.9	25.4	42.8	67.9	157.0	342.0	239.7	191.3	45.5	20.7	21.6	1185.9
1915	19.8	37.5	44.1	33.6	63.9	155.1	227.9	226.9	171.7	90.5	45.2	8.2	1124.4
1916	4.6	20.1	11.0	35.2	59.4	232.0	265.0	309.7	199.6	139.2	46.3	2.9	1324.8
1917	7.6	37.9	20.5	40.1	74.0	230.7	282.7	292.8	278.1	161.3	29.1	9.3	1463.9
1918	11.8	4.0	36.6	35.8	103.6	212.3	183.8	240.9	111.8	19.5	44.7	15.5	1020.2
1919	48.8	20.2	19.1	32.7	59.5	194.7	304.6	285.3	163.1	91.5	50.1	18.2	1287.9
1920	23.9	21.3	55.1	38.2	52.5	163.7	295.7	191.6	123.0	45.9	25.2	3.0	1039.1
1921	37.6	7.4	17.8	43.9	51.2	193.9	293.7	274.4	203.3	70.5	16.1	15.3	1225.0
1922	28.9	9.8	14.3	33.0	48.8	204.9	314.9	218.9	199.8	62.0	55.6	13.3	1204.2
1923	21.6	38.9	21.2	31.0	58.1	102.0	337.8	272.8	173.8	58.0	17.6	15.8	1148.6
1924	21.1	21.9	14.0	30.7	61.4	136.8	328.7	255.4	238.4	65.8	57.1	14.6	1245.9
1925	13.0	11.2	15.3	44.1	100.8	204.7	300.9	234.5	140.2	67.2	41.5	16.1	1189.5
1926	28.3	10.3	55.7	39.4	57.8	98.7	316.9	330.5	210.1	57.3	10.9	10.3	1226.2
1927	13.1	34.7	22.4	36.3	50.4	177.7	346.6	253.2	173.6	69.3	57.2	10.1	1244.6
1928	20.9	40.3	21.1	34.6	54.4	178.9	303.5	229.0	144.0	127.7	21.6	24.4	1200.2
1929	29.6	18.6	14.4	54.6	65.9	194.1	296.7	241.0	125.5	92.9	19.6	40.1	1193.2
1930	23.5	23.2	28.9	51.0	55.9	181.5	288.6	212.0	174.1	96.7	53.0	10.3	1198.5
1931	12.4	32.9	19.0	37.3	59.4	134.5	319.6	303.9	191.1	120.5	41.4	21.0	1292.8
1932	9.2	22.9	20.1	31.0	85.7	141.7	328.3	237.9	181.9	69.4	60.3	14.4	1202.9
1933	16.5	29.6	25.1	48.1	102.4	215.1	279.7	313.4	211.6	93.6	20.5	16.5	1372.0
1934	23.3	11.5	16.1	46.8	47.3	217.7	284.8	294.4	166.8	65.8	32.4	10.5	1217.5
1935	26.9	20.7	19.0	41.5	36.8	159.4	313.5	246.9	185.3	49.9	16.7	11.2	1127.9
1936	12.3	41.8	37.8	33.5	82.7	245.8	292.5	236.7	193.9	66.4	57.2	21.2	1321.8
1937	6.3	50.6	19.0	56.3	58.0	162.2	336.2	208.2	174.0	94.6	20.3	18.9	1204.4
1938	29.9	30.7	33.4	34.2	70.9	273.4	300.2	249.7	171.6	75.4	16.2	5.0	1290.5
1939	13.3	32.1	30.6	40.7	40.6	172.9	272.4	231.5	154.9	91.2	29.6	1.7	1111.6

Table 3.2.3 All India area weighted monthly and annual rainfall (in mm) (1901-2012)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1940	13.0	25.8	47.7	26.9	80.8	173.8	308.4	278.1	125.5	63.0	40.9	17.4	1201.3
1941	22.9	16.4	20.4	31.5	81.0	171.8	238.7	228.4	154.0	62.1	26.5	20.3	1073.9
1942	21.4	46.0	20.6	44.7	63.7	191.5	339.6	287.0	182.5	34.5	17.7	23.5	1272.9
1943	56.8	9.8	32.5	47.9	94.3	167.8	308.9	228.4	211.4	89.0	17.1	5.2	1269.2
1944	27.6	37.8	54.9	31.9	61.0	155.6	349.1	287.0	156.2	92.3	29.4	15.6	1298.5
1945	34.2	10.2	20.1	47.1	53.6	159.1	333.3	246.7	214.5	80.6	17.9	4.9	1222.0
1946	4.4	19.1	24.5	48.0	71.3	214.0	318.3	296.3	145.0	84.4	76.0	35.8	1337.2
1947	22.4	18.3	26.0	39.1	55.9	130.1	314.4	290.4	240.0	69.8	7.2	22.6	1236.3
1948	25.2	29.0	39.5	42.5	91.3	164.1	347.7	282.7	178.0	61.2	71.1	10.0	1342.2
1949	12.6	28.8	24.1	53.0	89.3	164.3	316.8	243.2	227.0	95.1	10.6	4.7	1269.6
1950	35.4	25.4	36.7	28.7	49.4	135.7	331.6	235.6	202.6	57.7	27.5	7.9	1174.2
1951	15.7	12.1	44.4	54.4	59.4	163.3	252.7	222.8	124.6	73.9	31.3	5.8	1060.6
1952	10.5	19.8	37.4	32.4	69.7	165.6	286.6	256.6	120.0	79.6	9.2	22.5	1110.1
1953	30.2	10.6	25.3	38.3	47.1	162.2	323.1	299.2	179.9	85.8	12.3	8.0	1222.1
1954	37.6	37.2	17.1	22.8	53.9	145.5	297.2	232.0	246.7	73.8	3.6	13.9	1181.4
1955	20.8	4.1	21.3	30.6	72.6	177.7	236.8	313.8	215.7	146.3	26.4	9.3	1275.4
1956	17.0	11.1	31.5	28.1	85.5	211.0	354.1	254.3	163.9	150.1	44.0	11.9	1362.6
1957	31.1	10.9	24.2	39.5	71.2	153.2	300.8	265.4	131.7	64.0	28.6	11.3	1131.9
1958	12.4	16.5	19.1	36.9	80.5	123.7	316.9	324.9	225.7	114.7	30.0	10.9	1312.3
1959	31.8	23.8	21.3	25.9	75.3	169.8	375.5	265.1	237.3	119.7	26.0	5.3	1376.9
1960	13.8	2.7	35.2	20.0	57.7	157.3	320.0	252.9	184.7	68.5	33.7	8.3	1154.8
1961	26.1	34.8	26.0	28.5	77.6	192.9	336.6	287.6	234.9	122.2	21.7	10.4	1399.2
1962	12.6	21.6	16.0	43.6	70.8	137.1	281.6	276.9	211.0	78.4	18.3	29.9	1198.0
1963	6.8	9.8	41.7	50.6	60.9	168.0	258.6	316.7	164.9	99.1	28.4	15.5	1220.9
1964	18.6	14.1	19.0	40.0	52.1	177.2	345.7	273.7	200.4	67.4	22.8	13.3	1244.4
1965	11.8	28.1	26.7	45.1	52.7	116.1	270.1	192.8	129.5	34.0	18.2	22.2	947.4
1966	13.1	25.4	20.3	30.6	57.2	178.8	252.5	212.5	143.9	56.1	51.0	16.7	1058.0
1967	11.1	14.2	63.3	29.5	42.8	144.0	305.6	264.3	170.3	40.6	12.1	56.1	1154.0
1968	29.4	19.8	27.5	32.6	46.7	149.6	309.9	212.8	129.5	67.1	21.8	12.6	1059.3
1969	12.7	14.5	20.1	39.7	63.4	130.2	317.8	273.4	172.7	55.0	35.8	12.7	1147.8
1970	23.2	27.3	25.9	29.2	69.7	215.9	245.6	313.0	212.7	75.3	15.7	1.6	1255.0
1971	16.1	23.6	10.8	52.8	75.0	229.9	267.2	267.3	146.5	99.9	15.9	12.0	1216.9
1972	10.3	27.6	21.6	37.1	55.3	123.3	204.0	219.5	127.5	65.7	31.4	23.7	947.1
1973	21.0	21.8	21.2	27.5	56.5	149.9	277.4	311.0	182.1	114.6	18.9	17.7	1219.5
1974	16.1	12.9	20.5	33.7	64.2	122.0	283.6	232.5	145.3	101.6	10.7	12.1	1055.3
1975	15.4	20.8	28.7	28.3	50.2	175.6	310.7	292.5	224.6	121.9	22.8	3.3	1294.8
1976	11.5	24.5	25.5	36.3	45.4	160.3	294.1	294.0	144.2	33.0	55.0	7.6	1131.6
1977	21.0	10.2	14.6	68.3	84.4	187.2	323.4	245.4	147.8	85.6	65.8	16.1	1269.7
1978	12.3	27.0	44.2	33.1	60.2	208.8	290.0	282.0	161.9	49.1	49.9	18.8	1237.2
1979	20.9	35.0	28.9	21.2	54.2	140.5	239.6	210.6	136.8	51.8	76.1	14.4	1030.2

Table 3.2.3 All India area weighted monthly and annual rainfall (in mm) (1901-2012)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1980	12.8	22.3	32.5	34.6	55.3	227.8	295.0	263.8	145.7	49.3	24.2	19.0	1182.3
1981	29.3	20.4	48.0	37.3	67.1	151.3	309.1	237.0	184.5	45.1	27.4	14.0	1170.7
1982	23.8	24.2	45.7	49.8	59.0	137.8	230.8	276.9	124.9	51.7	46.0	13.9	1084.4
1983	18.5	23.3	43.4	57.0	70.1	150.8	282.2	304.3	251.6	85.9	10.8	22.9	1320.9
1984	19.0	35.9	22.8	45.3	60.4	192.3	291.9	256.5	144.6	61.0	15.7	15.3	1160.8
1985	23.2	9.9	20.1	39.5	63.0	156.5	290.1	231.7	149.6	114.1	18.8	28.4	1144.9
1986	15.5	36.6	29.9	50.0	49.4	182.6	264.2	228.3	128.4	74.7	49.6	28.4	1137.6
1987	13.2	23.8	28.8	43.9	67.0	133.9	223.2	242.1	152.2	94.4	44.4	21.9	1088.9
1988	10.4	28.7	53.7	41.7	70.4	161.8	374.8	295.3	217.7	53.6	16.2	17.8	1342.1
1989	15.4	15.3	28.8	34.6	57.5	184.7	302.3	236.2	163.1	51.9	20.3	17.2	1127.4
1990	16.0	44.2	54.0	43.8	112.9	191.3	282.9	293.6	197.4	104.1	30.2	31.0	1401.4
1991	14.3	28.1	27.8	51.7	68.9	184.7	279.2	268.1	140.7	61.8	30.2	14.7	1170.2
1992	16.0	16.5	24.8	26.1	59.3	139.7	262.5	274.0	171.7	64.7	41.6	5.6	1102.7
1993	18.2	25.6	41.6	27.0	71.3	172.1	305.4	203.2	208.5	87.9	30.5	16.5	1207.8
1994	25.0	27.9	25.2	45.9	53.1	205.7	350.0	282.2	149.4	82.8	25.5	22.6	1295.3
1995	31.3	29.4	28.3	32.4	82.4	143.3	323.4	269.0	179.0	78.0	36.8	9.2	1242.4
1996	22.9	23.2	32.1	31.4	56.0	185.7	262.1	292.4	146.1	100.5	13.6	16.9	1182.9
1997	14.3	10.4	30.3	46.0	48.6	171.7	281.5	261.9	151.4	61.1	57.6	48.3	1183.1
1998	16.4	28.2	39.1	36.3	49.2	163.9	278.4	243.8	196.5	107.4	39.3	10.3	1208.8
1999	13.7	11.2	8.8	19.3	94.9	169.9	261.7	213.2	183.0	117.2	20.0	3.7	1116.6
2000	18.4	28.2	17.9	34.7	71.6	179.0	263.5	221.1	134.5	41.9	14.6	10.0	1035.4
2001	6.7	11.6	19.9	44.6	62.9	221.2	281.1	205.5	111.0	100.4	19.7	16.1	1100.7
2002	17.1	20.1	23.8	38.6	59.8	172.6	143.8	246.1	137.9	55.6	15.6	5.0	935.9
2003	7.3	42.3	36.7	36.6	40.1	169.3	306.5	243.6	183.4	92.7	11.5	17.2	1187.3
2004	25.1	10.0	12.8	55.2	80.6	171.1	250.5	254.0	131.5	95.0	17.9	2.8	1106.5
2005	28.1	41.8	42.5	37.7	46.1	143.2	334.1	190.1	206.9	99.3	27.2	11.2	1208.3
2006	17.7	11.9	35.6	32.7	75.0	141.8	287.6	281.3	178.6	51.8	34.6	13.1	1161.6
2007	1.7	36.7	35.2	30.6	46.8	192.5	286.2	257.4	206.8	55.7	14.4	15.3	1179.3
2008	18.4	19.3	41.2	29.5	43.7	202.0	245.0	265.8	165.1	51.6	25.5	11.0	1118.0
2009	12.0	12.0	14.2	25.1	56.0	85.7	280.7	192.5	139.4	71.4	53.7	11.1	953.7
2010	7.5	17.0	14.0	39.0	73.8	138.1	300.7	274.7	197.7	69.0	61.4	22.7	1215.5
2011	6.8	25.8	22.4	41.1	53.1	183.5	246.0	284.9	186.9	38.1	20.1	7.6	1116.3
2012	26.5	12.7	11.3	47.5	31.7	117.8	250.2	262.4	193.5	58.7	30.7	11.7	1054.7

Source: IMD, Ministry of Earth Sciences

Rainfall (in mm) in India

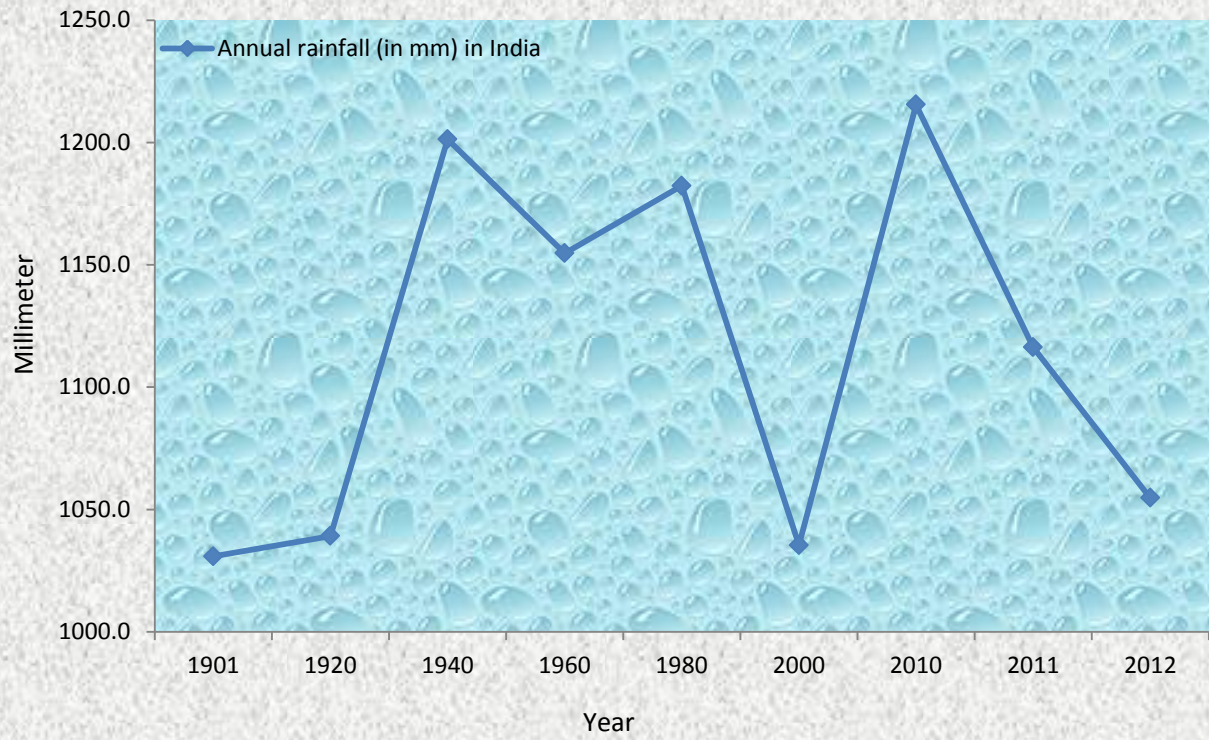


Table 3.2.4 : Season-wise distribution of rainfall in India

(In Millimeters)

Year	Monsoon Season		Post Monsoon		Winter season		Pre-monsoon Season		Overall rainfall	
	(June- September)		(October- December)		(January -February)		(March-May)		(June-May)	
	Actual	Normal	Actual	Normal	Actual	Normal	Actual	Normal	Actual	Normal
1992-93	830.7	899.2	106.5	114.1	37.9	41	116.5	121.3	1091.6	1175.6
1993-94	902.1	908.9	131.6	119.6	44.5	40.8	106.1	123.3	1184.3	1192.6
1994-95	999.2	906.8	121.5	119.6	53.1	41.1	123.5	123.2	1297.3	1190.7
1995-96	904.5	904.7	117.8	119.9	37.4	40.8	94.9	123.9	1154.6	1189.3
1996-97	927.6	905.7	128	120.8	21	40.6	118.9	123.2	1195.5	1190.3
1997-98	927.4	908.6	187.7	119.5	44.1	41.9	132.3	128.3	1291.5	1198.3
1998-99	945.2	903.6	178.8	121.8	28.4	42.8	123.1	130.6	1275.5	1198.8
1999-00	866.9	903.2	144.7	121.8	43.1	42.5	128.8	129.5	1183.5	1197
2000-01	833.7	902.3	64.1	121.7	16.2	42.2	129.7	129.3	1043.7	1195.5
2001-02	826	901.1	137.7	121.7	35	41.2	121.5	132	1120.2	1196
2002-03	737.1	911.7	83.4	123.7	53.2	38.3	107.7	131.7	981.4	1205.4
2003-04	947.3	902.7	134.6	125	34.5	39.2	161.6	129.6	1278	1196.5
2004-05	779.6	893.3	111.8	125.7	69.8	43.8	124.7	134.5	1085.9	1197.3
2005-06	879.3	892.5	138.4	125.8	27.8	43.9	139.9	134.6	1185.4	1196.8
2006-07	886.6	892.2	99.3	125.9	34.3	43.8	112.8	133.6	1133	1195.5
2007-08	936.9	892.2	85.4	125.9	42.6	43.2	115.3	133.5	1180.2	1194.8
2008-09	873.2	892.2	87.2	125.9	23.6	43.8	91	134.5	1075	1196.4
2009-10	689.8	892.2	135.5	125.9	24.6	43.8	122.9	133.7	972.8	1195.6

Source: ENVIS; Indian Institute of Tropical Meteorology, Pune, India.

3.3 Glaciers and Landslides.

A glacier is a mass of ice consisting of compacted and recrystallized ice on land that flows down under its own weight due to gravity. Glaciers are lying largely or wholly on land and showing evidence of past or present movement. Snowfields that persist through the summer melt season are not glaciers because they lack motion. Presently, glaciers cover nearly 15 million km² or about 10 % of land surface and contain 2.15 % of all water on Earth. 96 % of all glacial ice on this planet is in Antarctica (84.5%) and Greenland (12%), both of which are nearly covered by glaciers. Australia is the only continent lacking glaciers. Glaciers are one of the most important processes modifying Earth's surface through erosion, transport and deposition. These processes result in carving out the earth's surface and formation of easily recognizable landforms, both erosional and depositional. Majority of the present day glacial landforms are developed during the Pleistocene epoch, commonly called as Ice Age (1.6 million to 10,000 years ago). Erosion of mountains by valley glaciers produces U-shaped glacial troughs and hanging valleys. Sharp angular landforms including cirques, aretes and horns, etc. are also products of glaciers. When a large valley glacier directly calves in to a sea, it is known as fjord.

Geological Survey of India has prepared a detailed inventory of glaciers based on Survey of India toposheets, aerial photographs and satellite imageries with limited field checks. As per the latest available data, Indian Himalaya contains 9,575 glaciers distributed in the States of Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Sikkim and Arunachal Pradesh. Highest concentration of glaciers is in Jammu & Kashmir while least concentration is in Arunachal Pradesh.

Glaciers are one of the most important sources of fresh water. The ice locked up in the glacier melts during summer ablation season and augment water in the rivers. In winters, glaciers melt only due to pressure melting and base flow is maintained. In India, perennial Himalayan rivers owe their existence to the glaciers. Another important economic aspect of glaciers is the huge volume of sand and gravel generated due to glacial erosion and transportation. These sediments are used as building material. The wide distribution in space and time make glaciers as one of the most important proxy record for the study of climate change.

The retreat of glaciers suggests climate change. Moreover, as glaciers are directly linked to climate, their deposits and landforms provide evidence for interpretation of climatic changes that have taken place during the past. The studies carried out by the Geological Survey of India since the beginning of twentieth century, have revealed that majority of glaciers of the Himalayan region are passing through a phase of recession as has been the case with the glaciers located in other parts of the world. The retreat of the glaciers is continuing but there has not been any alarming change in the rate of retreat of the glaciers during couple of decades. Few long-term data, however, do suggest higher rate of recession after 1950 or so. Even in the Himalayan region, the rate of recession in different climatic zones is found to be variable in different years.

This variable rate of recession can be attributed to several factors like micro as well as macroclimate, orography, size of the glacier, nature of nourishment, etc. The recession of glaciers could be attributed to the phenomenon of global warming. The recession may result due to subnormal snowfall, higher temperature during summer, less severe winter or a combination of all of them. Thus, overall climate change may be considered as the driving force behind the recession of glaciers.

During the last ten years GSI has monitored twenty five glaciers, viz. Hamtah, Jobri, Beas Kund, Gl. No. 30, Sara Umga, Mantalai (Gl. No. 115), Tal, Manimahesh, Yoche Lungpa, Mulkila, Panchi nala – I, Panchi nala –II, Gangstang, Tingal Goh in Himachal Pradesh and Bandarpunch, Jaundar Bamak, Jhajju Bamak, Tilku, Meola, Jhulang, Chipa, Pindari, Bhagirathi Kharak, Adikailash, Nikarchu and Ramganga in Uttarakhand.

..... and hanganga in Uttarakhand.

GSI has undertaken a few pilot studies on artificial retardation and augmentation of glacier melt. The studies do indicate that the recession of glaciers can be checked to a very limited extent (site specific only) through artificial measures. However, such projects cannot be undertaken on large scale in view of the nature of Indian Himalayan glaciers (debris covered), economic feasibility, scale of operation and likely pollution. Since the recession of glaciers is a natural process and we cannot single out any one meteorological parameter responsible for the present situation, the possible mitigation strategy should include (a) monitoring of the glaciers, (b) expansion and diversification of the meteorological observation network, (c) construction of dams in the Himalayan region for better utilisation of the water resources, (e) reduction in deforestation activities, new afforestation programmes and preservation of ecology, particularly in high altitude regions.

The framework for statistics related to climate change included variables/indicators on (1) Glacier Advancement/ Retraction and (2) Landslide hazards.

The following are the tables included

3.3 Glacier/ Landslide

- 3.3.1 Distribution of glaciers in Indus and Ganga Basin
- 3.3.2 Net Mass Balance, in millions of cubic meters of water equivalent recorded for some of the glaciers in the Himalayas
- 3.3.3 Average melt water discharge, in million cubic meters, per day, recorded at some of the glaciers during the melt season
- 3.3.4 Suspended sediment load, in metric tonnes, (daily average) carried in the melt water streams of small glaciers in the Himalayas, during the melt season
- 3.3.5 General features of Chhota Shigri, Dokriani and Chorabari glaciers
- 3.3.6 Annual retreat/advance, in metres, recorded at the snouts of the Chhota Shigri, Dokriani and Chorabari glaciers.
- 3.3.7 Mass balance and melt water discharge data of Chhota Shigri and Dokriani glaciers
- 3.3.8 Glacier terminus position changes in Sikkim (1976-2005)
- 3.3.9 Retreat of some glaciers in the NWH in the last century

Data Sources

MOEF Discussion Paper: "Himalayan Glaciers: A State of- Art Review of Glacial Studies, Glacial Retreat and Climate Change". Data in the paper mainly compiled from Geological Survey of India. The report is available in MOEF website.

Table 3.3.1: Distribution of glaciers in Indus and Ganga Basin

5-Q-Indus Basin				5-O-Ganga Basin			
Basin	No. of glacier	Glacier covered Area (km ²)	Ice volume (km ³)	Basin	No. of glacier	Glacier covered Area (km ²)	Ice volume (km ³)
Ravi	172	193		Yamuna	52	144	12.2
Chenab	1,278	3,059	8.04	Bhagirathi	238	755	67.02
Jhelum	133	94	206.3	Alaknanda	407	1,229	86.38
Beas	277	579		Ghagra	271	729	43.77
Satluj	926	635	3.3	Tista	449	706	39.61
Upper Indus	1,796	8,370	36.93	Brahamputra	161	223	10
Shyok	2,454	10,810					
Nubra	204	4,288	34.95				
Gilgit	535	8,240					
Kishenganga	222	163	73.58				
Total	7997	36431			1578	3786	259

Total number of glaciers:9,575

Source: Himalayan Glaciers, A State-of-Art Review of Glacial Studies, Glacial Retreat and Climate Change-2009, MOEF

Table 3.3.2: Net Mass Balance, in millions of cubic metres of water equivalent recorded for some of the glaciers in the Himalayas

Name	74-75	75-76	76-77	77-78	78-79	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90	90-91
Nehnar	...	0.41	0.78	1.47	0.91	0.56	0.81	0.3	0.02	0.79							
Gara	(+)2.50	(+)1.30	4.33	4.63	3.45	3.57	1.03	(+)0.33		..							
Gorgarang	...	...	1.36	1.22	0.5	0.99	1.97	(+)0.53	(+) 0.10	1.53	0.85						
Shaune Garang								1.19	(+)0.11	3.94	3.15	1.05	3.93	3.1	(+)1.68	1.35	4.1
Dunagiri								...	...	...	1.98	2.41	2.65	3.3	2.5	3.1	
Tipra Bank								2.39	1.06	1.63	1.9	4.24	..	..	0.98		
Changme Khangpu						1.7	1.77	1.33	1.31								

Source: Himalayan Glaciers, A State-of-Art Review of Glacial Studies, Glacial Retreat and Climate Change-2009, MOEF

(+): Values indicate a positive balance, and other indicate negative balance

Table 3.3.3: Average melt water discharge, in million cubic metres, per day, recorded at some of the glaciers during the melt season

Name	74	75	76	77	78	79	80	82	83	84	85	86	87	88	89	90	92
Nehnar, J&K 5Q21407 022					0.08	0.07	0.06	0.09	0.13	0.15							
Gara, H.P. 5Q22204 050	0.09	0.16	0.08	0.04	0.11	0.04	0.09	0.1									
Shaunegarang H.P. 5Q22213 084									0.51	0.27	0.33	0.39	0.45	0.46	0.43		
Dunagri Uttarakhand 5O13209 044											0.15	0.22	0.22		0.16	0.2	0.22
Tiprabank Uttarakhand 5O132 06 092								0.5	0.71	0.6	0.59				0.98		
Zemu, Sikkim 5O201 05 032			24	24													
Changme Khangpu, Sikkim 5O20104 022							0.4										

Source: Himalayan Glaciers, A State-of-Art Review of Glacial Studies, Glacial Retreat and Climate Change-2009, MOEF

Table 3.3.4: Suspended sediment load, in metric tonnes, (daily average) carried in the melt water streams of small glaciers in the Himalayas, during the melt season.

Glacier with code number	Orientati on	Area (km ²)	Cumulativ e specific bal.(m)	Summer mean daily discharge (10 ⁶ m3)	Av. Daily suspended sediment (Tonnes)	Year of observation
Neh Nar, 5Q21407 022 J&K	N	1.69	(-)	0.1	6	1974-1984
Triloknath, 5Q21209 019 H.P.	NE	7	-	0.33	63	1995-1996
Gara, 5Q22204 050 H.P.	NE	5.19	(-)2.87	0.12	22	1974-1983
ShauneGarang 5Q22213 084 H.P.	W-N	4.94	(-) 2.87	0.41	30	1981-1991
Hamtah, 5Q21212 180 H.P.	NW-N	3.24	(-)8.40	0.38	127	2000-2006
Tipra Bank, 5O13206 092 Uttarakhand	NW-N	7	(-)1.34	0.67	40	1981-1988
Dunagiri, 5O13209 044 Uttarakhand	N-NW	2.56	(-) 6.26	0.2	47	1984-1992

Source: Himalayan Glaciers, A State-of-Art Review of Glacial Studies, Glacial Retreat and Climate Change-2009, MOEF

(-): Values indicate a negative balance

Table 3.3.5: General features of Chhota Shigri, Dokriani and Chorabari glaciers			
Parameters	Chhota Shigri glaciers	Dokriani glaciers	Chorabari glaciers
Co-ordinates			
a) Latitude	32°12' to 32°17'N	30°49' to 30°52'N	30° 42' to 30° 47'N
b) Longitude	77°30' to 77° 32'E	78°47' to 78°51'E	79° 01' -79° 12'E
Length	9 km	5 km.	6.5km
Catchment area	45.0 km ²	15.1 km ²	27.8 km ²
Glacier ice cover	8.75 km ²	5.76 km ²	5.90 km ²
Accumulation area	5.43 km ²	3.85 km ²	2.19 km ²
Ablation area	3.32 sq km	1.19 sq km	3.71km ²
Snout altitude	4055 m (in 1989)	3910 m (in 2007)	3860m (in 2008)
Orientation	North facing	NW facing	South facing
Surface Slope	12.5°	12°	11°
Debris cover	15.-20%	30.-40%	60-65%
Mass balance w.e.	-1.35x10 ⁶ m ³ (1987-89)	-2.55x10 ⁶ m ³ (1992-2000)	-4.4x10 ⁶ m ³ (2003-07)
Glacier ice thickness	15 m to 130 m 1	5 m to 120 m	-
Equilibrium line altitude (ELA)	4840--4845m (1987-1989)	5030--5100m (1992-2000)	4960-5000 (2003-2008)
Source: Himalayan Glaciers, A State-of-Art Review of Glacial Studies, Glacial Retreat and Climate Change-2009, MOEF			

Table 3.3.6: Annual retreat/advance, in meters, recorded at the snouts of the Chhota Shigri, Dokriani and Chorabari glaciers.

