सत्यमेव जयते

EnviStats India 2018

(Supplement on Environmental Accounts)

GOVERNMENT OF INDIA
MINISTRY OF STATISTICS AND PROGRAMME IMPLEMENTATION
CENTRAL STATISTICS OFFICE
(SOCIAL STATISTICS DIVISION)

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सत्यमेव जयते

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FOREWORD

The Agenda 21 adopted at Earth Summit of 1992 necessitated establishment of a "programme to develop national systems of integrated environmental and economic accounting in all countries". The Rio+20 Conference in 2012 also reaffirmed that "integrated social, economic and environmental data and information ... are important to decision-making processes." Recognizing the increasing importance of integrated information on the relationship between the economy and environment, the ***System of Environment-Economic Accounting (SEEA) - Central Framework*** was adopted as an international statistical standard in the 43rd session of United Nations Statistical Commission in 2012.

With the global commitment to 2030 Agenda for Sustainable Development, the use of SEEA-Central Framework in assessment of content and extent of natural assets has increased manifold. The data derived from the SEEA- Central Framework can support the assessment of environmental assets and their sustainability. They can also help monitor the progress made in respect of not just the Sustainable Development Goals for environment, but also those related to agriculture, energy, employment and sustainable production and consumption.

The Central Statistics Office (CSO) of the Ministry of Statistics and Programme Implementation has addressed this requirement by bringing out this Supplement on Environmental Accounts to its publication, EnviStats-India 2018. This Supplement gives time-series data on the 'stock-position' of various natural resources across the States of India.

I take this opportunity to congratulate and convey my appreciation for the team of officers of the Social Statistics Division of CSO who have taken up the challenge of developing these accounts after analyzing the multitude of data-sources on different aspects.

I believe that this publication will be helpful in evidence-based policy making so that a truly sustainable future is ensured.

20/9/18

(K. V. Eapen)

New Delhi
20th September 2018

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सत्यमेव जयते

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एक कदम स्वच्छता की ओर

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PREFACE

The notion of man's dependence on nature is deeply ingrained in the Indian philosophy. But with the global focus on economic development, 'environment' shifted down on the priority list for policies and programmes. It didn't take long, however, for the world to realise that human well-being in future is solely dependent on the inter-relationship between environment and the economy.

Reinforcing the realization, the System of Environment-Economic Accounting - Central Framework (SEEA-CF) was adopted as an international standard for environmental-economic accounting by the United Nations Statistical Commission, at its 43rd session in 2012. SEEA-CF is a multipurpose conceptual framework for understanding the interactions between the environment and the economy, and for describing stocks and changes in stocks of environmental assets. It is an invaluable tool for compiling integrated statistics, deriving coherent and comparable indicators and measuring progress towards sustainable development.

In view of the diversity of the country, not just in terms of its environmental assets, but also the socio-economic-political aspects, and its sheer vastness, an implementation plan with short-term, medium-term and long-term activities was drawn by the Expert Group on "Green National Accounts in India", constituted under the Chairmanship of Prof. Sir Partha Dasgupta.

In line with the implementation plan recommended by the Expert Group, the Central Statistics Office (CSO) under the Ministry of Statistics and Programme Implementation has compiled this supplement on "Environmental Accounts", giving the asset accounts of four main natural assets – land, forests, water and minerals. Effort has been made to incorporate the maximum information presently available with the concerned nodal agencies on these assets. Further details will be added in subsequent issues keeping in view the formats prescribed in the SEEA-CF.

The data given in this publication is based on the information sourced from different Ministries/ Departments/ Organizations of Central Governments. I express my deep gratitude to all data source agencies for sharing the valuable data /information in support of our efforts to bring out this publication.

Comments/suggestions for further improvement of the publication are welcome and will be highly appreciated.

(M. V. S. Ranganadham)
Director General

New Delhi
24th September 2018

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The Social Statistics Division of the Central Statistics Office gratefully acknowledges the contribution of all the source agencies listed below for the material and content of this first publication on "Environmental Accounts":

1. Forest Survey of India and Divisions of the Ministry of Environment, Forest & Climate Change;
2. Central Water Commission, Central Ground Water Board and Divisions of the Ministry of Water Resources, River Development and Ganga Rejuvenation;
3. National Remote Sensing Centre, Ministry of Space;
4. Indian Bureau of Mines, Ministry of Mines;
5. Coal Controller's Organization, Ministry of Coal;
6. Ministry of Petroleum & Natural Gas; and
7. Department of Land Resources, Ministry of Rural Development.

This diversified compilation of information on various natural resources could not have been possible without their commitment towards production of timely and accurate statistics.

The acknowledgment would be incomplete without the mention of all the members of the Inter-Ministerial Group on Environmental-Economic Accounting, whose suggestions and comments have helped enrich the publication and improve its usefulness.

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Acronyms and Abbreviations

AGB	Above Ground Biomass
BCM	Billion Cubic Meters
BGB	Below Ground Biomass
bgl	Below Ground Level
CCA	Culturable Command Area
CFS	Cubic Feet per Second
CGWB	Central Ground Water Board
CIFOR	Center for International Forestry Research
CMR	Coal Mines Regulation
CSO	Central Statistics Office
Cu. m	Cubic Meter
cumecs	Cubic Meter per Second
CWC	Central Water Commission
DOM	Dead Organic Matter
DOS	Department of Space
DW	Deposit Well
EEA	Experimental Ecosystem Accounts
EW	Exploratory Well
FAO	Food and Agriculture Organization
FSI	Forest Survey of India
GOI	Government of India
GPG	Good Practice Guidance
Ha	Hectare
IBM	Indian Bureau of Mines
IMD	Indian Meteorological Department
IMYB	Indian Mineral Year Book
IPC	Irrigation Potential Created
IPCC	Intergovernmental Panel on Climate Change
IPU	Irrigation Potential Utilized
ISFR	India State of Forest Report
km	Kilometre
LC	Land Cover
LU	Land Use
LULC	Land Use and Land Cover
LULCF	Land Use, Land-Use Change, and Forestry
M. ha.	Million Hectare
MDF	Moderately Dense forest

MI	Micro Irrigation
million cum	Million Cubic Metre
mm	Millimetre
MoEF&CC	Ministry of Environment, Forest and Climate Change
MMDR Act	Mines and Minerals (Development and Regulation) Act, 1957
MOWR,RD&GR	Ministry of Water Resources, River Development & Ganga Rejuvenation
MSMP	Monthly Statistics of Mineral Production
NCIWRD	National Commission on Integrated Water Resources Development
NPV	Net Present Value
NRC	Natural Resources Census
NRR	Natural Resources Repository
NRSA	National Remote Sensing Agency
NRSC	National Remote Sensing Centre
OF	Open Forest
OW	Observation Well
PZ	Pizo Meter
SDF	Second-day Feet
SDGs	Sustainable Development Goals
SEEA	System of Environmental-Economic Accounting
SEEA-CF	System of Environment Economic Accounting-Central Framework
SH	Slim Hole
SOC	Soil Organic Carbon
sq. km	Square Kilometre
TOF	Trees Outside Forests
SWAR	System of Water for Agriculture Rejuvenation
UIP	Ultimate Irrigation Potential
UNFC	United Nations Framework Classification
UNFCCC	United Nations Framework Convention on Climate Change
UNSD	United Nations Statistical Division
VDF	Very Dense Forest
WMO	World Meteorological Organization

INTRODUCTION

INTRODUCTION

Background

Natural capital refers to all types of environmental assets existing in the environment. The concept of natural capital incorporates a broad perspective on the set of services provided by ecosystems assets. Natural capital is essential for economic growth, employment, and, ultimately, prosperity. The benefits derived from environment range from the use of environmental assets as raw materials for production and the dependence on environmental conditions for production to the benefits derived from being able to enjoy nature, we constantly derive benefits from the environment. The interplay of the environment and the economy is crucial to be understood by the policy makers while framing the policy for growing economy using the natural resource on sustainable basis.

National Accounts and Environment

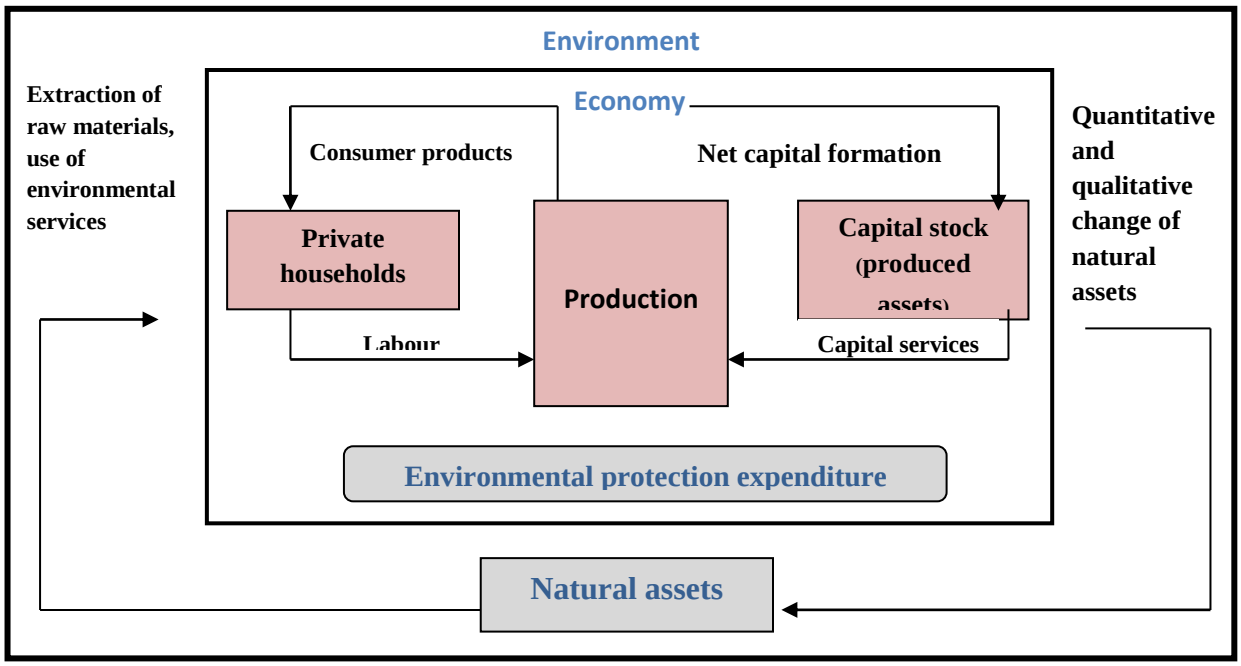
2. The System of National Accounts (SNA) is an accounting framework for measuring the economic activities of production, consumption and accumulation of wealth in an economy during a period of time. The SNA provides a comprehensive conceptual and accounting framework for analyzing and evaluating the performance of an economy. It also provides a structure for addressing emerging concerns related to the determinants of economic growth and their links to different sectors of the economy. However, the fact that the standard accounting procedures followed for tracking a growth in the economy (read GDP and SNA) fail to account for environmental degradation and resource depletion is now well acknowledged. This issue is more pronounced especially in developing countries, which depend heavily on natural resources. If a country cuts down its forests, depletes its soil fertility, and pollutes its water supplies, this surely makes the country poorer in real sense. But national income accounts merely record the market value of the timber, agricultural produce, and industrial output as positive contributions to GDP. This may lead policy makers to view the country's development in an unrealistically rosy light—at least until the effects of the environmental damage become apparent, which in some cases may take decades.

3. In this context, different measures have been formulated which involve environmental modelling which aim to develop economic, social, and governance systems capable of ending poverty and achieving sustainable levels of production and consumption while securing the life-support systems provided by nature underpinning

current and future human well-being. Essential to meeting this objective is the incorporation of status of natural capital and the ecosystem services it provides into decision-making.

4. Environmental-Economic Accounting (EEA) describes the interrelationship between the economy and the environment (**Figure 1**). For its economic activities, an economy not only uses labour and produced assets but also natural assets. Natural assets include raw materials such as sources of energy, ores, other minerals and water as well as land that serves as a location for production, consumption and various leisure activities. These parts of natural assets are used directly. Other components of natural assets are ecosystems and other natural systems such as the atmosphere. They support economic activities by absorbing and eliminating residues and pollutants arising from production and consumption, such as atmospheric emissions, waste and effluent.

Figure 1: Interrelationship between economy and environment



5. The use of natural assets–similar to the produced capital stock–generally involves depletion, which means that the burden or impact on the environment causes changes in its state and/or natural assets. On the one hand, these changes are of a quantitative nature (e.g. a decreasing amount of non-renewable raw materials); on the other, they have many qualitative aspects (deteriorating air quality due to emissions of pollutants, diminished biodiversity etc.). Attempts then need to be made to prevent these negative changes with targeted, appropriate environmental protection measures,

such as by avoiding environmental burden or remedying damage that has already been done (e.g. cleaning up polluted sites). The interdependencies between the economy and the environment therefore are not restricted to showing the burdens on the environment - in fact, the pattern also includes changes to the state of the environment brought about by pollution and the steps taken to avoid it or repair the damage.

6. The EEA aims to describe all three forms of interdependence between economy and environment – environmental burden, the environmental state and environmental measures. The description of these interdependencies takes as its starting point the fact, mentioned above, that a national economy not only uses labour and capital but also nature. Therefore, the basic idea is to take the commonly accepted definition of a national economy and expand it by a factor "nature".

7. In 2012, the United Nations Statistical Commission adopted the System of Environmental Economic Accounting (SEEA) - Central Framework as an international statistical standard, which prescribes a satellite System of Integrated Environmental and Economic Accounting framework to supplement SNA system of accounts. The objective of this framework is to extend the presentation of the economic process by a depiction of the interrelationship between the economic system and the environment. SEEA envisages compilation of the following broad accounts namely -

i. Asset accounts for individual environment asset in physical and monetary terms showing stock of environmental asset at the beginning and end of each accounting years and changes in the stock;
ii. Supply and use tables in physical and monetary terms showing flow of natural resource inputs, products and residuals;
iii. A sequence of economic accounts that highlights depletion adjusted economic aggregates; and
iv. Functional accounts which records transactions and other information about economic activities undertaken for environmental purposes.

By describing the two dimensions of sustainable development – economy and environment – and their interrelationship, these accounts provide an important and useful data base for stakeholder discussions concerning sustainability.

Environmental Accounting in India

8. India has a long history of research on environmental aspects including ecosystem services, ranging from theoretical concepts to its practical applications and internalization of study outcomes into policies. These studies had been carried out in

the areas of forest, wetland, coastal, marine & mangrove and others. Some of the major milestones in the research in this area are highlighted in **Figure 2**.

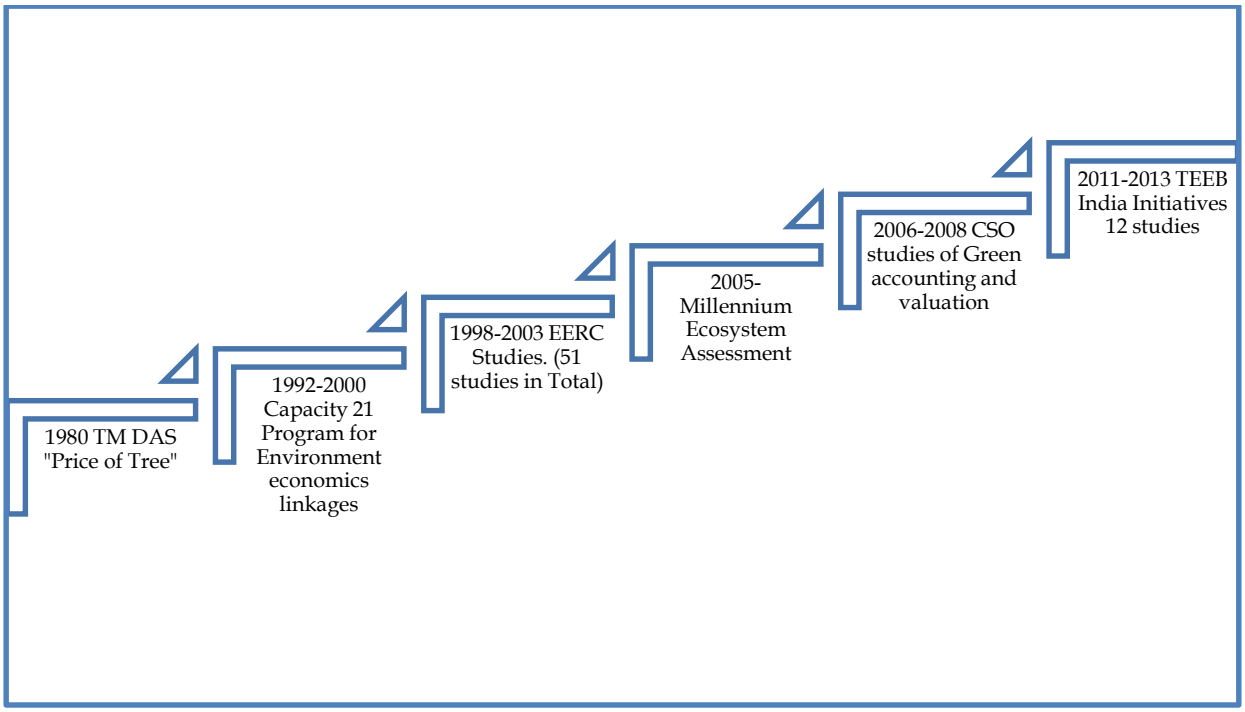


Figure 2: Milestones of environment studies in India

9. The studies conducted so far cover a wide range of issues – from application of economic principles and tools to environmental management in India for policies related to pollution control, modelling, resources management and biodiversity conservation and from quantifying the resourcefulness of India to highlighting the economic consequences of the loss of biological diversity and the associated decline in ecosystem services. But despite having vast richness of findings of these research studies, a full-fledged national account could not be compiled due to lack of comparability in the methods and definitions used in these studies which limited their aggregation.

10. In order to help the official system to come up with the environmental economic accounts, a high level Expert Group under the Chairmanship of Prof. Sir Partha Dasgupta, Frank Ramsey Professor Emeritus of Economics, University of Cambridge, U.K. was constituted by MOSPI in 2011 with the mandate of developing a framework for green national accounts of India and preparing a roadmap to implement the framework. The Expert Group submitted its report titled "Green National Accounts in India-A Framework" in 2013 which included a roadmap for implementing the Green Accounting Framework.

11. The central conclusion of the report is to judge the changes of the circumstances of an economy on the basis of their effect on the economy's wealth per-capita, where wealth represents the social value of an economy's stock of capital assets comprising of not just the **Reproducible or "Manufactured" Capital** or **Human Capital,** but also the **Natural Capital** and the per-capita estimates need to be duly adjusted to the distribution of wealth. Here, the term "**Reproducible Capital"** is used to refer to manufactured goods like roads, ports, cables, building machinery, equipment etc., while **Human Capital** indicates the population size, its composition, as also the quality indicators like education and health. **Natural Capital** refers to a class of natural goods comprising of ecosystems, land, water, sub-soil resources and the like.

12. The Expert Group in its report recommends compilation of the accounts envisaged in SEEA Central Framework (such as the Asset accounts and the Supply and Use tables). Since the compilation of these accounts entails rich datasets across multiple domains, especially for the compilation in monetary terms and final integration with national accounts, an Inter-Ministerial Group (IMG) constituted by MoSPI facilitates the assessment of datasets for the compilation of these accounts and makes the recommendations for the line of action. The Ministries of Environment, Forests and Climate Change; Water Resources, River Development & Ganga Rejuvenation; Agriculture and Farmers Welfare; Mines; Coal; Petroleum and Natural Gas; New & Renewable Energy; Power as well as Department of Land Resources and the National Remote Sensing Centre are represented in this Group and provide the impetus for the compilation of these accounts.

13. Adding another dimension to the work stream of the Ministry related to the compilation of environmental accounts, India is participating in the "Natural Capital Accounting and Valuation of Ecosystem Services" project launched by the United Nations Statistics Division (UNSD) in five piloted countries- the other countries being Brazil, China, South Africa and Mexico. This EU-funded project is under implementation as a partnership project between United Nations Statistics Division (UNSD), the United Nations Environment Programme (UNEP) and the Secretariat of the Convention of Biological Diversity and is likely to propel India on the path of compilation of ecosystem accounts. The general goal of ecosystem accounting is to encourage and enable greater consideration of natural assets, and the services they provide, in monitoring and planning relating to economic activity. Physical ecosystem accounts – which record the stocks and flow of services from environmental assets - go some way to supporting these activities, but monetary valuation provides a common

metric for assessing overall value and trade-offs concerning the provision of ecosystem services, and ready comparison with stocks and flows already included in the SNA. In this background, the main objective of the UNSD-led project is to mainstream natural capital accounting and the valuation of ecosystem services in data-driven decision and policy-making at the national, regional and local levels.

14. The Inter-Ministerial Group and the pilot project are expected to help in formulating a long-term National Plan for Advancing Environmental-Economic and Ecosystem Accounting. These accounts can then be mainstreamed into policy-making as they are capable of providing advice on: when, where and how natural assets are being used (un)sustainably; how government should prioritize action to protect and improve natural capital, so that public and private activity is focused where it will have greatest impact on improving wellbeing; and research priorities to improve future advice and decisions on protecting and enhancing natural capital.

Coverage of the publication

15. In order to make a gradual progression towards the compilation of these accounts, this supplement on "Environmental Accounts" of the publication "EnviStats-India" initiates the presentation of aggregate environment accounts for India with the asset accounts in physical terms of four natural resources – forest, land, minerals and water. State-wise information has been provided as far as possible so that policy makers could identified the areas warranting focused interventions for taking remedial actions and evaluation. A brief overview of the content of the different chapters is given in the following paragraphs:

Land

16. Land is a crucial natural resource and sustainable use and management of land resources is a necessity for the well-being of people of a country. The chapter contains the national and state-wise land cover accounts in physical terms as also the associated change matrix that have been compiled using the National Remote Sensing Centre's land cover data for the year 2005-06 and 2011-12.

Forest

17. The benefits provided by forest ecosystems, especially those in the context of climate change, are globally recognized and sustainable use of forests without compromising the forest's ability to provide those services is a pre-requisite to continue receiving these benefits. The chapter contains the asset account of forests and other wooded land compiled using the biennial publication of the Forest Survey of India, "India State of Forest Report". In addition, the chapter also contains national and state-wise estimates of growing stock and carbon stock which provides an assessment of tree wealth and the capability to combat and adapt to climate change.

Minerals

18. Minerals are the vital raw material for basic industries, the major source for development in any country. Demand for minerals is increasing world-wide with the increase in population and the associated increase in the consumption demand of individual people. The accelerated growth of mining is posing environmental concerns which need to be addressed so as to ensure its sustainability. India has huge resources of many metallic and non-metallic minerals. With the advancement of technology and its proper selection, these resources can be tapped to shift the country's trajectory of growth minus the environmental hazards. The chapter includes state-wise and mineral-wise reserves / resources for the years 2005, 2010 and 2015, mainly sourced from the National Mineral Inventory conducted by the Indian Bureau of Mines. The information in respect of coal, lignite, petroleum and natural gas has been obtained from the concerned Ministries.

Water

19. Water is one of the most essential natural resources for sustaining life. Aptly it is said: "Jal hi jivan hai". Availability of potable water has become critically scarce in many parts of the country due to continuous increase in demand on account of increase in population, industries and agricultural activities. In addition to the information on the status of water resources of the country compiled from the various publications of the Central Water Commission, the chapter also provides detailed information on groundwater, which is important in view of the predominant dependence on groundwater for irrigation and domestic use.

HIGHLIGHTS OF THE ASSET ACCOUNTS

- **Positive changes in respect of the natural assets**: Dispelling the popular notion that stock of natural assets is declining, a net positive increment was observed in the asset account in some cases. Possible change of fallow land to farmland, increases in forest cover, growing/carbon stock, proven reserves and new findings of resources of minerals - are some examples of such changes, some of which were observed in Andhra Pradesh, Gujarat, Jharkhand, Kerala, Maharashtra and Odisha.
- **Effect of climate change**: Evidences of climate change are also observed in these asset accounts, with a decline in the area of land under 'snow and glacier' in some States and increase in others as also significant fluctuations of 'wetlands/water bodies', examples of which are Himachal Pradesh, Sikkim and Jammu Kashmir.
- **Urbanization**: Built-up area has increased in almost all the States, a change that is now inevitable with the growing population and consequent urbanization. But what is worrisome is the change from farmland to built-up land which is likely to affect the productive capacity of the States. This phenomenon has been observed in Punjab, Haryana, Karnataka, Telangana and West Bengal.
- **Decline in resources**: With the country still being dependent on imports for wood and wood products for meeting its domestic demand, growing stock is a crucial forest resource, the decline of which may be a harbinger of trouble for the economy. Similarly, increase in the level of extraction of groundwater vis-à-vis the annual recharge signals unsustainability of groundwater resources. Such decline was seen in Tamil Nadu, Chhattisgarh, Goa, Odisha and Rajasthan.

20. No doubt the assessment of the natural capital of the States is challenging with mixed signals being observed in the different assets. In order to place these changes into perspective, the status of natural resources in the States could be analysed if these results could be aggregated in terms of an index or an estimate. One of the options available is to attribute a monetary value to the different natural assets. For instance, in the World Bank Report "The Changing Wealth of Nations 2018: Building a Sustainable Future"[1], four classes of environmental assets – energy and mineral resources, forest

[1] Lange, Glenn-Marie, Quentin Wodon, and Kevin Carey, eds. 2018. The Changing Wealth of Nations 2018: Building a Sustainable Future. Washington, DC: World Bank.

resources, agricultural land and protected areas – are considered and evaluated on the basis of their "Net Present Values" as an assessment of "Natural Capital". As all the basic materials for different economic activities emanate from these resources, these estimates provide an assessment of the future productive capacity of the States.

21. ***As an experimental illustration of the valuation***, the estimates of natural capital at constant prices have been compiled using the methodology adopted in World Bank report and the official datasets available for the States. Analysing the changes can help in assessing the aggregate changes in the cohort of environmental assets of States of India. An outline of the 'adapted' methodology is given below:

I. Energy and Mineral Resources

The Net Present Value (NPV) of the proven reserves of fossil energy, metallic and non-metallic minerals have been estimated as the sum of the present value of the stream of expected rents that may be extracted from the resource until it is exhausted. The minor minerals were excluded from valuation.

II. Forest Resources and Protected Areas

The Ministry of Environment, Forest and Climate Change got a study conducted for the "Revision of rates of NPV applicable for different class/category of forests" by the Centre for Ecological Services Management (CESM), Indian Institute of Forest Management (IIFM) Bhopal in collaboration with Forest Survey of India (FSI), the report of which was submitted in November 2014. Estimates of net-present values, duly classified by 14 physiographic zones and four forest cover density classes, as available in the report of the study, have been used to evaluate the forest resources.

III. Agricultural Land: Crop land and Pasture land

State-wise data on the rents for 25 major crops is available under the reports of the Cost of Cultivation Studies, conducted by the Ministry of Agriculture and Farmers Welfare. The information on the annual flow of rents the agricultural land generates has been used to estimate the present value of such rents in the future, assuming that the area of agricultural land is constant. The minimum value of rent per hectare estimated in the Cost of Cultivation for the State has been used for compiling the value of the pastureland.

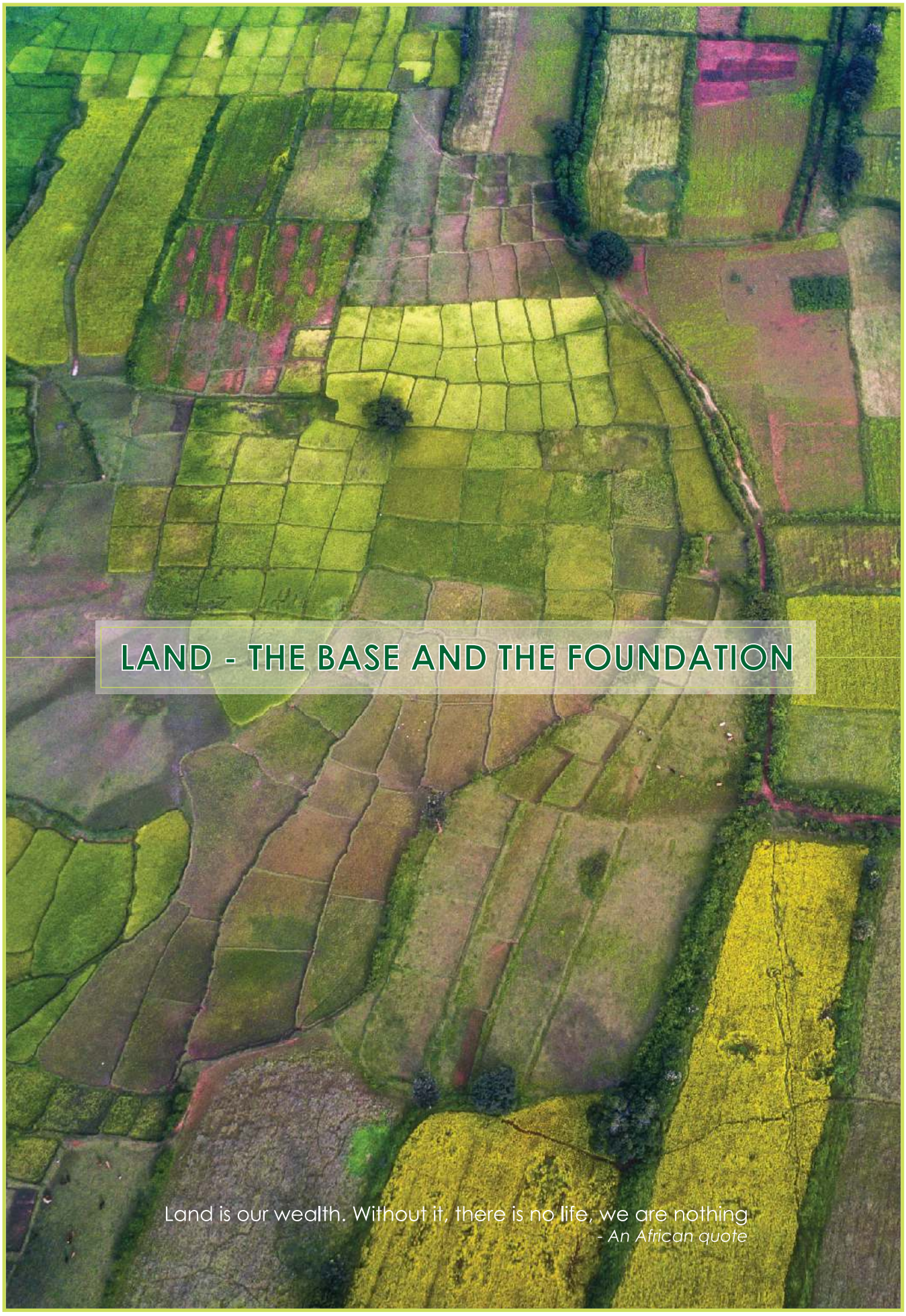
22. The following table summarizes the state-wise changes between 2005 and 2015.

Level of change in natural capital during 2005-15	States
Increase greater than 5%	Madhya Pradesh, Maharashtra, Manipur and Rajasthan
Increase between 0-5%	Andhra Pradesh, Arunachal Pradesh, Chhattisgarh, Goa, Haryana, Himachal Pradesh, Jammu & Kashmir, Meghalaya, Nagaland, Odisha, Sikkim, Uttar Pradesh and West Bengal
Negative change	Assam, Bihar, Gujarat, Jharkhand, Karnataka, Kerala, Mizoram, Punjab, Tamil Nadu, Tripura and Uttarakhand

23. An analysis of these changes presents another angle to the economic development of the States. The average growth rate of GSDP during 2005-15 for almost all the States is around 7-8%. So the growth in natural capital, if any, is almost insignificant and the economic development seems to be happening at the cost of environment. Therefore, the States may not be able to sustain the rate of development for long. This, in turn, highlights the importance of monitoring the natural capital and making the assessment a basis for sustainable development.

24. It is in this background, the United Nations Statistical Commission "recognized SEEA as an important statistical framework for the post-2015 development agenda and the sustainable development goals indicators" in 2014. The SEEA-Central Framework helps provide a common conceptual approach across the goals by aiding in the development of coherent environmental-economic SDG indicators, which allow spatial and sectoral disaggregation to inform national policy.

25. Additional accounts of the SEEA-Central Framework will be included in the forthcoming issues of this supplement on "Environmental Accounts" of the publication "EnviStats-India". The publication "Envistats-India" intends to provide the technical 'push' to public policy imperatives in India, so that environmental information in mainstreamed to reshape government decision-making for a "better environment, better tomorrow".

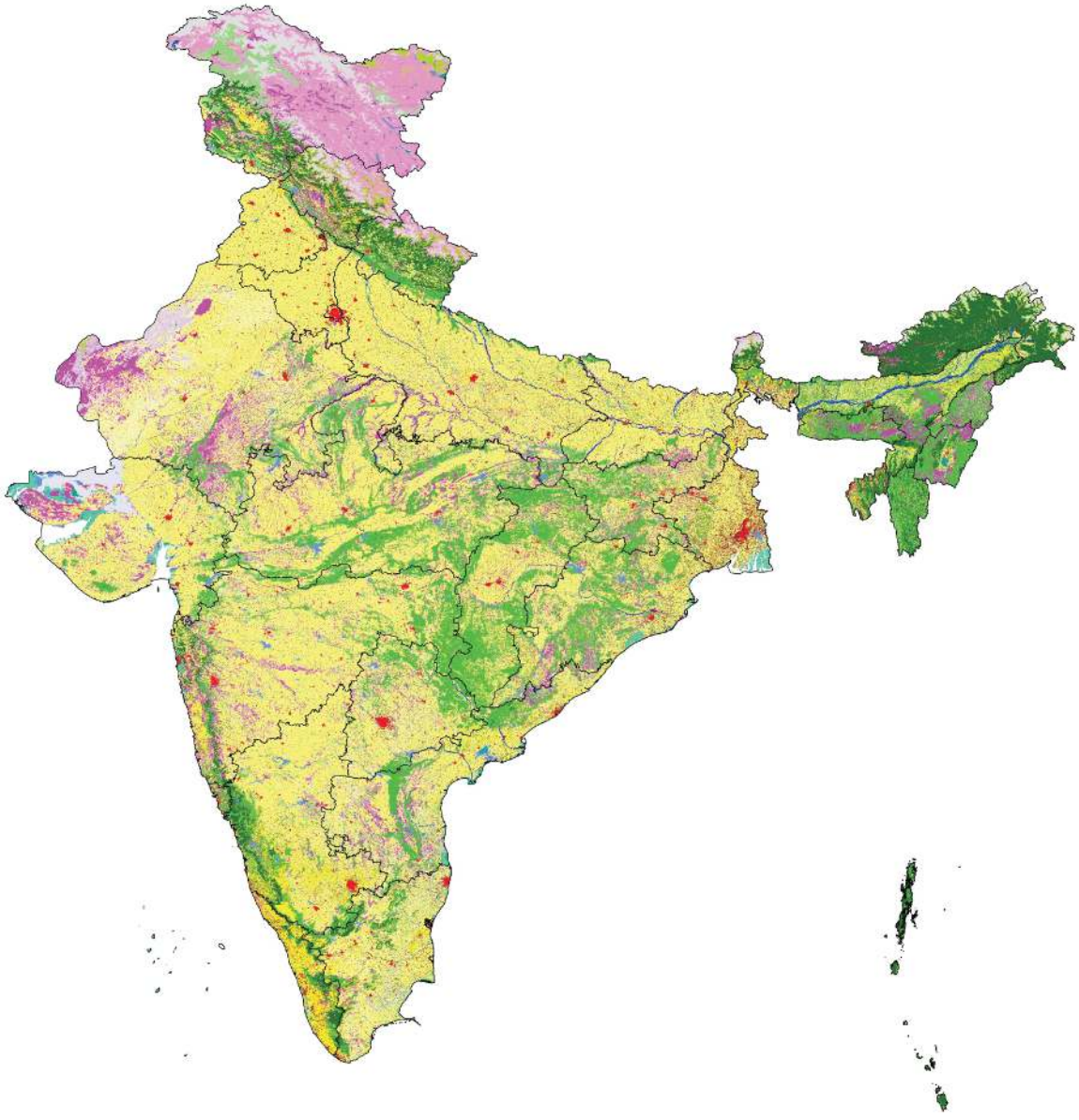


LAND - THE BASE AND THE FOUNDATION

Land is our wealth. Without it, there is no life, we are nothing

- An African quote

LULC 2011-2012



Built Up
- Urban
- Rural
- Mining

Agricultural Land
- Crop Land
- Agricultural Plantation
- Fallow Land
- Current Shifting Cultivation

Forest
- Evergreen/ Semi Evergreen
- Deciduous
- Forest Plantation
- Scrub Forest
- Swamp/ Mangroves

Grass / Grazing
- Grass/Grazing

Barren / Waste Lands
- Salt Affected Land
- Gullied/Ravinous Land
- Scrub Land
- Sandy Area
- Barren Rocky
- Rann

Wetlands / Water bodies
- Water bodies
- Rivers/Streams/Canals
- Inland Wetland
- Coastal Wetland

Snow and Glaciers
- Snow/Glaciers

CHAPTER 1
LAND- THE BASE, THE FOUNDATION

Introduction

Land with its multifarious functions ranging from living and connective space to production, hydrologic and biotic environmental functions, is the basis for many life-support systems. It is a crucial natural resource and an important determinant of a country's socioeconomic and ecological health. With growing population and changing industrial profile of economies and consequently, the country's socio-economic priorities drive changes in land use. Land-use change has broad lines of impact with a potential for influencing economic growth, quality of life, management of environmental resources, and national food supply. But given the finite supply of land resources, it is important that this land-use change is not indiscriminate. Land is required for both agriculture and non-agricultural purposes, including establishment of industries, housing, roads, parks, railway lines etc. Further, due to the rapid industrialization and population growth, land resources are under pressure from physical, human and global causes such as soil erosion, desertification, pollution, food shortage, land conflict, water shortage and climate change. In addition, the urbanization of land has measurable impact on the quantity and quality of water resources. The problem arises because market driven, albeit unplanned diversification as well as urbanization often results in non-sustainable patterns of development. A market driven land use pattern may yield higher returns in the short run, but may pose several unmanageable problems for future generations due to unplanned overexploitation of land, water and other natural resources. But on the other hand, due to the variedness in its characteristics, different types of land and locations are not equally suitable for different purposes. Hence, the need arises for appropriate land use planning-including land monitoring and management-for sustainable development.