Name	62-84	85-86	88-87	88-89	92-93	93-94	94-95	95-97	97-98	98-99	99-20			Area km ²
Chhota Shigri	7.6	2.58	17.5 (Adv)											8.75
	62-91	91-92	92-93	93-94	94-95	95-97	97-98	99-92	20-01	01-02	02-03	02-03	03-04	
Dokriani	16.5	16.5	16.5	18.5	18.7	17.8	18.5	18.5	18.75	17	18	7	22	5.76
	Averaged retreat 1962-2003							Averaged retreat 2003-2008						
Chorabari	6.5							9.7						

Source: Himalayan Glaciers, A State-of-Art Review of Glacial Studies, Glacial Retreat and Climate Change-2009, MOEF

Table 3.3.7: Mass balance and melt water discharge data of Chhota Shigri and Dokriani glaciers

Mass Balance in millions of cubic meters (x10 ⁶ m ³) of water equivalent												
Name/Period	87-88	88-89	92-93	93-94	94-95	97-98	98-99	99-2000	Area km ²			
Chhota Shigri	(-)1.01	(-)1.70							8.75			
Dokriani			(-)1.54	(-)1.58	(-)2.17	(-)2.41	(-)3.19	(-)2.65	5.76			
Average daily melt water discharge in millions of cubic meters (x10 ⁶ m ³) during ablation season												
Name/Period	88	89	94	98	99	2000	01	02	03	04	Catchm ents area Km ²	Glacier area
Chhota Shigri	0.88	0.87									45.0	8.75
Dokriani			0.34	0.3	0.24	0.29	0.31	0.4	0.32	0.36	15.1	5.76

Source: Himalayan Glaciers, A State-of-Art Review of Glacial Studies, Glacial Retreat and Climate Change-2009, MOEF

Table 3.3.8: Glacier Terminus Position Changes in Sikkim (1976-2005)

Name	Area 2005(Km ²)	1976-78	Rate (1976-78)	1988- 2000	Rate (1988- 2000)	2000-05	Rate (2000-05)	Total	Average
Changme	5.45	0	0	-56	-4.67	-22	-3.67	-78	-2.60
Changsand	9.24	-102	-8.5	-180	-15	-389	-64.83	-671	-22.37
Chuma	3.94	-83	-6.92	-96	-8	-68	-11.33	-247	-8.23
E.Langpo	4.94	-213	-17.75	-229	-19.08	-277	-46.17	-719	-23.97
Gyamtang	2.57	-200	-16.67	-10	-0.83	-150	-25	-360	-12.00
Jongsand	10.23	-119	-9.92	-24	-2	-1003	167.17	-1146	-38.20
Jumthul	7.97	-61	-5.08	-125	-10.42	-169	-28.17	-355	-11.83
Kangkyong	23.31	-78	-6.5	-28	-2.33	-124	-20.67	-230	-7.67
Lohank	5.45	-152	-12.67	-106	-8.83	-555	-92.5	-813	-27.10
N.Lohank	5.43	-50	-4.17	-168	-14	-180	-30	-398	-13.27
Onglaktang	7.9	-18	-1.5	-106	-8.83	-174	-29	-298	-9.93
Rathoung	5.23	-50	-4.17	-215	-17.92	-281	-46.83	-546	-18.20
Rula glacier	3.85	-82	-6.83	-15	-1.25	39	6.5	-58	-1.93
S. Lhonak	10	-279	-23.25	-334	-27.83	-380	-63.33	-993	-33.10
S.Simpu	7.38	73	6.08	-169	-14.08	-422	-70.33	-518	-17.27
Talung	25.51	0	0	-31	-2.58	-102	-17	-133	-4.43
Tasha	4.01	0	0	-160	-13.33	97	16.17	-63	-2.10
Tasha 1	2.73	105	8.75	-168	-14	-60	-10	-123	-4.10
Tenbawa	6.59	-124	-10.33	0	0	0	0	-124	-4.13
Theukang	2.2	-60	-5	-111	-9.25	-112	-18.67	-283	-9.43
Tista glacier	8.2	-149	-12.42	-225	-18.75	-71	-11.83	-445	-14.83
Toklung	2.74	-117	-9.75	-48	-4	-166	-27.67	-331	-11.03
Tongshong	5.93	-97	-8.08	-104	-8.67	-219	-36.5	-420	-14.00
Umaram	6.14	42	3.5	-613	-51.08	150	25	-421	-14.03
Yulhe	2.17	30	2.5	-40	-3.33	49	8.17	39	1.30
Zemu	90.94	-495	-41.25	92	7.67	-19	-3.17	-422	-14.07
Average			-7.3		-10.48		-29.54		-13.02

Source: Himalayan Glaciers, A State-of-Art Review of Glacial Studies, Glacial Retreat and Climate Change-2009, MOEF

Table 3.3.9 : Retreat of some glaciers in the NWH in the last century

Glacier name	Basin	Time-span	Year	Retreat of snout in m	Average retreat (m/yr)
Triloknath	Chenab	1969-95	27	400	14.81
Bara Shigri	-do-	1906-56	51	1750	34.31
		1957-77	21	250	11.90
		1978-95	18	650	36.11
		1996-2000*	4	950	237.50
Chhota Shigri	-do-	1962-95	34	225	6.62
		1988-2000*	13	1100	84.62
Pindari	Ganga	1845-66	122	2840	23.28
Milam	-do-	1849-1997	149	2472	16.59
Gangotri	-do-	1849-1900	51	682	13.37
		1901-35	35	527	15.06
		1936-56	20	173	8.65
		1957-64	7	227	32.43
		1965-71	6	555	92.50
		1972-2002	29	1424	49.10
Siachen	Nubra	1962-1984*	22	504	22.91
		1985-2001*	17	432	25.41
South Terong	-do-	1962-1984*	22	3100	140.91
		1985-2001*	17	870	51.18

* Obtained from remotely sensed data.

(Abnormally high rates of retreat are shown in bold figures)

Source: Himalayan Glaciers, A State-of-Art Review of Glacial Studies, Glacial Retreat and Climate Change-2009, MOEF

3.4 Biodiversity

Biodiversity, in simple terms, is a measure of the health of ecosystems. More technically, biodiversity can be defined as degree of variations of life forms within a species, ecosystem, biome and the entire Earth. Conservation of biodiversity, in any ecosystem acts as a bulwark against abrupt instabilities and makes it more resilient. Economically too, biodiversity is important for agriculture, food security, industry, medicine etc. Biodiversity also proffers rich externalities in various forms – recreation, aesthetics, environmental conservation

Biodiversity of any given area being a function of precipitation, temperature, soils, altitude etc. India is considered very rich in biodiversity. It is estimated that about 1/6th plant species of entire world belong to India. An area with a high concentration of endemic species is called a “hotspot”. Out of the twelve hotspots of the world, two (North East and Western Ghat areas) are in India.

Preventing a loss of biodiversity is important for mankind, given that humans depend on the natural richness of the planet for the food, energy, raw materials, clean air and clean water that make life possible and drive economies and societies. As such, a reduction or loss of biodiversity may not only undermine the natural environment but also economic and social goals. The challenges associated with preserving biodiversity have made this topic an international issue.

Climate change affects biodiversity in many ways. Impacts on species include changes in distribution and abundance, the timing of seasonal events and habitat use and, as a consequence there are likely to be changes in the composition of plant and animal communities. Habitats and ecosystems are also likely to change character by, for example, showing altered water regimes, increased rates of decomposition in bogs and higher growth rates in forests.

Biodiversity also has an important role in climate change adaptation and mitigation. For example, soils, forests and oceans hold vast stores of carbon. The way managed habitats are used will affect how much of that carbon is released in gaseous form into the atmosphere. How we address climate change and maintain healthy ecosystems so that they provide ecosystem goods and services essential for human well-being is now a key challenge for society. Understanding the ongoing impacts of climate change on ecosystems is an essential prerequisite to addressing this challenge.

The framework for statistics related to climate change included the following variables/indicators .

Biodiversity

- (i) Total Species
- (ii) Endangered
- (iii) Endemic
- (iv) Invasive

The Following Tables are included.

3.4 Biodiversity

- 3.4.1 Estimated faunal diversity in India
- 3.4.2 Percentage endemism in Indian faunal groups
- 3.4.3 Population trends in threatened Indian species (IUCN Red list 2004)
- 3.4.4 Number of species in major groups of plants and microorganisms
- 3.4.5 State-wise distribution of endemic wetland plants, threatened birds, fishes and turtles
- 3.4.6 Comparison of marine faunal diversity in the world and India

- 3.4.7 Forest occupancy and population estimates of tiger.
- 3.4.8 Estimated population of wild elephants -2007-08
- 3.4.9 Elephant reserves with estimated population in India as per 2005 Census
- 3.4.10 National Parks (NP) and Wildlife Sanctuaries (WLS) in various biogeographic zones of India
- 3.4.11 Biosphere reserves setup in India

Data Sources

MOEF: National Biodiversity Action Plan 2008.

MOEF: India's 4th National Report to the convention on Biological Diversity MOEF-2009

Botanical Survey of India.

MOEF: Projects on Tiger and Elephant

National Wildlife Database, Wildlife Institute of India, 2009

MOEF: Annual Reports.

Table 3.4.1 : Estimated faunal diversity in India			
Taxonomic group	No. of species		% in India
	World	India	
PROTISTA (Protozoa)	31250	2577	8.25
ANIMALIA			
Mesozoa	71	10	14.08
Porifera	4562	500	10.96
Cnidaria	9916	842	8.49
Ctenophora	100	12	12.00
Platyhelminthes	17500	1622	9.27
Nemertinea	600	-	-
Rotifera	2500	330	13.20
Gastrotricha	3000	100	3.33
Kinorhyncha	100	10	10.00
Nematoda	30000	2850	9.50
Nematophora	250	-	-
Acanthocephala	800	229	28.63
Sipuncula	145	35	24.14
Mollusca	66535	5072	7.62
Echiura	127	43	33.86
Annelida	12700	840	6.61
Onychophora	100	1	1.00
Arthropoda	987949	68389	6.92
Crustacea	35534	2934	8.26
Insecta	867391	61151	7.05
Arachnida	73440	5818	7.92
Pyconogonida	600	16	2.67
Pauropoda	360	-	-
Chilopoda	3000	100	3.33
Diplopoda	7500	162	2.16
Symphyla	120	4	3.33
Merostomata	4	2	50.00
Phoronida	11	3	27.27
Bryozoa	4000	200	5.00
Entoprocta	60	10	16.67
Brachiopoda	30	3	10.00
Pogonophora	80	-	-
Pariapulida	8	-	-
Pentastomida	70	-	-
Chaetognatha	111	30	27.03
Tardigrada	514	30	5.84
Echinodermata	6223	765	12.29
Hemichordata	120	12	10.00
Chordata	48451	4994	10.31
Protochordata	2106	119	5.65
Pisces	21723	2546	11.72
Amphibia	5150	248	4.82
Reptilia	5817	460	7.91
Aves	9026	1232	13.65
Mammalia	4629	397	8.58
Total	2233033	162121	
Source: National Biodiversity Action Plan, 2008, Ministry of Environment and Forests(MoEF)			

Table 3.4.2: Percentage endemism in Indian faunal groups

Group	Percentage Endemism
Protozoa	
Free living	7.21
Parasitic	41.33
Mesozoa	100.00
Porifera	
Freshwater	41.93
Cnidaria	-
Platyhelminthes	71.88
Rotifera	7.00
Gastrotricha	64.00
Kinorhyncha	70.00
Nematoda	-
Acanthocephala	88.64
Mollusca	
Terrestrial	33.50
Freshwater	41.80
Echiura	28.00
Annelida	28.00
Oligochaeta	77.80
Hirundinea	42.37
Arthropoda	
Crustacea	17.07
Insecta	34.90
Arachnida	45.08
Phoronida	1.00
Bryozoa	-
Entoprocta	1.00
Chaetognatha	2.70
Chordata	
Pisces	8.75
Ambhibia	61.24
Reptilia	47.00
Aves	14.28
Mammalia	9.23

Source: India's 4th National Report to the convention on Biological Diversity MOEF-2009

Table 3.4.3: Population trends in threatened Indian species (IUCN Red list 2004)

Group	Threatened	No change or stable	Upwards or improving	Downwards or decreasing	Indeterminate	Trends not available
Mammals	213	4	1	47	87	74
Birds	149	2	-	80	10	57
Reptiles	33	-	-	2	2	29
Amphibia	148	5	-	68	73	2
Pisces	75	-	-	21	42	12
Crustacea	12	-	-	-	-	12
Mollusca	5	-	-	-	1	4
Hymenoptera	5	-	-	-	-	5
Lepidoptera	4	-	-	-	1	4
Odonata	3	-	-	-	1	3
Anoplura	1	-	-	-	-	1
Total	648	11	1	218	217	203

Source: India's 4th National Report to the convention on Biological Diversity, MOEF-2009

Table 3.4.4: Number of species in major groups of plants and microorganisms

Plant groups	No. of species described		% of India to the world
	India	World	
Virus/Bacteria	850	8,050	10.56
Algae	7175	40,000	17.94
Fungi	14,500	72,000	20.14
Lichens	2223	13,500	16.47
Bryophytes	2500	14500	17.24
Pteridophytes	1,200	10,000	12.00
Gymnosperms	67	650	10.31
Angiosperms	17,527	250000	7.01
Total	46,042	408,700	

Source: Botanical Survey of India-2009

Table 3.4.5: State-wise distribution of endemic wetland plants, threatened birds, fishes and turtles

State	Endemic plants	Threatened birds	Threatened fishes	Threatened turtles
Tamil Nadu	46	3	35	4
Kerala	65	0	37	3
Karnataka	64	5	15	2
Goa	17	0	15	0
Andhra Pradesh	13	6	19	2
Odisha	6	0	22	6
Madhya Pradesh & Chhattisgarh	20	5	16	7
Maharashtra	69	2	19	3
Gujarat	11	6	12	1
Rajasthan	9	6	17	3
Haryana	0	6	15	1
Punjab	0	4	15	5
Jammu & Kashmir	2	2	20	2
Himachal Pradesh	0	2	19	0
Uttar Pradesh	3	13	34	10
Bihar & Jharkhand	5	6	19	9
West Bengal	5	6	32	11
Assam	2	10	35	10
North East States*	5	12	34	9
Total	342	94	430	88

* Arunachal Pradesh, Meghalaya, Nagaland, Manipur, Mizoram, Sikkim, Tripura

Source: Vijayan et al. 2004; SACON, Coimbatore(table reproduced from

India's 4th National Report to the convention on Biological Diversity, MOEF-2009)

Table 3.4.6: Comparison of marine faunal diversity in the world and India

Group	World	India	
		Total aquatic	Marine
Protista	31,250	2,577	750
Mesozoa	71	10	10
Porifera	4,562	519	486
Cnidaria	9,916	817	790
Ctenophora	100	12	12
Gastrotricha	3,000	88	88
Kinorhyncha	100	99	99
Platyhelminthes	17,500	4920	550
Annelida	12,700	842	440
Mollusca	66,535	50	3370
Bryozoa	4,000	194	184
Crustacea	35,534	2,994	2,440
Meristomata	4	2	2
Pycnogonidae	600	16	16
Sipuncula	145	38	38
Echiura	127	33	33
Tardigrada	514	30	10
Chaetognatha	111	30	30
Echinodermata	6,223	765	765
Hemichordata	120	12	12
Protochordata	2,106	116	116
Pisces	21,723	2546	1800
Amphibia	5,150	204	3
Reptilia	5,817	446	26
Aves	9,026	1228	145
Mammalia	4,629	327	29
Total	241,563	18,915	12,244

Source: India's 4th National Report to the convention on Biological Diversity, MOEF-2009

Table 3.4.7: Forest occupancy and population estimates of tiger

State	Tiger Population		Tiger Km ²	
	2006	2010	2006	2010
Shivalik-Gangetic Plain Landscape Complex				
Uttarakhand	178	227	1901	3476
Uttar Pradesh	109	118	2766	2511
Bihar	10	8	510	750
Shivalik Gangetic	297	353	5177	6712
Central Indian Landscape Complex and Eastern Ghats Landscape Complex				
Andhra Pradesh	95	72	14126	4495
Chhattisgarh	26	26	3609	3514
Madhya Pradesh	300	257	15614	13833
Maharashtra	103	168	4273	11960
Odisha	45	32	9144	3398
Rajasthan	32	36	356	637
Jharkhand	-	10	1488	1180
Central Indian	601	601	48610	39017
Western Ghats Landscape Complex				
Karnataka	290	300	18715	14414
Kerala	46	71	6168	6804
Tamil Nadu	76	163	9211	8389
Western Ghats	412	534	34094	29607
North East Hills and Brahmaputra Flood Plains				
Assam	70	143	1164	2381
Arunachal Pradesh	14	-	1685	1304
Mizoram	6	5	785	416
Northern West Bengal	10	-	596	799
North East Hills, and Brahmaputra	100	148	4230	4900
Sunderbans	-	70	1586	1645
Total Tiger Population	1411	1706	93697	81881
Source: National Tiger Conservation Authority, Project Tiger, 'Status of Tigers, Co- Predators, and Prey in India 2010', Ministry of Environment & Forests				

Table 3.4.8 : Estimated population of wild elephants -2007-08

REGION	STATE	ELEPHANT POPULATION			
		1993	1997	2002	2007-08
North-East	Arunachal	2102	1800	1607	1690
	Assam	5524	5312	5246	5281
	Meghalaya	2872	1840	1868	1811
	Nagaland	178	158	145	152
	Mizoram	15	22	33	12
	Manipur	50	30	12	Nil
	Tripura	100	70	40	59
	West Bengal (North)	186	250	292	300-350
Total for North-East		11027	9482	9243	9305-9355
East	West Bengal (South)	14	26	36	25
	Jharkhand	550*	618*	772	624
	Odisha	1750	1800	1841	1862
	Chhattisgarh	-	-	-	122
Total for East		2314	2444	2649	2633
North	Uttarakhand	828*	1130*	1582	1346
	U.P.	47	70	85	380
Total for North		875	1200	1667	1726
South	Tamil Nadu	2307	2971	3052	3867
	Karnataka	5500	6088	5838	4035
	Kerala	3500	3600	3850	6068
	Andhra Pradesh	46	57	74	28
	Maharashtra	-	-	-	7
Total for South		11353	12716	12814	14005
Islands	Andaman & Nicobar	35	35	40	NA
Grand Total		25604	25877	26413	27669-27719 Mid value- 27694

Source: Project Elephant Division, Ministry of Environment and Forest.

* As part of Bihar, Madhya Pradesh and Uttar Pradesh respectively

Table 3.4.9 : Elephant reserves with estimated population in India as per 2005 Census

Sl.	Elephant Range	Elephant Reserve	State	Total Area (Sq. Km)	Project area in Elephant Reserves (Sq. Km)
I	Eastern India (South West Bengal- Jharkhand- Orissa)	1. Mayurjharna ER (24.10.02)	West Bengal	414	-
		2. Singhbhum ER (26.9.01)	Jharkhand	4530	193
		3. Mayurbhanj ER (29.9.01)	Odisha	3214	1309
		4. Mahanadi ER (20.7.02)**	Odisha	1038	964
		5.Sambalpur ER (27.3.02)**	Odisha	427	427
		6. Baitarni ER#	Odisha	1755	-
		7. South Orissa ER#	Odisha	4216	750
		8. Lemru #	Chhattisgarh	450	-
		9.Badalkhol-Tamorpingla- #	Chhattisgarh	1048.3	1154.93
II	North Brahmaputra (Arunachal –Assam)	10. Kameng ER (19.6.02)	Arunachal Pradesh	1892	748
		11. Sonitpur ER (6.3.03)	Assam	1420	420
III	South Brahmaputra (Assam- Arunachal)	12. Dihing-Patkai ER (17.4.03)	Assam	937	345
		13. South Arunachal ER (29-2-08)	Arunachal Pradesh	1957.5	378.13
IV	Kaziranga (Assam- Nagaland)	14. Kaziranga – Karbi Anglong ER (17.4.03)	Assam	3270	1073
		15. Dhansiri-Lungding ER (19.4.03)	Assam	2740	
		16. Intanki ER (28.2.05)	Nagaland	202	202
V	Eastern Dooars (Assam- W. Bengal)	17. Chirang-Ripu ER (7.3.03)	Assam	2600	526
		18. Eastern Dooars ER (28.8.02)	West Bengal	978	484
Total				3578	1010
VI	E. Himalayas (Meghalaya)	19 Garo Hills ER (31.10.01)	Meghalaya	3500	402
		20. Khasi Hills ER#	Meghalaya	1331	-
VII	Nilgiri –Eastern Ghat (Karnataka- Kerala- Tamilnadu-Andhra)	21. Mysore ER (25.11.02)	Karnataka	6724	3103
		22. Wayanad ER (2.4.02)	Kerala	1200	394
		23. Nilgiri ER (19.9.03)	Tamil Nadu	4663	716
		24. Rayala ER (9.12.03)	Andhra Pradesh	766	525
VIII	South Nilgiri (Kerala- Tamilnadu)	25. Nilambur ER (2.4.02)	Kerala	1419	90
		26. Coimbatore ER (19.9.03)	Tamil nadu	566	482
IX	Western Ghat (Tamilnadu- Kerala)	27. Anamalai ER (19.9.03)	Tamil nadu	1457	300
		28. Anamudi ER (2.4.02)	Kerala	3728	780
X	Periyar (Kerala- Tamilnadu)	29. Periyar (2.4.02)	Kerala	3742	1058
		30. Srivilliputtur ER(19.9.03)	Tamil nadu	1249	568
XI	Northern India (Uttaranchal-U.P.)	31. Shivalik ER (28.10.02)	Uttarakhand	5405	1340
		32. Ganga-Jamuna ER#	U.P.	744	-

Source: Project Elephant, Ministry of Environment and forests

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

**Proposal for extension approved by GOI , but not yet notified by the State.

Table 3.4.10: National Parks (NP) and Wildlife Sancturries (WLS) in various biogeographic zones of India

Zone no	Zone Name	Zone Area*	% of India's Geographic Area	No. of NPs	Area*	% of Biozone Area	No of WLS	Area*	% of Biozone Area	No of NPs +WLS	Area*	% of Biozone Area
1	Trans Himalaya	184823	5.62	3	5809	3.14	4	10438.56	5.65	7	16247.56	8.79
2	Himalaya	210673	6.41	12	7366.92	3.5	65	16065.85	7.63	77	23432.77	11.12
3	Deserts	214014	6.51	1	3162	1.48	5	12914.09	6.03	6	16076.09	7.51
4	Semi-Arid	539479	16.41	10	1505.78	0.28	81	12410.66	2.3	91	13916.44	2.58
5	Western Ghats	132179	4.02	16	3673.52	2.78	47	10018.86	7.58	63	13692.38	10.36
6	Deccan Peninsula	1380339	41.99	24	9712.24	0.7	127	44329.08	3.21	151	54041.32	3.92
7	Gangetic Plain	354848	10.79	6	2363.62	0.67	32	5473.24	1.54	38	7836.86	2.21
8	Coasts	91319	2.78	5	1731.18	1.9	20	2959.45	3.24	25	4690.63	5.14
9	North East	171340	5.21	13	2674	1.56	36	3418.62	2	49	6092.62	3.56
10	Islands	8249	0.25	9	1156.91	14.02	96	389.39	4.72	105	1546.3	18.75
11	Grand Total	3287263	99.99	99	39155.17	1.19	513	118417.8	3.60	612	157573	4.79

Source: National Wildlife Database, Wildlife Institute of India, 2009

Note : * : Square Km

Table 3.4.11: 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	6497.03	18.01.1988	Part of Chamoli, Pithoragarh & Almora Districts and valley of flowers (Uttarakhand)-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 & Barahmaputra 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	5111.50	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 North and West Sikkim
13	Agasthyamalai	3500.36	12.11.2001	Part of Thirunelveli and Kanya Kumari Districts in Tamil Nadu and Thiruvananthapuram, Kollam and Pathanmthita of Kerala (Tamil Nadu & Kerala)
14	Achankmar-Amarkantak	3835.31	30.3.2005	Part of Anuppur and Dindori Distt., of MP, part of Bilaspur distts., of Chhattisgarh State (Madhya Pradesh & Chattisgarh)
15	Kachchh	12454.00	29.01.2008	Parts of Kachchh, Rajkot, Surendranagar and Patan Civil Districts of Gujarat State
16	Cold Desert	7770.00	28.08.09	Pin Valley National Park and surroundings; Chandratol and Sarchu & Kibber Wildlife Sanctuary in Himachal Pradesh.
17	Seshachalam	4756.00	20.09.2010	Seshachalam hill range in Eastern Ghats encompassing part of Chittoor and Kadapa district in Andhra Pradesh
18	Panna	-2998.98	25.08.2011	Part of Panna and Chhattarpur district in Madhya Pradesh

Source: Ministry of Environment and Forests, Annual Report-2010-11

3.5 Health

Climate change is a major problem caused by the increase of human activities leading to several direct and indirect impacts on health. The weather has a direct impact on our health. If the overall climate becomes warmer, there will be an increase in health problems. It is anticipated that there will be an increase in the number of deaths due to greater frequency and severity of heat waves and other extreme weather events. The elderly, the very young and those suffering from respiratory and cardiovascular disorders will probably be affected by such weather extremes as they have lesser coping capacity. An extreme rise in the temperature will affect people living in the urban areas more than those in the rural areas. This is due to the 'heat islands' that develop here owing to the presence of concrete constructions, paved and tarred roads. Higher temperatures in the cities would lead to an increase in the ground-level concentration of ozone thereby increasing air pollution problems. Indirectly, changes in weather pattern, can lead to ecological disturbances, changes in food production levels, increase in the distribution of malaria, and other vector-borne diseases. Fluctuation in the climate especially in the temperature, precipitation, and humidity can influence biological organisms and the processes linked to the spread of infectious diseases.. Due to global warming there will be an increase in the areas of habitat of disease-spreading insects such as the mosquito, causing an increase in the transmission of infection through these carriers. Disease-causing agents, called pathogens, can be transmitted through food, water, and animals such as deer, birds, mice, and insects. Climate change could affect all of these transmitters.

There is a high incidence of occurrence of vector borne diseases like Malaria, Kala-azar, Japanese Encephalitis, filaria, Chikungunia etc., in the immediate past. It is observed that changes in climatic patterns may alter the distribution of vector species and increase its spread in new areas. An increase in temperature and relative humidity may enlarge the transmission windows. Effluent emissions to water bodies and salination of rivers through sea level rise may increase the incidence of water borne diseases. Deaths due to heat wave are reported from several parts of the country from time to time, particularly during the summer.

The expert Committee identified the Health deterioration as one of the impacts of the Climate Change. framework for statistics related to climate change included the following variables/indicators

- 1) Recurring Endemic Diseases
- (2) Newly Reported Endemic diseases

The following Tables are included in this chapter on the above indicators.

3.5 Health

- 3.5.1 Malaria cases and deaths in the country since 2008
- 3.5.2 Dengue cases and deaths in the country since 2007
- 3.5.3 Clinically suspected chikungunya fever cases since 2007
- 3.5.4 Details of AES/JE cases and deaths from 2008-2012
- 3.5.5 Kala-azar cases and deaths in the country since 2007
- 3.5.6 State-wise cases & deaths due to cholera in India
- 3.5.7 State/UT wise cases and deaths due to acute diarrhoeal disease in India
- 3.5.8 State/UT wise cases and deaths due to Enteric Fever (Typhoid) in India

Data Sources

National Vector Borne Disease Control Programme (Dte. NVBDCP), Ministry of Health and Family

Welfare provide data on Vector Bourne diseases like Malaria, Chikungunia, Dengue and Kala-azar.
(<http://www.nvbdc.gov.in/>).

National Health Profile of India, Central Bureau of Health Intelligence, MOHFW. CBHI publishes the
“National Health Profile of India every year. Available in the website <http://cbhidghs.nic.in/index.asp>.