Land Accounts in SEEA-CF

Land is an environmental asset that outlines the space in which all the natural processes and human/economic activities are occurring. There are two main characteristics on the basis of which land could be classified: land cover (LC) and land use (LU). Land accounting inputs are of particular importance for starting environment accounts, because they provide the means to initiate the following tasks:

- Apply land cover types as proxy for ecosystem units (or assets);
- Apply land use to delimit areas where ecosystem services originate; and

- Help harmonize various inputs from scientific grid-data to assess condition and services like water run-off, habitats and carbon storage.

Key components of land accounting include land cover types (which may relate to broad categories of ecosystem assets, such as forest, wetlands and grasslands) and their functions and/or uses (ecological, economic, social) at broader scale. Information on land ownership and tenure can be combined with land cover/use to produce accounts at a finer scale. The broader categories are useful for comparability, but the finer categories are required for analytical purposes, provided that bio-physical changes as well as economic transactions can be registered for these categories. Ideally, the data needs to be collected at these different scales, processed and organized in a single dataset, to demonstrate both (local) decision-support applicability at local levels and broader comparability with other regions and countries.

Land accounts register both the state of land cover and use at a certain time, which can be termed as land stocks and include the extent (area), type (which can be further related with indicators on condition) other properties (e.g. ownership); as also the changes between at least two steps in time (or flows). It may be useful to distinguish in these accounts the 'naturally-driven' changes and those driven by human actions (anthropic).

Key term definitions relevant to land cover and land use, as given in the SEEA-Central Framework, are listed below:

- **Land cover** refers to the observed physical and biological cover of the Earth's surface and includes natural vegetation and abiotic (non-living) surfaces
- **Land use** reflects both (a) the activities undertaken and (b) the institutional arrangements put in place for a given area for the purposes of economic production, or the maintenance and restoration of environmental functions

The SEEA-Central Framework provides guidance on both land cover and land use accounts preparation separately, but the existing practical experience mostly shows evidence on combined applications on only land cover. Land use remains a more challenging subject to map, in part because of the overlapping nature of land use activities, and difficulties to summarize dominant ones. The classification prescribed under the framework for land cover and land use is given in **Table 1.1**.

Table 1.1: Land Cover and Land Use Classification under SEEA-CF

Land cover classification	Land use classification
1. Artificial surfaces (including urban and associated areas) 2. Herbaceous crops 3. Woody crops 4. Multiple or layered crops 5. Grassland 6. Tree-covered areas 7. Mangroves 8. Shrub-covered areas 9. Shrubs and/or herbaceous vegetation, aquatic or regularly flooded 10. Sparsely natural vegetated areas 11. Terrestrial barren land 12. Permanent snow and glaciers 13. Inland water bodies 14. Coastal water bodies and intertidal areas	**Land** 1.1. Agriculture 1.2. Forestry 1.3. Land used for aquaculture 1.4. Use of built-up and related areas 1.5. Land used for maintenance and restoration of environmental functions 1.6. Other uses of land n.e.c. 1.7. Land not in use **Inland Water** 2.1. Inland waters used for aquaculture or holding facilities 2.2. Inland waters used for maintenance and restoration of environmental functions 2.3. Other uses of inland waters n.e.c. 2.4. Inland waters not in use

n.e.c: not elsewhere classified

The land accounts in physical terms under the framework describes the area and changes in the area of land under different classes over an accounting period. A range of different land accounts can be envisaged—for example, accounts for land use, land cover or land-ownership (by industry or institutional sector).

Generally, a country's total area of land will remain unchanged from one period to the next. Hence, the changes between the opening and closing stock of land in physical terms will primarily encompass changes between different classes of land. A physical account for land cover is presented in **Table 1.2** given below.

Table 1.2: Physical Account for Land Cover

	Artificial surfaces	Crops	Grassland	Tree-Covered area	Mangroves	Shrub-covered area	Regularly flooded areas	Sparse natural vegetated areas	Terrestrial barren areas	Permanent snow, glaciers and inland water bodies	Coastal water and inter-tidal areas
Opening stock of resources											
Addition to stock											
Managed expansion											
Natural expansion											
Upward reappraisals											
Total addition to stock											
Reduction in stock											
Managed expansion											
Natural expansion											
Downward reappraisals											
Total reduction to stock											
Closing stock											

A physical account of land shows the opening and closing areas for different land cover types and various activities causing the changes over the accounting period. The different terms are explained in detail in the framework. A brief description is given in the following paragraphs.

- **Managed expansion/ regression** represents an increase/decrease in the area of a land cover type due to human activity. Generally, the managed expansion/regression of one land cover type will also lead to the recording of a matching entry for managed regression/expansion of another land cover type. A matching entry is not recorded if there is a managed expansion in the total area of land within scope of the account (e.g., in the case of land reclamation).
- **Natural expansion/ regression** is an increase/decrease in area resulting from natural processes including seeding, sprouting, suckering, layering or erosion by sea. In the case of sparse natural vegetation and terrestrial barren land, the natural loss of vegetation from other vegetation types would lead to increases in these areas. Changes in the extent of permanent snow, glaciers and inland water bodies can also be due to natural variation in rainfall. As in the case of managed expansion/regression, generally, the natural expansion of one land cover type will also lead to the recording of a matching entry for natural regression of the another land cover type. A matching entry is not recorded if there is a natural expansion/regression in the total area of land (e.g., in the case where land is created through volcanic activity or landslide or eroded by sea).
- **Reappraisals** can be upward or downward and can reflect changes due to the use of updated information that permits a reassessment of the size of the area of different land covers, for example, from new satellite imagery or interpretation of satellite imagery. The use of updated information may require the revision of previous estimates to ensure a continuity of time series.

Land Statistics in India

Land Use Statistics

The land use statistics in India were developed as a source of information for planning of agricultural production. Out of a geographical area of 328.73 million hectares, statistics are available for 305 million hectares, with coverage of more than 93%. As much as 58 percent of India's farmland is held by marginal farmers with holdings below one

hectare, against less than 8.2 percent in large holdings of 10 hectares and above[1]. The reporting area is classified into the following nine categories:

1. **Forests:** Includes land classed as forest under any legal enactment dealing with forests or administered as forests, whether state-owned or private and whether wooded or maintained as potential forest land. The area of crops raised in the forest and grazing lands or areas open for grazing within the forests are included under the forest area.
2. **Net area sown:** Represents the total area sown with crops and orchards. Area sown more than once in the same year is counted only once.
3. **Area under non-agricultural uses:** Includes land occupied by buildings, roads and railways or under water, e.g. rivers and canals as also other land put to uses other than agriculture.
4. **Barren and unculturable land:** Includes all barren and unculturable land like mountains, deserts, etc. Land which cannot be brought under cultivation except at an exorbitant cost, are classified as unculturable whether such land is in isolated blocks or within cultivated holdings.
5. **Permanent pastures and other grazing lands:** Includes all grazing lands whether they are permanent pastures and meadows or not. Village common grazing land is included under this head.
6. **Land under miscellaneous tree crops, etc. :** Includes cultivable land which is not included in 'Net area sown' but is put to some agricultural uses. Lands under Casurina trees, thatching grasses, bamboo bushes and other groves for fuel, etc. which are not included under 'Orchards' are classified under this category.
7. **Culturable waste land:** Includes land available for cultivation, but not cultivated during the current year and the last five years or more in succession for one reason or other. Such lands may be either fallow or covered with shrubs, which are not put to any use. They may be assessed or unassessed and may lie in isolated blocks or within cultivated holdings. Land once cultivated but not cultivated for five years in succession are also included in this category at the end of the five years.

[1] *Agricultural Census 2010-11*

8. **Current fallow:** This represents cropped area which are kept fallow during the current year. If a seeding area is not cropped against the same year, it may be treated as current fallow.
9. **Fallow Land other than Current Fallow:** Includes all lands, which were taken up for cultivation but are temporarily out of cultivation for a period of not less than one year and not more than five years.

The land-use categories defined in SEEA-CF and Indian 9-fold classification have deviations in respect of concept, definition and treatment. Hence a one-to-one correspondence cannot be established between the datasets. However, Indian 9-fold classification could be arranged in the SEEA land use categories as per details mentioned in the **Table 1.3** below:

Table 1.3: Comparative Statement of Land Use Classification under SEEA- CF and India 9-fold Classification

Land Use Classification under SEEA		Indian 9-fold Land Use Classification	
1.1	Agriculture	2, 5, 7 and 8	Net area sown, Permanent pastures and other grazing lands, Culturable waste land, Current fallow
1.2	Forestry	1, 6	Forests, Land under miscellaneous tree crops, etc.
1.3	Land used for aquaculture	3	Area under non-agricultural uses
1.4	Use of built-up and related areas	3	Area under non-agricultural uses
1.5	Land used for maintenance and restoration of environmental functions	1, 3	Forests, Area under non-agricultural uses
1.6	Other uses of land n.e.c.	3	land Area under non-agricultural uses
1.7	Land not in use	4, 9	Barren and unculturable, Fallow Land other than Current Fallow
	Inland waters		
2.1	Inland waters used for aquaculture or holding facilities		Not classified separately
2.2	Inland waters used for maintenance and restoration		

	of environmental functions		
2.3	Other uses of inland waters n.e.c.		
2.4	Inland waters not in use		

Land Cover Statistics

In India, land cover statistics are maintained by National Remote Sensing Centre (NRSC), Department of Space (DOS) through a component on National Land Use/ Land Cover (LULC) mapping of the Natural Resources Census (NRC) Project of National Natural Resources Repository (NRR) Program. The data for land use/land cover classification of 1:50,000 scale for 2005-06 and 2011-12 has been released by NRSC, where the LULC data is grouped as per the land cover classes given in **Table 1.4**.

Table 1.4: Grouping of Land Use and Land Cover (LULC) Classes

Sl.	Level-I	Level-II	Level-III
I.	**Built-up**	Urban	Built up – Compact (Continuous), Built up – Sparse (Discontinuous), Built up – Vegetated / Open area, Industrial area, Ash / Cooling Pond / effluent and other waste
		Rural	Rural
		Mining	Mining – Active, Mining – Abandoned, Quarry
II.	**Agriculture**	Crop land	Kharif, Rabi, Zaid, Cropped in 2 seasons, Cropped in more than 2 seasons
		Plantation	Agriculture Plantation
		Fallow	Fallow land
		Current Shifting cultivation	Shifting cultivation – Current
III.	**Forest**	Evergreen / Semi-evergreen	Dense/Closed and Open category of Evergreen / Semi-evergreen
		Deciduous	Dense / Closed and Open category of Deciduous and Tree Clad Area
		Forest Plantation	Forest Plantation
		Scrub Forest	Scrub Forest, Shifting Cultivation – Abandoned
		Swamp / Mangroves	Dense / Closed & Open Mangrove
IV.	**Grass/ Grazing**	Grass/ Grazing	Grassland: Alpine / Sub-Alpine, Temperate / Sub

Sl.	Level-I	Level-II	Level-III
			Tropical, Tropical / Desertic
V.	**Barren / unculturable /Wasteland**	Salt Affected Land	Salt Affected Land
		Gullied / Ravinous Land	Gullied, Ravinous
		Scrub land	Dense / Closed and Open category of scrub land
		Sandy area	Desertic, Coastal, Riverine sandy area
		Barren rocky	Barren rocky
		Rann	Rann
VI.	**Wetlands / Water Bodies**	Inland Wetland	Inland Natural (Ox-bow lake, cut off meander, waterlogged etc.); Inland Manmade (Water logged, saltpans etc.); Lagoon, creeks, mudflats
		River / Stream / canals	Perennial & Non-Perennial River, Canal / Drain
		Water bodies	Aquaculture, Permanent & seasonal Lake/Ponds, Reservoir/Tanks
VII.	**Snow and Glacier**	Snow	Snow

As per FAO, 2005[2], Land Cover is defined as observed physical features on the Earth's Surface, which transforms to Land Use when an economic function is added to it. A one-to-one concordance of LULC, India with LULC, SEEA-CF is given in the **Table 1.5** below:

Table 1.5: Comparative Statement of Land Cover Classification under SEEA- CF and India

LULC Classes in India	LULC under SEEA-CF
1. Built-up	1. Artificial surface (including urban and associated areas)
2. Agriculture	2. Herbaceous crops 3. Woody crops 4. Multiple or layered crops
3. Forest	6. Tree-covered areas 7. Mangroves 8. Shrub-covered areas (partially)
4. Grass / Grazing	5. Grass land
5. Barren / Unculturable /Wasteland	10. Sparsely natural vegetated areas (partially) 11. Terrestrial barren land

[2] Land Cover Classification System- Classification Concepts-Software Version 3

LULC Classes in India	LULC under SEEA-CF
6. Wetlands / Water Bodies	8. Shrub-covered areas (partially) 9. Shrubs and/or herbaceous vegetation, aquatic or regularly flooded 10. Sparsely natural vegetated areas (partially) 13. Inland water bodies 14. Coastal water bodies and intertidal areas
7. Snow & Glacier	12. Permanent snow and Glacier

Asset Account for Land Cover

The framework suggested in the SEEA CF for preparation of asset account for land cover requires segregated information on natural and managed activities leading to the changes in land cover. As these are not readily available, the land cover accounts are presented at a more-aggregate level. Based on the LULC data for the year 2005-06 and 2011-12, the asset account for land cover is given in **Table 1.6**. The state-wise asset account for land cover is given in the **Annexure-1.1**.

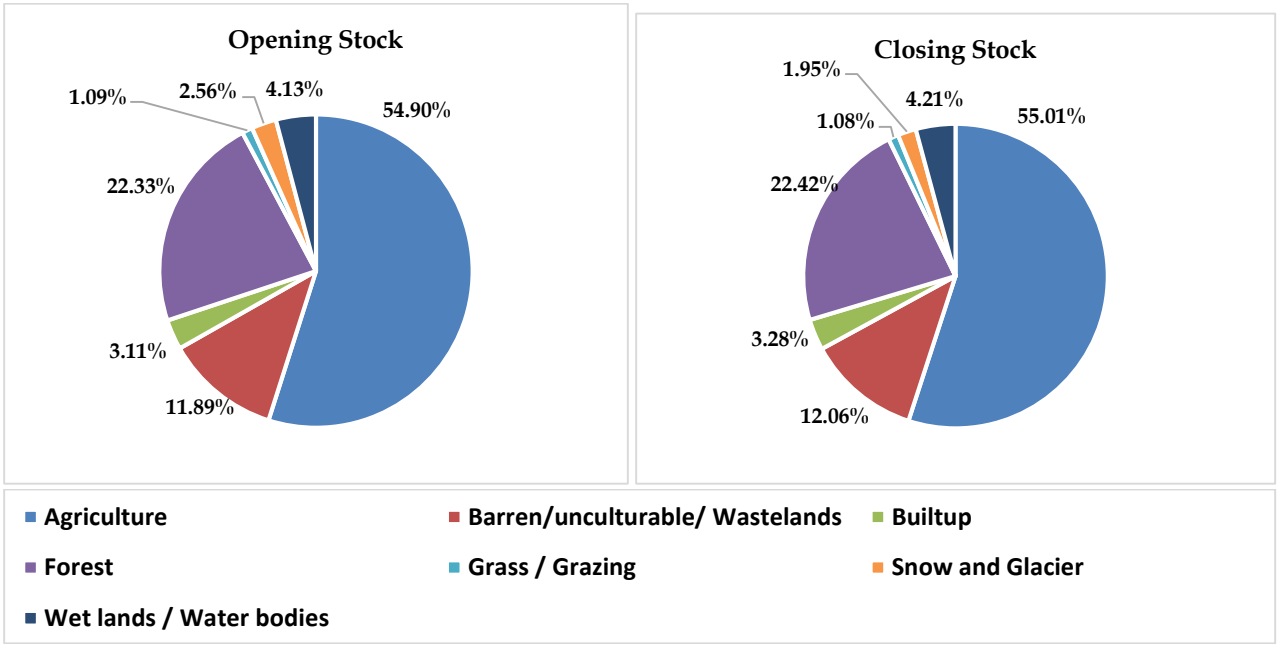
Table 1.6: Asset Account for Land Cover (Sq. Kms)

INDIA

		Opening Stock (2005-06)	Addition to Stock	Reduction in Stock	Closing Stock (2011-12)
Agriculture	**Crop land**	1519600.64	78227.66	39541.78	1558286.52
	Current Shifting cultivation	5155.97	2927.64	3546.70	4536.90
	Plantation	81840.63	3459.89	1268.86	84031.66
	Farmland(subtotal)	1606597.23	84615.18	44357.33	1646855.08
	Fallow	198242.26	31018.47	67905.01	161355.73
	Sub Total 1	***1804839.50***	***115633.66***	***112262.34***	***1808210.82***
Barren/ unculturable/ Wastelands	**Barren Rocky**	119482.81	17580.40	2169.66	134893.55
	Gullied / Ravinous Land	10425.99	96.23	537.49	9984.74
	Rann	17065.02	0.10	0.28	17064.83
	Salt Affected Land	9232.56	230.47	1112.38	**8350.65**
	Sandy Area	34025.43	269.21	5778.04	28516.60
	Scrub Land	200499.06	8676.76	11583.50	197592.32
	Sub Total 2	***390730.87***	***26853.17***	***21181.35***	***396402.69***
Built-up	**Mining**	4045.99	1068.01	25.09	5088.91

Table 1.6: Asset Account for Land Cover (Sq. Kms)					
INDIA					
		Opening Stock (2005-06)	Addition to Stock	Reduction in Stock	Closing Stock (2011-12)
	Rural	66403.71	661.00	250.24	66814.47
	Urban	31663.85	4393.62	2.16	**36055.31**
	Sub Total 3	***102113.55***	***6122.64***	***277.50***	***107958.69***
Forest	Deciduous	416187.55	30340.93	16907.44	429621.05
	Evergreen/Semi evergreen	186560.87	13359.06	29642.20	170277.74
	Forest Plantation	11396.09	474.30	149.98	11720.41
	Scrub Forest	114596.56	8859.55	3509.24	119946.86
	Swamp / Mangroves	5172.92	151.51	31.36	5293.07
	Sub Total 4	***733913.99***	***53185.35***	***50240.21***	***736859.13***
Grass / Grazing	Grass / Grazing	35788.81	2194.09	2522.42	35460.48
	Sub Total 5	***35788.81***	***2194.09***	***2522.42***	***35460.48***
Snow and Glacier	Snow and Glacier	84107.93	2660.73	22815.05	63953.61
	Sub Total 6	***84107.93***	***2660.73***	***22815.05***	***63953.61***
Wet lands / Water bodies	Inland Wetland	10545.98	757.58	1428.20	9875.36
	Coastal Wetland	14340.61	59.37	256.23	14143.74
	River/Stream/Canals	60369.63	2988.01	2810.46	60547.18
	Water bodies	50512.13	4030.88	691.72	53851.29
	Sub Total 7	***135768.35***	***7835.84***	***5186.61***	***138417.58***
Grand Total		**3287263.00**	**214485.47**	**214485.47**	**3287263.00**

Figure 1.1: Opening and Closing stock of Land Cover



The major findings of Asset Account of Land Cover (**Table 1.6 and Figure 1.1**) are given below:

- Agriculture area had a low net increase of 3371.32 sq. kms during 2005-06 to 2011-12 with higher changes observed between farmland and fallow land that can be seen in the LULC change matrix (**Table 1.7**).
- Under the Barren/unculturable/wasteland, the major addition in the area of land was contributed by Snow & Glacier which converted into barren rocky and scrub area. Similarly, the major reduction in this class of land was due to the conversion of scrub and sandy land to agriculture land.
- Under the Built-up area, the major addition in the urban land is through conversion of farmland and fallow land.
- Under the Forest area, the addition was due to conversion of land under current shifting cultivation and snow & glacier. Other notable changes were conversion of scrub and deciduous forest to current shifting cultivation.
- Under the grass/grazing land, the major addition in the area of land contributed by snow & glacier and river/streams/canals. The reduction in the land contributed by agriculture (farmland & fallow land), evergreen/semi evergreen forest, snow & glacier and scrub land.

- Under the Snow & Glacier, the major increase in the area contributed by barren rocky and grass & grazing. The major area of snow & glacier converted into barren rocky, scrub forest and grass & grazing land.
- Under the wet lands/water bodies, the interesting feature was increase in the class of land due to conversion of farmland, scrub land and grass & grazing and decrease to its change to the same classes - cropland, scrub land and grass & grazing.

Land Cover Change Matrix

The broad LULC class-wise change matrix at All India level from 2005-06 to 2011-12 is presented in the **Table 1.7**. The detailed LULC class-wise change matrices at all India level and State-wise are given in the **Annexure 1.2 and 1.3**.

Table 1.7: Land Cover Change Matrix-India (Thousand Sq. Kms.)

LULC-CLASSES		INDIA 2011-12								
		FL	1.1.4	1.2	1.3	1.4	1.5	1.6	1.7	Grand Total
2005-06	Farmland (FL)	**1565.43**	28.97	1.56	3.20	3.32	0.06		4.05	**1606.60**
	1.1.4 Fallow	65.10	**130.34**	0.55	1.11	0.01			1.13	**198.24**
	1.2:Barren/unculturable/ Wastelands	9.98	1.69	**374.30**	1.08	0.57	0.17	1.89	1.06	**390.73**
	1.3: Built-up				**102.09**	0.01			0.01	**102.11**
	1.4: Forest	3.61	0.01	0.92	0.24	**728.29**	0.18	0.16	0.50	**733.91**
	1.5: Grass / Grazing	0.35	0.21	0.29	0.13	0.38	**33.27**	0.60	0.57	**35.79**
	1.6:Snow and Glacier			17.88		4.11	0.82	**61.29**	0.01	**84.11**
	1.7: Wet lands / Water bodies	2.37	0.14	0.91	0.11	0.17	0.97		**131.09**	**135.77**
	Grand Total	**1646.85**	**161.36**	**396.40**	**107.96**	**736.86**	**35.46**	**63.95**	**138.42**	**3287.26**

Note: Farmland includes Cropland, Current Shifting Cultivation and Plantation

The major findings of LULC Change matrix at all India level is given below:

i. **Farmland:** Around 28.97 thousand sq.kms (0.88%) area of farmland shifted into fallow land from 2005-06 to 2011-12 under the Agriculture Land. Similarly, around 65.10 thousand sq. kms (1.98%) area of fallow land and 9.98 thousand sq. kms of barren/wastelands/unculturable converted into farmland under agriculture land in the same period.

ii. **Fallow**: Around 65.10 thousand sq.kms (1.98%) area of fallow land converted to farmland from 2005-06 to 2011-12 under the Agriculture Land. Similarly, around 28.97 thousand sq. kms of farmland converted to fallow land under agriculture land in the same period.

iii. **Barren/ Unculturable /Wastelands**: 9.98 thousand sq. kms (0.30%) area of this class of land shifted to farmland under agriculture from 2005-06 to 2011-12 and 17.88 thousand sq. kms of snow and glacier converted into barren / unculturable/ wastelands in the same period.

iv. **Built-up**: 5.39 thousand sq. kms area (0.16%) of land of agriculture and barren/unculturable/wastelands converted into built-up from 2005-06 to 2011-12.

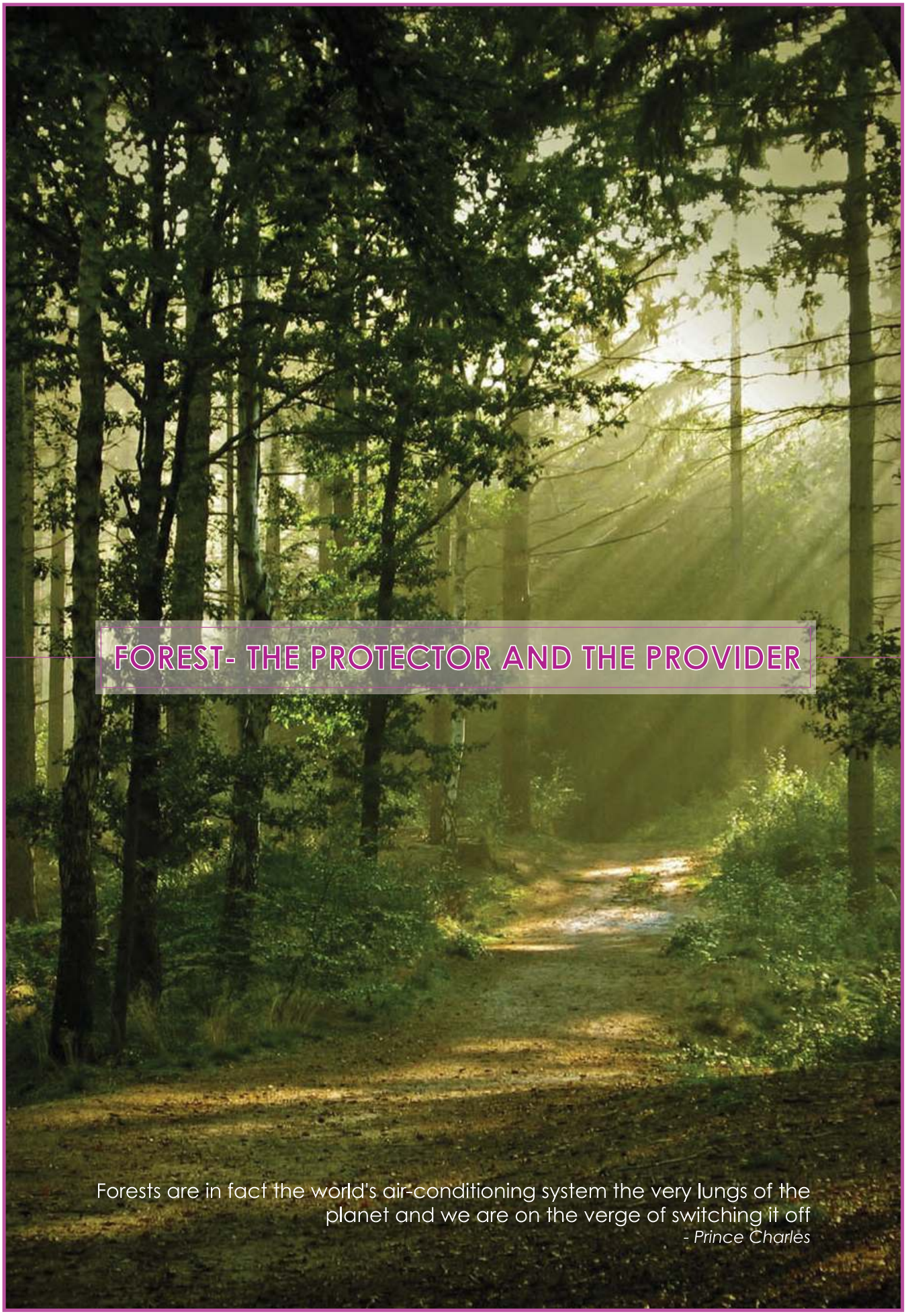
v. **Forest**: 4.53 thousand sq. kms (0.14%) area of land of forest shifted to farmland under agriculture and barren/unculturable/wastelands from 2005-06 to 2011-12 and 7.43 thousand sq. kms of farmland under agriculture and snow and glacier converted into forest in the same period.

vi. **Snow and Glacier**: 21.99 thousand sq. kms (0.67%) area of land under snow & glacier converted to barren/unculturable/wastelands and forest from 2005-06 to 2011-12.

vii. **Wet Lands / Water Bodies**: 4.26 thousand sq. kms (0.13%) area of land of wet lands / water bodies shifted to farmland, barren/unculturable/wasteland and grass/grazing from 2005-06 to 2011-12 and 6.24 thousand sq. kms of agriculture and barren/unculturable/wastelands converted into wet lands /water bodies in the same period.

Conclusion

Land cover and land use statistics and accounts provides the crucial information to the policy makers for better utilization of land in a sustainable manner to fulfill the demands of growing population without increasing the degraded land. The compilation of land accounts will help in addressing many of the SDGs like SDG 2. 'Zero Hunger', SDG 11, 'Sustainable cities and Communities' and SDG 15, "Life on land". Three of the targets in SDG 2.4, 11.3 – 15.1 and 15.3 – explicitly refer to quality and utilization of land in a sustainable manner. The information on the quality of country's land and its utilization provides valuable information required to initiate the requisite corrective measures and also forms the input for forest, coastal & marine policies.



FOREST- THE PROTECTOR AND THE PROVIDER

Forests are in fact the world's air-conditioning system the very lungs of the planet and we are on the verge of switching it off

- Prince Charles

Forest Cover 2015-16

CHAPTER 2
FOREST – THE PROTECTOR AND PROVIDER

Introduction

The term 'Forest' is generally defined as a large area covered chiefly with trees and undergrowth. The services provided by forests cover a wide spectrum of ecological, economic, social and cultural considerations and processes. A multitude of benefits are received from them which includes goods such as timber, food, fuel and bio-products; ecological functions such as carbon storage, nutrient cycling, water and air purification, and maintenance of wildlife habitat; and social and cultural benefits such as recreation and spirituality. The contribution of forest resources in protecting top soil, watershed and irrigation structures, reclaiming land from the sea, protecting coastal areas from storm damage and in maintaining and upgrading the environmental quality is much beyond quantification. The range of essential ecosystem services provided by forests further extend to other aspects such as health (through disease regulation), livelihoods (providing jobs and local employment), water (watershed protection, water flow regulation, rainfall generation), nutrient cycling and climate security.

Intergovernmental Panel on Climate Change (IPCC), 2013 specifically mentions that "protecting tropical forests therefore not only has a double-cooling effect, by reducing carbon emissions and maintaining high levels of evaporation from the canopy, but is also vital for the continued provision of essential life-sustaining services". Though these services are obviously essential for the well-being of people and the planet, they remain undervalued and therefore, cannot compete with the more immediate gains delivered from converting forests into commodities (Mitchel et al., 2008)[1]. Recognizing that ecosystem services operate from local to global scales and are not confined within national borders and that the existence of mankind relies on them, it is in collective interest to ensure their sustained provisioning into the future.

It is no surprise, therefore, that economic, social and environmental importance of ecosystem services provided by forests is increasingly recognized globally and forms the core of many discussions and resolutions worldwide. The primary challenge for

[1] Mitchell, A.W., Secoy, K., Mardas, N., Trivedi, M., Howard, R. and Parker, C. (2008). Forests NOW in the Fight Against Climate Change. Forest Foresight Report 1.v4 Global Canopy Programme, Oxford. pp.23; https://theredddesk.org/sites/default/files/resources/pdf/2009/Forests_Now_version_4.pdf; https://theredddesk.org/what-redd

sustainable forest management is finding ways to continue to benefit from ecological services without compromising the forest's ability to provide those services. Owing to factors such as over exploitation, conversion of forestland into cropland, forest fires and uncontrolled grazing, there is a need to enhance or maintain the forest resources both in terms of their area and quality so as to ensure that these essential services continue to be received by mankind in a sustainable manner.

The ***"2030 Agenda for Sustainable Development"*** adopted by countries across the world, lists out the Sustainable Development Goals, an intergovernmental set of aspirations with 17 goals and 169 specific targets to be achieved over the next 15 years. Of these global goals and targets, as many as 21 targets spread over 8 SDGs are directly or indirectly related to forestry activities. But forests are linked to the other SDGs as well – this can be exemplified by defining 'forestry' to include all of the ways that forests and trees contribute to sustainable development (CIFOR, 2016[2]). With the forest cover in India occupying more than 20% of the total geographical area of country, forests plays an important role in sustainable development, especially due to their role in providing livelihood to a significant portion of the population and hence in income generation.

Concept of Forest Accounts in SEEA-CF

Forests are at the centre of many environmental and economic issues including climate change, biodiversity protection, tourism, soil erosion, stability of water cycles etc. Forest accounts provide a framework in this context to capture the economic contribution of forests and their connection with the economy. Recognizing the fact that timber is a prime economic resource, SEEA-Central Framework prescribes the compilation of physical asset accounts for forest and other wooded land (***the term 'forests' would be used to refer to 'forest and other wooded land' in the rest of this chapter for the sake of simplicity***) in conjunction with the compilation of asset accounts for timber resources. In principle, however, accounts for forests are a type of land account.

A key distinction between the asset accounts for forests and those for timber resources is that the scope of timber resources is not limited to timber from forests. For example, depending on their significance, orchards would fall within scope of timber resources but are not considered areas of forests. In addition, while the asset account for timber

[2] Centre for International Forestry Research (CIFOR)- 2016

resources is focused on the volume of timber resources rather than on the area of land covered by forests, the focus of the asset accounts for forests is on changes in the area due to activities like deforestation and afforestation. Nevertheless, despite having the clear distinction in purpose and scope, there are strong connections between asset accounts for timber resources and those for forests. This is because the majority of timber resources are found in forest areas.

Asset Accounts for Forests

Forest land, as per FAO Global Forest Resources Assessment 2010, is defined as land spanning more than 0.5 hectares with trees higher than 5 metres and a canopy cover of more than 10 per cent, or trees able to reach these thresholds in situ. The scope of the asset accounts for forests follows a land use perspective. Thus, it does not include land that is predominantly under agricultural or urban land use and is not strictly defined on the basis of changes in tree-covered areas.

Forest land is classified according to different types of forest. Forest land can be further classified as naturally regenerated forest (including primary forest) and planted forest. **Other wooded land** is land not classified as forest land, spanning more than 0.5 hectares; with trees higher than 5 metres and a canopy cover of 5-10 per cent, or trees able to reach these thresholds in situ; or with a combined cover of shrubs, bushes and trees above 10 per cent. It does not include land that is predominantly under agricultural or urban land use.

The structure of physical asset account for forests as per the SEEA-CF is given in the **Table 2.1** below. It shows the opening and closing stock by area and changes in the area of forests. The area of forests should be measured inclusive of relevant access roads, rivers and streams.

Table 2.1: Physical asset account for forests

	Type of forests				
	Primary forest	Other naturally regenerated forest	Planted forest	Other wooded land	Total
Opening stock of forests					
Additions to stock					
Afforestation					
Natural expansion					
Total additions to stock					
Reductions in stock					

Deforestation					
Natural regression					
Total reductions in stock					
Closing stock of forests					

Forests in India

In India, the term 'Forest Cover'[3] refers to all lands more than one hectare in area with a tree canopy of more than 10% irrespective of land use, ownership and legal status. It may include even orchards, bamboo and palm and is assessed through remote sensing. In India, forest cover has been classified in terms of the following tree canopy density:

Very Dense Forest(VDF)	**• All lands with tree canopy density of 70% and above**
Moderately Dense Forest(MDF)	**• All lands with tree canopy density of 40% - 70%**
Open Forest (OF)	**• All lands with tree canopy density of 10% - 40%**
Scrub	**• Degraded forest lands with canopy density less than 10%**

In addition, the term 'Recorded Forest Area' or 'Forest Area' refers to all the geographical areas recorded as 'Forests' in government records. Recorded forest area consists of Reserved Forest, Protected Forest or any area notified under the provision of Indian Forest Act, 1927 or any state act or local laws. The recorded forest area may also include all such areas which have been recorded as forests in the revenue records.

As per Champion and Seth, 1968 classification, Indian forests can be classified into four major classes namely tropical, sub-tropical, temperate and alpine. These major classes are further divided into 16 type groups. The regional distribution of the forest type is given in the **Table 2.2**.