TABLE 3.5.1: Malaria cases and deaths in the country since 2008

STATE/UTs.	2008				2009				2010				2011				2012(P)			
	Blood Slide Examination	Malaria cases	Pf cases	Deaths	Blood Slide Examination	Malaria	Pf cases	Deaths	Blood Slide Examination	Malaria	Pf cases	Deaths	Blood Slide Examination	Malaria	Pf cases	Deaths	Blood Slide Examination	Malaria	Pf cases	Deaths
Andhra Pradesh	8964918	26424	15947	0	9189256	25152	14841	3	9120643	33393	23259	20	9368740	34949	24089	5	9423964	24699	15695	2
Arunachal Pradesh	250884	29146	8219	27	213893	22066	6602	15	190063	17944	5412	103	197626	13950	4856	17	150707	8368	2789	15
Assam	2687755	83939	58124	86	3021920	91413	66557	63	4309287	68353	48330	36	4130216	47397	34707	45	3973341	29999	20579	13
Bihar	147279	2541	1712	0	115174	3255	2408	21	133757	1908	933	1	167561	2643	1273	0	190307	2605	838	0
Chhattisgarh	3052934	123495	94803	4	3250904	129397	104055	11	3426558	152209	120080	47	3444641	136899	107472	42	3721209	124006	96924	90
Goa	397349	9822	2727	21	417110	5056	1056	10	459861	2368	275	1	418722	1187	135	3	445331	1714	170	0
Gujarat	9065142	51161	11712	43	10180104	45902	8485	34	10689221	66501	13729	71	10967041	89764	16112	127	10755616	76246	10483	29
Haryana	2571866	35683	1397	0	2083245	30168	781	0	2340573	18921	764	0	2907380	33401	1133	1	2813199	26819	569	1
Himachal Pradesh	384835	146	2	0	397327	192	0	0	393203	210	2	0	367499	247	2	0	401511	216	3	0
Jammu & Kashmir	394922	217	17	1	464748	346	21	0	473268	802	43	0	484704	1091	45	0	490495	864	34	0
Jharkhand	2551489	214299	73521	25	3347069	230683	91194	28	3383496	199842	89357	16	3441614	160653	70302	17	3763323	131476	48188	10
Karnataka	8994881	47344	9864	8	9321098	36859	5723	0	9281666	44319	7936	11	9205620	24237	2648	0	9109193	16466	1278	0
Kerala	1819294	1804	222	4	2054473	2046	249	5	2143497	2299	271	7	2153277	1993	271	2	2414705	2036	236	3
Madhya Pradesh	9286269	105312	42355	53	9609659	87628	24581	26	9230400	87165	31092	31	9900131	91851	31940	109	9580368	76538	24039	43
Maharashtra	13371478	67333	22257	148	14770338	93818	24962	227	16118905	139198	32387	200	16098563	96577	21401	118	16578129	58517	11875	96
Manipur	134755	708	356	2	114720	1069	620	1	117986	947	487	4	120615	714	314	1	115257	255	82	0
Meghalaya	353071	39616	36301	73	501419	76759	74251	192	437167	41642	39374	87	391397	25143	24018	53	354574	20834	19805	52
Mizoram	165441	7361	6172	91	171793	9399	7387	119	334991	15594	14664	31	213149	8861	8373	30	168421	9883	9437	25
Nagaland	135910	5078	835	19	156259	8489	2893	35	182804	4959	1877	14	205520	3363	950	4	214943	2891	821	1
Odisha	5029677	375430	329631	239	5015489	380904	336047	198	5240458	395651	350428	247	4650799	308968	281577	99	4616440	262842	244503	79
Punjab	2979882	2494	38	0	2996929	2955	35	0	3140465	3477	71	0	3120544	2693	64	3	2911782	1689	43	0
Rajasthan	8041283	57482	3954	54	7845840	32709	1767	18	8732582	50963	2331	26	8591970	54294	2973	45	8591458	45809	1394	22
Sikkim	6164	38	10	0	6688	42	16	1	6526	49	14	0	6969	51	14	0	6574	77	14	0
Tamil Nadu	6300226	21046	739	2	7801419	14988	448	1	7838638	17086	623	3	7841899	22171	925	0	7682917	18869	576	0
Tripura	341246	25894	23588	51	361848	24430	22952	62	330608	23939	21254	15	288076	14417	13812	12	268189	11565	10915	7
Uttarakhand	226903	1059	47	0	208350	1264	43	0	214763	1672	183	0	246641	1277	123	1	267013	1948	111	0
Uttar Pradesh	4150306	93383	2310	0	3527695	55437	660	0	4066059	64606	1382	0	4110871	56968	1857	0	3898829	46557	681	0
West Bengal	4465619	89443	24453	104	5336895	141211	36982	74	5440313	134795	24693	47	5044278	66368	10858	19	5159246	55793	8669	30
A.N. Islands	165631	4688	3173	0	133504	5760	3056	0	121760	2484	803	0	97946	1918	607	0	95372	1539	696	0
Chandigarh	77716	347	6	0	94301	430	4	0	98930	351	6	0	75368	582	9	0	86991	201	3	0
D & N Haveli	51804	3037	1007	0	62279	3408	1181	0	65104	5703	2243	0	58949	5150	2082	0	101055	4940	2149	1
Daman & Diu	27155	115	19	0	24123	97	19	0	25502	204	60	0	31856	262	55	0	20715	186	33	0
Delhi	593882	253	0	0	509231	169	0	0	503926	251	1	0	377122	413	1	0	380515	382	1	0
Lakshadweep	229	0	0	0	426	8	0	0	440	6	0	0	578	8	0	0	473	9	0	0
Puducherry	127963	72	5	0	90550	65	1	0	86009	175	0	0	241778	196	6	1	233078	143	2	0
All India Total	97316158	1526210	775523	1055	103396076	1563574	839877	1144	108679429	1599986	834364	1018	108969660	1310656	665004	754	108985240	1066981	533635	519

Pf: Plasmodium falciparum : Malaria caused by Pf is the most dangerous form of malaria

Source: National Vector Borne Disease Control Programme (NVBDCP), Ministry of Health & Family Welfare

(P): Provisional

TABLE 3.5.2: Dengue cases and deaths in the country since 2007

Sl. No.	Affected States/UTs	2007		2008		2009		2010		2011		2012 (P)	
		Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
1	Andhra Pradesh	587	2	313	2	1190	11	776	3	1209	6	2299	2
2	Arunachal Pradesh	0	0	0	0	0	0	0	0	0	0	346	0
3	Assam	0	0	0	0	0	0	237	2	0	0	1058	5
4	Bihar	0	0	1	0	1	0	510	0	21	0	872	3
5	Chhattisgarh	0	0	0	0	26	7	4	0	313	11	45	0
6	Goa	36	0	43	0	277	5	242	0	26	0	39	0
7	Gujarat	570	2	1065	2	2461	2	2568	1	1693	9	3067	6
8	Haryana	365	11	1137	9	125	1	866	20	267	3	768	2
9	Himachal Pradesh.	0	0	0	0	0	0	3	0	0	0	73	0
10	J & K	0	0	0	0	2	0	0	0	3	0	17	1
11	Jharkhand	0	0	0	0	0	0	27	0	36	0	42	0
12	Karnataka	230	0	339	3	1764	8	2285	7	405	5	3924	21
13	Kerala	603	11	733	3	1425	6	2597	17	1304	10	4172	15
14	Madhya Pradesh	51	2	3	0	1467	5	175	1	50	0	239	6
15	Meghalaya	0	0	0	0	0	0	1	0	0	0	27	2
16	Maharashtra	614	21	743	22	2255	20	1489	5	1138	25	2931	59
17	Manipur	51	1	0	0	0	0	7	0	220	0	6	0
18	Mizoram	0	0	0	0	0	0	0	0	0	0	6	0
19	Nagaland	0	0	0	0	25	0	0	0	3	0	0	0
20	Odisha	4	0	0	0	0	0	29	5	1816	33	2255	6
21	Punjab	28	0	4349	21	245	1	4012	15	3921	33	770	9
22	Rajasthan	540	10	682	4	1389	18	1823	9	1072	4	1295	10
23	Sikkim	0	0	0	0	0	0	0	0	2	0	2	0
24	Tamil Nadu	707	2	530	3	1072	7	2051	8	2501	9	12826	66
25	Tripura	0	0	0	0	0	0	0	0	0	0	9	0
26	Uttar Pradesh	132	2	51	2	168	2	960	8	155	5	342	4
27	Uttarakhand	0	0	20	0	0	0	178	0	454	5	110	2
28	West Bengal	95	4	1038	7	399	0	805	1	510	0	6456	11
29	A& N Islands	0	0	0	0	0	0	25	0	6	0	24	0
30	Chandigarh	99	0	167	0	25	0	221	0	73	0	351	2
31	Delhi	548	1	1312	2	1153	3	6259	8	1131	8	2093	4
32	D&N Haveli	0	0	0	0	0	0	46	0	68	0	156	1
33	Daman&Diu	0	0	0	0	0	0	0	0	0	0	96	0
34	Puduchery	274	0	35	0	66	0	96	0	463	3	3506	5
	Total	5534	69	12561	80	15535	96	28292	108	18860	169	50222	242

Source: National Vector Borne Disease Control Programme (NVBDCP), Ministry of Health & P = Provisional

TABLE 3.5.3: Clinically suspected chikungunya fever cases since 2007

Sl. No.	Affected States/UTs	2007	2008	2009	2010	2011	2012*
1	Andhra Pradesh	39	5	591	116	99	2827
2	Bihar	0	0	0	0	91	34
3	Goa	93	52	1839	1429	664	571
4	Gujarat	3223	303	1740	1709	1042	1317
5	Haryana	20	35	2	26	215	9
6	Jharkhand	0	0	0	0	816	86
7	Karnataka	1705	46510	41230	8740	1941	2382
8	Kerala	24052	24685	13349	1708	183	66
9	Madhya Pradesh	0	0	30	113	280	20
10	Meghalaya	0	0	0	16	168	0
11	Maharashtra	1762	853	1594	7431	5113	1544
12	Odisha	4065	4676	2306	544	236	129
13	Punjab	0	0	0	1	0	1
14	Rajasthan	2	3	256	1326	608	172
15	Tamil Nadu	45	46	5063	4319	4194	5018
16	Uttar Pradesh	4	11	0	5	3	13
17	Uttarakhand	0	0	0	0	18	0
18	West Bengal	19138	17898	5270	20503	4482	1381
19	A& N Islands	0	0	0	59	96	256
20	Chandigarh	0	0	0	0	1	0
21	D&N Haveli	0	0	0	0	0	100
22	Delhi	203	14	18	120	110	6
23	Lakshadweep	5184	0	0	0	0	0
24	Puducherry	0	0	0	11	42	45
	Total	59535	95091	73288	48176	20402	15977

*: Provisional

Source: National Vector Borne Disease Control Programme (NVBDCP), Ministry of Health &

TABLE 3.5.4: Details of AES/JE cases and deaths from 2008-2012

Japanese encephalitis (JE) and Acute Encephalitis Syndrome (AES).

Sl. No.	Affected States/UTs	2008				2009				2010				2011				2012			
		AES Cases	Deaths	JE Cases	Deaths	AES Cases	Deaths	JE Cases	Deaths	AES Cases	Deaths	JE Cases	Deaths	AES Cases	Deaths	JE Cases	Deaths	AES Cases	Deaths	JE Cases	Deaths
1	Andhra Pradesh	22	0	16	0	49	0	35	0	139	7	7	5	73	1	4	1	64	0	3	0
2	Assam	319	99	157	33	462	92	218	46	469	117	142	40	1319	250	489	113	1343	229	463	100
3	Bihar	203	45	0	0	325	95	0	0	50	7	0	0	821	197	145	18	745	275	8	0
4	Delhi	0	0	0	0	0	0	0	0	0	0	0	0	9	0	9	0	0	0	0	0
5	Goa	39	0	3	0	66	3	1	0	80	0	9	0	91	1	1	0	84	0	9	0
6	Haryana	13	3	0	0	12	10	1	0	1	1	1	0	90	14	12	3	5	0	3	0
7	Jharkhand	0	0	0	0	0	0	0	0	18	2	2	2	303	19	101	5	16	0	1	0
8	Karnataka	3	0	0	0	246	8	7	0	143	1	3	0	397	0	23	0	189	1	1	0
9	Kerala	2	0	0	0	3	0	0	0	19	5	0	0	88	6	37	3	29	6	2	0
10	Maharashtra	24	0	0	0	5	0	4	0	34	17	0	0	35	9	6	0	37	20	3	0
11	Manipur	4	0	0	0	6	0	1	0	118	15	45	5	11	0	9	0	2	0	0	0
12	Nagaland	0	0	0	0	9	2	9	2	11	6	2	0	44	6	29	5	21	2	0	0
13	Punjab	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
14	Tamil Nadu	144	0	7	0	265	8	18	0	466	7	11	1	762	29	24	3	935	64	25	4
15	Uttarakhand	12	0	10	0	0	0	0	0	7	0	7	0	0	0	0	0	174	2	1	0
16	Uttar Pradesh	3012	537	193	36	3073	556	302	50	3540	494	325	59	3492	579	224	27	3484	557	139	23
17	West Bengal	58	0	41	1	454	5	57	5	70	0	1	0	714	58	101	3	1216	100	87	13
	Total	3855	684	427	70	4975	779	653	103	5167	679	555	112	8249	1169	1214	181	8344	1256	745	140

Source: National Vector Borne Disease Control Programme (NVBDCP), Ministry of Health & Family Welfare

TABLE 3.5.5: Kala-azar cases and deaths in the country since 2007

Sl. No.	Affected States/UTs	2007		2008		2009		2010		2011		2012(P)	
		Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
1	Assam	0	0	98	0	26	0	12	0	5	0	0	0
2	Bihar	37819	172	28489	142	20519	80	23084	95	25222	76	16036	27
3	Delhi	19	0	34	0	12	0	92	0	19	0	11	0
4	Gujarat	4	1	0	0	0	0	0	0	0	0	0	0
5	Himachal Pradesh	0	0	0	0	0	0	6	1	1	0	0	0
6	Jharkhand	4803	20	3690	5	2875	12	4305	5	5960	3	3535	1
7	Madhya Pradesh	0	0	1	0	0	0	0	0	0	0	0	0
8	Punjab	0	0	0	0	0	0	1	0	0	0	0	0
9	Sikkim	0	0	4	1	5	0	3	0	7	0	5	0
10	Uttrakhand	2	0	0	0	2	0	1	0	0	0	7	1
11	Uttar Pradesh	69	1	26	0	17	1	14	0	11	1	5	0
12	West Bengal	1817	9	1256	3	756	0	1482	4	1962	0	995	0
	Total	44533	203	33598	151	24212	93	29000	105	33187	80	20594	29

P = Provisional

Source: National Vector Borne Disease Control Programme (NVBDCP), Ministry of Health & Family Welfare

Table 3.5.6 : State-wise cases & deaths due to cholera in India

Sl. No.	Affected States/UTs	2007		2008		2009		2010		2011	
		Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
1	Andhra Pradesh	80	0	153	0	308	4	178	0	227	0
2	Arunachal Pradesh	-	-	0	0	3	0	0	0	0	0
3	Assam	0	0	-	-	21	0	0	0	0	0
4	Bihar	-	-	-	-	0	0	-	-	0	0
5	Chhattisgarh	10	0	0	0	3	0	12	0	1	0
6	Goa	38	0	0	0	0	0	0	0	0	0
7	Gujarat	66	0	50	0	309	0	132	1	79	0
8	Haryana	22	0	27	0	17	1	105	0	1	0
9	Himachal Pradesh	0	0	0	0	0	0	5	0	0	0
10	J & K	0	0	0	0	0	0	2976	3	0	0
11	Jharkhand	-	0	-	-	-	-	-	-	0	0
12	Karnataka	117	2	254	1	143	0	301	3	166	0
13	Kerala	5	1	7	0	62	2	2	0	19	1
14	Madhya Pradesh	1	0	14	0	7	4	3	0	0	0
15	Maharashtra	527	0	96	0	183	1	384	1	210	2
16	Manipur	2	0	-	-	-	-	0	0	0	0
17	Meghalaya	0	0	0	0	0	0	-	-	0	0
18	Mizoram	0	0	0	0	0	0	0	0	0	0
19	Nagaland	0	0	0	0	0	0	0	0	0	0
20	Odisha	35	0	-	-	0	-	2	0	0	0
21	Punjab	11	0	12	0	19	0	43	1	9	0
22	Rajasthan	1	0	0	0	1	0	37	0	0	0
23	Sikkim	0	0	0	0	0	0	0	0	0	0
24	Tamil Nadu	297	0	990	0	818	0	156	0	580	0
25	Tripura	0	0	0	0	0	0	0	0	0	0
26	Uttar Pradesh	6	0	0	0	1	-	-	-	0	0
27	Uttarakhand	1	0	0	0	0	0	20	0	9	0
28	West Bengal	176	0	236	0	486	0	570	0	652	0
29	A& N Island	0	0	0	0	0	0	0	0	0	0
30	Chandigarh	28	0	15	0	35	0	-	-	0	0
31	D&N Haveli	0	0	0	0	0	0	1	0	8	0
32	Daman & Diu	0	0	0	0	0	0	0	0	0	0
33	Delhi	1212	0	824	0	1066	-	77	0	380	7
34	Lakshadweep	0	0	0	0	0	0	0	0	0	0
35	Puducherry	0	0	2	0	0	0	0	0	0	0
	Total	2635	3	2680	1	3482	12	5004	9	2341	10

Source: National Health Profile of India, Central Bureau of Health Intelligence, MOHFW.

Table 3.5.7 : State/UT wise cases and deaths due to acute diarrhoeal disease in India											
Sl. No.	State/UT	2007		2008		2009		2010		2011	
		Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
1	Andhra Pradesh	1516795	198	1748983	16	2322963	111	2291375	214	2235614	107
2	Arunachal Pradesh	-	-	37546	2	26909	7	19104*	3	32228	11
3	Assam	293648	911	93712	745	190070	0	75681	0	96816	16
4	Bihar	-	-	-	-	-	-	-	-	130276*	0
5	Chhattisgarh	125463	11	149531	37	125069	11	51480*	2	64575	5
6	Goa	10322	0	15549	1	20103	0	16417	5	15146	2
7	Gujarat	337610	3	331979	2	337608	3	357922	3	367450	0
8	Haryana	265006	30	246957	46	240017	33	215717	43	224223	21
9	Himachal Pd.	341266	33	342870	17	334699	24	284548	28	310227	51
10	Jammu Division	199532	0	259380	4	329742	5	324255	4	342670	0
	Kashmir Division	221839	0	157345	0	188936	0	169883	1	202041	0
11	Jharkhand	59563	6	70505	4	64817	5	58767	0	98258	1
12	Karnataka	828026	80	723128	84	787179	81	583103	62	591989	49
13	Kerala	450107	12	364147	1	371714	4	373945	2	260938	0
14	Madhya Pd.	577770	302	549421	148	565568	134	305438	107	290705	92
15	Maharashtra	825044	199	990299	401	640056	39	813445	12	507046	4
16	Manipur	21745	16	17426	4	20614	9	13869	12	17605	39
17	Meghalaya	120435	60	133478	39	174769	24	181411	16	148801	20
18	Mizoram	17356	10	20143	41	21841	17	16148	12	16192	11
19	Nagaland	16048	6	15922	0	33970	0	36535	0	30458	1
20	Odisha	455004	68	535028	76	663651	91	681659	104	632493	143
21	Punjab	185825	84	180720	31	190473	51	204936	39	190022	15
22	Rajasthan	228597	38	358853	41	244836	27	223106	11	227571	7
23	Sikkim	45032	9	42506	3	46629	6	55223	2	44094	2
24	Tamil Nadu	109758	140	428365	16	517896	18	455668	49	210074	24
25	Tripura	133993	19	126471	39	147400	33	119945	88	109777	83
26	Uttar Pradesh	87961	18	85591	29	111240	70	100065	42	79643	26
27	Uttarakhand	575496	137	406439	107	453863	159	431893	164	554770	185
28	West Bengal	2592432	1118	2681699	829	2443284	725	1970448	398	1854651	288
29	A& N Island	19506	4	24477	0	30416	0	28028	8	19679	0
30	Chandigarh	10715	7	-	-	10468	7	-	-	42615	0
31	D&N Haveli	50178	3	60748	1	94537	0	69265	1	81322	1
32	Daman & Diu	283	0	4645	0	6849	0	8169	0	12638	0
33	Delhi	160773	70	117766	86	145171	107	115478	89	102983	62
34	Lakshadweep	6679	0	5115	0	4590	1	6742	0	4693	0
35	Puducherry	103832	11	81922	15	76543	16	82659	5	80766	3
	Total	10993639	3603	11408666	2865	11984490	1818	10742327	1526	10231049	1269
Source: National Health Profile of India, Central Bureau of Health Intelligence, MOHFW.											
- : Not Reported											
* : Data of only small number of districts											

Table 3.5.8 : State/UT wise cases and deaths due to Enteric Fever (Typhoid) in India											
Sl. No.	State/UT	2007		2008		2009		2010		2011	
		Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
1	Andhra Pradesh	124644	18	133174	17	136585	8	170763	5	180297	6
2	Arunachal Pradesh*	-	-	5578	1	3739	23	5715	10	7885	9
3	Assam	4166	37	1955	75	4422	0	4140	0	4541	5
4	Bihar*	-	-	-	-	-	-	-	-	14787	0
5	Chhattisgarh*	38854	0	40231	0	53291	5	38532	0	42115	1
6	Goa	425	0	1429	1	623	0	431	0	285	0
7	Gujarat	5724	1	4918	0	7156	1	9778	0	14371	0
8	Haryana	6638	1	11233	1	21183	31	22361	2	25469	1
9	Himachal Pd.	21360	0	24029	2	20252	4	24417	3	28074	2
10	Jammu Division	41460	0	47364	0	74416	0	69713	1	59465	0
	Kashmir Division	19625	0	10682	0	19537	0	21134	0	22882	0
11	Jharkhand	12209	0	37598	5	34172	10	35872	0	27009	3
12	Karnataka	61610	5	54572	16	50434	11	34296	6	38727	2
13	Kerala	4261	4	5920	5	4331	2	4621	1	3322	0
14	Madhya Pd.	46863	38	62746	37	57883	39	33792	25	32490	20
15	Maharashtra	67661	14	81188	8	79162	12	94363	0	50095	1
16	Manipur	5278	1	4460	1	5247	3	3859	0	5498	7
17	Meghalaya	37124	2	7478	0	10066	0	8169	1	9235	2
18	Mizoram	909	2	1395	9	1163	4	1115	0	2270	1
19	Nagaland	6458	5	8409	0	15569	0	19014	0	14962	2
20	Odisha	26734	22	40153	32	50341	33	45692	29	59903	104
21	Punjab	19855	6	20927	4	22444	1	28248	6	36263	9
22	Rajasthan	6072	0	15168	8	11469	0	10575	0	7902	0
23	Sikkim	315	0	217	0	218	0	689	0	551	0
24	Tamil Nadu	24037	128	86228	1	143948	1	112879	51	50185	0
25	Tripura	2618	4	8328	4	2025	1	2068	5	3553	0
26	Uttar Pradesh	10447	0	9649	0	23009	49	16489	2	13760	1
27	Uttarakhand	82387	53	48806	31	65096	72	71037	158	117537	80
28	West Bengal	118940	82	136543	74	133095	78	146428	74	127180	34
29	A& N Island	689	1	1675	0	2608	0	1266	1	1343	1
30	Chandigarh	422	3	-	-	498	0	-	-	3190	0
31	D&N Haveli	688	0	1541	0	2653	0	2221	0	2269	0
32	Daman & Diu	50	0	486	0	920	0	1652	0	964	0
33	Delhi	21198	24	19340	32	40646	47	32542	60	42976	55
34	Lakshadweep	2	0	11	0	4	0	13	0	14	0
35	Puducherry	637	1	1038	2	1126	1	11001	0	11077	0
	Total	820360	452	934469	366	1099331	436	1084885	440	1062446	346

Source: National Health Profile of India, Central Bureau of Health Intelligence, MOHFW.

* : Data of only 'a few districts

3.6 Soil and Land

Soil degradation is the decline in soil quality caused by its improper use, usually for agricultural, postural, industrial or urban purposes. Soil degradation is a serious global environmental problem and may be exacerbated by climate change. It encompasses physical, chemical and biological deterioration. Examples of soil degradation are loss of organic matter, decline in soil fertility, decline in structural condition, erosion, adverse changes in salinity, acidity or alkalinity, and the effects of toxic chemicals, pollutants or excessive flooding.

Soils host the majority of the world's biodiversity and healthy soils are essential to securing food and fibre production and providing an adequate water supply over the long term. Ecosystem services provided by soils are integral to the carbon and water cycles and include cultural functions. There are strong links between climate change and soil condition.

The framework for statistics related to climate change included soil and land degradation as an indicator/variable .

The following Tables are included.

3.6 Soil and Land

- 3.6.1 State-wise major soil (traditional nomenclature)type area
- 3.6.2 Per hectare consumption of fertilizers (state-wise nutrient-wise) during 2010-11
- 3.6.3 All-India consumption of fertilisers in terms of nutrients (N, P & K)
- 3.6.5 NPK Consumption ratio during the year 2007-08 to 2010-11
- 3.6.3 State-wise number of soil testing laboratories in country, their analyzing capacity and its utilization during -2010-11
- 3.6.6a Wasteland classification system as per Waste Land Atlas of India
- 3.6.6b Non- wasteland classes as per Waste Land Atlas of India
- 3.6.7 State and category wise total area under wastelands (sq.km) during 2008-09 vis-a-vis 2005-06 and change in wasteland during the period
- 3.6.8 Category wise total area under wastelands (sq.km) during 2008-09 vis-a-vis 2005-06 and change in different categories
- 3.6.9 Change matrix showing inter-class area changes (sq.km) in different wasteland categories in India during 2005-06 and 2008-09
- 3.6.10 Change Matrix showing inter-class area changes (sq.km) in India during 2005-06 and 2008-09
- 3.6.11 State-wise and category-wise distribution of wastelands (sq.km) during 2008-09 vis-a- vis 2005-06

Data Sources

National Bureau of Soil Survey and Land Use Planning (ICAR) Nagpur

Compendium of Soil Health- January 2012: Ministry of Agriculture, Department of Agriculture & Cooperation (INM Division)

Department of Agriculture & Cooperation, Ministry of Agriculture

Source: Wastelands Atlas of India 2011, Department of Land resource, Ministry of Rural Development .

Table 3.6.1 : State-wise major soil (traditional nomenclature)type area

Sr. No.	State	Major Soils Area (Thousand ha)																								
		Alluvial soils	Coastal Alluvial soils	Black Soils	Brown forest soils	Beaches	Mountain meadow soils	Laterites	Sub-montane soils	Salt Waste	Sand dunes	Greeks and Lagoons	Gullied land	Glaciers	Desert Soils	Hill Soils	Water bodies	Peat Soils	Red Soils	Rock outcrops	Rock Land	Terai Soils	Mangrove swamps	Miscellaneous	Others	Total
1	Jammu & Kashmir	11869.76					60.14		103.84				850.60			113.70		-	9225.56					-	22223.60	
2	Himachal Pradesh	1054.00					-						248.04					2917.11	1348.15						5567.30	
3	Punjab	3897.48												957.51	131.81										49.40	5036.20
4	Haryana	3828.93		12.74										409.07											170.46	4421.20
5	Delhi	94.58																6.06							148.30	
6	Uttar Pradesh *	23089.58		1494.46														3926.97			83.01			847.08	29441.10	
7	Rajasthan	6992.47		1678.12					36.92	49.08				22381.95				588.22	1656.60				837.46	2586.22	36807.04	
8	Gujarat	6703.43	2021.06	5308.68										2534.87				101.40						2932.96	19602.40	
9	Goa	281.98																70.04						18.18	370.20	
10	Madhya Pradesh*	11867.72		15203.57														16601.28	13.51					658.52	44344.60	
11	Maharashtra	8577.24		15423.78	276.72			64.05										4302.86	274.75					1844.60	30764.00	
12	Andhra Pradesh	2432.68	785.15	4727.26				7003.35										9930.11						2625.95	27504.50	
13	Karnataka	1825.54	913.21	6685.43	263.30			4446.77										4344.98		355.61				344.26	19179.10	
14	Tamil Nadu	704.44	178.64	2334.74				1934.27										7009.01	73.21	474.57				296.92	13005.80	
15	Kerala	315.16	191.20					955.16										2044.90	202.88					177.00	3886.30	
16	Puducherry **	11.31	10.53	14.61		0.92		1.32				0.09	0.20					0.74						9.48	49.20	
17	Bihar (including Jharkhand)	9012.82		772.37														7113.67	18.72					470.12	17387.70	
18	Odisha	4527.71	2214.89	908.30				1960.63							1372.06			3948.85						638.26	15570.70	
19	West Bengal	3247.43	3369.40					1727.96							238.54				18.20					273.67	8875.20	
20	Sikkim												101.40					523.16			78.34			6.70	709.60	
21	Arunachal Pradesh	251.61																8004.46						118.23	8374.30	
22	Assam	1204.68																6292.32						346.80	7843.80	
23	Nagaland																	1604.44						53.46	1657.90	
24	Manipur	318.04													428.44			1432.40	3.90					49.92	2232.70	
25	Mizoram	107.30																1840.44						160.36	2108.10	
26	Tripura	243.08													90.92	2.40		706.69						5.51	1048.60	
27	Meghalaya	167.62																2075.28							2242.90	
28	Andaman & Nicobar	197.00	362.70															89.57				114.46		61.17	824.90	
29	Lakshadweep		2.49																				0.56	0.10	3.20	

Source: National Bureau of Soil Survey and Land Use Planning (ICAR) Nagpur

* Including Uttarakhand (with UP) and Chhattisgarh(with MP)

** and Karaikal

Table 3.6.2 : Per hectare Consumption of fertilizers (state-wise nutrient-wise) during 2010-11