[3] As per India State of Forest Report (ISFR), Forest Survey of India (FSI)

Table 2.2: Regional distribution of the forest types in India

S. No.	Forest Type Group	General Composition	Regional Occurrence (States of India)
		Temperate Forests	
1	Himalayan Dry Temperate Forests (HDTF)	Coniferous forests with sparse xerophytic under-growth	Jammu & Kashmir and Himachal Pradesh
2	Himalayan Moist Temperate Forest (HMTF)	Evergreen forests mainly sclerophyllous oak and coniferous species	Himachal Pradesh. Jammu & Kashmir and Uttar Pradesh
3	Montane Wet Temperate Forests (MWTF)	Evergreen without coniferous species	Arunachal Pradesh, Manipur and Nagaland
		Sub-alpine & Alpine Forests	
4	Sub- Alpine	Stunted deciduous or evergreen forests, usually close formation with or without conifers	Arunachal Pradesh, Himachal Pradesh, Jammu & Kashmir and Uttar Pradesh
5	Moist Alpine Scrub	Low but often dense scrub of evergreen species	Arunachal Pradesh, Himachal Pradesh, Jammu & Kashmir and Uttar Pradesh
6	Dry Alpine Scrub	Xerophytic scrub in open formation mostly of deciduous in nature	Arunachal Pradesh, Himachal Pradesh, Jammu & Kashmir and Uttar Pradesh
		Sub-tropical Forests	
7	Sub-Tropical Broad-Leaved Hill Forests (STBLHF)	Broad-leaved largely evergreen high forests	Assam and Meghalaya
8	Sub-Tropical Dry Evergreen Forests (STDEF)	Low xerophytic forest and scrubs	Himachal Pradesh and Jammu & Kashmir
9	Sub-Tropical Pine Forests (STPF)	Pine associated predominates	Arunachal Pradesh, Haryana, Himachal Pradesh, Jammu & Kashmir, Manipur, Meghalaya, Nagaland, Punjab and Uttar Pradesh
		Tropical Forests	
10	Littoral and Swamp Forests (L&SF)	Mainly evergreens of varying density and height but always associated predominantly with wetness	Andhra Pradesh, Gujarat, Maharashtra, Odisha, Tamil Nadu, West Bengal and Andaman & Nicobar Islands.
11	Tropical Dry Deciduous Forests (TDDF)	Entirely deciduous or nearly so top canopy uneven rarely over 25 m high	Andhra Pradesh, Bihar, Gujarat, Haryana, Himachal Pradesh, Karnataka, Madhya Pradesh, Maharashtra, Jammu & Kashmir, Odisha, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal.
12	Tropical Dry Evergreen Forests (TDEF)	Hard leaved evergreen trees predominates with some deciduous emergent often dense but usually under 20 m high	Andhra Pradesh and Tamil Nadu
13	Tropical Moist Deciduous Forests (TMDF)	Dominants mainly deciduous but sub-dominants and lower story largely evergreen top canopy even and dense but 25m high	Andhra Pradesh, NER excluding Arunachal Pradesh & Sikkim, Bihar, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Tamil Nadu, Uttar Pradesh, West Bengal, Andaman & Nicobar Islands, Goa and Dadra & Nagar Haveli.
14	Tropical Semi-Evergreen Forests (TSEF)	Dominants includes deciduous species but evergreens predominant	Assam, Karnataka, Kerala, Maharashtra, Nagaland, Odisha, Sikkim, Tamil Nadu, Andaman & Nicobar Islands and Goa.
15	Tropical Thorn Forests (TTF)	Deciduous with low thorny trees and xerophytes predominant top canopy more or less broken, less than 10 m high	Andhra Pradesh, Gujarat, Haryana, Himachal Pradesh, Karnataka, Madhya Pradesh, Maharashtra, Punjab, Rajasthan, Tamil Nadu and Uttar Pradesh.
16	Tropical Wet Evergreen Forest (TWEF)	Dense tall forests, entirely evergreen or nearly so	NER excluding Meghalaya and Tripura, Karnataka, Kerala, Tamil Nadu, Andaman & Nicobar Islands and Goa.

India is one of the few countries which have a National Forest Policy since 1894. The policy has been revised twice – in 1952 and 1988 – to account for the changing circumstances. It is currently under revision and the draft National Forest Policy 2018 aims to integrate the vision of sustainable forest management by incorporating elements of ecosystem security, climate change mitigation and adaptation, forest hydrology, participatory forest management, urban forestry, robust monitoring and evaluation framework and establishment of mechanisms to oversee multi-stakeholder convergence in forest management, while building on the rich cultural heritage of co-existence and relying on the rich and diverse forest resources. The new draft policy has the objective to safeguard the ecological and livelihood security of people, of the present and future generations, based on sustainable management of the forests for the flow of ecosystem services. The new policy also aims to bring a minimum one-third of India's total geographical area under forest cover through scientific interventions and enforcing strict rules to protect the dense cover. Unlike the previous policies, which focused on environmental stability and maintenance of ecological balance, the 2018 policy focuses on the international challenge of climate change.

Forest Cover

Forest Survey of India, under the MOEF&CC, has been bringing out a biennial publication, 'India State of Forest Report' (ISFR), since 1987. The report provides state/district-wise forest cover of the country and changes thereon with respect to the previous assessment, with a specific reference to the forest cover in hill and tribal areas, as also in the north-eastern states. It also provides the estimates of growing stock within and outside the forest areas, carbon stock and tree, bamboo & mangrove cover. In addition, the report includes information on water bodies in the forest and forest fires.

As per India State of Forest Report 2017, the total forest cover of the country is 7, 08,273 sq. km. which is 21.54% of the total geographic area of the country. From the distribution of forest cover given in the **Table 2.3** and **Figure 2.1,** it can be seen that the total forest cover has marginally increased by 0.54% from 2004-05 to 2015-16. This increase is notable since an area of 24187 sq. km. of forest land has been diverted during the period under the Forest (Conservation) Act 1980 for various developmental works such as road and railway construction, mining activities, power & irrigation projects as also industrial requirements.

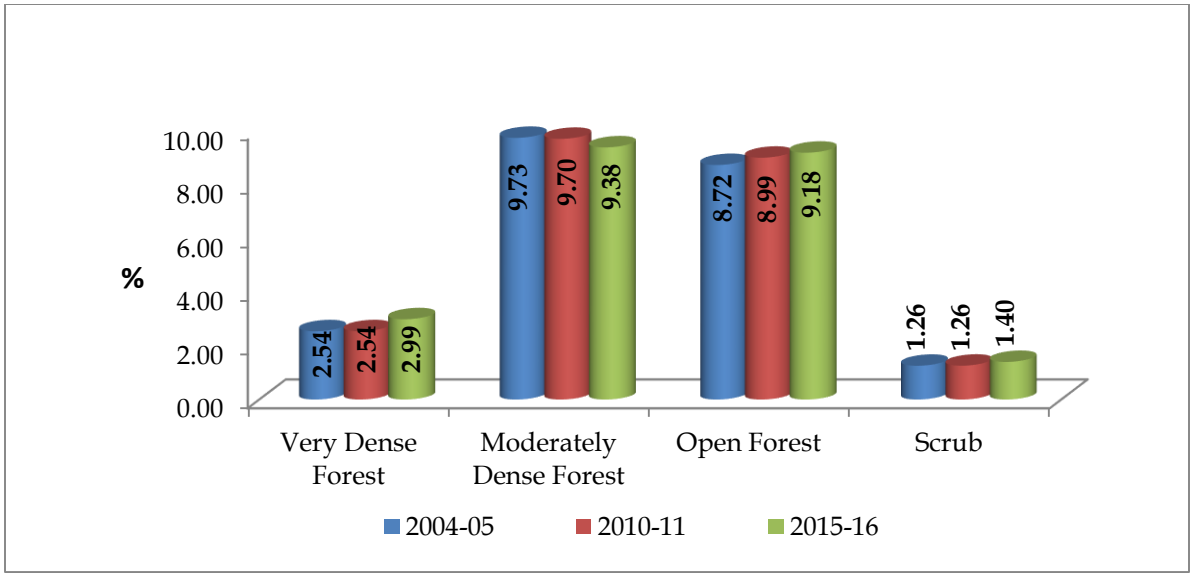
The state-wise distribution of forest cover of the same period is given at **Annexure 2.1**.

Table 2.3: Forest Cover of India in terms of canopy density cover

(sq. km.)

Forest Classes	Assessment Period (2004-05)	Assessment Period (2010-11)	Assessment Period (2015-16)
	ISFR 2005	ISFR 2013	ISFR 2017
Very Dense Forest	83,472	83,502	98,158
Moderately Dense Forest	3,19,948	3,18,745	3,08,318
Open Forest	2,86,751	2,95,651	3,01,797
Mangroves	4445	4629	4921
Total Forest Cover	**6,90,171**	**6,97,898**	**7,08,273**
Scrub	41,286	41,383	45,979
Non-Forest	25,55,806	25,47,982	25,33,217
Percentage to Total Geographic Area (%)			
Very Dense Forest	2.54	2.54	2.99
Moderately Dense Forest	9.73	9.70	9.38
Open Forest	8.72	8.99	9.18
Total Forest Cover	**21.00**	**21.23**	**21.54**
Scrub	1.26	1.26	1.40
Non-Forest	77.75	77.51	77.06

Figure 2.1: Forest Cover in India



The ISFR 2017 report also reveals that 15 States/UTs have more than 33 per cent of the geographical area under forest cover. Out of these States and Union Territories, seven States/UTs have more than 75% forest cover namely Mizoram, Lakshadweep, Andaman & Nicobar Islands, Arunachal Pradesh, Nagaland, Meghalaya and Manipur, while 8

states namely Tripura, Goa, Sikkim, Kerala, Uttarakhand, Dadra & Nagar Haveli, Chhattisgarh and Assam have forest cover between 33% and 75%. The total forest cover in the North-Eastern Region is 1,71,306 sq. km., which is 65.34% of its geographical area in comparison to the national forest cover of 21.54%. Madhya Pradesh (77,414 sq. km.) has the largest forest cover in the country in terms of area, followed by Arunachal Pradesh (66,964 sq. km.) and Chhattisgarh (55,547 sq. km.). In terms of percentage of forest cover with respect to the total geographical area, Lakshadweep with (90.33%) has the highest forest cover, followed by Mizoram (86.27%) and Andaman and Nicobar Island (81.73%).

The State-wise analysis of forest cover (**as per Annexure 2.1**) from 2004-05 to 2015-16 shows that the total forest cover area as percentage to the total geographical area has increased in the State of Kerala (8%) followed by West Bengal (4%) and 2% each in the States of Odisha, Tamil Nadu, Goa and Manipur. The majority of increase in the total forest cover area has been contributed by very dense forest and open forest in the States of Kerala and Tamil Nadu; very dense and moderate forest in Manipur; open forest in the States of West Bengal, Odisha and Goa. Similarly, the forest cover has shown decrease in the States of Nagaland (7%), Tripura (4%), Mizoram (2%) and Dadra & Nagar Haveli (2%). This decline in the total forest cover area has been on account of decrease in the moderate and open forests in Nagaland and moderate forest in Mizoram & Dadra & Nagar Haveli. The State of Tripura also shows an increase in the area of very dense and moderate forest accompanied by a simultaneous decrease in the open forest by 44% from 2004-05 to 2015-16.

Growing Stock

The precise information on growing stock, which is a measure of tree wealth and includes distribution of stems in different diameter class, volume, biomass, carbon stock etc. both within and outside forest area, is required for strategic planning of the forestry sector at various levels. Traditionally, growing stock is considered as an important indicator of forest health and productivity. The growing stock is estimated through forest inventory under which both qualitative and quantitative parameters are recorded. The growing stock at all India level is presented in **Table 2.4** which shows that total growing stock substantially decreased by 7.22% from 2006-07 to 2010-11 but increased by 2.90% in 2015-16. Similarly, the growing stock within forest decreased by 7.23% from 2006-07 to 2010-11 but later increased by 1.07% in 2015-16.

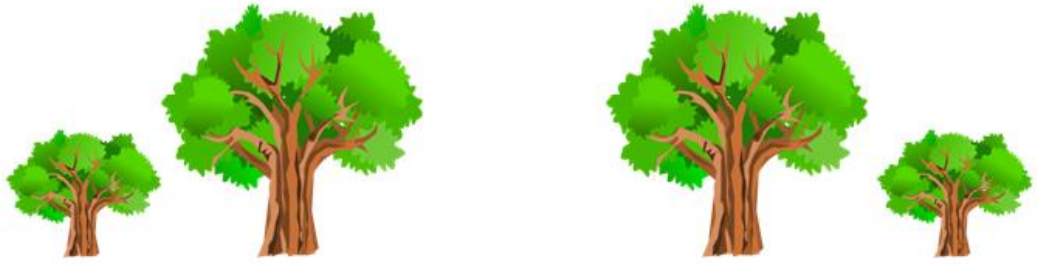
Table 2.4: All India Growing Stock

(million cum)

	In Forest	In Trees Outside Forest (TOF)	Total
2006-07 (ISFR 2009)	4498.66	1599.57	**6098.23**
2010-11 (ISFR 2013)	4173.36	1484.68	**5658.05**
2015-16 (ISFR 2017)	4218.38	1603.99	**5822.38**

The state-wise estimate of growing stock for both within as well as outside forest areas for the years 2006-07, 2010-11 and 2015-16 is given at **Annexure 2.2**. In the North-Eastern region, total growing stock has decreased from 1122.12 million cum in 2006-07 to 958.34 million cum in 2015-16. The States of Arunachal Pradesh and Assam, which contribute around 58% of growing stock within the NE Region, have shown a significant reduction in growing stock within the forest. Most of the remaining states have shown mixed trends in the growing stock during the period. The changes in the growing stocks in the States during 2006-07 to 2015-16 are depicted in the **Figure 2.2**.

Figure 2.2: Change in Growing Stock from 2006-07 to 2015-16



From 2006-07 to 2010-11, almost all the states have shown decline in growing stock except Goa and Sikkim. However, from 2010-11 to 2015-16, even though there was a marginal change in Forest cover in Assam and Uttarakhand, growing stock has significantly reduced by more than 10%. But in case of Jharkhand, Madhya Pradesh,

Maharashtra and Rajasthan despite a marginal change in Forest cover, growing stock has significantly increased by more than 10%.

Carbon Stock

The variability in climate, referred to as climate change, poses a threat to the environment and quality of human life all over the world. The parties to the United Nations Framework Convention on Climate Change (UNFCCC) have undertaken a comprehensive exercise to address the issues of climate change adaptation and mitigation, in which forests play an important role. Forests sequester and store more carbon than any other terrestrial ecosystem and are, therefore, an important natural deterrent to climate change. The total carbon stocked in the forests is divided into five pools by Good Practice Guidance (GPG)[4] and the emission factors are derived from the assessments of changes in carbon stocks in these carbon pools. The living portion of biomass carbon is classified as 'above ground biomass (AGB)' and 'below ground biomass (BGB)' and stores significant amount of carbon. The 'dead organic matter (DOM)' is classified as 'dead wood' and 'litter'. The fifth pool is 'soil organic carbon (SOC)' which contains substantial amount of organic carbon. The national level estimates of carbon stock for 2004-05 and 2015-16 under different pool is given in the **Table 2.5**.

Table 2.5: Carbon Stock in forests between 2004-05 and 2015-16

(Million tonnes)

Component	Carbon Stock in forests in 2004-05	Carbon Stock in forests in 2015-16	Net Change in Carbon Stock
Above Ground Biomass	2101	2238	137
Below Ground Biomass	663	699	36
Dead wood	25	30	5
Litter	121	136	15
Soil Organic Carbon	3753	3979	226
Total	**6663**	**7082**	**419**

It can be seen from **Table 2.5** that there is an increase of 419 million tonnes of carbon stock in 2015-16 as compared to the estimates of 2004-05, with an average annual increase of carbon stock of about 34.91 million tonnes. Soil organic carbon is the largest pool of carbon followed by AGB, BGB, Litter and Dead Wood. State-wise estimate of

[4] https://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf_files/Chp3/Chp3_1_Introduction.pdf

carbon stock for the years 2004-05 and 2015-16 is given in **Annexure 2.3 and 2.4**. Around 42% of increased carbon stock at the national level is contributed by five states – Arunachal Pradesh, Jammu & Kashmir, Madhya Pradesh, Odisha and West Bengal. State/ UT-wise analysis shows that Arunachal Pradesh, Sikkim and Andaman & Nicobar Island each have maintained more than 14 thousand tonnes carbon stock per sq. km. Similarly, the States of Karnataka, Kerala, Jammu & Kashmir, Himachal Pradesh, Uttarakhand and Nagaland have maintained 10 to 12 thousand tonnes carbon stock per sq. km.

Physical Asset Account for Forests

The framework suggested in the SEEA CF as mentioned in the Table 2.1 for preparation of physical asset account for forests requires detailed information on the sources of "addition in stock" and "reduction in stock". In view of the limited availability of such details, an abridged version of the asset account is given in **Table 2.6**.

Table 2.6: Physical Asset Account for Forests

(Area in sq. km.)

Class	Opening Stock in 2004-05	Changes during the period		Closing stock in 2010-11
		Additions to stock	Reductions in stock	
Very Dense Forest	83472	984	954	83502
Moderately Dense Forest	319948	11047	12250	318745
Open Forest	286751	24638	15737	295652
Scrub	41286	2605	2508	41383
Non Forest	2555806	14291	22116	2547981
Total	**3287263**	**53565**	**53565**	**3287263**
Class	**Opening Stock in 2010-11**	**Changes during the period**		**Closing stock in 2015-16**
		Additions to stock	**Reductions in stock**	
Very Dense Forest	83502	19833	5177	98158
Moderately Dense Forest	318745	26958	37385	308318
Open Forest	295651	51607	45461	301797
Scrub	41383	18776	14180	45979
Non Forest	2547982	34810	49575	2533217
Total	**3287263**	**151984**	**151778**	**3287469**

Some of the salient changes highlighted by the physical asset account of forests is given below:

Changes from 2004-05 to 2010-11

- Under the Very Dense Forest (VDF), more than 90% of the addition was contributed by Moderately Dense Forests. On the other hand, conversion of VDF to MDF and open forest was the major reason for the reduction in this class of forest.
- Under the Moderately Dense Forest (MDF), more than 56% of the addition was contributed by open forest followed by non-forest (36%). On the other side, the degradation of MDF to open forest (46%) and non-forest (45%) was the major reason for reduction in this class of forest.
- Under the Open Forest, more than 70% of the addition was contributed by non-forest followed by MDF (23%). Similarly, conversion of open forest to MDF (35%) and degradation of forest to non-forest (60%) was the major reason for reduction in this class.
- Under the scrub, more than 60% of the addition was contributed by non-forest followed by open forest (34%). On the other hand, conversion of scrub forest to open forest (50%) and degradation of scrub forest to non-forest (46%) was the major reason for the reduction in this class.
- The non-forest area decreased by 2.98% (% of forest area) on account of conversion of non- forest area into forest area. The conversion of major non-forest area into 2.48% open forest followed by 0.51% moderate dense forest. On the other hand, the forest area has also reduced by 2.14% (% of Total Forest Area) on account of diversion of forest area into non-forest area. The major reduction in forest area contributed by open forest (1.35%) followed by moderately dense forest (0.79%).

Changes from 2010-11 to 2015-16

- Under the Very Dense Forest (VDF), more than 88% of the addition was contributed by Moderately Dense Forests. On the other hand, conversion of VDF to MDF (77.32%) was the major reason for reduction in this class of forest.
- Under the Moderately Dense Forest (MDF), more than 69% of the addition was contributed by open forest followed by non-forest (15%). On the other side, the conversion of MDF to VDF (40%) and degradation of MDF to open forest (37%) and non-forest (22%) was the major reason for reduction in this class of forest.

- Under the Open Forest, more than 58% of the addition was contributed by non-forest followed by MDF (26%). Similarly, conversion of open forest to MDF (45%) and degradation of forest to non-forest (45%) was the major reason for reduction in this class.
- Under the scrub, more than 80% of the addition was contributed by non-forest followed by open forest (17%). On the other hand, conversion of scrub forest to open forest (52%) and degradation of scrub forest to non-forest (45%) was the major reason for the reduction in this class.
- The non-forest area decreased by 6.96% (% of Total Forest Area) on account of conversion of non- forest area into forest area. The conversions of major non-forest area into 4.29% open forest followed by 2.048% scrub and 0.63% moderate dense forest. On the other hand, the forest area has also reduced by 4.90% (% of Total Forest Area) on account of diversion of forest area into non-forest area. The major reduction in forest area contributed by open forest (2.86%) followed by moderately dense forest (1.17%) and scrub (0.87%).

Conclusion

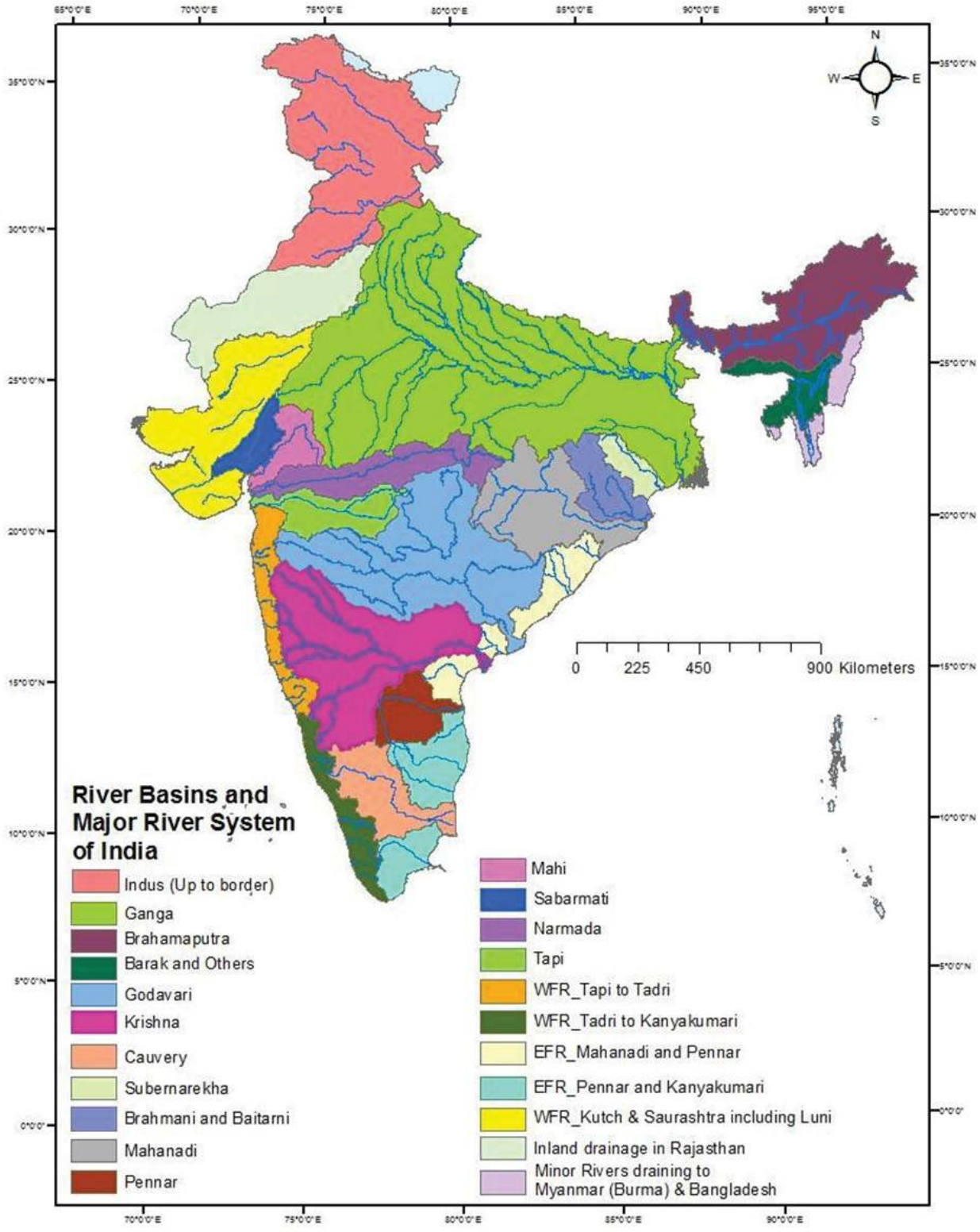
Compilation of forest statistics and accounts play significant role in incorporating the forests in the planning processes. In view of their contribution towards food security, livelihoods and the many products and ecosystem services they provide, SDG 15, "Life on land", puts forests and mountains at the centre of the sustainability of terrestrial ecosystems. The targets explicitly refer to forests and sustainable forest management, and also on land degradation and conservation of mountain ecosystems. Accurate information on a country's forest area is crucial for forest policy and planning. Changes in forest area reflect changes in demand for land for other uses and may help in identifying (un)sustainable practices in the forest and agriculture sectors. Monitoring the information can help in identifying negative change factors such as overgrazing, land clearing, urbanization, timber extraction, wood fuel collection and fire as also positive factors such as land restoration, reforestation, afforestation and sustainable agricultural practices.

WATER - THE NECTAR OF LIFE

When the well is dry, we will know the worth of water

- Benjamin Franklin

River Basins and Major River Systems of India



CHAPTER 3

WATER-THE NECTAR OF LIFE

Introduction

Water, the magical substance from which all life springs forth, is essential to the very existence of every life form on earth. The role of water for the living organisms has not changed since life's first creation in water billions of years ago. It is, therefore, quite aptly referred to as the "nectar of life". The earth has an abundance of water, but unfortunately, only a small percentage (about 0.3 percent), is even usable by humans. The other 99.7 percent is in the oceans, soils, icecaps, and floating in the atmosphere. Still, much of the 0.3 percent that is useable is unattainable. Most of the water used by humans comes from rivers. The visible bodies of water are referred to as surface water. The majority of fresh water is actually found underground as soil moisture and in aquifers. Groundwater can feed the streams, which is why a river can keep flowing even when there has been no precipitation.

Physiography of India

With a geographical area of about 329 Million Hectare (M. ha) and annual precipitation of 4000 Billion Cubic Metres (BCM), India is a land of many mountains and rivers, with some being the mightiest rivers of the world. India may be divided into seven well defined regions on the basis of its river systems. These are:

i. The Northern Mountains comprising the mighty Himalayan ranges;
ii. The Great Plains traversed by the Indus, Ganga and Brahmaputra river systems;
iii. The Central Highlands, consisting of a wide belt of hills running east-west between the Great Plains and the Deccan plateau;
iv. The Peninsular Plateaus;
v. The East Coast, a belt of land of about 100-130 km wide, bordering the Bay of Bengal;
vi. The West Coast, a narrow belt of land of about 10-25 km wide, bordering the Arabian Sea; and
vii. The islands, comprising the coral islands of Lakshadweep in Arabian Sea and Andaman and Nicobar group of islands in the Bay of Bengal.

India has a great diversity and variety of climate which in turn affects the water resources and their utilization. Climate is influenced by the Himalayas in the north and the Indian Ocean in the south. India has rich surface water resources. However, there is a marked variation in the concentration of rains in the three predominant monsoon months across regions making them either drought prone or frequently flooded.

Supply-Side: Water Resources in India

Inland Water Resources

Inland water resources include both fresh and brackish water bodies. While freshwater is naturally occurring water with low concentration of salt, brackish water has a salt concentration varying between that of freshwater and marine water[1]. Inland Water Resources of the country are categorized as: rivers and canals; reservoirs; tanks, lakes & ponds; lakes and derelict water bodies; and brackish water[2].

In India, rivers and canals run throughout the country with total length amounting to 1.9 lakh kilometres and the total water bodies other than rivers and canal cover an area of around 7.31 Million Hectare (M. ha). The area of water bodies at an all-India level is given in **Table 3.1**.

Table 3.1: Inland Water Resources of India[3]

Rivers & Canals (length in km)	**195095**
Other Water Bodies (area in M. ha)	
Reservoirs	**2.93**
Tanks & Ponds	**2.43**
Flood Plain Lakes & Derelict Water bodies	**0.80**
Brackish Water	**1.15**
Total	**7.31**

The state-wise inland water resources are given at **Annexure 3.1**. As can be seen from the Annexure 3.1, Uttar Pradesh and Jammu & Kashmir have the longest length of rivers and canals of 28,500 kilometres and 27,781 kilometres respectively. The inland water resources are unevenly distributed across the states, with the expanse ranging from 9.89 lakh hectares in Odisha and 8.11 lakh hectares in Andhra Pradesh (including Telangana) to negligible amounts in the smaller States of Mizoram, Sikkim and Puducherry.

River basin is the most important unit of analysis for any water-related study. River basin, also called catchment area of the river, is the area from which the rain will flow into that particular river. India can be divided into 20 river basins. Central Water Commission (CWC) has the responsibility of planning, development and management of surface water resources of the country. **Table 3.2** depicts the river-basin wise catchment

[1] The System of Environmental-Economic Accounting: Central Framework (SEEA-CF),2012, United Nations Statistics Division

[2] Water and Related Statistics, CWC, 2015

[3] Annual Report 2016-17, Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture & Farmers Welfare

area, average water resources potential river-basin wise according to the Reassessment studies conducted by CWC. The total water resource potential, which occurs as a natural runoff in these rivers, is estimated to be about 1869 BCM. Water availability is highest in Brahmaputra basin (537.24 BCM) followed by Ganga Basin (525.02 BCM).

Table 3.2: River Basin Water Availability[2]

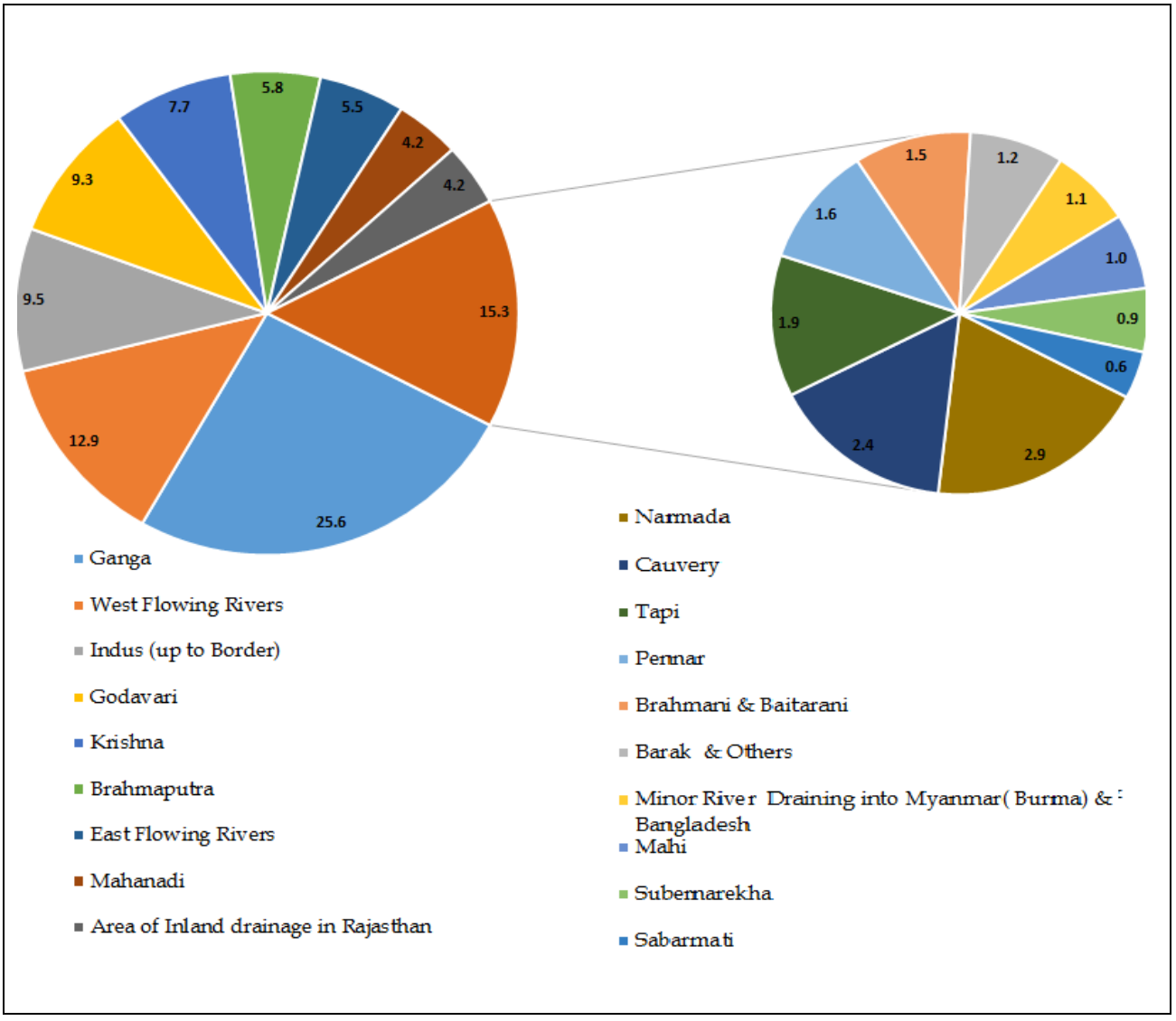
S. No.	Basin	Catchment Area[4] (sq.km)	Average Water Resource Potential (BCM)	Utilisable Surface Water Resources (BCM)
1)	Indus (up to Border)	3,21,289	73.31	46
2)	Ganga- Brahmaputra- Meghna			
	a) Ganga	8,61,452	525.02	250
	b) Brahmaputra	1,94,413	537.24	24
	c) Barak & Others	41,723	48.36	
3)	Godavari	3,12,812	110.54	76.3
4)	Krishna	2,58,948	78.12	58
5)	Cauvery	81,155	21.36	19
6)	Subarnarekha*	29,196	12.37	6.8
7)	Brahmani-Baitarani	51,822	28.48	18.3
8)	Mahanadi	1,41,589	66.88	50
9)	Pennar	55,213	6.32	6.9
10)	Mahi	34,842	11.02	3.1
11)	Sabarmati	21,674	3.81	1.9
12)	Narmada	98,796	45.64	34.5
13)	Tapi	65,145	14.88	14.5
14)	West Flowing Rivers from Tapi to Tadri	55,940	87.41	11.9
15)	West Flowing Rivers from Tadri to Kanyakumari	56,177	113.53	24.3
16)	East Flowing Rivers between Mahanadi and Pennar	86,643	22.52	13.1
17)	East Flowing Rivers between Pennar and Kanyakumari	1,00,139	16.46	16.5
18)	West Flowing Rivers of Kutch & Saurashtra including Luni	3,21,851	15.1	15
19)	Area of inland drainage in Rajasthan	1,39,917.04	Negligible	-
20)	Minor rivers draining into Myanmar (Burma) and Bangladesh	36,202	31	-
Total			**1869.37**	**690.1**

Note: *: Combining Subarnarekha and other small rivers between Subarnarekha and Baitarani

The largest river basin is that of Ganga-Brahmaputra-Meghna with a catchment area of about 11 lakh sq. km and annual water resource potential of 1111 BCM out of total 1869 BCM in the country. But the proportion of utilisable surface water to average water resources potential is found to be least in Brahmaputra sub-basin. State-wise drainage area for various river basins are given in **Annexure 3.2**.

The proportion of geographical area in the river basins is shown in **Figure 3.1**, where it can be seen that of the individual river basins, the Ganga basin accounts for about 25.6% of the country's area followed by the Indus and Godavari with a share of 9.5% and 9.3% respectively.

Figure 3.1: Percentage of geographical area in basin[4]



[4] River Basin Atlas of India, 2012, http://www.india-wris.nrsc.gov.in/wrpinfo/index.php?title=WRIS_Publications

Ground Water

Groundwater is defined as the water that collects in porous layers of underground formations known as aquifers. An aquifer is a geologic formation, group of formations, or part of a formation that contains sufficient saturated permeable material to yield significant quantities of water to wells and springs. Groundwater arises from rain, snow, sleet and hail that soak into the ground.

The assessment of presence of ground water as well as the potential is complicated in India, based on the occurrence of the diversified geological formations with considerable lithological and chronological variations, complex tectonic framework, climatological dissimilarities and various hydro chemical conditions. Hydrogeological units in India along with the type of aquifer and their ground water potential are given in **Table 3.3**.