State	Consumption (in '000 tonnes)				Gross Cropped Area -2008-09 (P) ('000 ha)	Per hectare Fertiliser Consumption in Kgs			
	N	P	K	Total		N	P	K	Total
Andhra Pradesh	1966.63	1031.98	498.18	3496.79	13830.00	142.20	74.62	36.02	252.84
Karnataka	1016.21	696.17	398.05	2110.43	12368.00	82.16	56.29	32.18	170.64
Kerala	117.68	69.00	96.86	283.54	2695.00	43.67	25.60	35.94	105.21
Tamil Nadu	643.18	279.91	306.10	1229.19	5824.00	110.44	48.06	52.56	211.06
Puducherry	19.14	4.81	5.43	29.38	33.00	580.00	145.76	164.55	890.30
A&N Island	0.39	0.33	0.19	0.91	18.00	21.67	18.33	10.56	50.56
Lakshadweep	0.00	0.00	0.00	0.00	3.00	0.00	0.00	0.00	0.00
South Zone Total	3763.23	2082.20	1304.81	7150.24	34771.00	108.23	59.88	37.53	205.64
Gujarat	1241.22	518.00	179.94	1939.16	11571.00	107.27	44.77	15.55	167.59
Madhya Pradesh	998.30	741.11	128.34	1867.74	20657.00	48.33	35.88	6.21	90.42
Chhattisgarh	321.99	171.19	68.99	562.17	5683.00	56.66	30.12	12.14	98.92
Maharashtra	1657.29	1126.37	671.68	3455.34	22108.00	74.96	50.95	30.38	156.29
Rajasthan	870.39	413.30	34.95	1318.64	22771.00	38.22	18.15	1.53	57.91
Goa	3.32	2.27	1.79	7.38	166.00	20.00	13.67	10.78	44.46
Daman & Diu	0.42	0.16	0.03	0.61	5.27	79.70	30.36	5.69	115.75
D& N Haveli	0.72	0.53	0.03	1.28	27.00	26.67	19.63	1.11	47.41
WestZone	5093.65	2972.93	1085.75	9152.32	82988.27	61.38	35.82	13.08	110.28
Haryana	974.04	335.95	47.63	1357.62	6484.00	150.22	51.81	7.35	209.38
Punjab	1402.91	435.17	73.43	1911.51	7912.00	177.31	55.00	9.28	241.60
Uttar Pradesh	2951.01	1097.49	267.39	4315.89	25540.00	115.54	42.97	10.47	168.99
Uttarakhand	111.92	30.91	14.03	156.86	1188.00	94.21	26.02	11.81	132.04
Himachal Pradesh	32.59	10.73	11.81	55.13	936.00	34.82	11.46	12.62	58.90
J & K	72.82	37.30	11.15	121.27	1137.00	64.05	32.81	9.81	106.66
Delhi	0.37	0.05	0.00	0.42	43.00	8.60	1.16	0.00	9.77
Chandigarh	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00
North Zone	5545.66	1947.60	425.44	7918.70	43242.00	128.25	45.04	9.84	183.13
Bihar	907.28	289.59	155.84	1352.71	7797.00	116.36	37.14	19.99	173.49
Jharkhand	79.08	38.11	9.01	126.20	1689.00	46.82	22.56	5.33	74.72
Odisha	294.72	153.97	89.15	537.84	9071.00	32.49	16.97	9.83	59.29
West Bengal	712.37	495.58	363.87	1571.82	9802.00	72.68	50.56	37.12	160.36
East Zone	1993.45	977.25	617.87	3588.57	28359.00	70.29	34.46	21.79	126.54
Assam	142.76	59.51	74.79	277.06	3984.00	35.83	14.94	18.77	69.54
Tripura	8.01	4.47	3.46	15.94	295.00	27.15	15.15	11.73	54.03
Manipur	5.10	1.10	0.30	6.50	236.00	21.61	4.66	1.27	27.54
Meghalaya	3.03	1.52	0.48	5.03	337.00	8.99	4.51	1.42	14.93
Nagaland	0.77	0.48	0.17	1.42	402.00	1.92	1.19	0.42	3.53
Arunachal Pradesh	0.52	0.22	0.09	0.83	276.00	1.88	0.80	0.33	3.01
Mizoram	2.05	2.43	1.12	5.60	95.00	21.58	25.58	11.79	58.95
Sikkim	0.00	0.00	0.00	0.00	118.00	0.00	0.00	0.00	0.00
NE Total	162.24	69.73	80.41	312.38	5743.00	28.25	12.14	14.00	54.39
Grand Total	16558.23	8049.71	3514.28	28122.21	195103.27	84.87	41.26	18.01	144.14

Source: Compendium of Soil Health- January 2012: Ministry of Agriculture, Department of Agriculture & Cooperation (Integrated Nutrient Management Division)

N : Nitrogen P : Phosphorous K : Potash (Potassium)

(P) : Provisional

Table 3.6.3 : All-India consumption of fertilisers in terms of nutrients (N, P & K)- a time series				
(Thousand Tonnes)				
Year	N	P	K	Total
1950-51	58.7	6.9	-	65.6
1955-56	107.5	13.0	10.3	130.8
1960-61	210.0	53.1	29.0	292.1
1965-66	574.8	132.5	77.3	784.6
1970-71	1487.0	462.0	228.0	2177.0
1975-76	2148.6	466.8	278.3	2893.7
1980-81	3678.1	1213.6	623.9	5515.6
1985-86	5660.8	2005.2	808.1	8474.1
1986-87	5716.0	2078.9	850.0	8644.9
1987-88	5716.8	2187.0	880.5	8784.3
1988-89	7251.0	2720.7	1068.3	11040.0
1989-90	7386.0	3014.2	1168.0	11568.2
1990-91	7997.2	3221.0	1328.0	12546.2
1991-92	8046.3	3321.2	1360.5	12728.0
1992-93	8426.8	2843.8	883.9	12154.5
1993-94	8788.3	2669.3	908.4	12366.0
1994-95	9507.1	2931.7	1124.7	13563.5
1995-96	9822.8	2897.5	1155.8	13876.1
1996-97	10301.8	2976.8	1029.6	14308.1
1997-98	10901.8	3913.6	1372.5	16187.9
1998-99	11353.8	4112.2	1331.5	16797.5
1999-00	11592.7	4798.3	1678.7	18069.7
2000-01	10920.2	4214.6	1567.5	16702.3
2001-02	11310.2	4382.4	1667.1	17359.7
2002-03	10474.1	4018.8	1601.2	16094.1
2003-04	11077.0	4124.3	1597.9	16799.1
2004-05	11713.9	4623.8	2060.6	18398.3
2005-06	12723.3	5203.7	2413.3	20340.3
2006-07	13772.9	5543.3	2334.8	21651.0
2007-08	14419.1	5514.7	2636.3	22570.1
2008-09	15090.5	6506.2	3312.6	24909.3
2009-10	15580.0	7274.0	3632.4	26486.4
2010-11	16558.2	8049.7	3514.3	28122.2
2011-12	17300.3	7914.3	2525.5	27740.0

Source: Department of Agriculture & Cooperation, Ministry of Agriculture

N : Nitrogen P : Phosphorous K : Potash (Potassium)

Table 3.6.4 : NPK Consumption ratio during the year 2007-08 to 2010-11

Name of State	2007-08			2008-09			2009-10			2010-11		
	N	P	K	N	P	K	N	P	K	N	P	K
Andhra Pradesh	3.8	1.7	1	3.5	1.7	1	3.6	1.8	1	3.9	2.1	1
Karnataka	2.4	1.2	1	2.1	1.4	1	2.1	1.4	1	2.6	1.7	1
Kerala	1.3	0.6	1	1.2	0.6	1	1.2	0.6	1	1.2	0.7	1
Tamil Nadu	1.8	0.7	1	1.8	0.7	1	1.9	0.8	1	2.1	0.9	1
Puducherry	2.3	1.0	1	2.6	0.9	1	3.1	0.8	1	3.5	0.9	1
A&N Island				2.0	1.3	1	2.4	2.1	1	2.1	1.7	1
Lakshadweep												
South Zone				2.5	1.3	1	2.5	1.3	1	2.9	1.6	1
Gujarat	7.2	2.9	1	5.8	2.5	1	5.3	2.4	1	6.9	2.9	1
Madhya Pradesh	10.5	5.7	1	8.9	5.9	1	8.3	5.3	1	7.8	5.8	1
Chhattisgarh	5.2	2.2	1	4.4	2.2	1	5.4	2.8	1	4.2	2.3	1
Maharashtra	3.0	1.5	1	2.8	1.6	1	2.6	1.8	1	3.4	2.3	1
Rajasthan	33.7	12.5	1	30.2	13.6	1	20.8	9.1	1	24.6	11.3	1
Goa	19.0	1.0	1	1.4	1.3	1	1.2	1.2	1	1.9	1.2	1
Daman & Diu				12.2	8.8	1	18.0	11.3	1	14.8	10.8	1
D& N Haveli												
West Zone				5.0	2.6	1	4.6	2.6	1	5.6	3.3	1
Haryana	39.8	10.9	1	32.2	10.7	1	15.9	5.5	1	20.4	6.0	1
Punjab	34.3	9.0	1	23.6	6.7	1	18.4	5.9	1	19.1	5.4	1
Uttar Pradesh	15.1	4.5	1	11.5	3.6	1	9.0	3.2	1	11.8	4.0	1
Uttarakhand	11.2	2.4	1	8.8	2.4	1	11.2	2.9	1	8.2	2.2	1
Himachal Pradesh	3.7	1.0	1	3.2	1.0	1	2.8	1.0	1	2.8	0.9	1
J & K	11.9	3.6	1	8.1	3.3	1	5.7	1.9	1	6.5	3.3	1
Delhi										2.7	1.0	1
Chandigarh												
North Zone				14.6	4.5	1	11.1	3.8	1	13.5	4.3	1
Arunachal Pradesh				5.7	2.3	1	5.7	2.4	1	5.8	2.4	1
Bihar	11.0	2.3	1	5.7	1.5	1	5.3	1.5	1	5.8	1.9	1
Jharkhand	9.2	4.7	1	7.0	3.6	1	4.9	2.8	1	8.8	4.2	1
Odisha	4.3	1.9	1	3.3	1.7	1	3.7	1.9	1	3.3	1.7	1
West Bengal	2.2	1.3	1	1.7	1.0	1	1.6	1.0	1	1.9	1.3	1
Assam	1.8	1.0	1	2.0	0.8	1	1.9	0.7	1	1.9	0.8	1
Tripura	3.4	1.2	1	2.7	1.3	1	2.6	1.0	1	3.2	1.3	1
Manipur	11.0	2.6	1	6.4	1.3	1	29.6	2.8	1	13.7	2.7	1
Meghalaya	7.7	3.7	1	6.5	1.7	1	7.1	2.4	1	6.3	3.2	1
Mizoram				2.0	1.1	1	1.9	2.3	1	1.8	2.2	1
Nagaland	3.9	2.1	1	3.9	2.7	1	2.9	1.9	1	4.6	3.0	1
East Zone				2.9	1.2	1	2.8	1.2	1	3.0	1.2	1
Grand Total	5.5	2.1	1	4.6	2.0	1	4.3	2.0	1	5.0	2.4	1

Source: Ministry of Agriculture, Department of Agriculture & Cooperation (Integrated Nutrient Management Division)

N : Nitrogen P : Phosphorous K : Potash (Potassium)

Note : Lakshadweep, D& N Haveli & Chandigarh data is not available.

Table 3.6.5: State-wise number of soil testing laboratories in country, their analyzing capacity and its utilization during -2010-11

Name of State	No of Soil testing laboratories				Total			Annual Analyzing capacity in '000'	Sample Analyzed in '000'	Capacity Utilization (%)
	State Govt.		Fert. Industry		Static	Mobile	Total			
	Static	Mobile	Static	Mobile						
South Zone										
Andhra Pradesh	84	5	25	4	109	9	118	543.00	462.52	85.18
Karnataka	22	0	3	1	25	1	26	211.00	143.85	68.18
Kerala	14	9	1	0	15	9	24	291.00	173.45	59.60
Tamil Nadu	30	16	1	0	31	16	47	1147.40	786.27	68.53
Puducherry	2	0	0	0	2	0	2	4.00	4.03	100.75
A&N Island	1	1	0	0	1	1	2	12.00	4.73	39.42
Total	153	31	30	5	183	36	219	2208.40	1574.85	71.31
West Zone										
Gujarat	142	2	3	1	145	3	148	930.00	1898.09	204.10
Madhya Pradesh	24	0	2	4	26	4	30	405.00	225.64	55.71
Maharashtra	29	0	6	4	35	4	39	378.00	379.10	100.29
Rajasthan	22	23	1	2	23	25	48	445.00	348.27	78.26
Chhattisgarh	6	4	0	0	6	4	10	70.00	92.63	132.33
Goa	1	1	0	0	1	1	2	25.00	20.64	82.56
Total	224	30	12	11	236	41	277	2253.00	2964.37	131.57
North Zone										
Haryana	30	1	1	0	31	1	32	312.50	363.99	116.48
Punjab	54	12	1	3	55	15	70	622.00	224.14	36.04
Uttarakhand	13	3	0	0	13	3	16	106.44	88.18	82.84
Uttar Pradesh	255	18	7	3	262	21	283	4186.00	2715.42	64.87
Himachal Pradesh	11	4	0	0	11	4	15	125.00	122.83	98.26
J & K	12	6	0	0	12	6	18	76.00	33.52	44.11
Delhi	1	0	0	0	1	0	1	0.80	0.61	76.25
Total	376	44	9	6	385	50	435	5428.74	3548.69	65.37
East Zone										
Bihar	39	0	0	0	39	0	39	220.00	123.75	56.25
Jharkhand	7	1	0	0	7	1	8	59.30	10.89	18.36
Odisha	11	0	0	0	11	0	11	132.00	124.11	94.02
West Bengal	10	8	0	2	10	10	20	122.00	29.80	24.43
Total	67	9	0	2	67	11	78	533.3	288.55	54.11
NE Zone										
Assam	7	4	0	0	7	4	11	84.00	59.29	70.58
Tripura	2	4	0	0	2	4	6	32.00	11.55	36.09
Manipur	4	1	0	0	4	1	5	40.00	1.38	3.45
Meghalaya	3	0	0	0	3	0	3	30.00	9.30	31.00
Nagaland	3	0	0	0	3	0	3	45.00	12.50	27.78
Arunachal Pradesh	3	3	0	0	3	3	6	9.00	8.40	93.33
Sikkim	1	0	0	0	1	0	1	8.00	7.50	93.75
Mizoram	2	3	0	0	2	3	5	24.00	20.00	83.33
Total	25	15	0	0	25	15	40	272	129.92	47.76
Grand Total	845	129	51	24	896	153	1049	10695.44	8506.38	79.53

Source: Compendium of Soil Health- January 2012: Ministry of Agriculture, Department of Agriculture & Cooperation (Integrated Nutrient Management Division)

Table 3.6.6a : Wasteland Classification system		Table 3.6.6b Non-wasteland classes in 2008-09 considered for change analysis	
Wasteland classes		Non-Wasteland classes	
Category	Waste Land Class Code	Category	Non Waste Land Class Code
Gullied and/ or ravinous land (Medium)	1	Built - Up	24
Gullied and/ or ravinous land (Deep)	2	Industrial Area	25
Land with Dense Scrub	3	Cropland	26
Land with Open Scrub	4	Fallow Land	27
Waterlogged and Marshy land (Permanent)	5	Plantation	28
Waterlogged and Marshy land (Seasonal)	6	Forest (Dense/ Open)	29
Land affected by salinity/alkalinity(Moderate)	7	Forest Plantation	30
Land affected by salinity/alkalinity (Strong)	8	Grasslands	31
Shifting Cultivation - Current Jhum	9	Water bodies	32
Shifting Cultivation - Abandoned Jhum	10		
Under-utilised/degraded forest (Scrub domin)	11		
Under-utilised/degraded forest (Agriculture)	12		
Degraded pastures/ grazing land	13		
Degraded land under plantation crop	14		
Sands - Riverine	15		
Sands - Coastal	16		
Sands - Desertic	17		
Sands - Semi Stab. - Stab > 40 m	18		
Sands - Semi Stab. - Stab 15 - 40 m	19		
Mining Wastelands	20		
Industrial Wastelands	21		
Barren Rocky Area	22		
Snow Covered/ Glacial Area	23		

Source: Wastelands Atlas of India 2011, Department of Land resource, Ministry of Rural Development

Table 3.6.7: State Category wise total area under wastelands (sq.km) during 2008-09 vis-a-vis 2005-06 and change in Wasteland during the period

State	No of Districts	Total Geographic Area (TGA)	Total Waste Land(WL)		Change	Total Reduction	Total Increase	% of WL to TGA		% Change over 2005-06
			2005-06	2008-09				2005-06	2008-09	
Andhra Pradesh	23	275068	38788.22	37296.62	-1491.60	1682.10	190.46	14.10	13.56	-0.54
Arunachal Pradesh	16	83743	5743.83	14895.24	9151.41	108.48	9259.89	6.86	17.79	10.93
Assam	23	78438	8778.02	8453.86	-324.16	862.56	538.04	11.19	10.78	-0.41
Bihar	37	94171	6841.09	9601.01	2759.92	1895.09	4654.41	7.26	10.20	2.93
Chhattisgarh	16	135194	11817.82	11482.18	-335.64	379.06	43.15	8.74	8.49	-0.25
Delhi	1	1483	83.34	90.21	6.87	3.62	10.27	5.62	6.08	0.46
Goa	2	3702	496.27	489.08	-7.19	11.48	3.99	13.41	13.21	-0.19
Gujarat	25	196024	21350.38	20108.06	-1242.32	2858.99	1616.67	10.89	10.26	-0.63
Haryana	21	44212	2347.05	2145.98	-201.07	232.20	31.92	5.31	4.85	-0.45
Himachal Pradesh	12	55673	22470.05	22347.88	-122.17	197.25	75.57	40.36	40.14	-0.22
Jammu & Kashmir *	14	101387	73754.38	75435.77	1681.39	1191.48	2872.78	72.75	74.40	1.66
Jharkhand	24	79706	11670.14	11017.38	-652.76	1183.50	531.16	14.64	13.82	-0.82
Karnataka	27	191791	14438.12	13030.62	-1407.50	1477.98	70.82	7.53	6.79	-0.73
Kerala	14	38863	2458.69	2445.62	-13.07	247.55	234.44	6.33	6.29	-0.03
Madhya Pradesh	48	308252	40042.98	40113.27	70.29	258.95	329.25	12.99	13.01	0.02
Maharashtra	35	307690	38262.81	37830.82	-431.99	469.93	38.22	12.44	12.30	-0.14
Manipur	9	22327	7027.47	5648.53	-1378.94	2391.10	1012.14	31.48	25.30	-6.18
Meghalaya	7	22429	3865.76	4127.43	261.67	93.86	355.13	17.24	18.40	1.17
Mizoram	8	21081	6021.14	4958.64	-1062.50	2669.27	1606.71	28.56	23.52	-5.04
Nagaland	7	16579	4815.18	5266.72	451.54	721.75	1172.60	29.04	31.77	2.72
Odisha	30	155707	16648.27	16425.76	-222.51	271.75	48.69	10.69	10.55	-0.14
Punjab	20	50362	1019.50	936.83	-82.67	112.70	30.56	2.02	1.86	-0.16
Rajasthan	32	342239	93689.47	84929.10	-8760.37	10264.60	1503.37	27.38	24.82	-2.56
Sikkim	4	7096	3280.88	3273.15	-7.73	11.83	4.29	46.24	46.13	-0.11
Tamil Nadu	30	130058	9125.56	8721.79	-403.77	426.78	22.74	7.02	6.71	-0.31
Tripura	4	10486	1315.17	964.64	-350.53	486.15	135.07	12.54	9.20	-3.34
Uttarakhand	13	53483	12790.06	12859.53	69.47	440.35	509.86	23.91	24.04	0.13
Uttar Pradesh	70	240928	10988.59	9881.24	-1107.35	1269.71	163.08	4.56	4.10	-0.46
West Bengal	19	88752	1994.41	1929.20	-65.21	92.98	28.46	2.25	2.17	-0.07
Union Territory	8	9490	337.30	315.00	-22.30	27.33	4.68	3.55	3.32	-0.23
Total	599	3166414	472261.95	467021.16	-5240.79	32340.38	27098.42	14.91	14.75	-0.17

Source: Wastelands Atlas of India 2011, Ministry of Rural Development Department of Land resources

* Unmapped areas (J&K) 120849.00

Table 3.6.8 :Category wise total area under wastelands (sq.km) during 2008-09 vis-a-vis 2005-06 and change in different categories

Waste Land Classification Code	Category	Total WL			% to TGA		
		2005-06	2008-09	Change	2005-06	2008-09	Change
1	Gullied and/or ravinous land-Medium	7005.47	6145.96	-859.51	0.22	0.19	-0.03
2	Gullied and/or ravinous land-Deep/very deep ravine	1714.80	1266.06	-448.74	0.05	0.04	-0.01
3	Land with dense scrub	93372.62	86979.91	-6392.71	2.95	2.75	-0.20
4	Land with open scrub	91645.83	93033.00	1387.17	2.89	2.94	0.05
5	Waterlogged and Marshy land-Permanent	2532.46	1757.07	-775.39	0.08	0.06	-0.02
6	Waterlogged and Marshy land-Seasonal	2994.22	6946.31	3952.09	0.09	0.22	0.13
7	Land affected by salinity/alkalinity-Moderate	5451.63	5414.53	-37.10	0.17	0.17	0.00
8	Land affected by salinity/alkalinity-Strong	1737.81	1391.09	-346.72	0.05	0.04	-0.01
9	Shifting cultivation area-Current Jhum	5625.07	4814.68	-810.39	0.18	0.15	-0.03
10	Shifting cultivation area-Abandoned Jhum	4608.44	4210.46	-397.98	0.15	0.13	-0.02
11	Under utilised/degraded forest-Scrub dominated	85787.78	83699.71	-2088.07	2.71	2.64	-0.07
12	Agricultural land inside notified forest land	16381.53	15680.26	-701.27	0.52	0.50	-0.02
13	Degraded pastures/grazing land	7197.14	6832.17	-364.97	0.23	0.22	-0.01
14	Degraded land under plantation crops	314.14	278.53	-35.61	0.01	0.01	0.00
15	Sands- Riverine	2439.86	2111.96	-327.90	0.08	0.07	-0.01
16	Sands- Coastal sand	719.31	654.47	-64.84	0.02	0.02	0.00
17	Sands- Desert Sand	5280.07	3934.8	-1345.27	0.17	0.12	-0.05
18	Sands- Semi-stabilized to stabilized (>40m) dune	11188.21	9279.75	-1908.46	0.35	0.29	-0.06
19	Sands- Semi-stabilized to stabilized moderately high (15- 40m) dune	15627.63	14273.03	-1354.60	0.49	0.45	-0.04
20	Mining Wastelands	506.58	593.65	87.07	0.02	0.02	0.00
21	Industrial wastelands	63.99	58.00	-5.99	0	0.00	0.00
22	Barren rocky area	69372.54	59482.29	-9890.25	2.19	1.88	-0.31
23	Snow cover and/or glacial area	40694.8	58183.44	17488.64	1.29	1.84	0.55
	Total	472261.93	467021.13	-5240.80	14.91	14.75	-0.16

WL : Waste Land ; TGA : Total Geographic Area.

Source: Wastelands Atlas of India 2011, Department of Land resource, Ministry of Rural Development

Table 3.6.9 Change matrix showing inter-class area changes (sq.km) in different wasteland categories in India during 2005-06 and 2008-09

WL Category	WL during 2005-06 remaining as WL in 2008-09																							WL Becoming Non WL	Category Total		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23				
1	5035.88	21.78	642.63	406.40	-	0.35	6.93	0.10	-	-	242.70	0.32	0.10	-	3.29	-	1.25	-	-	0.30	-	4.62	0.00	638.82	7005.47		
2	28.89	1219.27	315.77	59.28	-	-	-	-	-	-	4.65	-	0.45	-	-	-	0.81	-	-	-	-	0.12	18.78	67.30	1715.32		
3	55.78	0.04	75594.40	5085.50	3.18	28.93	253.14	-	152.40	30.24	1341.16	98.16	12.40	33.39	5.97	0.13	4.08	-	39.65	19.45	-	161.65	12.30	10441.01	93372.96		
4	32.11	9.18	3275.45	80140.81	3.88	43.80	247.13	2.66	155.43	45.69	809.55	12.77	12.12	0.93	8.98	0.05	1.78	58.30	29.46	37.29	2.11	99.03	436.77	6180.02	91645.30		
5	0.31	-	4.63	33.84	1507.19	465.19	5.05	0.58	-	-	0.30	0.48	0.01	-	0.91	3.86	-	-	-	-	-	-	-	-	510.81	2533.16	
6	0.85	-	76.56	84.15	91.82	1853.40	8.26	0.18	-	-	2.44	23.00	1.29	-	17.03	-	-	-	-	-	-	-	-	-	835.10	2994.08	
7	12.59	0.05	39.69	141.16	4.50	13.82	4594.58	15.90	-	-	1.70	-	0.27	5.31	1.95	1.44	0.01	-	0.62	2.04	0.03	1.33	-	614.64	5451.63		
8	0.14	0.01	3.32	25.64	2.62	1.87	147.28	1366.60	-	-	0.54	-	-	0.59	0.22	-	-	-	-	-	0.53	-	0.16	-	188.21	1737.73	
9	-	-	403.06	628.63	-	-	-	-	1567.66	2162.52	58.78	0.55	-	-	-	-	-	-	-	-	-	-	-	1.16	-	802.71	5625.07
10	-	-	596.34	845.07	-	-	-	-	387.85	1908.30	188.49	0.07	-	-	-	-	-	-	-	-	-	-	0.80	-	681.75	4608.67	
11	16.44	2.44	1725.21	1235.20	0.80	4.38	-	-	113.21	6.96	77660.96	497.14	26.27	6.89	1.19	-	-	-	-	2.65	0.04	25.96	79.73	4383.12	85788.59		
12	702.30	-	10.24	10.56	0.02	0.39	-	-	0.05	-	460.23	14593.31	-	0.26	-	-	-	-	-	3.90	-	7.64	-	592.46	16381.36		
13	-	0.48	117.83	179.38	0.07	0.58	0.92	0.30	-	-	11.30	0.90	6233.79	0.07	0.96	-	7.99	0.83	4.05	0.99	0.13	0.20	13.23	622.98	7196.98		
14	-	-	19.98	10.85	-	1.38	-	-	-	-	0.73	0.14	0.21	215.88	-	0.40	-	-	0.01	-	-	-	-	64.57	314.15		
15	1.98	-	87.21	86.15	0.86	0.49	0.63	0.06	-	-	0.17	-	1.68	-	1990.03	-	-	-	-	0.46	-	0.77	0.49	268.49	2439.47		
16	-	-	8.03	8.99	-	0.32	1.66	-	-	-	4.56	0.13	-	0.92	0.10	635.93	-	-	-	-	-	-	-	-	58.87	719.51	
17	-	-	111.58	83.62	0.23	-	-	0.06	-	-	0.03	-	2.59	-	1.05	-	3565.82	0.08	111.66	-	0.05	1.57	0.57	1401.16	5280.07		
18	-	-	179.15	59.48	0.43	5.34	-	-	-	-	-	-	0.90	-	-	-	70.93	9151.68	1147.19	-	-	-	-	573.11	11188.21		
19	-	-	303.86	69.87	-	0.14	-	-	-	-	-	-	2.48	-	0.18	-	89.16	66.99	12772.23	-	-	3.19	-	2318.97	15627.07		
20	-	-	9.68	14.22	0.72	0.06	0.35	-	-	-	1.25	-	0.02	0.14	0.04	-	-	-	-	451.76	-	0.07	-	28.28	506.59		
21	-	-	0.02	3.83	-	-	0.28	-	-	-	0.14	-	-	-	-	-	-	-	-	1.05	50.39	-	-	8.35	64.06		
22	64.28	9.85	584.10	888.51	0.72	0.01	0.12	-	0.41	-	542.81	61.56	12.46	-	14.79	-	-	-	-	14.46	0.66	56785.11	9906.11	486.60	69372.56		
23	-	-	1.22	81.94	-	-	-	-	-	-	1007.22	-	105.11	1.41	-	-	-	-	-	-	-	1746.21	37178.99	572.65	40694.75		
999*	194.41	2.96	2869.98	2849.92	140.02	4525.87	148.19	4.66	2437.67	56.75	1360.00	391.74	420.02	12.75	65.27	12.67	192.97	1.88	168.16	58.77	4.58	642.69	10536.48	-	-		
Category Total (2008-09)	6145.96	1266.06	86979.94	93033.00	1757.06	6946.32	5414.52	1391.10	4814.68	4210.46	83699.71	15680.27	6832.07	278.54	2111.96	654.48	3934.80	9279.76	14273.03	593.65	57.99	59482.28	58183.45	32339.98	-		

* Figures at the bottom row against category 999 are non-wasteland in 2005-06. These have become wasteland in 2008-09 as per the categories in the column heads

Source: Wastelands Atlas of India 2011, Department of Land Resources, Ministry of Rural Development

Table 3.6.10 Change Matrix showing inter-class area changes (sq.km) in India during 2005-06 and 2008-09

WL Category	WL in 2005-06 continued as WL in 2008-09	WL 2005-06 becoming non-WL in 2008-09										Category Total (2005-06)
		Non Waste Land Category										
		24	25	26	27	28	29	30	31	32	Total	
1	6366.65	7.73	0.75	477.52	80.84	56.05	7.60	2.28	-	6.05	638.82	7005.47
2	1648.02	9.30	-	41.25	13.76	-	0.57	1.78	-	0.64	67.30	1715.32
3	82931.95	140.33	22.37	3433.86	2966.89	355.47	2252.01	987.00	14.34	268.74	10441.01	93372.96
4	85465.28	213.99	48.91	3789.46	1204.50	219.52	395.80	79.68	5.79	222.37	6180.02	91645.30
5	2022.35	16.45	0.42	280.71	6.62	3.20	0.13	-	2.10	201.18	510.81	2533.16
6	2158.98	57.93	2.72	635.87	13.86	9.96	2.35	4.06	7.24	101.11	835.10	2994.08
7	4836.99	22.75	9.36	479.62	87.53	4.93	0.18	0.59	-	9.68	614.64	5451.63
8	1549.52	13.31	2.91	117.14	17.58	13.05	-	-	-	24.22	188.21	1737.73
9	4822.36	48.24	-	11.77	2.78	0.07	737.94	1.83	-	0.08	802.71	5625.07
10	3926.92	13.46	-	7.58	0.14	-	640.34	20.21	-	0.02	681.75	4608.67
11	81405.47	34.18	8.33	397.96	37.24	42.33	3125.87	682.38	0.41	54.42	4383.12	85788.59
12	15788.9	17.95	3.13	188.07	228.57	0.12	34.78	66.44	11.84	41.56	592.46	16381.36
13	6574	29.61	3.14	315.44	193.57	26.06	1.22	0.44	26.87	26.63	622.98	7196.98
14	249.58	4.05	0.46	23.05	1.09	18.63	11.17	1.93	3.67	0.52	64.57	314.15
15	2170.98	1.77	1.75	59.95	15.99	2.81	-	-	-	186.22	268.49	2439.47
16	660.64	10.38	-	10.92	0.83	19.62	0.08	0.19	-	16.85	58.87	719.51
17	3878.91	0.97	0.49	875.46	504.58	0.56	0.13	2.78	-	16.19	1401.16	5280.07
18	10615.1	-	-	357.73	211.88	2.27	-	0.29	0.94	-	573.11	11188.21
19	13308.1	0.43	-	1667.12	616.94	6.63	-	27.83	-	0.02	2318.97	15627.07
20	478.31	1.74	9.43	6.90	0.36	5.71	-	-	-	4.14	28.28	506.59
21	55.71	5.53	1.82	0.78	0.05	-	-	-	-	0.17	8.35	64.06
22	68885.96	36.99	21.69	219.84	54.26	20.17	28.48	5.65	13.60	85.92	486.60	69372.56
23	40122.1	-	-	3.35	-	-	436.80	0.06	131.90	0.54	572.65	40694.75
999	27098.41											
WL Category Total (2008-09)	467021.19	687.09	137.68	13401.35	6259.86	807.16	7675.45	1885.42	218.70	1267.27		

* Figures at the bottom row against category 999 are non-wasteland in 2005-06. These have become wasteland in 2008-09.

Source: Wastelands Atlas of India 2011, Department of Land Resources, Ministry of Rural Development

Table 3.6.11 : State-wise and category-wise distribution of wastelands (sq.k.m) during 2008-09 vis-a- vis 2005-06

WL	Andhra Pradesh			Arunachal Pradesh			Assam			Bihar			Chhattisgarh		
Class	2005-06	2008-09	Change	2005-06	2008-09	Change	2005-06	2008-09	Change	2005-06	2008-09	Change	2005-06	2008-09	Change
1	405.48	381.81	-23.67	-	-	-	-	-	-	71.83	71.44	-0.39	142.90	74.68	-68.22
2	2.89	3.00	0.11	-	-	-	-	-	-	-	-	-	-	15.50	15.50
3	10323.01	9613.83	-709.18	957.70	633.27	-324.43	1956.80	2008.32	51.52	954.39	543.97	-410.42	1049.85	979.44	-70.41
4	7416.17	7153.17	-263.00	2162.04	1554.94	-607.10	1626.68	2111.47	484.79	2761.16	1948.44	-812.72	3052.58	2962.15	-90.43
5	109.07	108.01	-1.06	-	0.15	0.15	494.69	317.67	-177.02	694.65	358.39	-336.26	-	0.74	0.74
6	-	0.22	0.22	-	1.60	1.60	1025.46	570.39	-455.07	869.40	5379.36	4509.96	-	-	-
7	1215.10	1165.63	-49.47	-	-	-	-	-	-	-	-	-	0.28	0.28	0.00
8	504.83	490.12	-14.71	-	-	-	-	-	-	3.97	1.65	-2.32	-	-	-
9	15.15	16.14	0.99	1025.07	961.04	-64.03	160.15	258.86	98.71	-	-	-	-	0.02	0.02
10	1.30	1.76	0.46	506.39	1078.52	572.13	79.41	136.33	56.92	-	-	-	-	0.14	0.14
11	13123.06	12843.74	-279.32	20.46	1197.77	1177.31	1300.80	929.51	-371.29	1198.63	1090.42	-108.21	2943.76	2954.52	10.76
12	1835.48	1743.79	-91.69	-	3.91	3.91	2132.50	2063.03	-69.47	76.85	46.64	-30.21	3616.45	3596.66	-19.79
13	132.37	132.41	0.04	186.11	220.29	34.18	-	2.84	2.84	60.63	34.57	-26.06	-	-	-
14	37.79	35.31	-2.48	-	-	-	-	-	-	11.54	1.32	-10.22	-	-	-
15	32.12	28.20	-3.92	-	0.04	0.04	0.01	52.64	52.63	6.82	17.98	11.16	179.10	174.10	-5.00
16	318.72	298.62	-20.10	-	-	-	-	-	-	-	-	-	-	-	-
17	3.76	4.34	0.58	-	-	-	-	-	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	-	0.35	0.35	-	-	-	-	-	-	-	-	-	-	-	-
20	14.39	15.52	1.13	-	-	-	1.51	2.13	0.62	0.22	3.78	3.56	5.91	5.97	0.06
21	1.77	2.39	0.62	-	-	-	-	-	-	6.66	6.29	-0.37	-	0.12	0.12
22	3295.73	3258.27	-37.46	150.09	133.67	-16.42	-	0.66	0.66	124.35	96.77	-27.58	827.00	717.85	-109.15
23	-	-	-	735.98	9110.04	8374.06	-	-	-	-	-	-	-	-	-
Total WL	38788.19	37296.63	-1491.56	5743.84	14895.24	9151.40	8778.01	8453.85	-324.16	6841.10	9601.02	2759.92	11817.83	11482.17	-335.66
TGA		275068.00			83743.00			78438.00			94171.00			135194.00	
% to TGA	14.10	13.56	-0.54	6.86	17.79	10.93	11.19	10.78	-0.41	7.26	10.20	2.93	8.74	8.49	-0.25

TGA: Total Geographic Area. WL: Waste Land

Source: Wastelands Atlas of India 2011, Ministry of Rural Development, Department of Land Resources.

WL Class:															
1. Gullied and/ or ravinous land (Medium)				9. Shifting Cultivation - Current Jhum				17. Sands-Desertic							
2. Gullied and/ or ravinous land (Deep)				10. Shifting Cultivation - Abandoned Jhum				18. Sands-Semi Stab.-Stab>40m							
3. Land with Dense Scrub				11. Under-utilised/degraded forest (Scrub domi				19. Sands-Semi Stab.-Stab 15-40m							
4. Land with Open Scrub				12. Under-utilised/degraded forest (Agriculture)				20. Mining Wastelands							
5. Waterlogged and Marshy land (Permanent)				13. Degraded pastures/ grazing land				21. Industrial wastelands							
6. Waterlogged and Marshy land (Seasonal)				14. Degraded land under plantation crop				22. Barren Rocky/Stony waste							
7. Land affected by salinity/alkalinity (Medium)				15. Sands-Riverine				23. Snow covered /Glacial area							
8. Land affected by salinity/alkalinity (Strong)				16. Sands-Coastal											

(Area in sq.km.) Contd.....

Table 3.6.11: State-wise and category-wise distribution of wastelands (sq.k.m) during 2008-09 vis-a-vis 2005-06 ((Area in sq.km.) Contd.....

WL Class	Delhi			Goa			Gujarat			Haryana			Himachal Pradesh		
	2005-06	2008-09	Change	2005-06	2008-09	Change	2005-06	2008-09	Change	2005-06	2008-09	Change	2005-06	2008-09	Change
1	0.72	0.73	0.01	-	-	-	398.46	337.74	-60.72	-	1.22	1.22	170.23	167.79	-2.44
2	6.12	6.18	0.06	-	-	-	1.70	0.93	-0.77	0.96	0.96	-	4.52	14.70	10.18
3	7.51	8.77	1.26	51.89	87.90	36.01	11597.91	9817.36	-1780.55	2.98	30.06	27.08	1103.65	1036.37	-67.28
4	56.09	60.93	4.84	216.38	199.53	-16.85	6670.86	6539.36	-131.50	837.95	762.90	-75.05	2268.19	2319.10	50.91
5	5.29	4.54	-0.75	42.79	40.64	-2.15	-	0.21	0.21	20.86	18.37	-2.49	-	-	-
6	-	2.60	2.60	9.48	12.15	2.67	83.98	23.67	-60.31	51.22	30.48	-20.74	10.45	6.17	-4.28
7	0.15	0.06	-0.09	-	-	-	718.36	1129.73	411.37	69.61	66.21	-3.40	-	-	-
8	-	-	-	-	-	-	-	-	-	23.26	19.77	-3.49	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	7.42	6.37	-1.05	58.78	56.71	-2.07	1392.12	1796.44	404.32	171.02	135.07	-35.95	1290.43	1272.29	-18.14
12	-	-	-	3.24	3.58	0.34	150.82	244.63	93.81	-	10.13	10.13	-	-	-
13	-	-	-	-	-	-	44.88	15.20	-29.68	914.58	859.95	-54.63	164.36	164.20	-0.16
14	-	-	-	14.69	10.18	-4.51	50.97	48.04	-2.93	75.63	52.26	-23.37	-	-	-
15	-	-	-	-	-	-	-	0.90	0.90	1.79	1.03	-0.76	49.38	39.36	-10.02
16	-	-	-	3.39	3.39	0.00	75.69	66.82	-8.87	-	-	-	-	-	-
17	-	-	-	-	-	-	-	-	-	-	0.63	0.63	-	-	-
18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	-	-	-	-	-	-	-	-	-	41.19	22.13	-19.06	-	-	-
20	0.04	0.04	0.00	30.95	22.86	-8.09	16.52	14.13	-2.39	35.36	33.18	-2.18	7.46	7.98	0.52
21	-	-	-	0.35	0.35	0.00	-	-	-	2.51	1.62	-0.89	-	-	-
22	-	-	-	64.33	51.79	-12.54	148.09	72.92	-75.17	98.13	100.01	1.88	5314.17	2620.17	-2694.00
23	-	-	-	-	-	-	-	-	-	-	-	-	12087.20	14700.10	2612.90
Total WL	83.34	90.22	6.88	496.27	489.08	-7.19	21350.36	20108.08	-1242.28	2347.05	2145.98	-201.07	22470.04	22348.23	-121.81
TGA		1483.00			3702.00			196024.00			44212.00			55673.00	
% to TGA	5.62	0.06	0.46	13.41	13.21	-0.19	10.89	10.26	-0.63	5.31	4.85	-0.45	40.36	40.14	-0.22

TGA: Total Geographic Area. WL: Waste Land

Source: Wastelands Atlas of India 2011, Ministry of Rural Development, Department of Land Resources.

WL Class :																	
1. Gullied and/ or ravinous land (Medium)				9. Shifting Cultivation - Current Jhum				17. Sands-Desertic									
2. Gullied and/ or ravinous land (Deep)				10. Shifting Cultivation - Abandoned Jhum				18. Sands-Semi Stab.-Stab>40m									
3. Land with Dense Scrub				11. Under-utilised/degraded forest (Scrub domi				19. Sands-Semi Stab.-Stab 15-40m									
4. Land with Open Scrub				12. Under-utilised/degraded forest (Agriculture)				20. Mining Wastelands									
5. Waterlogged and Marshy land (Permanent)				13. Degraded pastures/ grazing land				21. Industrial wastelands									
6. Waterlogged and Marshy land (Seasonal)				14. Degraded land under plantation crop				22. Barren Rocky/Stony waste									
7. Land affected by salinity/alkalinity (Medium)				15. Sands-Riverine				23. Snow covered /Glacial area									
8. Land affected by salinity/alkalinity (Strong)				16. Sands-Coastal													
														(Area in sq.km.)		Contd.....	

Table 3.6.11 : State-wise and category-wise distribution of wastelands (sq.km) during 2008-09 vis-a- vis 2005-06 ((Area in sq.km.) Contd.....

WL Class	Jammu & Kashmir			Jharkhand			Karnataka			Kerala			Madhya Pradesh		
	2005-06	2008-09	Change	2005-06	2008-09	Change	2005-06	2008-09	Change	2005-06	2008-09	Change	2005-06	2008-09	Change
1	423.14	226.24	-196.90	106.14	191.47	85.33	127.11	67.97	-59.14	-	-	-	1493.69	1444.79	-48.90
2	553.24	503.09	-50.15	-	-	-	-	-	-	-	-	-	8.37	8.47	0.10
3	1617.25	1411.66	-205.59	2074.06	2811.69		4745.46	3178.98	-1566.48	725.62	609.50	-116.12	6361.08	6785.52	424.44
4	2280.70	2117.23	-163.47	3600.33	2515.75	-1084.58	1656.52	2452.96	796.44	787.78	718.32	-69.46	16231.47	15886.04	-345.43
5	74.67	84.79	10.12	0.36	0.41	0.05	13.23	9.57	-3.66	5.06	2.05	-3.01	-	-	-
6	0.86	0.95	0.09	-	0.31	0.31	4.63	8.97	4.34	14.91	6.18	-8.73	-	-	-
7	16.65	15.47	-1.18	-	-	-	512.97	346.58	-166.39	-	-	-	-	-	-
8	56.68	52.66	-4.02	-	-	-	0.35	0.20	-0.15	-	-	-	--	-	-
9	-	-	-	-	-	-	-	0.24	0.24	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	4019.26	5165.47	1146.21	4400.59	4555.44	154.85	5245.32	5133.94	-111.38	572.25	560.05	-12.20	12256.23	12417.22	160.99
12	238.29	221.99	-16.30	518.99	620.94	101.95	644.85	764.44	119.59	-	-	-	3136.55	3084.65	-51.90
13	125.55	123.04	-2.51	-	-	-	6.36	6.45	0.09	-	208.10	208.10	20.19	20.23	0.04
14	41.61	48.91	7.30	-	-	-	9.04	8.32	-0.72	-	0.18	0.18	-	-	-
15	1671.02	1468.58	-202.44	--	0.02	0.02	11.62	9.80	-1.82	16.48	16.14	-0.34	-	3.26	3.26
16	-	-	-	-	-	-	9.22	8.63	-0.59	28.70	25.99	-2.71	-	-	-
17	226.07	209.51	-16.56	-	-	-	-	-	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	3.88	3.70	-0.18	7.82	27.37	19.55	28.36	27.62	-0.74	0.20	12.91	12.71	75.72	98.68	22.96
21	4.98	4.64	-0.34	0.29	0.62	0.33	-	-	-	-	-	-	1.48	1.48	0.00
22	46379.45	41314.61	-5064.84	961.56	293.35	-668.21	1423.09	1005.95	-417.14	307.68	286.20	-21.48	458.19	362.95	-95.24
23	16021.09	22463.22	6442.13	-	-	-	-	-	-	-	-	-	-	-	-
Total WL	73754.39	75435.76	1681.37	11670.14	11017.37	-652.77	14438.13	13030.62	-1407.51	2458.68	2445.62	-13.06	40042.97	40113.29	70.32
TGA		101387.00			79706.00			191791.00			38863.00			308252.00	
% to TGA	72.75	74.40	1.66	14.64	13.82	-0.82	7.53	6.79	-0.73	6.33	6.29	-0.03	12.99	13.01	0.02

TGA: Total Geographic Area. WL: Waste Land

Source: Wastelands Atlas of India 2011, Ministry of Rural Development, Department of Land Resources.

WL Class :															
1. Gullied and/ or ravinous land (Medium)				9. Shifting Cultivation - Current Jhum				17. Sands-Desertic							
2. Gullied and/ or ravinous land (Deep)				10. Shifting Cultivation - Abandoned Jhum				18. Sands-Semi Stab.-Stab>40m							
3. Land with Dense Scrub				11. Under-utilised/degraded forest (Scrub domi				19. Sands-Semi Stab.-Stab 15-40m							
4. Land with Open Scrub				12. Under-utilised/degraded forest (Agriculture)				20. Mining Wastelands							
5. Waterlogged and Marshy land (Permanent)				13. Degraded pastures/ grazing land				21. Industrial wastelands							
6. Waterlogged and Marshy land (Seasonal)				14. Degraded land under plantation crop				22. Barren Rocky/Stony waste							
7. Land affected by salinity/alkalinity (Medium)				15. Sands-Riverine				23. Snow covered /Glacial area							
8. Land affected by salinity/alkalinity (Strong)				16. Sands-Coastal											

(Area in sq.km.) Contd.....

Table 3.6.11 : State-wise and category-wise distribution of wastelands (sq.km) during 2008-09 vis-a-vis 2005-06 ((Area in sq.km.) Contd.....

WL Class	Mahatashtra			Manipur			Meghalaya			Mizoram			Nagaland		
	2005-06	2008-09	Change	2005-06	2008-09	Change	2005-06	2008-09	Change	2005-06	2008-09	Change	2005-06	2008-09	Change
1	547.03	510.89	-36.14	-	-	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	11251.44	11041.61	-209.83	3718.87	2267.01	-1451.86	454.43	579.08	124.65	-	2265.82	2265.82	972.55	944.79	-27.76
4	13242.14	13118.20	-123.94	900.54	2412.01	1511.47	2640.10	2683.48	43.38	36.32	472.25	435.93	1011.02	1948.90	937.88
5	59.03	59.30	0.27	-	-	-	-	-	-	-	-	-	-	-	-
6	1.76	1.74	-0.02	-	-	-	-	0.41	0.41	-	-	-	-	0.02	0.02
7	41.00	41.06	0.06	-	-	-	-	-	-	-	-	-	-	-	-
8	26.36	26.36	0.00	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	752.10	270.31	-481.79	291.87	272.52	-19.35	1028.53	612.71	-415.82	1239.09	1514.95	275.86
10	-	-	-	100.10	201.32	101.22	157.12	268.11	110.99	1589.03	1049.37	-539.66	1588.65	842.47	-746.18
11	10026.96	9956.45	-70.51	1555.86	495.45	-1060.41	67.11	68.88	1.77	3367.26	558.12	-2809.14	-	0.12	0.12
12	1189.18	1206.16	16.98	-	2.44	2.44	-	0.40	0.40	-	0.37	0.37	-	13.39	0.39
13	149.72	148.95	-0.77	-	-	-	-	-	-	-	-	-	-	-	-
14	21.25	20.67	-0.58	-	-	-	-	-	-	-	-	-	-	-	-
15	3.65	3.61	-0.04	-	-	-	-	0.16	0.16	-	-	-	-	-	-
16	29.48	29.99	0.51	-	-	-	-	-	-	-	-	-	-	-	-
17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	30.45	40.62	10.17	-	-	-	-	0.04	0.04	-	-	-	-	-	-
21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	1643.37	1625.19	-18.18	-	-	-	255.13	254.34	-0.79	-	-	-	3.87	2.09	-1.78
23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total WL	38262.82	37830.80	-432.02	7027.47	5648.54	-1378.93	3865.76	4127.42	261.66	6021.14	4958.64	-1062.50	4815.18	5266.73	451.55
TGA		307690.00			22327.00			22429.00			21081.00			16579.00	
% to TGA	12.44	12.30	-0.14	31.48	25.30	-6.18	17.24	18.40	1.17	28.56	23.52	-5.04	29.04	31.77	2.72

TGA: Total Geographic Area. WL: Waste Land

Source: Wastelands Atlas of India 2011, Ministry of Rural Development, Department of Land Resources.

WL Class:															
1. Gullied and/ or ravinous land (Medium)				9. Shifting Cultivation - Current Jhum						17. Sands-Desertic					
2. Gullied and/ or ravinous land (Deep)				10. Shifting Cultivation - Abandoned Jhum						18. Sands-Semi Stab.-Stab>40m					
3. Land with Dense Scrub				11. Under-utilised/degraded forest (Scrub domi						19. Sands-Semi Stab.-Stab 15-40m					
4. Land with Open Scrub				12. Under-utilised/degraded forest (Agriculture)						20. Mining Wastelands					
5. Waterlogged and Marshy land (Permanent)				13. Degraded pastures/ grazing land						21. Industrial wastelands					
6. Waterlogged and Marshy land (Seasonal)				14. Degraded land under plantation crop						22. Barren Rocky/Stony waste					
7. Land affected by salinity/alkalinity (Medium)				15. Sands-Riverine						23. Snow covered /Glacial area					
8. Land affected by salinity/alkalinity (Strong)				16. Sands-Coastal											

(Area in sq.km.) Contd.....

Table 3.6.11: State-wise and category-wise distribution of wastelands (sq.km) during 2008-09 vis-a- vis 2005-06 ((Area in sq.km.) concluded

WL Class	Odisha			Punjab			Rajasthan			Sikkim			Tamilnadu		
	2005-06	2008-09	Change	2005-06	2008-09	Change	2005-06	2008-09	Change	2005-06	2008-09	Change	2005-06	2008-09	Change
1	671.19	431.29	-239.90	82.12	79.49	-2.63	1020.17	1087.52	67.35	-	-	-	107.97	125.29	17.32
2	-	-	-	-	-	-	864.75	437.49	-427.26	-	-	-	0.91	0.91	0.00
3	5445.08	5158.18	-286.90	109.94	131.35	21.41	23661.70	21086.05	-2575.65	6.37	20.23	13.86	2128.14	2082.87	-45.27
4	1383.29	1591.41	208.12	95.29	85.08	-10.21	14619.38	15359.37	739.99	-	-	-	2027.41	1981.04	-46.37
5	424.04	333.46	-90.58	78.01	76.49	-1.52	64.88	48.00	-16.88	-	-	-	55.31	54.06	-1.25
6	35.56	68.95	33.39	34.39	41.70	7.31	54.94	70.36	15.42	-	-	-	68.25	65.27	-2.98
7	8.47	5.36	-3.11	30.14	28.63	-1.51	347.12	323.84	-23.28	-	-	-	296.00	239.59	-56.41
8	23.09	20.76	-2.33	27.87	23.52	-4.35	269.12	226.57	-42.55	-	-	-	83.82	28.19	-55.63
9	1023.83	874.70	-149.13	-	-	-	-	-	-	-	-	-	-	-	-
10	421.61	563.44	141.83	-	-	-	-	-	-	-	-	-	-	-	-
11	4781.34	5122.53	341.19	69.47	60.78	-8.69	11365.78	10962.97	-402.81	60.96	61.18	0.22	2600.55	2519.76	-80.79
12	1842.28	1677.57	-164.71	-	0.28	0.28	854.34	159.68	-694.66	-	-	-	61.13	75.81	14.68
13	-	1.42	1.42	-	-	-	3918.42	3438.40	-480.02	-	-	-	1041.74	934.04	-107.70
14	1.88	-	-	-	-	-	-	0.89	0.89	-	-	-	41.88	31.84	-10.04
15	2.79	2.53	-0.26	97.92	86.94	-10.98	196.69	112.78	-83.91	-	-	-	34.15	32.73	-1.42
16	34.15	23.14	-11.01	-	-	-	-	-	-	-	-	-	200.63	180.89	-19.74
17	-	-	-	394.35	322.57	-71.78	4655.88	3397.75	-1258.13	-	-	-	-	-	-
18	-	-	-	-	-	-	11188.21	9279.75	-1908.46	-	-	-	-	-	-
19	-	-	-	-	-	-	15586.44	14250.55	-1335.89	-	-	-	-	-	-
20	7.90	7.96	0.06	-	-	-	106.86	116.18	9.32	-	-	-	90.18	94.97	4.79
21	10.67	10.75	0.08	-	-	-	9.06	13.67	4.61	-	-	-	3.94	4.07	0.13
22	531.11	532.31	1.20	-	-	-	4905.72	4557.27	-348.45	579.90	362.22	-217.68	283.56	270.43	-13.13
23	-	-	-	-	-	-	-	-	-	2633.66	2829.51	195.85	-	-	-
Total WL	16648.28	16425.76	-222.52	1019.50	936.83	-82.67	93689.46	84929.09	-8760.37	3280.89	3273.14	-7.75	9125.57	8721.76	-403.81
TGA		155707.00			50362.00			342239.00			7096.00			130058.00	
% to TGA	10.69	10.55	-0.14	2.02	1.86	-0.16	27.38	24.82	-2.56	46.24	46.13	-0.11	7.02	6.71	-0.31
TGA: Total Geographic Area. WL: Waste Land															
Source: Wastelands Atlas of India 2011, Ministry of Rural Development, Department of Land Resources.															
WL Class:															
1. Gullied and/ or ravinous land (Medium)				9. Shifting Cultivation - Current Jhum				17. Sands-Desertic							
2. Gullied and/ or ravinous land (Deep)				10. Shifting Cultivation - Abandoned Jhum				18. Sands-Semi Stab.-Stab>40m							
3. Land with Dense Scrub				11. Under-utilised/degraded forest (Scrub domi				19. Sands-Semi Stab.-Stab 15-40m							
4. Land with Open Scrub				12. Under-utilised/degraded forest (Agriculture)				20. Mining Wastelands							
5. Waterlogged and Marshy land (Permanent)				13. Degraded pastures/ grazing land				21. Industrial wastelands							
6. Waterlogged and Marshy land (Seasonal)				14. Degraded land under plantation crop				22. Barren Rocky/Stony waste							
7. Land affected by salinity/alkalinity (Medium)				15. Sands-Riverine				23. Snow covered /Glacial area							
8. Land affected by salinity/alkalinity (Strong)				16. Sands-Coastal								concluded			

3.7 Agriculture

The impact of climate change on agriculture could result in problems with food security and may threaten the livelihood activities upon which much of the population depends. Climate change can affect crop yields (both positively and negatively), as well as the types of crops that can be grown in certain areas, by impacting agricultural inputs such as water for irrigation, amounts of solar radiation that affect plant growth, as well as the prevalence of pests.

India is a predominantly agriculture-oriented economy, as 52% of the population directly depends on agriculture either as farmers or agricultural laborers, and their concentration is higher at 76% in the villages. Variation in climate will have a direct impact on the majority of the livelihood of the people. Food production in India is sensitive to climate change like variations in temperature and monsoon rainfall. Rise in temperature has a direct impact on the Rabi crop and every 1^oC rise will reduce wheat production by 4 to 5 Million Tonnes. Every small change in temperature and rainfall has significant effect on the quality and quantity of fruits, vegetables, tea, coffee, basmati rice and aromatic and medicinal plants.

The Frame work has included the following indicators/variables on impact of climate change in agriculture.

Yield loss of major crops/ biomass loss due to (a)drought (moderate /severe) (b)cyclone (c) floods (d)heat waves (e)flowering (f)early vegetative (g)early maturity (h)early harvesting .

Data is not readily available for most of the variables above. ICAR under Ministry of Agriculture conducts various studies on the subjects. However data on average yield is a parallel indicator for change in productivity over the years.

The following tables are included.

3.7 Agriculture

3.7.1 Area under crops - All India

3.7.2 Average yield of principal crops

Data Sources

Directorate of Economics and statistics, Ministry of Agriculture.

Indian Council of Agricultural Research.