Table 3.3: Aquifer System in the Country[5]

System	Coverage	Ground water potential
Unconsolidated formations -alluvial	Indo-Gangetic, Brahmaputra plains	Enormous reserves down to 600 m depth. High rain fall and hence recharge is ensured. Can support large-scale development through deep tube wells.
	Coastal Areas	Reasonably extensive aquifers but risk of saline water intrusion
	Part of Desert area – Rajasthan and Gujarat	Scanty rainfall. Negligible recharge. Salinity hazards. Ground water Availability at great depths.
Consolidated/semi-consolidated formations - sedimentaries, basalts and crystalline rocks	Peninsular Areas	Availability depends on secondary porosity developed due to weathering, fracturing etc. Scope for GW availability at shallow depths (20- 40 m) in some areas and deeper depths (100- 200 m) in other areas. Varying yields.
Hilly	Hilly states	Low storage capacity due to quick runoff

[5] Ground Water Year Book- India 2016-17, Central Ground Water Board, Ministry of Water Resources

The Central Ground Water Board (CGWB) has the mandate to make an assessment of groundwater. CGWB undertakes the measurement of groundwater four times in a year during January, pre-Monsoon, August and post-Monsoon through a network of wells drilled throughout the country. The pre-monsoon water level data is collected from all the monitoring stations during the months of March/ April/ May, depending on the climatological conditions of the region. For North-Eastern states, pre-monsoon data is collected during March, since the onset of monsoon is normally observed in April. Similarly, for Odisha, West Bengal and Kerala where monsoon appears early in May the monitoring is carried out during the month of April. For remaining states, pre-monsoon monitoring month is May. Water levels during August are monitored to access the impact of monsoon on the ground water resources. Post monsoon data collected during November reflects the cumulative effect of ground water recharge and withdrawal of ground water for various purposes. January water level data indicates the effect of withdrawal for rabi crops.

For assessment of ground water, Central Ground Water Board (CGWB) has drilled various types of bore wells in the country, forming a basis for planning the development and management of ground water resources. As on March 31, 2016, 18226 Exploratory Wells (EW), 7075 Observation Wells (OW), 5151 Piezometers (PZ), 3635 Deposit Wells (DW) and 364 Slim Hole (SH) (a total of 34451 Wells in all) have been constructed to assess the ground water potential in different hydrogeological settings. It has been estimated by CGWB that as on March 2013, the annual replenishable ground water is around 447 BCM[5].

Water availability

In India, industrialisation and urbanisation have not yet reached the peak levels considering ever increasing demands of the growing population. This translates to a mounting pressure on the freshwater in the country. The water resources are being increasingly stressed not only by over-abstraction, but also by pollution and climate change. So, the prospects arising from improved water management, both in terms of quality and quantity is indispensable in the context of Indian economy. However, the per capita availability of water has been estimated to decrease over the decades in India, as shown in **Table 3.4.**

Table 3.4: Per Capita Water Availability in India[6]

Year	Population (Million)	Per capita water availability (m^3/year)	Remarks
1951	361	5178	
1955	395	4732	
1991	846	2210	
2001	1027	1820	
2011	1211	1544	water stressed
2015	1326*	1441$	water stressed
2021	1345a	1421$	water stressed
2031	1463a	1306$	water stressed
2041	1560 a	1225$	water stressed
2051	1628 a	1174$	water stressed

*projected from 2011 census

Note:

a: Population figures for 2021 to 2051 are taken from projected population by Planning Commission available at http://planningcommission.nic.in/aboutus/committee/ strgrp/ stgp_fmlywel/sgfw_ch2.pdf

$: The per capita availability from 2015 onwards has been calculated from 2017 WRA estimate.

As per Falkenmark Water Stress Indicator, a per capita availability of less than 1700 cubic metres (m^3) is termed as a water-stressed condition, while if per capita availability falls below 1000 m^3, it is termed as a water scarcity condition. India is currently facing water stressed situation and is moving towards the water scarcity situation since the gap between water demand and water supply is gradually getting widened highlighting the dire need to manage water resources for a sustainable future.

Analysing the per-capita availability across the river basins of the country as given in **Annexure 3.3**, it is observed that Krishna, Cauvery, Subarnarekha, Pennar, Mahi, Sabarmati, Tapi, East Flowing Rivers and West Flowing Rivers of Kutch and Saurashtra including Luni are some of the basins, fall into the category of "water scarce"- out of which the scarcity can be said to be acute in Cauvery, Pennar, Sabarmati, East Flowing rivers and West Flowing Rivers of Kutch and Saurashtra including Luni with a per capita availability of water less than or around 500 m^3.

Demand-Side: Uses

The demand for freshwater for various purposes has been increasing and have been assessed by National Commission on Integrated Water Resources Development

[6] Government of India, 2009 (NCIWRD Report, 1999)

(NCIWRD) in 2000. This assessment is based on the assumption that the irrigation efficiency will increase to 60%. The demand for water by various uses is given in **Table 3.5**.

Table 3.5: Projected Water Demand in India (By Different Use)[7]

Sector	Water Demand in Km³ (or BCM)								
	Standing Sub-Committee of MoWR, RD & GR			NCIWRD					
	2010	2025	2050	2010		2025		2050	
				Low	High	Low	High	Low	High
Irrigation	688	910	1072	543	557	561	611	628	807
Drinking Water	56	73	102	42	43	55	62	90	111
Industry	12	23	63	37	37	67	67	81	81
Energy	5	15	130	18	19	31	33	63	70
Other	52	72	80	54	54	70	70	111	111
Total	**813**	**1093**	**1447**	**694**	**710**	**784**	**843**	**973**	**1180**

As can be observed, irrigation is the key demand sector for water. Therefore, any water management policy has to incorporate the various aspects related to irrigation, including the irrigation potential of the country and the type of irrigation facilities to be put in place. The total Ultimate Irrigation Potential (UIP) in India is around 140 million hectares[2]. Efforts have been made in the different Five-Year Plans to attain this potential through Irrigation projects, which are generally classified in the Indian context as under:

- **Major project:** This type of project consists of huge surface water, storage reservoirs and flow diversion structures. The area envisaged to be covered under irrigation is of the order over 10000 hectares. These projects are generally planned for multiple purposes like irrigation, hydro-power generation, water supply for drinking and industrial purpose, flood control navigation etc.
- **Medium project:** These are also surface water projects but with medium size storage and diversion structures with the area under irrigation between 10000 hectares and 2000 hectares.
- **Minor project:** The area proposed under irrigation for these schemes is below 2000Ha and the source of water is either ground water or from wells or tube wells

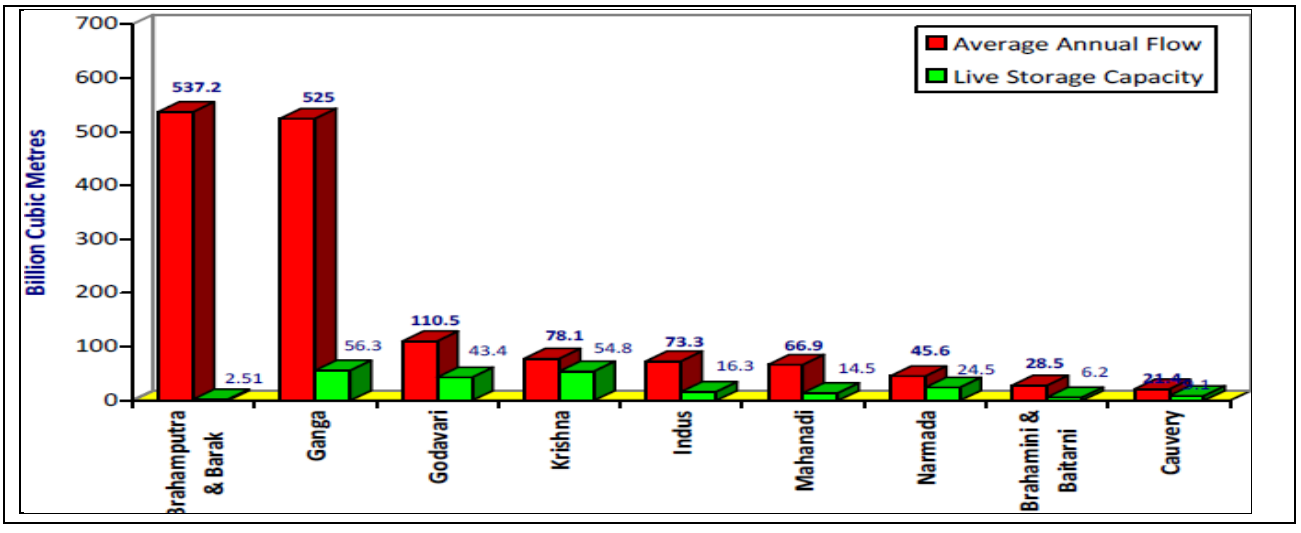
[7] Basin Planning Directorate, CWC, XI Plan Document; Report of the Standing Sub-Committee on "Assessment of Availability & requirement of Water for Diverse uses-2000"

or surface water lifted by pumps or by gravity flow from tanks. It could also be irrigated from through water from tanks.

It has been estimated that UIP for Minor Irrigation projects is 81.4 million hectares while that for Major & Medium Irrigation is 58.5 million hectares. Ground Water contributes more than 78% of the total ultimate potential through minor irrigation. State-wise details of ultimate irrigation potential are given at **Annexure 3.4,** while the State-wise information on Irrigation Potential created and utilised under Major, Medium and Minor Irrigation projects are given at **Annexure 3.5**.

In order to monitor the availability of water for irrigation and other uses, CWC keeps track of the storage in a set of major reservoirs in the country. Till 2015, a storage capacity had been created of about 253.4 BCM in the country under major and medium irrigation projects and an additional capacity of 51 BCM is likely to be created by the ongoing projects. So in totality, 304.4 BCM will be available storage once the projects are completed against the total availability in the river basin of 1869 BCM in the country[2]. Maximum storages are in Ganga basin followed by Krishna, Godavari and Narmada (**Figure 3.2, Annexure 3.6**).

Figure 3.2: Basin wise Flow & Storage Potential in India[2]



The Flows and Status: Precipitation and Groundwater Levels

Rainfall in India is dependent on the South-West and North-East monsoons, on shallow cyclonic depressions and disturbances and on violent local storms which forms in regions where cool humid winds from the sea meet hot dry winds from the land and occasionally reach cyclonic dimension. Rainfall is a major source of water in the country with estimated annual precipitation including snowfall of around 4000 BCM.

Table 3.6: South-West Monsoon and Annual Rainfall along with departure - India[8]

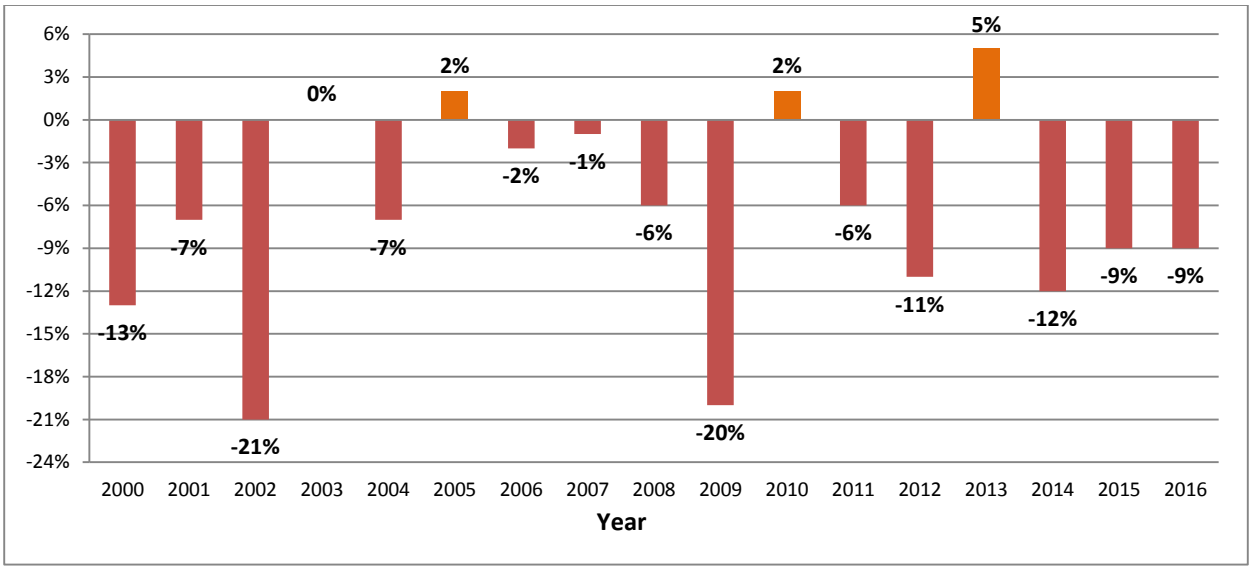
Year	SW-Monsoon Rainfall (mm)		Annual Rainfall (mm)	
	Rainfall	% Departure	Rainfall	% Departure
2000	798.1	-10%	1035.4	-13%
2001	818.8	-8%	1100.7	-7%
2002	700.5	-21%	935.9	-21%
2003	902.9	2%	1187.3	0%
2004	807.1	-9%	1106.5	-7%
2005	874.3	-1%	1208.3	2%
2006	889.3	0%	1161.6	-2%
2007	943	6%	1179.3	-1%
2008	877.8	-1%	1118	-6%
2009	698.3	-21%	953.7	-20%
2010	911.1	3%	1215.5	2%
2011	901.3	2%	1116.3	-6%
2012	823.9	-7%	1054.7	-11%
2013	937.4	6%	1242.6	5%
2014	781.7	-12%	1044.7	-12%
2015	765.8	-14%	1085	-9%
2016	864.4	-3%	1083.2	-9%

South-West and Annual rainfall of India for the period from 2000 to 2016 has been shown in **Table 3.6** along with their departures from the normal rainfall. As can be seen, most of the monsoon in India is under the influence of South-West monsoon from June to September. State-wise annual rainfall for the past five years has been given in **Annexure 3.7** from where it can be seen that on an average Meghalaya has received the highest rainfall of around 3179.74 mm of annual rainfall over the period of 2012 to 2016 followed by Goa and Andaman & Nicobar Islands.

Figure 3.3 shows the departure (%) in annual rainfall from the normal rainfall. It is observed from Figure 3.3 that rains have been deficient in most of the years – the only exceptions being 2005, 2010 and 2013.

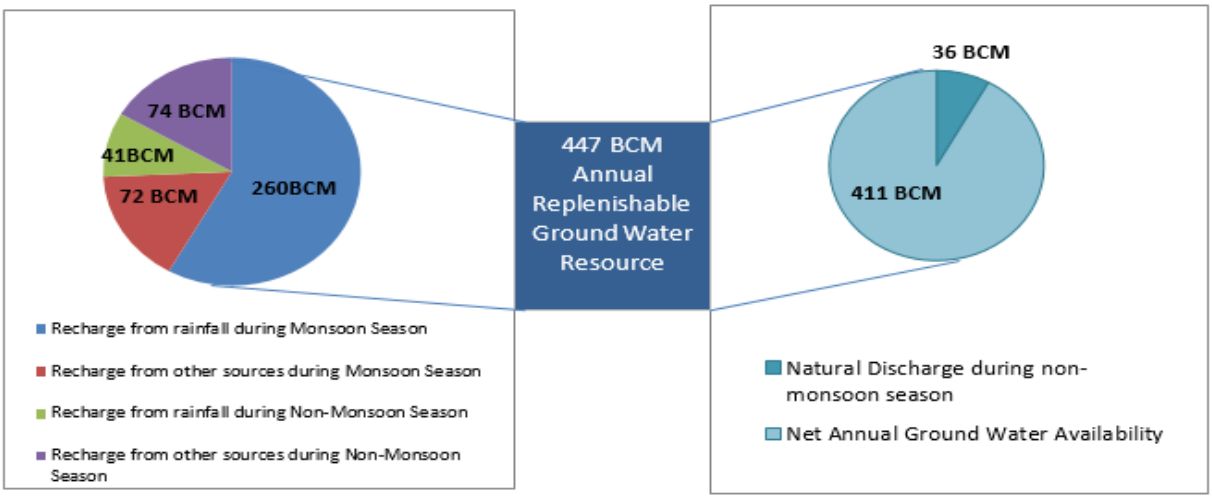
[8] Rainfall Statistics of India (2016), Indian Meteorological Department (IMD), Ministry of Science & Technology

Figure 3.3: Departures (%) in annual rainfall (2000-2016)[8]



This deficiency in rainfall is a cause of concern, since in India, monsoon rain is the major source of ground water recharge, contributing about 67% of the total annual replenishable resource (**Figure 3.4**). The Annual Replenishable Ground Water Resources of the area is the sum of recharge during monsoon and non-monsoon seasons and is used majorly for irrigation and domestic uses. Irrigation alone accounts for around 228 BCM usage of ground water whereas industrial and domestic uses in comparison hold a lower usage of around 25 BCM[9]. The amount of usage of ground water highlights its importance as a source of water and indicates the need for proper groundwater management.

Figure 3.4: Ground Water Resources Availability in India (in BCM)[9]

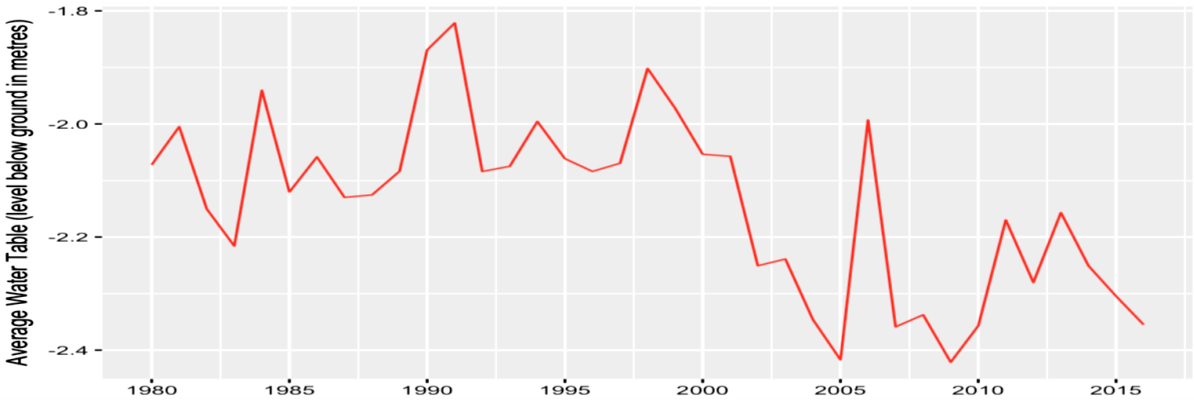


An indicator of whether or not the abstraction of groundwater is sustainable is the depth to water level. With more extraction of ground water, the depth to water level increases and the water table moves downward. Such a change is a cause of major concern for

[9] Dynamic Ground Water Resources of India (As on 31st March, 2013), Central Ground Water Board, Ministry of Water Resources

agriculture and irrigation in particular (scenario of groundwater depletion is depicted in **Figure 3.5**). In major parts of north-western states depth to water level generally ranges from 10-40 m bgl (below ground level). Water level of more than 40 m bgl is also prevalent in the north western part of the country. In the western parts of the country deeper water level is recorded in the depth range of 20-40 m bgl and more than 40 m bgl (**Figure 3.6**). The depleting groundwater is also negatively affecting India's farmland. According to Agriculture Census 2010-11[10], net area irrigated by groundwater is 63.63% (45.17% by tube wells and 18.46% by wells). Since in India, agriculture is dependent on irrigation which in turn is highly dependent on ground water resources, thus depleting resources are reducing the country's cultivated land hence, aggravating the water woes of the nation.