Table 3.7.1 : Area under crops (Foodgrains) - All India

(Thousand Hectares)

Year	FOOD GRAINS													
	Rice	Jowar	Bajra	Maize	Ragi/ Marua	Wheat	Barley	Other Cereals & Millets	Total Cereals & Millets (col.2 to 9)	Gram	Tur or Arhar	Other pulses (Excl. Gram & Tur or Arhar)	Total Pulses (col.11 to 13)	Total Foodgrains (col.10+1 4)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1950-51	31056	15554	9744	3250	2254	10010	3198	5576	80642	7803	2228	10523	20554	101196
1951-52	30434	15960	10083	3435	2229	9624	3384	5396	80545	6963	2521	10824	20308	100853
1952-53	29991	18023	11489	3721	2315	9938	3346	5597	84420	7392	2499	10901	20792	105212
1953-54	31186	17876	12727	3877	2423	10745	3547	6057	88438	8097	2476	11426	21999	110437
1954-55	30660	17273	11436	3928	2407	11344	3401	5899	86348	9295	2474	11238	23007	109355
1955-56	31633	17447	10972	3811	2333	12704	3405	5412	87717	9844	2336	11428	23608	111325
1956-57	32365	16663	11301	3834	2292	13625	3518	5200	88798	9694	2333	11837	23864	112662
1957-58	32292	17298	11185	4146	2355	11758	3072	5033	87139	9087	2357	11185	22629	109768
1958-59	33195	17935	11405	4259	2454	12616	3314	5225	90403	10038	2466	11938	24442	114845
1959-60	33888	17715	10852	4348	2472	13384	3379	5200	91238	10348	2433	12338	25119	116357
1960-61	34056	18426	11470	4401	2478	12931	3140	4997	91899	9274	2429	11962	23665	115564
1961-62	34656	18220	11275	4501	2459	13565	3309	4908	92893	9562	2439	12387	24388	117281
1962-63	35734	18402	10961	4646	2426	13589	3021	5000	93779	9192	2447	12739	24378	118157
1963-64	35745	18370	11103	4586	2420	13519	2774	4855	93372	9353	2513	12458	24324	117696
1964-65	36359	18023	11916	4617	2410	13453	2675	4803	94256	8875	2560	12728	24163	118419
1965-66	35338	17623	11959	4794	2408	12539	2638	4807	92106	8004	2533	12244	22781	114887
1966-67	35060	18117	12787	5119	2419	12775	2859	4804	93940	7975	2621	11462	22058	115998
1967-68	36108	17900	12798	5612	2417	14926	3377	5099	98237	8012	2653	12352	23017	121254
1968-69	35864	17633	12447	5590	2411	15612	2828	5059	97444	6718	2610	12537	21865	119309
1969-70	37141	16985	12570	5717	2545	16782	2780	5185	99705	7631	2639	12739	23009	122714
1970-71	37381	16871	13391	5856	2474	18293	2556	4962	101784	7820	2639	12667	23126	124910
1971-72	37843	16489	11961	5588	2452	19095	2456	4428	100312	7944	2347	12243	22534	122846
1972-73	36894	16705	12287	5807	2385	18684	2453	4486	99701	6985	2455	12202	21642	121343
1973-74	38215	17059	14132	6011	2344	18641	2656	4658	103716	7726	2643	13298	23667	127383
1974-75	37804	16238	11468	5815	2428	17940	2889	4723	99305	7036	2566	12889	22491	121796
1975-76	39372	16062	11598	5912	2632	20339	2810	4994	103719	8303	2728	13788	24819	128538
1976-77	38477	15740	10806	5978	2502	20876	2244	4800	101423	7975	2578	13101	23654	125077
1977-78	40280	16100	11006	5712	2682	21277	2003	4747	103807	7928	2634	13356	23918	127725
1978-79	40511	16052	11400	5784	2682	22540	1837	4504	105310	7671	2679	13606	23956	129266
1979-80	39542	16618	10798	5754	2603	22098	1771	4067	103251	6952	2825	12570	22347	125598
1980-81	40237	16412	11658	6032	2504	22225	1799	4033	104900	6547	2877	13284	22708	127608
1981-82	40778	16817	11826	5916	2555	21992	1728	3905	105517	7839	2989	13352	24180	126997
1982-83	38424	16343	11155	5720	2345	23523	1493	3585	102588	7339	2909	12726	22974	125562
1983-84	41485	16608	11796	5837	2561	25545	1383	3681	108896	7041	3135	13351	23527	132423
1984-85	41167	16179	10659	5821	2379	23488	1247	3306	104246	6769	3156	12877	22802	127048
1985-86	41220	16338	10854	5797	2372	23179	1361	3198	104319	7746	3247	13444	24437	128756
1986-87	41154	16184	11497	5955	2394	23196	1224	3003	104607	7003	3186	13196	23385	127992
1987-88	38866	16116	9171	5645	2242	23213	1139	2929	99321	5794	3346	12415	21555	120876
1988-89	41756	14499	12156	5894	2275	24065	1087	2722	104454	6798	3514	12807	23119	127573
1989-90	42178	14602	11056	5946	2299	23661	1001	2574	103117	6446	3600	13363	23409	126526
1990-91	42744	14158	10735	5893	2145	24046	972	2372	103065	7471	3609	13803	24883	127948
1991-92	42661	12481	10268	5878	2109	23378	964	2102	99841	5591	3639	13449	22679	122520
1992-93	41860	13222	10854	6087	2039	24644	925	2015	101646	6434	3596	13539	23569	125215
1993-94	42687	12942	9738	6102	2017	25202	809	1917	101414	6326	3454	13631	23411	124825
1994-95	42894	11843	10333	6104	1897	25887	897	1811	101666	7500	3283	13500	24283	125949
1995-96	43016	11477	9558	6117	1929	25105	838	1786	99826	7121	3470	13046	23637	123463
1996-97	43529	11435	10297	6270	1864	25991	765	1634	101785	7040	3517	12760	23317	125102
1997-98	43581	10798	9940	6376	1757	26741	871	1653	101717	7456	3341	13201	23998	125715
1998-99	44898	9905	9527	6338	1862	27466	806	1563	102365	8535	3404	12576	24515	126880
1999-00	45456	9882	9103	6574	1736	27671	746	1432	102600	6295	3454	12369	22118	124718
2000-01	44761	9915	10022	6805	1816	25797	789	1449	101354	5318	3665	12343	21326	122680
2001-02	44677	9807	9744	6683	1732	26318	682	1321	100964	6424	3340	13494	23258	124222
2002-03	41209	9278	7936	6742	1512	25271	689	1221	93858	5898	3339	12160	21397	115255
2003-04	42293	9403	10961	7275	1779	26964	675	1164	100514	7084	3451	13923	24458	124972
2004-05	42637	9048	9432	7434	1669	26885	620	1097	98822	6688	3432	13768	23888	122710
2005-06	43920	8682	9745	7628	1648	26687	630	1000	99940	6790	3537	13345	23672	123612
2006-07(p)	43535	8459	9577	7775	1329	28325	654	963	100617	7375	3342	13527	24244	124861
2007-08(p)	43684	7827	9700	8101	1521	28575	660	924	100992	7743	3598	13527	24868	125860
2008-09(p)	45211	7543	8858	8128	1505	28022	717	889	100873	7920	3274	12570	23764	124637
2009-10(p)	42569	7809	9065	8164	1233	28547	622	900	98909	7997	3273	11303	22573	121482
2010-11(p)	43870	7363	9680	8392	1258	29835	707	847	101952	8865	4291	12593	25749	127701

Source: Directorate of Economics and Statistics, Ministry of Agriculture

(p): Provisional

Area under crops (Foodgrains) - All India

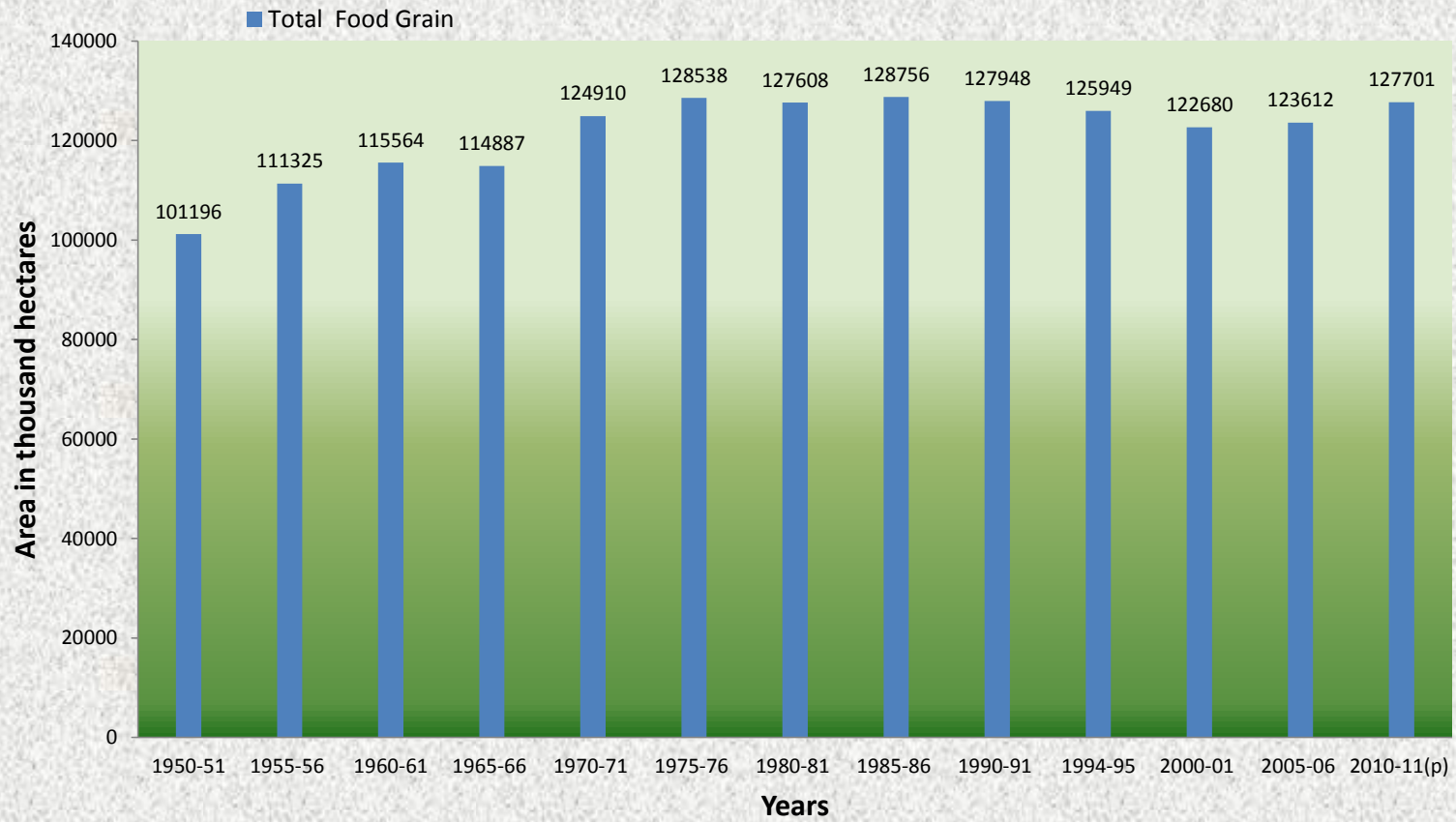


Table 3.7.2 : Average yield of principal crops

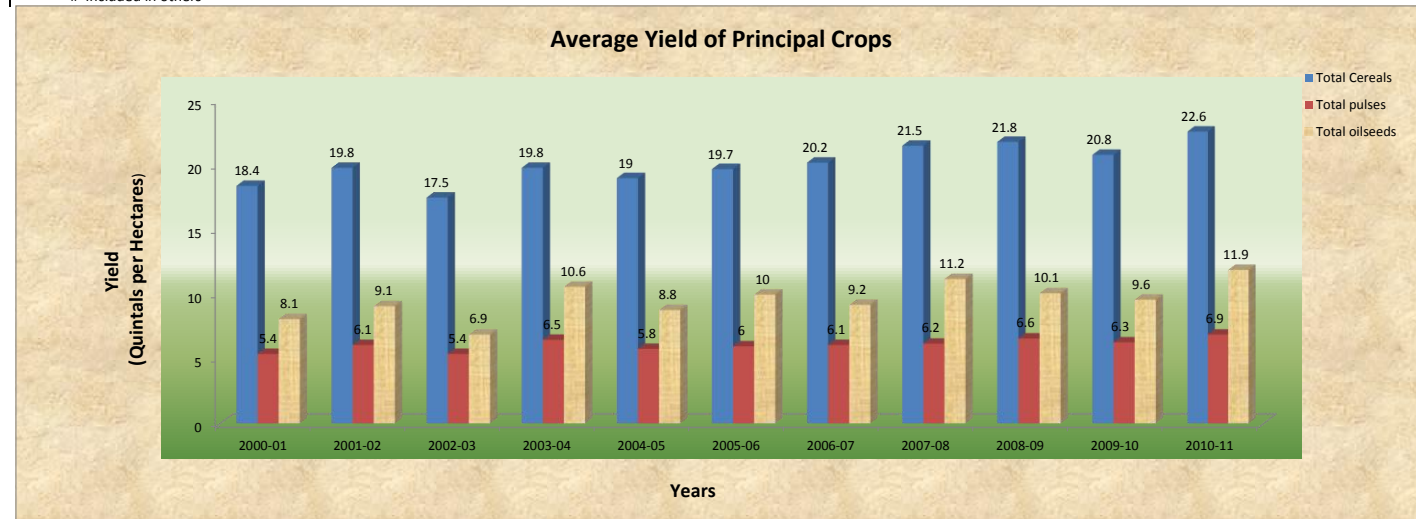
Year	Food grains (cereals)									Food grains (pulses)				Total food grains	Oilseeds					
	Rice	Jowar	Bajra	Maize	Ragi/ Marua	Small millets	Wheat	Barley	Total Cereals	Gram	Tur	Other pulses	Total pulses		Groundnuts (nuts in shells)	Sesame	Rapeseed & mustard	Linseed	Caster seed	Total oilseeds
2000-01	19	7.8	6.9	18.2	15.5	4.1	27.1	18.4	18.4	7.4	6.2	4.9	5.4	16.3	9.8	3	9.4	3.5	8.2	8.1
2001-02	20.8	7.7	8.7	20	14.4	4.4	27.6	21.6	19.8	8.5	6.8	4.6	6.1	17.3	11.3	4.2	10	3.9	9.1	9.1
2002-03	17.4	7.5	6.1	16.8	9.3	3.8	26.1	20.1	17.5	7.2	6.5	4.2	5.4	15.3	6.9	3.1	8.5	3.9	7.3	6.9
2003-04	20.8	7.2	11.4	20.4	11.8	4.7	27.1	19.8	19.8	8.1	6.7	5.3	6.5	17.3	13.6	4.6	11.6	4.1	11.1	10.6
2004-05	19.8	8	9.6	19.1	15.7	4.3	26	19.6	19	8.1	6.7	4.2	5.8	16.5	10.2	3.7	10.4	3.8	10.7	8.8
2005-06	21	8.8	8	19.4	15.3	4.4	26.2	19.4	19.7	8.1	7.6	4.2	6	17.2	11.9	3.7	11.2	4	11.5	10
2006-07	21.32	8.4	8.9	19.1	12.3	4.7	27.1	20.5	20.2	8.5	6.5	4.6	6.1	17.6	8.7	3.6	11	3.9	12.1	9.2
2007-08	22	10.2	10.4	23.4	15.5	5.3	28	19.8	21.5	7.6	8.3	4.8	6.2	180.6	14.6	4.2	10	3.5	9.2	11.2
2008-09	21.8	9.6	10.2	24.1	14.8	4.9	29.1	23.9	21.8	8.9	6.7	4.8	6.6	19.1	11.6	3.5	11.4	4.2	13.5	10.1
2009-10	21.3	8.6	7.3	20.2	14.9	4.6	28.4	21.7	20.8	9.2	7.1	9	6.3	18	9.9	3	11.8	4.5	13.7	9.6
2010-11	22.4	9.5	10.8	25.4	17.1	8.2	29.9	23.6	22.6	9	6.6	5.6	6.9	19.3	14.1	4.3	11.9	4.1	15.3	11.9

Year	Cotton	Jute	Mesta	Tea	Coffee	Rubber	Banana	Sugarcane	Tobacco	Potatoes	Pepper (black)	Chillies	Ginger	Coconut @	Turmeric
2000-01	1.9	20.3	65.3	16.8	9.6	15.8	28.1	685.8	13.2	18.4	3	11.8	33.4	69.5	37.3
2001-02	1.9	21.8	62.8	16.8	9.4	15.7	26.9	673.7	15.7	19.8	2.8	12.1	35.3	67.1	33.7
2002-03	1.9	21.4	58.6	16.4	8.6	15.9	26	635.8	15.3	17.3	3.2	10.8	31.5	65.2	34.8
2003-04	3.1	21.7	60.2	16.9	8.3	16.6	29.2	593.9	14.9	17.9	3.1	16	35.5	63	37.6
2004-05	3.2	206	61.6	17.4	8.3	17	29	647.5	15	17.9	3.2	16.1	37.7	66.3	45.2
2005-06	3.6	23.6	11.4	17.1	8	18	28.6	669.2	14.8	17.1	3.6	15.5	35.4	76.1	49.5
2006-07	4.2	23.4	12.1	17.2	8.4	18.8	34.8	690.2	14.1	14.9	2.8	16.3	37.1	81.8	44.1
2007-08	4.7	22.6	12.2	17.1	7.6	18	36.2	688.8	14.2	19.3	2.4	16.1	36.8	77.5	45.3
2008-09	4	22.1	11.4	16.8	7.5	18.7	34.4	645.5	16	18.8	2	16.3	35	52.3	45.4
2009-10	4	24.9	11.2	17.1	8.2	17.8	34.4	700.2	15.6P	19.9	2.6	15.7	35.8	57.1	43.8
2010-11	5.0#	23.3	11.2	-	8.4	18.1P	35.9	700.9	16.9P	22.7	2.8	15.4	47.1	57.2	50.9

Source: Directorate of Economic and Statistics, Ministry of Agriculture; Tea board, Ministry of Commerce & Industry

@ in terms of million nuts

Included in others



3.8 Disasters and Extreme Events

Extreme climate events include heat waves, cold snaps, tropical cyclones, storm surges, floods, droughts and bushfires. Extreme climate events can have a serious impact on the environment and society, including loss of life, property and livelihoods. In recent years, the occurrence of extreme climate events and the associated damage has become highly visible. While it is not established that the extreme events are all caused by climate change, it is believed that climate change contribute to many extreme events. The committee therefore regarded extreme events as one of the impacts of the climate change and occurrence of extreme events in the country and corresponding loss are included in the Climate change Statistics Report. The following Tables are included in this section

3.8 Disasters and Extreme Events

- 3.8.1 Year-wise damage caused due to floods, cyclonic storms, landslides etc. during 2001-11 in India
- 3.8.2 State wise details of damage due to cyclonic storms/heavy rains /floods/landslides etc.
- 3.8.3 Distribution of deaths by natural disasters in India 2000-2012
- 3.8.4 Number of heat waves in India
- 3.8.5 Number of cold waves in India
- 3.8.6 Deaths due to heat waves in India (1979- 2008)
- 3.8.7 Drought years with percentage area of the country effected by drought
- 3.8.8 Number of cyclonic storms/severe cyclonic storms formed over the North Indian Ocean

Data Sources

Annual report of Ministry of home Affairs : The data on damage caused due to floods, cyclonic storms, landslides etc. and also are obtained from the Annual Reports of Ministry of home Affairs. Available in MHA website.

Accidental deaths and Suicides in India, Annual publication by National Crime Record Bureau give data on deaths due to various natural calamities.

MHA Report ' Disaster Management in India-2011' available in MHA website

<http://data.gov.in/dataset/number-cyclonic-storms-severe-cyclonic-storms-formed-over-north-indian-ocean> for data related to cyclonic storms formed over the north Indian ocean.

Table 3.8.1: Year-wise damage caused due to floods, cyclonic storms, landslides etc. during 2001-2011 in India

Year	Live Lost human (in No)	Cattle Lost (in No)	Houses damaged (in No)	Cropped areas affected (in Lakh hectares)
2001-02	834	21269	346878	18.72
2002-03	898	3729	462700	21.00
2003-04	1992	25393	682209	31.98
2004-05	1995	12389	1603300	32.53
2005-06	2698	110997	2120012	35.52
2006-07	2402	455619	1934680	70.87
2007-08	3764	119218	3527041	85.13
2008-09	3405	53833	1646905	35.56
2009-10	1677	128452	1359726	47.13
2010-11	2310	48778	1338619	46.25

Source: Disaster management in India 2011, Ministry of Home Affairs (MHA)

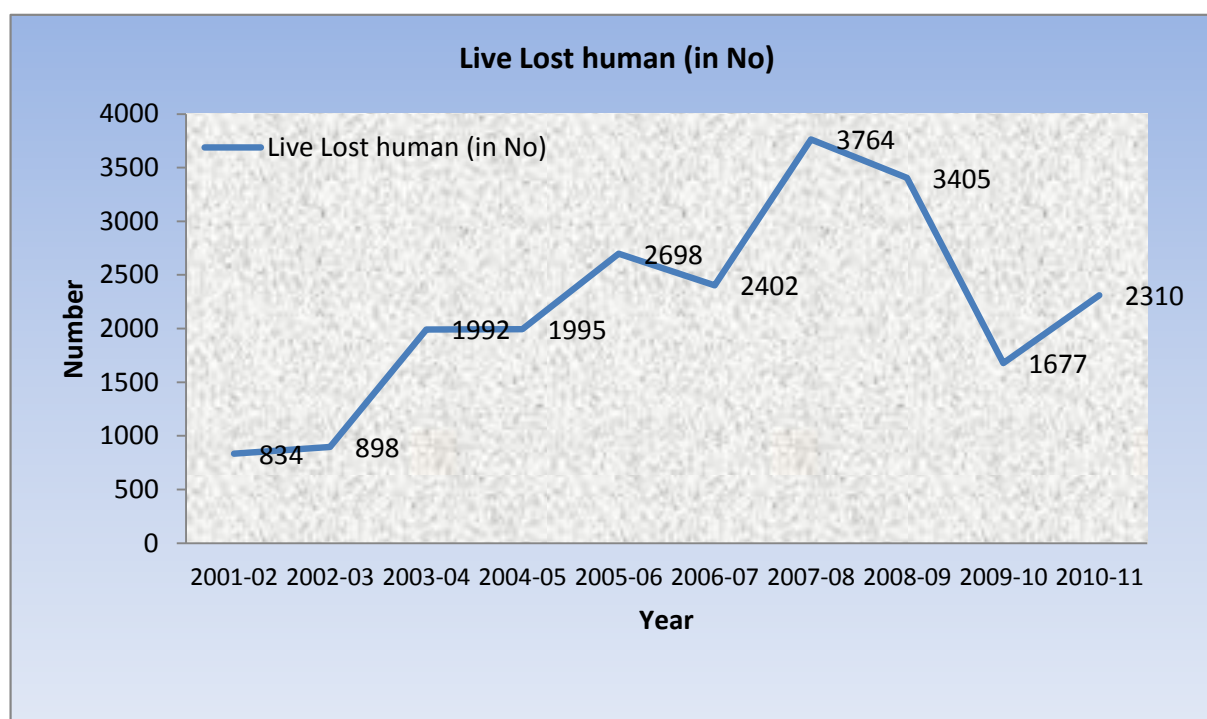


Table 3.8.2: State wise details of damage due to cyclonic storms/heavy rains /floods/landslides etc.

Sl. No.	States/ UTs	2006-07				2007-08 (P)			
		No. of Human lives lost	No. of Cattle heads lost	No. of Houses damaged	Cropped area affected (lakh hectares)	No. of Human lives lost	No. of Cattle heads lost	No. of Houses damaged	Cropped area affected (lakh hectares)
1	2	3	4	5	6	4	4	5	6
1	Andhra Pradesh	247	366308	322074	8.13	134	47598	235814	1.93
2	Arunachal Pradesh					4	14736	12987	0.28
3	Assam	7	20	2367	0.11	134	-	15846	6.75
4	Bihar	25	19	17447	0.75	976	988	690466	16.62
5	Chhattisgarh	37	9653	15820	10.15	15	53	12482	0.026
6	Gujarat	293	8421	161625	7.47	486	9707	41756	4.68
7	Goa	--	--	5	0.002	3	-	1100	n
8	Haryana	6	--	--	--				
9	Himachal Pradesh	48	846	4379	0.94	98	3087	10820	1.13
10	Jammu & Kashmir	25	2677	11835	0.61				
11	Jharkhand	5	101	3011	0.03	2	2	986	0.01
12	Karnataka	123	236	204401	1.55	222	12958	231698	5
13	Kerala	180	2269	114435	0.24	262	2813	58804	0.38
14	Madhya Pradesh	168	6107	129998	--	76	307	18321	0.04
15	Mizoram					12	8	2243	0.04
16	Maharashtra	423	13417	594516	12.59	155	1477	47045	-
17	Meghalaya	--	--	--	neg.	-	-	-	n
18	Odisha	90	1656	120356	3.09	91	662	104712	3.19
19	Punjab	8	16	224	0.02	7	18	527	0.28
20	Rajasthan	146	42253	254844	17.36	63	5114	10058	n
21	Tamil Nadu	23	67	444	17.37	52	159	726	-
22	Tripura	4	--	--	--	8	-	3	-
23	Uttar Pradesh	508	588	--	--	261	157	165064	5.13
24	Uttarakhand					83	275	979	-
25	West Bengal	36	697	160575	0.45	348	4154	996948	24.91
26	Puducherry	--	268	285	neg.	2	150	159	2.15
	Total	2402	455619	2118641	80.862	3494	104423	2659544	72.546

n: Negligible - : Not available (P) : Provisional

cont...

Table 3.8.2 : State wise details of damage due to cyclonic storms/heavy rains /floods/landslides etc.

S.No.	State/UT	2009-10 (P)				2010-11 (P)			
		No. of Human lives lost	No. of Cattle heads lost	No. of Houses damaged	Cropped area affected (lakh hectares)	No. of Human lives lost	No. of Cattle heads lost	No. of Houses damaged	Cropped area affected (lakh hectares)
1	2	3	4	5	6	7	8	9	10
1	Andhra Pradesh	108	44132	213748	2.82	133	17230	38152	12.07
2	Arunachal Pradesh					44	10163	19409	1.64
3	Assam	8	12	240	0.298	57	3623	383408	1.87
4	Bihar	63	2	6050	n	93	142	138092	0.32
5	Chhattisgarh	5	3	1321	-				
6	Goa	3	265	1053	0.034	1	1	101	-
7	Gujarat	94	456	12641	0.029	232	541	4735	0.67
8	Haryana	9	16	2216	0.083	38	67	5362	1.31
9	Himachal Pradesh	25	104	2670	-	62	5889	6656	0.26
10	Jammu & Kashmir					239	1805	2901	0.14
11	Jharkhand					22	74	4726	0.0014
12	Karnataka	396	9043	665877	24.22	82	215	14400	0.14
13	Kerala	142	177	22744	0.39	103	87	15328	0.03
14	Madhya Pradesh	56	148	11356	-	38	5	143	-
15	Maharashtra	65	31509	75441	8.79	8	5	9	-
16	Meghalaya					-	-	6	-
17	Mizoram					4	-	10127	0.02
18	Odisha	59	-	13547	1.33	10	260	5339	0.3
19	Punjab	8	-	72	0.06	38	108	2040	0.84
20	Rajasthan	48	3509	221	-				
21	Sikkim	1	-	-	-	3	300	511	-
22	Tamil Nadu	108	312	8437	-				
23	Uttar Pradesh	254	101	2893	4.61	530	1049	157523	8.15
24	Uttarakhand	87	362	412	-	214	1771	23851	5.02
25	West Bengal	137	38744	318786	4.47	112	7	180374	0.3
26	A & N Islands					6	-	-	-
27	Puducherry	-	7	1	n	-	-	346	0.01
	Total	1676	128902	1359726	47.134	2069	43342	1013539	33.0914

n: Negligible

- ot available

(P) : Provisional

cont...

Table 3.8.2 : State wise details of damage due to cyclonic storms/heavy rains /floods/landslides etc.

S.No.	State/UT	2011 -12(P)				2012 -13(P)			
		No. of Human lives lost	No. of Cattle heads lost	No. of Houses damaged	Cropped area affected (lakh hectares)	No. of Human lives lost	No. of Cattle heads lost	No. of Houses damaged	Cropped area affected (lakh hectares)
1	2	3	4	5	6	7	8	9	10
1	Andhra Pradesh	0	0	0	0	61	1858	30973	8.37
2	Arunachal Pradesh	0	0	0	0	68	891	1819	0.13
3	Assam	13	-	277	4.17	168	9921	531186	3.28
4	Bihar	37	-	1603	-	8	-	1713	0.08
5	Chhattisgarh	0	0	0	0	5	65	-	-
6	Gujarat	53	175	4734	-	26	67	2676	-
7	Goa	1	-	134	n	1	2	34	-
8	Himachal Pradesh	51	2374	10838	1.56	29	127	2411	1.57
9	Karnataka	84	51	419	-				
10	Kerala	152	531	14222	1.18	47	619	2455	0.172
11	Maharashtra	106	-	-	-				
12	Nagaland	0	0	0	0	-	2560	849	0.073
13	Odisha	87	1493	290780	4.19	4	-	522	0.02
14	Punjab	14	4	26	-	8	3034	149	0.0271
15	Sikkim	77*	1333	23903	0.14	47	105	2780	0.1
16	Tamil Nadu	57	669	99904	2.1	15	90	4831**	0.173
17	Uttar Pradesh	692	268	22858	5.25	17	-	1344	0.04326
18	Uttarakhand	19	10	107	-	201	705	5569	0.3854
19	West Bengal	79*	33	317481	0.09	241	4234	77981	0.02148
20	Puducherry	8	35	4	0.17	-	15	27	-
	Total	1530	6976	787290	18.85	946	24293	667319	14.45

Source: Annual Report 2011-12 & 2012-13 Ministry of Home Affairs

Concluded

n: Negligible

- : Not available

(P) : Provisional

0 : not affected

* This includes 60 lives lost in Sikkim, 11 lives lost in West Bengal and 10 lives lost in Bihar due to earthquake of 18.09.2011.

** This includes 4,693 no. of huts.

Table 3.8.3: Distribution of deaths by natural disasters in India 2000-2012

Sl.No	Causes	2000		2001		2002		2003		2004		2005		2006	
		Number of Deaths	% to total deaths	Number of Deaths	% to total deaths	Number of Deaths	% to total deaths	Number of Deaths	% to total deaths	Number of Deaths	% to total deaths	Number of Deaths	% to total deaths	Number of Deaths	% to total deaths
1	Avalanche	13	0.25	55	0.32	47	0.97	70	1.47	9	0.15	238	2.90	18	0.32
2	Cold and Exposure	762	14.44	641	3.69	525	10.89	835	17.57	570	9.43	646	7.86	694	12.25
3	Cyclone/tornado	115	2.18	93	0.54	62	1.29	120	2.53	1512	25.01	1438	17.49	96	1.70
4	Earthquake	1	0.02	13702	78.87	5	0.10	6	0.13	44	0.73	724	8.81	8	0.14
5	Epidemic	102	1.93	103	0.59	64	1.33	78	1.64	69	1.14	103	1.25	76	1.34
6	Flood	1863	35.31	399	2.30	484	10.04	453	9.53	754	12.47	785	9.55	1097	19.37
7	Heat Stroke	534	10.12	505	2.91	720	14.93	807	16.98	756	12.50	1075	13.08	754	13.31
8	Landslide	264	5.00	254	1.46	235	4.87	334	7.03	357	5.90	590	7.18	274	4.84
9	Lightening	1472	27.90	1507	8.67	1383	28.69	1792	37.71	1842	30.47	2064	25.11	2387	42.15
10	Torrential Rains	150	2.84	114	0.66	1296	26.88	257	5.41	133	2.20	557	6.78	259	4.57
	Total	5276	100.00	17373	100.00	4821	100.00	4752	100.00	6046	100.00	8220	100.00	5663	100.00

cont...

Table 3.8.3: Distribution of deaths by natural disasters in India 2000-2012

Sl.No	Causes	2007		2008		2009		2010		2011		2012	
		Number of Deaths	% to total deaths	Number of Deaths	% to total deaths	Number of Deaths	% to total deaths	Number of Deaths	% to total deaths	Number of Deaths	% to total deaths	Number of Deaths	% to total deaths
		33	0.51	47	0.84	22	0.41	45	0.69	60	1.07	40	0.73
1	Avalanche	802	12.35	836	14.98	742	13.73	937	14.45	849	15.10	997	18.12
2	Cold and Exposure	118	1.82	99	1.77	128	2.37	106	1.63	117	2.08	47	0.85
3	Cyclone/tornado	14	0.22	6	0.11	2	0.04	8	0.12	69	1.23	3	0.05
4	Earthquake	47	0.72	73	1.31	75	1.39	57	0.88	127	2.26		0.00
5	Epidemic	1348	20.75	861	15.43	726	13.43	965	14.88	585	10.41	420	7.63
6	Flood	932	14.35	616	11.04	1071	19.81	1274	19.65	793	14.11	1247	22.66
7	Heat Stroke	312	4.80	340	6.09	394	7.29	347	5.35	302	5.37	282	5.13
8	Landslide	2790	42.95	2553	45.76	2113	39.09	2622	40.44	2550	45.36	2263	41.13
9	Lightening	100	1.54	148	2.65	132	2.44	123	1.90	170	3.02	203	3.69
10	Torrential Rains	6496	100.00	5579	100.00	5405	100.00	6484	100.00	5622	100.00	5502	100.00
	Total	Source: National Crime Record Bureau, Ministry of Home Affairs										concluded	

Table 3.8.4 : Number of heat waves in India

Sl.No.	State	Epochs				
		1911-67	1968-77	1978-99	2000-2009	1911-2009
1	West Bengal	31	2	28	6	67
2	Bihar	76	9	28	4	117
3	Uttar Pradesh	105	6	23	-	134
4	Rajasthan	27	3	42	14	86
5	Gujarat, Saurashtra & Kutch	43	1	7	2	53
6	Punjab	-	2	-	6	8
7	Himachal Pradesh	-	1	-	1	2
8	Jammu & Kashmir	-	-	-	-	-
9	Maharashtra	26	5	35	12	78
10	Madhya Pradesh	32	4	15	5	56
11	Odisha	25	8	18	22	73
12	Andhra Pradesh	21	-	3	2	26
13	Assam	-	4	19	-	23
14	Haryana, Delhi & Chandigarh	-	1	2	2	5
15	Tamil Nadu	5	-	2	1	8
16	Karnataka	0	-	-	1	1

Source: IMD Disastrous weather Events annual report; EMDAT (reproduced from 'MHA Report Disaster Management in India-2011')

Note : Epoch is referred as number of events.

Table 3.8.5: Number of cold waves in India

Sl.No.	State	Epochs					
		1901-10	1911-67	1968-77	1978-99	2000-2009	1901-2009
1	West Bengal	2	14	3	28	7	54
2	Bihar	7	27	8	67	12	121
3	Uttar Pradesh	21	51	8	47	13	140
4	Rajasthan	11	124	7	53	12	207
5	Gujarat, Saurashtra & Kutch	2	85	6	6		99
6	Punjab	3	34	4	19	10	70
7	Himachal Pradesh	-	-	4	18	4	26
8	Jammu & Kashmir	1	189	6	15	2	213
9	Maharashtra	-	60	4	18	1	83
10	Madhya Pradesh	9	88	7	12	1	117
11	Odisha	4	5	-	-	3	15
12	Andhra Pradesh	2	-	--	-	-	2
13	Assam	1	1	-	-	2	4
14	Haryana, Delhi & Chandigarh	-	-	4	15	15	34
15	Tamil Nadu	-	-	-	-	-	-
16	Karnataka	-	10	-	-	-	10
17	Jharkhand	-	-	-	-	1	1

Source: IMD Disastrous weather Events annual report; EMDAT (reproduced from MHA Report ' Disaster Management in India-2011')

Note : Epoch is referred as number of events.

Table 3.8.6 : Deaths due to heat waves in India (1979- 2008)	
Year	No. of Deaths
1979	361
1980	156
1981	72
1982	16
1983	182
1984	58
1985	142
1986	156
1987	91
1988	637
1989	44
1990	2
1991	252
1992	114
1993	42
1994	434
1995	412
1996	20
1997	20
1998	1662
1999	126
2000	57
2001	70
2002	806
2003	1539
2004	117
2005	587
2006	135
2007	476
2008	294
Source: IMD ; ' Disaster Management in India-2011', Ministry of Home Affairs	

Table 3.8.7: Drought years with percentage area of the country effected by drought

Sl. No.	Year	Moderate drought (%)	Severe drought (%)	Total (%)
1	1877	30.6	28.9	59.5
2	1891	22.4	0.3	22.7
3	1899	44.1	24.3	68.4
4	1901	19.3	10.7	30.0
5	1904	17.5	16.9	34.4
6	1905	25.2	12.0	37.2
7	1907	27.9	1.2	29.1
8	1911	13.0	15.4	28.4
9	1913	24.5	0.0	24.5
10	1915	18.8	3.4	22.2
11	1918	44.3	25.7	70.0
12	1920	35.7	2.3	38.0
13	1925	21.1	0.0	21.1
14	1939	17.8	10.7	28.5
15	1941	35.5	0.0	35.5
16	1951	35.1	0.0	35.1
17	1965	38.3	0.0	38.3
18	1966	35.4	0.0	35.4
19	1968	22.0	0.0	21.9
20	1972	36.6	3.8	40.4
21	1974	27.1	6.9	34.0
22	1979	33.0	1.8	34.8
23	1982	29.1	0.0	29.1
24	1985	25.6	16.7	42.3
25	1987	29.8	17.9	47.7
26	2002	19.0	10.0	29.0
27	2009	32.5	13.5	46.0

Source: IMD ; Disaster Management in India-2011, Ministry of Home Affairs

Definitions of Drought

There is no universally accepted definition of drought. However, drought is broadly perceived in three different ways :

- i. Meteorological drought: When actual rainfall over an area is significantly less than the climatological mean.
- ii. Hydrological drought: When there is marked depletion of surface water causing very low stream flow and drying of lakes, reservoirs and rivers.
- iii. Agricultural drought: When inadequate soil moisture produces acute crop stress and affects productivity.

Meteorological drought need not necessarily result in agricultural drought, since timely rainfall during critical crop phases may save the crop, or irrigation water may be available. However, rainfall being the ultimate source of water, in the event of an extreme rainfall deficiency, its agricultural and hydrological impacts are inevitable.

It is common for drought conditions to exist on a sub-division or district level even when the monsoon is normal for the country as a whole. For such small areas, IMD defines a moderate meteorological drought when the rainfall is 26-50% below normal and a severe meteorological drought when it is more than 50% below normal.

When the rainfall deficiency for the country as a whole is more than 10% of normal and more than 20% of the country's area is affected by drought conditions, the situation is defined as an all-India drought year.

Source: <http://www.imd.gov.in/section/nhad/dynamic/mid1.htm>

Table: 3.8.9 : Number of cyclonic storms/severe cyclonic storms formed over the North Indian Ocean

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1951	0	0	0	1	0	0	1	0	0	0	1	1	4
1952	0	0	0	0	1	0	1	0	0	0	2	0	4
1953	0	0	0	1	0	0	0	1	0	0	0	0	2
1954	0	0	0	0	0	0	0	0	1	0	0	1	2
1955	0	0	0	0	1	0	0	0	2	1	2	0	6
1956	0	0	0	1	1	1	0	0	0	1	0	0	4
1957	0	0	0	0	0	0	0	1	0	0	1	1	3
1958	0	0	0	0	1	0	0	0	0	2	2	0	5
1959	0	0	0	0	1	2	1	0	1	1	0	0	6
1960	0	0	0	0	2	0	0	0	0	2	1	0	5
1961	0	0	0	0	3	1	0	0	1	0	0	0	5
1962	0	0	0	0	1	0	0	0	1	1	1	1	5
1963	0	0	0	0	2	0	0	0	0	3	0	1	6
1964	0	0	0	0	1	1	0	1	0	0	3	1	7
1965	0	0	0	0	2	0	0	0	0	0	1	3	6
1966	0	0	0	1	0	0	0	0	2	0	4	1	8
1967	1	0	0	0	1	0	0	0	0	3	0	1	6
1968	0	0	0	0	1	0	0	0	2	1	2	1	7
1969	0	0	0	0	1	0	0	1	0	2	1	1	6
1970	0	0	0	0	2	1	0	0	1	1	2	0	7
1971	0	0	0	0	1	1	0	0	1	2	1	1	7
1972	0	0	0	1	0	0	1	0	2	1	1	1	7
1973	0	0	0	0	0	1	1	0	0	1	2	1	6
1974	0	0	0	1	1	1	0	1	2	0	1	0	7
1975	0	0	0	0	2	1	0	0	0	1	3	0	7
1976	0	0	0	0	2	0	0	0	2	2	2	1	9
1977	0	0	0	0	1	1	0	0	0	1	3	0	6
1978	0	0	0	0	1	0	0	1	0	1	2	0	5
1979	0	0	0	0	1	1	0	1	1	0	1	0	5
1980	0	0	0	0	0	0	0	0	0	1	0	2	3
1981	0	0	0	0	0	0	0	1	1	1	2	1	6
1982	0	0	0	0	2	0	0	0	0	2	1	0	5
1983	0	0	0	0	0	0	0	0	0	2	1	0	3
1984	0	0	0	0	0	0	0	0	0	1	2	0	3
1985	0	0	0	0	2	0	0	0	1	2	1	1	7
1986	0	0	0	0	0	0	0	0	0	0	1	0	1
1987	1	0	0	0	0	1	0	0	0	1	2	0	5
1988	0	0	0	0	0	0	0	0	0	1	2	0	3
1989	0	0	0	0	1	0	1	0	0	0	1	0	3
1990	0	0	0	0	1	0	0	0	0	0	0	1	2
1991	0	0	0	1	1	0	0	0	0	0	1	0	3
1992	0	0	0	0	1	1	0	0	0	1	3	0	6
1993	0	0	0	0	0	0	0	0	0	0	1	1	2
1994	0	0	0	0	1	1	0	0	0	1	1	0	4
1995	0	0	0	0	0	0	0	0	0	1	2	0	3
1996	0	0	0	0	0	2	0	0	0	1	1	1	5
1997	0	0	0	0	1	0	0	0	1	0	1	0	3
1998	0	0	0	0	1	1	0	0	0	1	2	1	6
1999	0	1	0	0	1	0	0	0	0	2	0	0	4
2000	0	0	1	0	0	0	0	0	0	1	1	1	4
2001	0	0	0	0	1	0	0	0	1	2	0	0	4
2002	0	0	0	0	0	0	0	0	0	0	2	0	2
2003	0	0	0	0	1	0	0	0	0	0	1	1	3
2004	0	0	0	0	2	0	0	0	0	1	0	1	4
2005	1	0	0	0	0	0	0	0	1	0	1	1	4
2006	0	0	0	1	0	0	0	0	1	1	0	0	3
2007	0	0	0	0	1	2	0	0	0	0	1	0	4
2008	0	0	0	1	0	0	0	0	0	1	2	0	4
2009	0	0	0	1	1	0	0	0	0	0	1	1	4
2010	0	0	0	0	1	1	0	0	0	1	1	0	4
2011	0	0	0	0	0	0	0	0	0	0	1	1	2
2012	0	0	0	0	0	0	0	0	0	2	0	0	2

Source: Indian Meteorology Department, Ministry of Earth and Science , May 2013

4.1 Climate Change Mitigation and Adaptation

Climate change mitigation are actions to limit the magnitude and/or rate of long-term climate change. Climate change mitigation generally involves reductions in human (anthropogenic) emissions of greenhouse gases (GHGs). Mitigation may also be achieved by increasing the capacity of carbon sinks, e.g., through reforestation. By contrast, adaptation to global warming are actions taken to manage the eventual (or unavoidable) impacts of global warming, e.g., by building dikes in response to sea level rise. Examples of mitigation include switching to low-carbon energy sources, such as renewable and nuclear energy, and expanding forests and other "sinks" to remove greater amounts of carbon dioxide from the atmosphere. Energy efficiency can also play a major role, for example, through improving the insulation of buildings. Another approach to climate change mitigation is geoengineering.

The framework for statistics related to climate change included the following variables/ indicators .

Solar Energy

Solar Cells

Solar Lanterns

Solar Water Heater

Solar Electricity Generation Plants and Capacity

Energy Use

(i) Use of fuel like Condensed Natural Gas(CNG), Liquid Petroleum Gas (LPG)

(ii) Industries adopted fuel efficient technologies

(iii) Use of Compact Fluorescent Light (CFL)

Dry-land Agriculture

Crop Varieties for drought prone areas

Varieties of pest-resistant crops

Afforestation

Forest Cover/Area

The following chapters and tables are included.

4.1 Renewable Energy

4.1.1 State-wise cumulative installations of Solar Photovoltaic Systems

4.1.2 State wise details of Small hydro power projects (upto 25 MW) set up & under implementation (as on 31.03.2012)

4.1.3 Distribution of family- type biogas plants (number of installations)

4.1.4 State- wise break-up of the energy parks and energy clubs as on 31.03.2012

4.1.5 Source wise and State wise estimated potential of renewable power in India (In Mega Watts as on 31.03.2012)

4.2 Energy use

4.2.1 State-wise installed capacity of grid interactive renewable power as on 31st March 2013

4.3 Dry Land Agriculture

- 4.3.1 Categorization of blocks/mandals/talukas in India for ground water development as on 31st March, 2009
- 4.3.2 State wise area (in Hectares) under organic farming (Registered under accredited certification bodies) for the year 2010-11
- 4.3.3 State wise area (in ha) under organic certification (including wild harvest) 2011-12
- 4.3.4 Commodity-wise production details of top ten products (2011-12) (in metric tonnes)
- 4.3.5 Category wise production of certified organic products for the year 2010-2011 (in metric tonnes)
- 4.3.6 State wise details of different organic manures produced/available (lakh mt) (2011-12)
- 4.3.7 Biofertilizer production in India during the period from 2008-09 to 2011-12
- 4.3.8 State wise production of various Biofertilisers during 2011-12 (in metric tonnes)
- 4.3.9 Drought tolerant varieties of field crops

4.4 Afforestation

- 4.4.1 State-Wise releases under centrally sponsored schemes for protection of environment (in Rs crores)
- 4.4.2 National afforestation programme (NAP)
- 4.4.3 State-wise details of the protected area network in India.
- 4.4.4 Progress of afforestation through successive plans

4.5 Quality Standards

- 4.5.1 National ambient air quality standards (NAAQS)
- 4.5.2 Criteria for direct disposal of hazardous waste into secured landfill
- 4.5.3 Primary water quality criteria
- 4.5.4 Biological water quality criteria (BWQC)
- 4.5.5 Exhaust emission standards for Indian Automobiles

Data Sources

Annual Reports, Ministry of New And Renewable Energy(MNRE)
Annual Reports ,Central Ground Water Board.
National Center of Organic Farming, Department of Agriculture & Cooperation, Ministry of Agriculture.
National Bureau of Soil Survey and Land Use Planning (ICAR) Nagpur.
National Afforestation & Eco-Development Board, Ministry of Environment and Forests
Annual Reports, Ministry of Environment & Forests
CPCB-2010, Hazardous waste management series/2010-11
Central Pollution Control Board for quality standards

Table 4.1.1 :State-wise Cumulative Installations of Solar Photovoltaic Systems

S. No.	State/UT	Solar photovoltaic systems (numbers)				Power plant kWp (kilowatt peak)	
		Lanterns	Home lights	Street lights	Pumps	Stands alone power plant	Grid connected
1	Andaman & Nicobar	6296	405	358	5	167	100
2	Andhra Pradesh	35799	1958	4044	15	238.94	100
3	Arunachal Pradesh	13937	9120	1071	15	17.1	25
4	Assam	1211	5870	98	15	9	0
5	Bihar	50297	3170	955	139	0	0
6	Chandigarh	1675	275	229	12	0	0
7	Chhattisgarh	3192	7211	1889	166	371.72	0
8	Delhi	4753	0	301	89	80	2143
9	Goa	1027	362	463	15	1.72	5000
10	Gujarat	31603	9231	2004	85	336	0
11	Haryana	73116	37416	10858	469	434.4	0
12	Himachal Pradesh	22970	16848	2994	6	1.5	0
13	Jammu & Kashmir	28672	23083	5596	39	175.6	0
14	Jharkhand	16374	4905	620	0	0	0
15	Karnataka	7334	29894	2694	551	29.41	6000
16	Kerala	41181	32326	1090	810	44.7	25
17	Lakshadweep	0	0	0	0	85	750
18	Madhya Pradesh	9444	2651	6054	87	22.4	100
19	Maharashtra	68683	2072	5471	228	6.44	1000
20	Manipur	4787	3500	490	40	28	0
21	Meghalaya	24875	7840	1273	19	50.5	0
22	Mizoram	8331	5395	431	37	109	0
23	Nagaland	6317	720	271	3	6	0
24	Odisha	9882	5156	5819	56	74.515	0
25	Puducherry	1637	25	417	21	0	25
26	Punjab	17495	8620	4737	1857	121	1325
27	Rajasthan	4716	91754	6722	283	990	7450
28	Sikkim	2470	3890	212	0	16.7	5000
29	Tamil Nadu	16818	1557	5885	829	39.5	50
30	Tripura	42360	26066	1199	151	24.57	0
31	Uttar Pradesh	52815	102041	4117	751	129.2	375
32	Uttarakhand	64023	91307	7673	26	80.03	50
33	West Bengal	17662	111090	27512	48	675	1150
Source: India Energy Book 2012							

TABLE 4.1.2 : State wise Details of Small Hydro Power Projects (upto 25 MW) Setup & Under Implementation (as on 31.03.2012)

Sr. No	States	Projects set-up		Project under Implementation	
		No	Capacity (MegaWatt)	No	Capacity (MegaWatt)
1	Andhra Pradesh	64	192.63	18	62.05
2	Arunachal Pradesh	104	79.54	117	46.97
3	Assam	5	31.11	4	15.00
4	Bihar	21	61.30	7	22.60
5	Chhattisgarh	7	20.25	6	147.00
6	Goa	1	0.05	-	-
7	Gujarat	5	15.60	-	-
8	Haryana	7	70.10	2	3.40
9	Himachal Pradesh	132	481.37	28	106.85
10	Jammu & Kashmir	35	130.59	5	6.65
11	Jharkhand	6	4.05	8	34.85
12	Karnataka	127	879.25	13	126.18
13	Kerala	22	143.17	12	59.25
14	Madhya Pradesh	11	86.16	3	4.90
15	Maharashtra	45	281.33	21	7.00
16	Manipur	8	5.45	3	2.75
17	Meghalaya	4	31.03	3	1.70
18	Mizoram	18	36.47	1	0.50
19	Nagaland	10	28.67	4	4.20
20	Odisha	9	64.30	4	3.60
21	Punjab	46	154.50	12	21.15
22	Rajasthan	10	23.85	-	-
23	Sikkim	17	52.11	1	0.20
24	Tamil Nadu	20	111.69	-	18.00
25	Tripura	3	16.01	-	-
26	Uttar Pradesh	9	25.10	-	-
27	Uttarakhand	98	170.82	49	193.25
28	West Bengal	23	98.40	17	84.25
29	Andaman and Nicobar Islands	1	5.25	-	-
Total		868	3300.15	338	972.30

Source: Ministry of New And Renewable Energy

TABLE 4.1.3: Distribution of Family- Type biogas plants (number of installations)

Sl. No.	State/UT	Estimated Potential	Cumulative Achievement as on 31-03-2011	Achievements during 2011-12		Achievement till 31.03.2012
				Target	Achs.	
1	2	3	4	5		6
1	Andhra Pradesh	1065000	474213	16000	15346	489559
2	Arunachal Pradesh	7500	3132	100	150	3282
3	Assam	307000	88324	4900	6885	95209
4	Bihar	733000	126238	1000	3285	129523
5	Goa	8000	3911	50	65	3976
6	Gujarat	554000	418055	7000	2631	420686
7	Haryana	300000	55462	1700	1819	57281
8	Himachal Pradesh	125000	46161	500	426	46587
9	Jammu & Kashmir	128000	2603	200	136	2739
10	Karnataka	680000	433223	13000	12363	445586
11	Kerala	150000	130404	2600	3483	133887
12	Madhya Pradesh	1491000	312322	14000	12415	324737
13	Maharashtra	897000	801983	13000	22220	824203
14	Manipur	38000	2128	50	0	2128
15	Meghalaya	24000	7936	1000	1390	9326
16	Mizoram	5000	3920	200	100	4020
17	Nagaland	6700	5324	1000	1325	6649
18	Odisha	605000	245868	7000	7186	253054
19	Punjab	411000	128989	18000	14173	143162
20	Rajasthan	915000	67623	500	498	68121
21	Sikkim	7300	7691	200	635	8326
22	Tamil Nadu	615000	218009	1000	1383	219392
23	Tripura	28000	2882	200	117	2999
24	Uttar Pradesh	1938000	426872	5000	4759	431631
25	West Bengal	695000	335510	16000	19986	355496
	Union Territory					
26	Andaman and Nicobar Islands	2200	137		0	137
27	Chandigarh	1400	97		0	97
28	Dadra and Nagar Haveli	2000	169		0	169
29	Delhi	12900	680		1	681
30	Puducherry	4300	578	100	0	578
31	Chhattisgarh	400000	35882	4000	4779	40661
32	Jharkhand	100000	5846	500	750	6596
33	Uttaranchal	83000	12590	2000	2114	14704
	Total	12339300	4404762	130800	140420	4545182
Source : Annual Report 2011-12, Ministry of New and Renewable Energy						

**Table 4.1.4: State- wise break-up of the energy parks and energy clubs as on
31.03.2012**

No.	State/UT	Energy Parks (No.)		Renewable Energy Clubs (No.)
		District Level	State Level	
1	Andhra Pradesh	27	1	40
2	Arunachal Pradesh	6	1	-
3	Assam	22	1	-
4	Bihar	11	-	6
5	Chhattisgarh	15	2	8
6	Delhi	8	1	-
7	Goa	2	1	1
8	Gujarat	14	1	27
9	Haryana	21	1	14
10	Himachal Pradesh	9	2	2
11	Jammu & Kashmir	15	1	3
12	Jharkhand	7	1	-
13	Karnataka	34	1	89
14	Kerala	16	1	-
15	Madhya Pradesh	27		31
16	Maharashtra	52	1	66
17	Manipur	10		-
18	Meghalaya	7	1	
19	Mizoram	7	1	
20	Nagaland	6	1	
21	Odisha	11	1	13
22	Punjab	20	1	15
23	Rajasthan	12		10
24	Sikkim	7	1	
25	Tamil Nadu	21	1	124
26	Tripura	9	1	8
27	Uttar Pradesh	56	1	64
28	Uttarakhand	11	1	
29	West Bengal	11	1	24
30	A&N Islands	5	1	
31	Chandigarh	3	1	4
32	Puducherry	2	1	5
	Total	484	30	554

Source : Annual Report , Ministry of New and Renewable Energy

Energy Park scheme

The Renewable Energy Park Scheme was started in 1994-95 under the Special Area Demonstration Programme. The main objective of the Renewable Energy Park Scheme is to create awareness, publicity and provide an opportunity to the students / teachers and rural and urban masses about the use and benefits of the renewable energy by demonstrating new and renewable energy systems and devices by demonstrating working systems, cut models, LED models, blow ups etc.

Two types of Renewable Energy Parks are being supported under this scheme namely District Level Renewable Energy Parks(DLEP) and State Level Renewable Energy Parks(SLEP). DLEPs are set up at Educational Institutions, Krishi Vigyan Kendras, Registered Consumer Forums, registered NGOs with facilities for Science and Environment Education and public places where there is large inflow of public. SLEP is set up in a State at a location where large flow of people and tourists takes place every day.

(i) State Level Energy Park

Two State level Energy Park would be considered for setting up in each State. The State level Energy Park would be established by the State Nodal Agency or departments either by the Agency themselves or through a Memorandum of Understanding with any reputed Government institution/organization.

(ii) District Level Energy Parks

The Ministry has so far sanctioned 484 District Level Energy Parks. The component of DLEPs from the existing scheme has been discontinued. The sanctioned parks are being completed.

Source : <http://mnre.gov.in/schemes/support-programmes/special-area-demonstration-project-programme/>

Renewable Energy Clubs

9.20 A scheme has been evolved to promote the study of renewable energy through the setting up of Renewable Energy Clubs (REC) in AICTE recognized/ approved Engineering Colleges/ Technology Institutions all over the country. The financial assistance of Rs.25000 per annum is provided by the Ministry for these RECs. 554 such Clubs have been set up so far.

Source: http://mnre.gov.in/file-manager/annual-report/2007-2008/EN/Chapter%209/chapter%209_1.htm

Table 4.1.5: Sourcewise and State wise estimated potential of Renewable Power in India in Mega Watts (as on 31.03.2012)

States/ UTs	Wind Power	Small Hydro Power	Biomass Power	Cogeneration bagasse	Waste to Energy	Estimated Reverses	Distribution (%)
Andhra Pradesh	5394	560	578	300	123	6955	7.75
Arunachal Pradesh	201	1334	8	0	0	1543	1.72
Assam	53	239	212	0	8	512	0.57
Bihar	0	213	619	300	73	1205	1.34
Chhattisgarh	23	993	236	0	24	1276	1.42
Goa	0	7	26	0	0	33	0.04
Gujarat	10609	197	1221	350	112	12489	13.91
Haryana	0	110	1333	350	24	1817	2.02
Himachal Pradesh	20	2268	142	0	2	2432	2.71
Jammu & Kashmir	5311	1418	43	0	0	6772	7.54
Jharkhand	0	209	90	0	10	309	0.34
Karnataka	8591	748	1131	450	151	11071	12.33
Kerala	790	704	1044	0	36	2574	2.87
Madhya Pradesh	920	804	1364	0	78	3166	3.53
Maharashtra	5439	733	1887	1250	287	9596	10.69
Manipur	7	109	13	0	2	131	0.15
Meghalaya	44	230	11	0	2	287	0.32
Mizoram	0	167	1	0	2	170	0.19
Nagaland	3	197	10	0	0	210	0.23
Odisha	910	295	246	0	22	1473	1.64
Punjab	0	393	3172	300	45	3910	4.36
Rajasthan	5005	57	1039	0	62	6163	6.87
Sikkim		266	2	0	0	366	0.41
Tamil Nadu	98	660	1070	450	151	7705	8.58
Tripura	5374	47	3	0	2	52	0.06
Uttar Pradesh	0	461	1617	1250	176	3641	4.06
Uttaranchal	137	1577	24	0	5	1767	1.97
West Bengal	161	396	396	0	148	962	1.07
Andaman & Nicobar	22	7	0	0	0	9	0.01
Chandigarh	2	0	0	0	6	6	0.01
Dadar & Nagar Haveli	0	0	0	0	0	0	0
Daman & Diu	0	0	0	0	0	0	0
Delhi	0	0	0	0	131	131	0.15
Lakshadweep	16	0	0	0	0	16	0.02
Puducherry	0	0	0	0	3	3	0
All India Total	49130	15399	17538	5000	2707	89774	
Distribution (%)	54.73	17.15	19.54	5.57	3.02	100.00	100.00

Source: Ministry of New and Renewable Energy

Table 4.2.1 :State-wise Installed Capacity of Grid Interactive Renewable Power (As On 31st March 2013)

States / UTs	Small Hydro Power (MW)	Wind Power (MW)	Bio-Power-BM Power/Cogen(MW)	Bio-Power-Waste to Energy (MW)	Solar Power (MWp)	Total Capacity (MW)
Andhra Pradesh	219.03	447.65	380.75	43.16	23.35	1113.94
Arunachal Pradesh	103.91	NA	NA	NA	0.03	103.93
Assam	31.11	NA	NA	NA	NA	31.11
Bihar	70.70	NA	43.30	NA	NA	114.00
Chhattisgarh	52.00	NA	249.90	NA	4.00	305.90
Goa	0.05	NA	NA	NA	NA	0.05
Gujarat	15.60	3174.58	30.50	NA	857.90	4078.58
Haryana	70.10	NA	45.30	NA	7.80	123.20
Himachal Pradesh	587.91	NA	NA	NA	NA	587.91
Jammu & Kashmir	130.53	NA	NA	NA	NA	130.53
Jharkhand	4.05	NA	NA	NA	16.00	20.05
Karnataka	963.76	2135.15	491.38	1.00	14.00	3605.29
Kerala	158.42	35.10	NA	NA	0.03	193.55
Madhya Pradesh	86.16	386.00	16.00	3.90	37.32	529.38
Maharashtra	299.93	3021.85	756.90	9.72	100.00	4188.40
Manipur	5.45	NA	NA	NA	NA	5.45
Meghalaya	31.03	NA	NA	NA	NA	31.03
Mizoram	36.47	NA	NA	NA	NA	36.47
Nagaland	28.67	NA	NA	NA	NA	28.67
Odisha	64.30	NA	20.00	NA	13.00	97.30
Punjab	154.50	NA	124.50	9.25	9.33	297.58
Rajasthan	23.85	2684.65	91.30	NA	552.90	3352.70
Sikkim	52.11	NA	NA	NA	NA	52.11
Tamil Nadu	123.05	7162.18	538.70	8.05	17.11	7849.09
Tripura	16.01	NA	NA	NA	NA	16.01
Uttar Pradesh	25.10	NA	776.50	5.00	17.38	823.98
Uttarakhand	174.82	NA	10.00	NA	5.05	189.87
West Bengal	98.40	NA	26.00	NA	2.05	126.45
Andaman & Nicobar	5.25	NA	NA	NA	5.10	10.35
Chandigarh	NA	NA	NA	NA	NA	0.00
Dadar & Nagar Haveli	NA	NA	NA	NA	NA	0.00
Daman & Diu	NA	NA	NA	NA	NA	0.00
Delhi	NA	NA	NA	16.00	2.56	18.56
Lakshawadeep	NA	NA	NA	NA	0.75	0.75
Puducherry	NA	NA	NA	NA	0.03	0.03
Total(MW)	3632.25	19051.46	3601.03	96.08	1686.44	28067.26

Source: Ministry of New and Renewable Energy ; NA: Not Available; MW: Mega-Watt; MWp: Mega-Watt Peak

Note: This table gives state-wise installed capacity of Grid Interactive Renewable Power for Solar, Wind, Small Hydro and Biomass as on 31st March 2013.

Table 4.3.1: Categorization of blocks/mandals/talukas in India for ground water development (As on 31st March 2009)

State	Total No of Assessed Unit	Safe		Semi-critical		Critical		Over-exploited		Remarks
		Nos.	%	Nos.	%	Nos.	%	Nos.	%	
Andhra Pradesh	1108	867	78	93	8	26	2	84	8	38- Salinity Affected
Arunachal	16	16	100	0	0	0	0	0	0	
Assam	23	23	100	0	0	0	0	0	0	
Bihar	533	529	99	4	1	0	0	0	0	
Chhattisgarh	146	132	90	14	10	0	0	0	0	
Delhi	27	2	7	5	19	0	0	20	74	
Goa	11	11	100	0	0	0	0	0	0	
Gujarat	223	156	70	20	9	6	3	27	12	14-Salinity Affected
Haryana	116	18	16	9	8	21	18	68	59	
Himachal Pradesh	8	6	75	0	0	1	13	1	13	
Jammu & Kashmir	14	14	100	0	0	0	0	0	0	
Jharkhand	208	200	96	2	1	2	1	4	2	
Karnataka	270	154	57	34	13	11	4	71	26	
Kerala	152	126	83	22	14	3	2	1	1	
Madhya Pradesh	313	224	72	61	19	4	1	24	8	
Maharashtra	353	324	92	19	5	1	0	9	3	
Manipur	8	8	100	0	0	0	0	0	0	
Meghalaya	7	7	100	0	0	0	0	0	0	
Mizoram	22	22	100	0	0	0	0	0	0	
Nagaland	8	8	100	0	0	0	0	0	0	
Odisha	314	308	98	0	0	0	0	0	0	6 - Salinity Affected
Punjab	138	23	17	2	1	3	2	110	80	
Rajasthan	239	31	13	16	7	25	10	166	69	1 - Salinity Affected
Sikkim	4	4	100	0	0	0	0	0	0	
Tamil Nadu	386	136	35	67	17	33	9	139	36	11 - Salinity Affected
Tripura	39	39	100	0	0	0	0	0	0	
Uttar Pradesh	820	605	74	107	13	32	4	76	9	
Uttarakhand	17	11	65	5	29	1	6	0	0	
West Bengal	269	231	86	38	14	0	0	0	0	
Total States	5792	4235	73	518	9	169	3	800	14	
Andaman & Nicobar	33	33	100	0	0	0	0	0	0	
Chandigarh	1	1	100	0	0	0	0	0	0	
Dadra & Nagar Haveli	1	1	100	0	0	0	0	0	0	
Daman & Diu	2	0	0	1	50	0	0	1	50	
Lakshadweep	9	5	56	4	44	0	0	0	0	
Puducherry	4	2	50	0	0	0	0	1	25	1-Salinity Affected
Total Uts	50	42	84	5	10	0	0	2	4	
Grand Total	5842	4277	73	523	9	169	3	802	14	

Source: Central Ground Water Board, Annual Report 2010-11.

Blocks- Bihar, Chhattisgarh, Haryana, Jharkhand, Kerala, M.P., Manipur, Mizoram, Odisha, Punjab, Rajasthan, Tamil Nadu, Tripura, UP, Uttarakhand, WB, Taluks (Command/Non-Command) –Karnataka, Mandal - Andhra Pradesh

Taluks - Goa, Gujarat, Maharashtra, NCT Delhi

Districts (Valley) - Arunachal Pradesh, Assam, Himachal Pradesh, Jammu & Kashmir, Meghalaya, Manipur, Mizoram, Nagaland, Sikkim, Tripura

Islands - Lakshadweep, Andaman & Nicobar Islands

Region - Puducherry

Note: The assessment units are categorized for ground water development based on two criteria- a) stage of ground water development, and b) long term trend of pre and post monsoon water levels. The long term ground water level trends is computed generally for a period of 10 years. The significant rate of water level decline has been taken between 10 and 20 cm per year depending upon the local hydrogeological conditions. There are four categories, namely- 'Safe', 'Semi-critical', 'Critical' and 'Over exploited' areas. The criteria for categorization are given below:

Criteria for categorization of assessment unit

Stage of ground water development	Significant long term		Category
	Pre-monsoon	Post-monsoon	
<= 90%	No	No	Safe
>70% and <=100%	No	Yes	Semi-critical
>70% and <=100%	Yes	No	Semi-critical
>90% and >= 100%	Yes	Yes	Critical
>100%	No	Yes	Over-exploited
>100%	Yes	No	Over-exploited
>100%	Yes	Yes	Over-exploited

Apart from the four categories mentioned above, blocks where the entire assessment area is having poor quality ground water are demarcated as **saline blocks**.

Table 4.3.2 :State wise area(in Hectares) under organic farming (Registered under accredited certification bodies) for the year 2010-11

State/UT	Certified cultivated organic Area	In-conversion cultivated Area	Total area cultivated under certification process	Wild Area	Total cultivated+Wild
Andhra Pradesh	6070.90	6279.72	12350.62	2000.00	14350.62
Arunachal	243.09	0.00	243.09	0.00	243.09
Assam	2001.75	45.33	2047.08	0.00	2047.08
Andaman	0.00	334.68	334.68	0.00	334.68
Bihar	0.00	1303.62	1303.62	0.00	1303.62
Chhattisgarh	321.99	126.93	448.92	8000	8448.92
Daman & Diu	0.00	0.00	0.00	0.00	0.00
Delhi	127.50	138.82	266.32	0.00	266.32
Goa	13044.65	259.05	13303.70	0.00	13303.70
Gujarat	42267.48	6251.43	48518.91	0.00	48518.91
Haryana	2343.05	12420.54	14763.59	0.00	14763.59
Himachal Pradesh	2265.46	1781.41	4046.87	627855.12	631901.99
J&K	640.50	135.97	776.47	0.00	776.47
Karnataka	9128.01	10400.63	19528.64	69200.00	88728.64
Kerala	3870.27	2727.37	6597.64	0.00	6597.64
Lakshadweep	0.00	12.13	12.13	0.00	12.13
Madhya Pradesh	270955.69	27407.17	298362.86	2568209.00	2866571.86
Jharkhand	0.00	0.00	0.00	24300.00	24300.00
Maharashtra	124547.03	50298.44	174845.47	2500.00	177345.47
Manipur	2336.72	455.30	2792.02	0.00	2792.02
Meghalaya	1564.05	855.62	2419.67	0.00	2419.67
Mizoram	4471.60	8072.53	12544.13	0.00	12544.13
Nagaland	654.00	949.54	1603.54	0.00	1603.54
Odisha	16883.73	6218.56	23102.29	1315.26	24417.54
Punjab	2118.21	3907.56	6025.77	0.00	6025.77
Rajasthan	57566.93	9145.26	66712.19	151000.00	217712.19
Sikkim	1391.03	27.30	1418.33	308.00	1726.33
Tamil Nadu	3244.61	829.98	4074.59	30803.50	34878.09
Tripura	203.56	144.83	348.39	0.00	348.39
Uttar Pradesh	17212.43	23800.40	41012.83	70632.00	111644.83
Uttarkhand	9513.76	2073.03	11586.78	93879.20	105465.98
West Bengal	5014.94	1110.78	6125.72	0.00	6125.72
Total	600002.93	177513.91	77516.85	3650002.08	4427518.92

Source: National Center of Organic Farming, Department of Agriculture & Cooperation, Ministry of Agriculture(2010-11 & 2011-12)

**Table 4.3.3: State wise area under organic certification
(including wild harvest) 2011-12**

State/UT	Area (hectares)
Andhra Pradesh	47456.77
Arunachal Pradesh	520.43
Assam	2048.27
Andaman & Nicobar	0.00
Bihar	188.60
Chhattisgarh	299970.60
Delhi	100238.70
Goa	153684.60
Gujarat	41978.94
Haryana	17442.36
Himachal Pradesh	933798.20
J&K	26834.26
Jharkhand	29794.42
Karnataka	118739.70
Kerala	15790.49
Lakshadweep	891.93
Madhya Pradesh	432129.50
Maharashtra	245339.30
Manipur	1296.91
Meghalaya	288.23
Mizoram	7023.97
Nagaland	7762.60
Odisha	43868.18
Punjab	927.28
Rajasthan	222319.10
Sikkim	25716.55
Tamil Nadu	38554.33
Tripura	4.05
Uttar Pradesh	2593821.00
Uttarakhand	122880.60
West Bengal	19095.55
Total	5550405.42

Source: National Center of Organic Farming, Department of Agriculture & Cooperation, Ministry of Agriculture(2010-11 & 2011-12)

Table 4.3.4 :Commodity-wise production details of top ten products (2011-12)

MT:Metric tonnes

Sr. No.	Product Name	Organic Production (MT)	In Conversion Production (MT)	Total Production (MT)
1	Cotton	107591	3792	111383
2	Cereals & Millets (excluding rice)	33888	6898	40786
3	Rice (Basmati & non Basmati)	17345	5329	22674
4	Pulses	12504	453	12957
5	Fruits and Vegetables	7801	427	8228
6	Tea	5272	1	5273
7	Oil Seeds excluding Soyabean	2835	15	2850
8	Coffee	1139	238	1377
9	Dry Fruits	490	32	522
10	Medicinal & Herbal Plants	189	0	189

Source: National Center of Organic Farming, Department of Agriculture & Cooperation, Ministry of Agriculture(2010-11 & 2011-12)

Table 4.3.5 :Category wise production of certified organic products for the year 2010-2011

MT:Metric tonnes

Sr. No	PRODUCTS	TOTAL PRODUCTION (M.T.)
1	Cereals (except Rice)	171684.66
2	Coffee	13122.03
3	Cotton	552388.47
4	Dry Fruits	52369.09
5	Fresh Fruits & Vegetables	335863.11
6	Medicinal & Herbal Plants	1792014.86
7	Oil Seeds	360837.17
8	Pulses	42721.61
9	Rice	176683.17
10	Spices-Condiments	129878.46
11	Tea	27684.26
12	Misc	221191.96
	TOTAL	3876438.85
		3.88 million M.T.

Source: National Center of Organic Farming, Department of Agriculture & Cooperation, Ministry of Agriculture(2010-11 & 2011-12)

Table 4.3.6 : State wise details of different organic manures produced/available (lakh mt) (2011-12)

Sl. No	State	Rural Compost	Urban Compost	Farmyard Manure	Vermicompost	Green Manuring	Other manures	Total Manure lakh MT
1	Andhra Pradesh	48	0.11	25	1.2	31.69	0	106
2	Arunachal Pradesh	0.005	0	0.002	0.0053	0	0	0.0123
3	Assam	0.95	0.55	0	1.35	0	0	2.85
4	Bihar	16.5	2.75	45	2	0	0	66.25
5	Chhattisgarh	80.3	3.15	36	2	2.7	5	129.15
6	Goa	1.57	0.022	0	0.015	2.69	0.007	4.304
7	Gujarat	0	0	358	0.5	0	5	363.5
8	Haryana	10.05	0	7.85	0.5	0	0	18.4
9	Himachal Pradesh	23	0.05	12	5.5	0	0	40.55
10	Jammu & Kashmir	12.35	0.13	9.603	0.008	0.04	0.0761	22.2071
11	Jharkhand	6.41	0.8	15.41	209.94	1.4	0.49	234.45
12	Karnataka	256.33	98.22	625.4	5.88	106.21	16.58	1108.62
13	Kerala	0.45	0.6	75	0.15	4.77	4.02	84.99
14	Madhya Pradesh	45	3.5	85.5	2	0	0	136
15	Maharashtra	0	0	0	0.17	0	0.65	0.82
16	Manipur	0	0	0.5	0	0	0	0.5
17	Meghalaya	0	0	0.045	0.036	0	0	0.081
18	Mizoram	0	0	0.004	10.57	0	0	10.574
19	Nagaland	0.06	0	0	0.0125	0.089	0	0.1615
20	Odisha	10.77	0.081	0	0.33	0.27	0.04	11.491
21	Punjab	307.5	0.08	0	0.6	33.11	0	341.29
22	Rajasthan	19.752	15.06	252.54	0.036	7.133	0	294.521
23	Sikkim	0.005	0	0	0.0008	0	0	0.0058
24	Tamil Nadu	5.02	0.56	1.29	1.48	0.02	0	8.37
25	Tripura	0	0	0	0	0	0	0
26	Uttar Pradesh	7.93	7.5	275	2.306	35.05	0	327.786
27	Uttarakhand	9.2	0.4	0	0.47	0	0.57	10.64
28	West Bengal	78.7	7.3	36.5	21.45	15.89	3	162.84
	Total	939.852	140.863	1860.644	268.5096	241.062	35.4331	3486.364

Source: National Center of Organic Farming, Department of Agriculture & Cooperation, Ministry of Agriculture(2010-11 & 2011-12)

0 : means data not provided by the State Government

Table 4.3.7 : Biofertilizer production in India during the period from 2008-09 to 2011-12

Sl. No	State	Actual production of biofertilizers in Metric Tonnes			
		2008-09	2009-10	2010-11	2011-12
1	Andhra Pradesh	168.14	1345.28	999.60	1126.35
2	Arunachal Pradesh	-	-	-	-
3	Assam	129.36	121.04	130.00	68.33
4	Bihar	-	-	136.26	75.00
5	Chhattisgarh	-	-	-	276.34
6	Delhi	1165.10	1021.85	1205.00	1617.00
7	Goa	1149.70	1309.19	6318.00	2037.35
8	Gujarat	-	0.00	443.40	0.00
9	Haryana	14.25	6.20	6.53	914.41
10	Himachal Pradesh	-	8.50	9.00	1.29
11	Jammu & Kashmir	15.00	15.00	0.00	8.38
12	Jharkhand	11921.06	3695.50	6930.00	5760.32
13	Karnataka	1187.00	1936.45	3257.00	904.17
14	Kerala	848.45	1587.68	2455.57	2309.06
15	Madhya Pradesh	1249.87	1861.33	2924.00	8743.69
16	Maharashtra	-	-	-	-
17	Manipur	2.00	2.50	2.00	-
18	Meghalaya	-	-	0.00	-
19	Mizoram	16.01	18.25	21.50	13.00
20	Nagaland	405.03	289.87	357.66	590.12
21	Odisha	1.14	301.23	2.50	692.22
22	Punjab	561.79	452.79	783.00	509.45
23	Rajasthan	353.67	805.57	819.75	199.78
24	Sikkim	-	-	-	-
25	Tamil Nadu	4687.82	3732.59	8691.00	3373.81
26	Tripura	14.68	278.40	850.00	1542.85
27	Uttar Pradesh	885.52	962.64	1217.45	8695.08
28	Uttarakhand	48.23	32.00	45.00	263.01
29	West Bengal	241.24	256.50	393.39	603.20
	Total	25065.04	20040.35	37997.61	40324.21

Source: National Center of Organic Farming, Department of Agriculture & Cooperation, Ministry of Agriculture(2010-11 & 2011-12)

Table 4.3.8 : State wise production of various Biofertilisers during 2011-12 in Metric Tonnes

Sl. No	State	Name of Biofertiliser						Grand Total
		AZB	AZS	RZB	PSB	Total BF	Other Inoculants*	
1	Andhra Pradesh	121.99	319.88	101.57	581.66	1126.35	133.2	1259.55
2	Assam	20.48	12.56	6.86	28.43	68.33	0	68.33
3	Bihar	28	0	16.6	30.4	75	0	75
4	Chhattisgarh	11.91	0	99.65	164.78	276.34	0	276.34
5	Delhi	1157	27	47	386	1617	1582	3199
6	Gujarat	433.35	314.93	219.67	1069.4	2037.35	12.05	2049.4
7	Goa	0	0	0	0	0	592.14	592.14
8	Haryana	503.81	0	84.6	326	914.41	50	964.41
9	Himachal Pradesh	0.34	0.15	0.2	0.6	1.29	0	1.29
10	Jharkhand	0.42	0	4.61	3.35	8.38	0.11	8.49
11	Karnataka	756.4	1015.33	1114.87	2873.72	5760.32	14343.48	20103.8
12	Kerala	31.83	161.87	164.3	546.17	904.17	4122.63	5026.8
13	Madhya Pradesh	246.43	3	565.03	1494.6	2309.06	67.53	2376.59
14	Maharashtra	2262.39	731.03	2376.65	3373.62	8743.69	622.9	9366.59
15	Mizoram	0	0	0	0	0	0	0
16	Nagaland	2.5	1.5	2.5	6.5	13	0	13
17	Odisha	72.45	36.42	144.76	336.49	590.12	0	590.12
18	Punjab	94.2	13.96	18.65	565.41	692.22	0	692.22
19	Puducherry	11.12	85.39	73.22	339.72	509.45	1304.34	1813.79
20	Rajasthan	27.76	0	25.02	147	199.78	0	199.78
21	Tamil Nadu	197.66	926.45	385.04	1764.66	3373.81	5941.29	9315.1
22	Tripura	537.58	463	0.04	542.24	1542.86	0.01	1542.87
23	Uttar Pradesh	3871.79	14.92	439.41	4352.96	8679.08	46.54	8725.62
24	Uttarakhand	128.25	4.37	6.77	123.62	263.01	0	263.01
25	West Bengal	104.3	61.6	109.5	327.8	603.2	35.67	638.87
Total		10621.96	4193.36	6006.52	19385.13	40308.22	28853.89	69162.11

Source: National Center of Organic Farming, Department of Agriculture & Cooperation, Ministry of Agriculture(2010-11 & 2011-12)

* : Others include compost enrichers (Trichoderma, Paceliomyces etc.) PGPRs, BGA Azolla

Note:

AZB Azotobacter RZB Rhizobium
AZS Azospirillum PSB Phosphate Solubilizing Biofertilizers

Table 4.3.9 : Drought tolerant varieties of field crops

Variety	Traits	Zone
Cereal Varieties		
Rice Sahabhagi Dhan	Drought tolerance	Upland rice areas
Wheat VL 892 PBW 527 HI 1531, HI 1500, HI 8627 HD 2888	Medium fertility and restricted irrigation condition Drought tolerance Drought tolerance Drought tolerance	Hills of Himachal Pradesh and Uttarakhand North west plains Central Zone Eastern India
Maize Pusa hybrid Makka 1 HM 4 Pusa hybrid Makka 5	Drought tolerance Drought tolerance Drought tolerance	Rajasthan, Gujarat, Madhya Pradesh Punjab, Haryana, Uttar Pradesh, Maharashtra, Tamil Nadu and Goa Whole of India
Sorghum CSH 19 R, CSV 18 CSH 15 R	Drought tolerance Drought tolerance	All Rabi sorghum area Maharashtra, Karnataka, Andhra Pradesh and Tamil Nadu
Pearl Millet HHB 67	Drought tolerance	All dry areas of Western Rajasthan and Gujarat
Barley RD 2660, K 603	Drought tolerance	North west plains region
Pulses		
Chickpea RSG 14, RSG88 COI, ICCV 10 Vijay, Vikas	Drought tolerance Drought tolerance Drought tolerance	North West Plain Zone Southern Zone Central Zone
Mothbean CZM 1, CZM 2, CZM 3	Drought tolerance	All India
Oilseeds		
Soybean NRC-7, JS 71-05	Pod shattering and drought tolerance	All soybean growing zones
Groundnut Ajeya, Giral 1, TAG-24, C TG 37 A, ICGS 1	Drought tolerance Drought tolerance	Central and South Zone Northern Plain
Commercial Crops		
Cotton LRA 5166 KC 3	Tolerance to drought Tolerance to drought	Central Zone South Zone
Sugercane Co 94008 (Shyama) Co 98014 (Karan-1) CoLk 94184 (Birendra)	Tolerance to drought and salinity Tolerance to drought, water -logging Tolerance to drought and waterlogging with good rationing	Peninsular Zone North West Zone North central Zone
Variety/Hybrid		
Jute JBO 1 (Sudhangsu)	Drought tolerance	Tossa jute belt of West Bengal, Assam, Bihar and Odisha

Source: National Bureau of Soil Survey and Land Use Planning (ICAR) Nagpur, 2009

TABLE 4.4.1 :State-Wise releases under centrally sponsored schemes for protection of Environment in (Rs Crore)

Sl.No	State /Scheme	2010-11	2011-12	2012-13
1	Conservation & Management of Mangroves & Coral Reefs	6.68	7.01	4.97
2	Conservation and Management of Wetlands	12.04	14.79	11.88
3	Biosphere Reserve Scheme	9.31	10.05	10.75
4	Biodiversity Conservation and Rural Livelihood Improvement	0.45	2.13	1.2
5	National Lake Conservation Plan (NLCP)	49.96	79.9	52.3
6	National River Conservation Plan (NRCP)	656.94	187.4	268.6
7	National Ganga River Basin Authority	466.73	53.44	315.99
8	National Afforestation Programme	309.99	303	193.39
9	Green India Mission	0	49.95	0
10	Integrated Development of Wildlife Habitats	74.24	68.62	74.88
11	Project Elephant	21.94	20.92	17.94
12	Project Tiger	178.7	160.57	162.85
13	Intensification of Forest Management Scheme	56.7	63.28	48.64
14	National Green Corps Programme	26.62	26.87	25.17
15	National Environment Awareness Campaign	11.25	12.12	12.09

Source : Lok Sabha Unstarred Question No 29, dt.05/08/2013. MOEF, Aug.2013

TABLE 4.4.2 :National afforestation programme (NAP)

Hectares										
SI No	State	Area (ha)								
		00-02	02-03*	03-04*	04-05*	05-06	07-08	08-09	09-10	Total
1	Andhra Pradesh	2000	21090	13040	7780	2690	13859	8182	4182	72823
2	Chhattisgarh	1950	15670	19869	2800	2225	40990	14706	8450	106660
3	Gujarat	1500	12415	6600	4930	5000	32545	14620	4920	82530
4	Haryana	9400	3405	7250	1000	1050	8298	8260	5526	44189
5	Himachal Pradesh	2950	1520	20434	7474	0	10028	1222	1255	44883
6	Jammu & Kashmir	4580	28204	15055	0	0	7735	6370	3550	65494
7	Karnataka	625	42770	6450	4790	2650	32905	3765	2200	96155
8	Madhya Pradesh	20300	32650	5700	14700	3170	28707	13367	6188	124782
9	Maharashtra	4003	17925	31580	8605	3175	41538	5182	7219	119227
10	Odisha	820	39636	6228	2313	6025	59140	7400	1745	123307
11	Punjab	650	0	3300	900	3385	7687	1640	547	18109
12	Rajasthan	1250	12550	6800	2500	5090	1000	9500	6800	45490
13	Tamil Nadu	2500	21400	19577	7450	1340	6230	5670	4025	68192
14	Uttar Pradesh	7344	33615	19028	2000	1017	39104	18355	9664	130127
15	Uttarakhand	815	4122	18186	10346	5665	18867	3510	4065	65576
16	Goa	0	0	1250	0	0	0	0	0	1250
17	Jharkhand	0	5700	25400	7500	1250	31990	14680	9980	96500
18	Bihar	0	0	7750	2400	2165	9016	3675	3475	28481
19	Kerala	0	6600	5890	805	2955	10518	4118	1095	31981
20	West Bengal	0	9470	9286	3900	200	9984	4793	615	38248
21	Arunachal Pradesh	3846	11030	4600	0	1940	5705	1450	1750	30321
22	Assam	0	0	19665	4350	2940	15660	6365	3625	52605
23	Manipur	0	11674	5600	600	500	12295	2950	1525	35144
24	Nagaland	4130	19000	2398	0	0	10640	3500	4050	43718
25	Sikkim	1600	11783	1000	0	0	6045	3350	2225	26003
26	Tripura	805	16400	0	2200	0	8350	335	1380	29470
27	Mizoram	0	26170	600	0	0	16150	4500	2700	50120
28	Meghalaya	0	0	0	7400	0	8075	1970	800	18245
	TOTAL	71068	404799	282536	106743	54432	493061	173435	103556	1689630
Source: National Afforestation & Eco-Development Board, Ministry of Environment and Forests										
*Projected coverage during 10 th Plan										

Table 4.4.3 : State-wise details of the protected area network in India

Sr. No	State	No of National Parks	No of Wildlife Sanctuaries	No. Conservation Reserves	No of Community Reserves
1	Andhra Pradesh	6	21	0	0
2	Arunachal Pradesh	2	11	0	0
3	Assam	5	18	0	0
4	Bihar	1	12	0	0
5	Chhattisgarh	3	11	0	0
6	Goa	1	6	0	0
7	Gujarat	4	23	1	0
8	Haryana	2	8	2	0
9	Himachal Pradesh	5	32	0	0
10	Jammu & Kashmir	4	15	34	0
11	Jharkhand	1	11	0	0
12	Karnataka	5	22	2	1
13	Kerala	6	16	0	1
14	Madhya Pradesh	9	25	0	0
15	Maharashtra	6	35	1	0
16	Manipur	1	1	0	0
17	Meghalaya	2	3	0	0
18	Mizoram	2	8	0	0
19	Nagaland	1	3	0	0
20	Odisha	2	18	0	0
21	Punjab	0	12	1	2
22	Rajasthan	5	25	3	0
23	Sikkim	1	7	0	0
24	Tamil Nadu	5	21	1	0
25	Tripura	2	4	0	0
26	Uttar Pradesh	1	23	0	0
27	Uttarakhand	6	6	2	0
28	West Bengal	5	15	0	0
29	A& N Islands	9	96	0	0
30	Chandigarh	0	2	0	0
31	D&N Haveli	0	1	0	0
32	Lakshadweep	0	1	0	0
33	Daman & Diu	0	1	0	0
34	Delhi	0	1	0	0
35	Puducherry	0	1	0	0
	Total	102	515	47	4

Source: Annual Report -2011-12, Ministry of Environment & Forests

Table 4.4.4 : Progress of afforestation through successive plans**(one sq. km = 100 hectares)**

Plan Period	Area Afforested In Plan Period ('000 hectares.)	Cumulative ('000 hectares.)	Afforestation Expenditure In Plan Period (Rs Crores)	Cumulative (Rs Crores)
1951-56	52	52	1.28	1.28
1956-61	311	363	6.86	8.14
1961-66	583	946	21.13	29.27
1966-69	453	1399	23.02	52.29
1969-74	714	2113	44.34	96.63
1974-79	1221	3334	107.28	203.91
1979-80	222	3556	37.10	241.01
1980-85	4650	8206	926.01	1167.02
1985-90	8863	17069	2426.63	3593.65
1990-91	1387	18456	627.79	4221.44
1991-92	1725	20181	705.72	4927.16
1992-97	7950	28131	3686.40	8613.56
1997-02	8050	36181	7350.50	* 15964.06
2002-03	405	36586	151.26	16115.32
2003-04	283	36869	207.98	16323.30
2004-05	107	36976	233.00	16556.30
2005-06	54	37030	248.12	16804.42
2006-07	0	37030	292.75	17097.17
2007-08	493	37523	392.95	17490.12
2008-09	173	37696	345.62	17835.74
2009-10	104	37800	318.17	18153.91
2010-11	57	37857	309.99	18463.90
2011-12	140	37997	303.00	18766.90

Source : Ministry of Environment & Forests

* Figures of Allocation

Table 4.5.2 : Criteria for direct disposal of hazardous waste into secured landfill

Leachate Quality	Concentration	
pH	,4-12	
Total Phenols	<100	mg./l.
Arsenic	<1	mg./l.
Lead	<2	mg./l.
Cadmium	<0.2	mg /l.
Chromium-VI	<0.5	mg./l.
Copper	<10	mg./l.
Nickel	<3	mg./l.
Mercury	<0.1	mg./l.
Zinc	<10	mg./l.
Fluoride	<50	mg./l.
Ammonia	<1,000	mg./l.
Cyanide	<2	mg./l
Nitrate	<30	mg./l
Absorbable organic bound Chlorine	<3	mg./l
Water soluble compounds except salts	<10	%
Strength		
Transversal Strength (Vane Testing)	>25	KN/m2
Unconfined Compression Test	>50	KN/m2
Axial Deformation	<20	%
Degree of Mineralization or Content of Organic Materials (original sample)		
Annealing loss of the dry residue at 550°	C <20 Wt. % (for non- biodegradable waste) <5 Wt. % (for biodegradable waste)	
Extractable Lipophylic contents (Oil & Grease)	<4	Wt. %

Source: CPCB-2010, Hazardous waste management series/2010-11

Note:

1). leachate quality is based on water leachate test i.e. Leachability tests are conducted by preparing a suspension of waste and water i.e. taking 100 gm of waste and filling up to 1 liter with distilled water, stirring or shaking for 24 hrs, filtering the solids and analyzing the filtrate.

2) Calorific value of the land disposable hazardous waste should be less than 2500 K. Cal/Kg

Table 4.5.3 : Primary water quality criteria

Sl. No.	Designated Best Use	Class of Water	Criteria
1	2	3	4
1	Drinking Water Source without Conventional Treatment but after Disinfection	A	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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 after conventional treatment and disinfection	C	<ol style="list-style-type: none"> 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 and Fisheries	D	<ol style="list-style-type: none"> 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 disposal	E	<ol style="list-style-type: none"> 1 pH between 6.0 to 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

Table4.5.4: 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 4.5.5: Exhaust emission standards for Indian Automobiles**Emission norms for passenger cars**

Norms	CO(g/km)	HC+ NOx(g/km)
1991Norms	14.3-27.1	2.0(Only HC)
1996 Norms	8.68-12.40	3.00-4.36
1998Norms	4.34-6.20	1.50-2.18
India stage 2000 norms	2.72	0.97
Bharat stage-II	2.2	0.5
Bharat Stage-III	2.3	0.35(combined)
Bharat Stage-IV	1	0.18(combined)

Emission norms for Heavy Diesel vehicles

Norms	CO(g/kmhr)	HC (g/kmhr)	NOx (g/kmhr)	PM(g/kwhr)
1991Norms	14	3.5	18	-
1996 Norms	11.2	2.4	14.4	-
India stage 2000 norms	4.5	1.1	8	0.36
Bharat stage-II	4	1.1	7	0.15
Bharat Stage-III	2.1	1.6	5	0.1
Bharat Stage-IV	1.5	0.96	3.5	0.02

Emission Norms for 2/3 wheeler

Norms	CO(g/km)	HC+ NOx)(g/km)
1991Norms	12--30	8-12 (only HC)
1996 Norms	4.5	3.6
India stage 2000 norms	2	2
Bharat stage-II	1.6	1.5
Bharat Stage-III	1	1

Source: Central Pollution Control Board