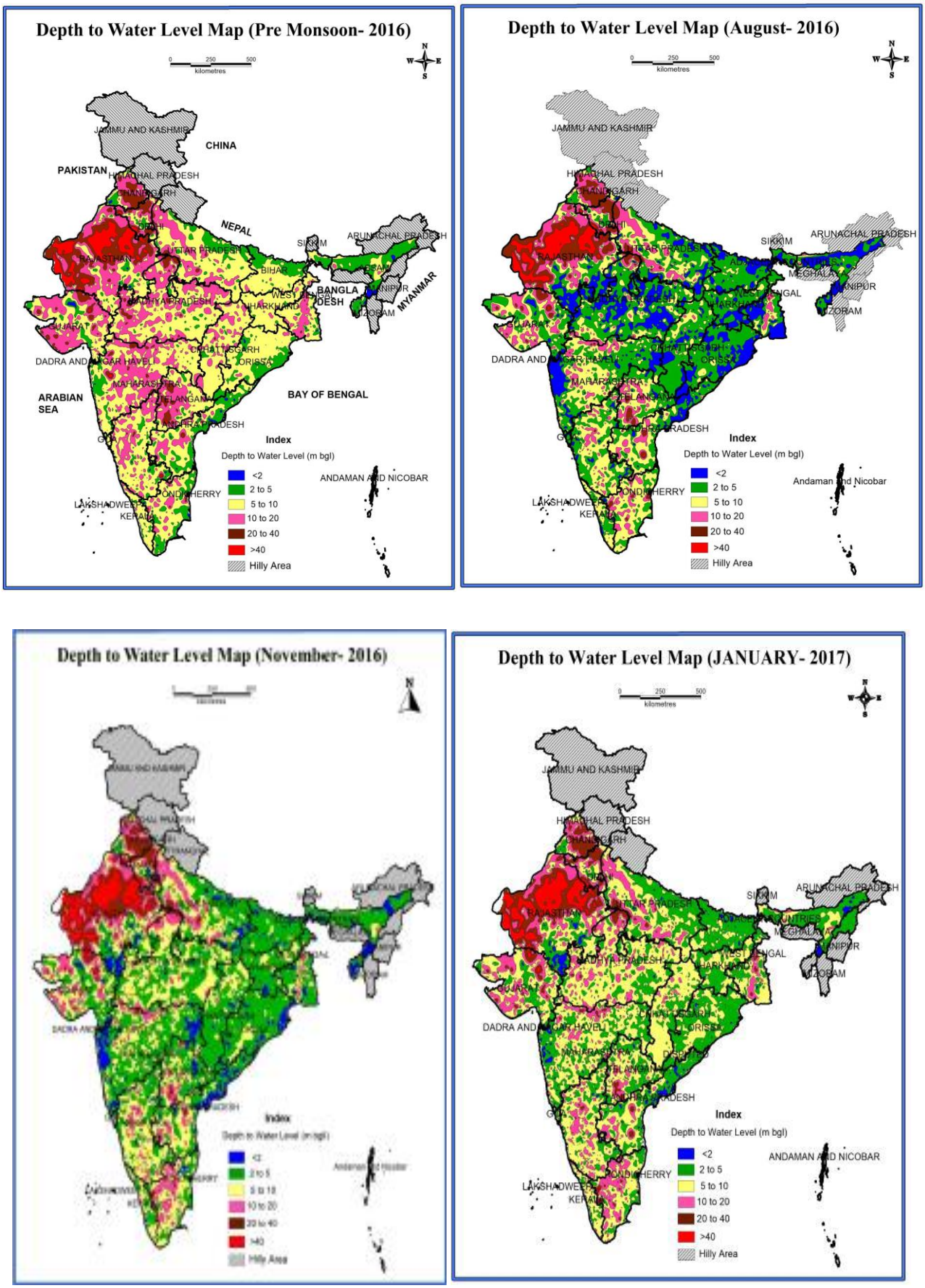
Figure 3.5: Groundwater Depletion in India[11]



[10] Agriculture Census 2010-11, Department of Agriculture, Cooperation & Farmers Welfare, Ministry of Agriculture & Farmers Welfare

[11] Economic Survey 2017-18, Volume I

Figure 3.6: Depth to Water Level at a Glance[5]



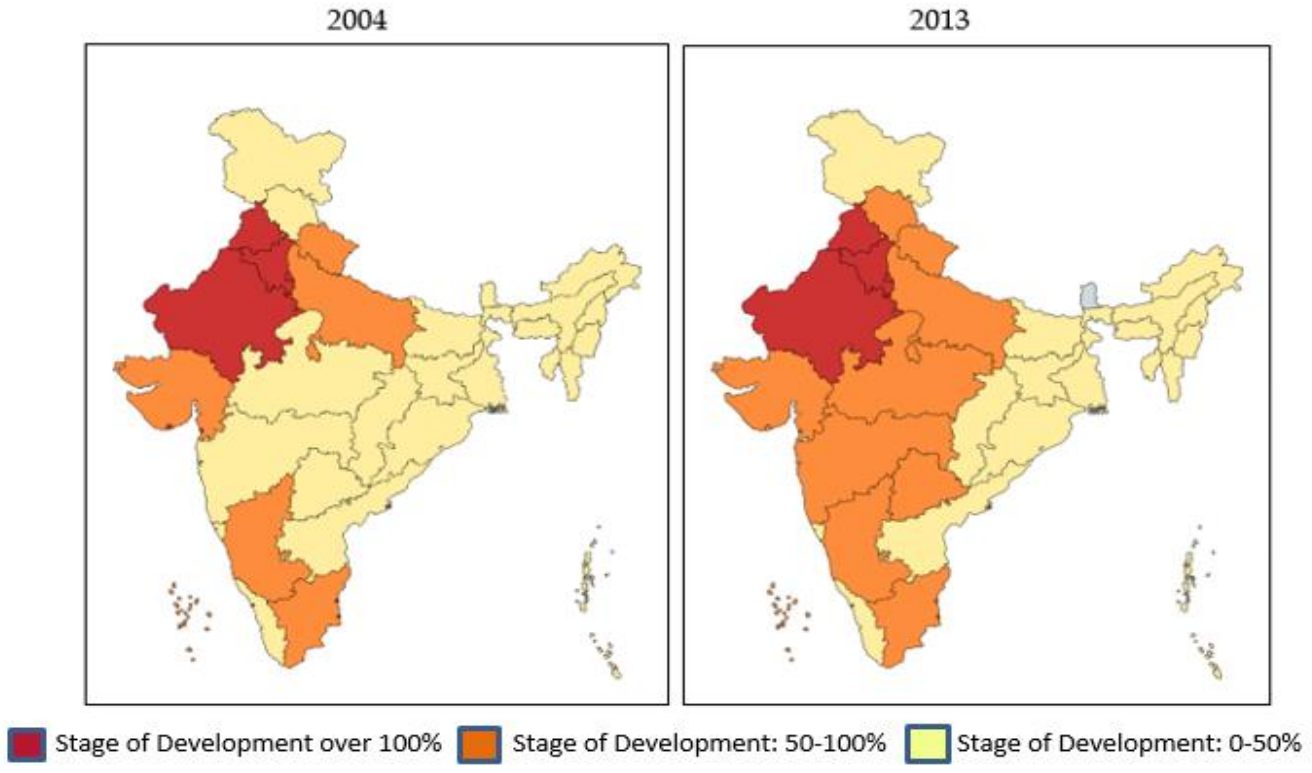
The decadal water level fluctuations of the monitored wells in the States of India are given in **Annexure 3.8.** Assuming that these monitoring wells represent the general scenario of the State, it can be said that more than 85% of the areas in the States of Tamil Nadu, Punjab, Kerala, Puducherry and Uttar Pradesh have witnessed a fall in depth to water. In the context of the level of fall, a maximum fall of about 19 metres was observed in Gujarat, Telangana, West Bengal and Rajasthan.

Another indicator of the stress on groundwater is the stage of ground water development, which is denoted by the percentage of utilization with respect to recharge and can be computed as:

$$\text{Stage of development} = \frac{Existing Gross\ Draft\ For\ All\ Uses}{Net\ Annual Groundwater Availability} * 100$$

The overall stage of ground water development in the country is 62%. The stage of ground water development is very high in the states of Delhi, Haryana, Punjab and Rajasthan, where it is more than 100%, which implies that in these states the annual ground water consumption is more than annual ground water recharge. On comparing, the stage of development over the years, we observe that in some states like Madhya Pradesh, Maharashtra, and Himachal Pradesh the Stage of Development has increased and shifted to the orange region depicting the range of 50-100% (**Figure 3.7**).

Figure 3.7: Changes in the Stage of groundwater extraction[5,12]



[12] Ground Water Year Book- India 2009-10, Central Ground Water Board, Ministry of Water Resources

In order to allow for focussed interventions in areas (referred to as assessment units) where the ground water resources need attention, Central Ground Water Board has classified areas into safe, semi critical, critical and over exploited ground water resources based on two criteria, namely:

i. Stage of ground water development (percentage of utilization with respect to recharge)
ii. Long-term trend of pre and post monsoon water levels.

The long term ground water trend is computed generally for a period of 10 years and the significant rate of water level decline is taken to be between 10 and 20 cm per year depending upon the local hydrogeological conditions. The criterion for categorization is given in **Table 3.7.**

Table 3.7: Criteria for Categorization of Assessment Units[9]

Stage of Ground Water Development	Significant Long Term Water level Decline trend		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 above four categories, one more category is used, where the entire assessment area is having poor quality and is demarcated as '*Saline*'.

Central Ground Water Board has classified the country into these categories; the proportion of safe units in the states are indicated in **Table 3.8** (Details in **Annexure 3.9**). It may be noted that the assessment units can be blocks, talukas, water-sheds, mandals, island, district or regions and are not uniform across the states.

Table 3.8: Classification of States by proportion of safe area units[9]

% of units	States
90+	Arunachal Pradesh, Assam, Bihar, Goa, Jammu &Kashmir, Jharkhand, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Tripura, Andaman &Nicobar Islands, Chandigarh, Dadra & Nagar Haveli
75-90	Chhattisgarh, Gujarat, Himachal Pradesh, Kerala, Uttarakhand
40-75	Andhra Pradesh, Karnataka, Madhya Pradesh, Telangana, Uttar Pradesh, West Bengal, Daman & Diu, Lakshadweep, Puducherry
20-40	Haryana, Tamil Nadu
5-20	Delhi, Rajasthan, Punjab

Summary statistics based on the categorization of Assessment units over the years is presented in **Table 3.9**. Number of Over-exploited and Critical Assessment Units is significantly higher in Delhi, Haryana, Himachal Pradesh, Karnataka, Punjab, Rajasthan, Tamil Nadu and Uttar Pradesh.

Table 3.9: Summary Statistics of Categorization of Assessment Units over the years[13, 14, 15, 9]

	2004		2009		2011		2013	
Category	No.	Share (%)	No.	Share (%)	No.	Share (%)	No.	Share (%)
Total No. of Assessed Units	5723	-	5842	-	6607	-	6584	-
Safe	4078	71	4277	73	4530	69	4520	69
Semi-Critical	550	10	523	9	697	11	681	10
Critical	226	4	169	3	217	3	253	4
Over-Exploited	839	15	802	14	1071	16	1034	16
Saline	NA	NA	71	1	92	1	96	1

On comparing the status of assessed units (**Annexure 3.10**) across States, it is witnessed that percentage of over-exploited areas remains highest in the states of Punjab, Rajasthan and Delhi over 2004, 2009, 2011 and 2013. Moreover, on comparing 2013 with 2011, it is

[13] Dynamic Ground Water Resources of India (As on March, 2004), Central Ground Water Board, Ministry of Water Resources

[14] Dynamic Ground Water Resources of India (As on 31st March, 2009), Central Ground Water Board, Ministry of Water Resources

[15] Dynamic Ground Water Resources of India (As on 31st March, 2011), Central Ground Water Board, Ministry of Water Resources

observed that though the status of 349 units in India deteriorated, that of 343 units showed improvement and 5603 units showed no change (Details in **Annexure 3.11**).

The state-wise annual replenishable ground water potential is given at **Annexure 3.12**. The colour code depicts the range of Stage of Development, yellow is 0-50%, orange is 50-100% and red is over 100%. Uttar Pradesh (17.08%) ranks first among the various states in terms of share of replenishable ground water resources for the year 2013. **Annexure 3.12** presents the State-wise ground water availability, utilization and Stage of Development for 2004, 2009, 2011 and 2013.

The deteriorating status of groundwater is not unnoticed. Several water management techniques like rainwater harvesting, water conservation and harvesting, solar pumping methods, promotion of drip and sprinkler Micro- Irrigation (MI) techniques of irrigation, a unique irrigation technology called System of Water for Agriculture Rejuvenation (SWAR); SWAR shifts irrigation from surface to measure moisture at plant root zone and others[16] are being promoted both by the Union and State Governments. Several areas are being identified which are either prioritized for artificial recharge or delineated for water conservation and harvesting or identified as being suitable for ground water development (**Details in Annexure 3.13**). These efforts are likely to renew India's depleting water resources for sustainable future.

Conclusion

The surface water and groundwater resources play a major role in agriculture, hydropower generation, livestock production, industrial activities, forestry, fisheries, navigation, recreational activities, etc; thus the increased demand pose challenges in the concerned sector. With the population in India estimated to grow to 1.6 billion by 2051, the water availability per capita is expected to fall to 1174 m^3 per year. Adding to the water woes, food requirements are also likely to increase i.e. annual food requirement in India are expected to exceed 250 million tons by 2050[17]. The situation is worsened by the fact that of the total annual availability of 1869 BCM in the river basins, only 1123 BCM (690 BCM being due to surface water resource)[2] can be put to beneficial use, due to topographical and other constraints like uneven distribution in space and time.

It has been clearly stated in Water Scarcity and security in India[17] that this increased demand is also associated with the following issues:

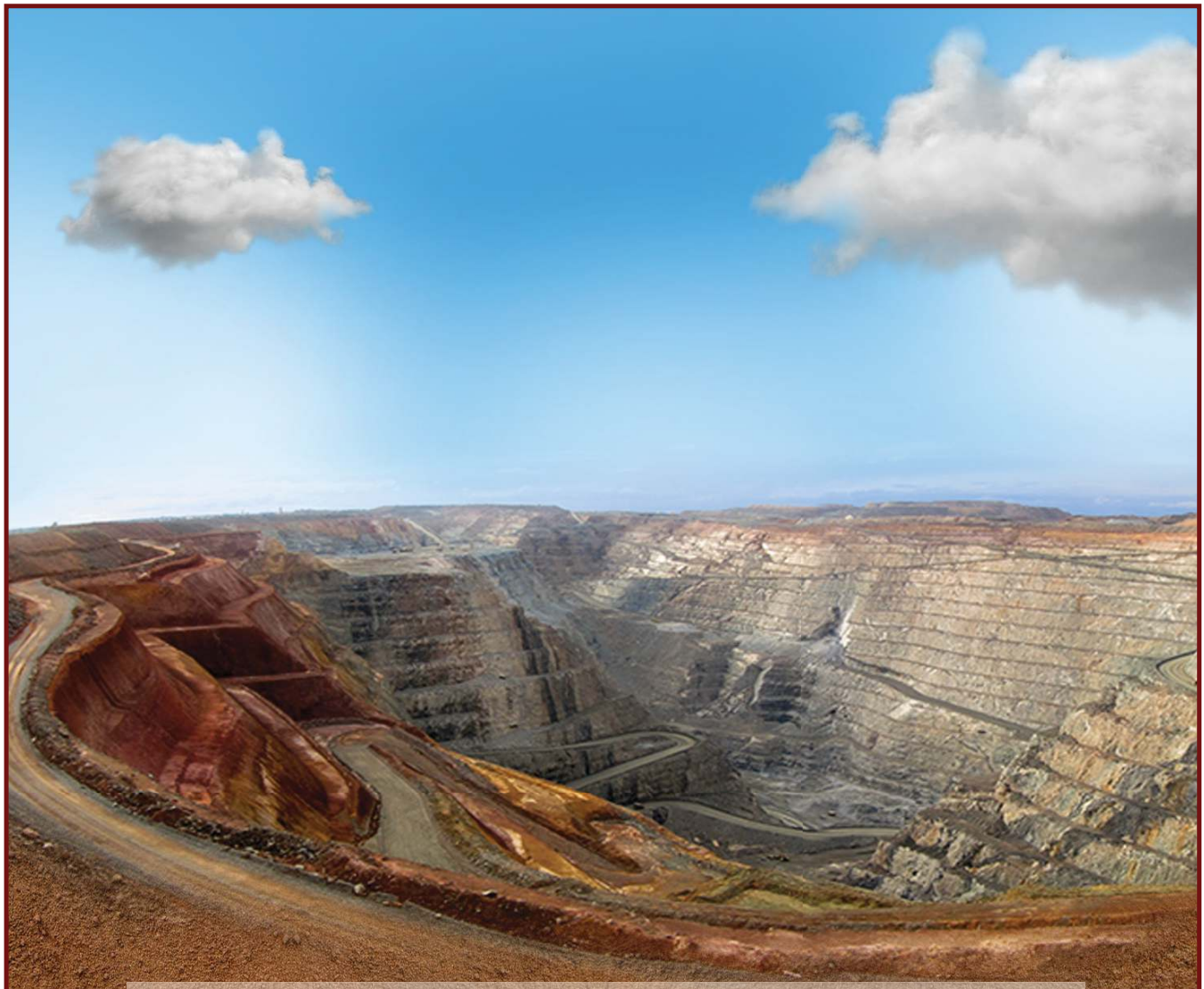
[16] Selected Best Practices in Water Management (August 2017), NITI Aayog, TERI University

[17] NG Hegde (2012), 'Water Scarcity and security in India', http://www.indiawaterportal.org/articles/water-scarcity-and-security-india

- *Over exploitation of ground water:* Over 20 million wells are pumping water with free power supply provided by some of the State Governments. This is resulting in depleting ground water resources which in turn affects the water table in the country which is dipping by 0.4 m every year.
- *Intrusion of sea water:* In the coastal areas, heavy intrusion of the sea water has made fertile agricultural land unfit for cultivation.
- *Sub optimal utilization leading to erosion:* Infrastructure development and investment in water sector has been low. The utilization of the created facilities in fact has also not been optimum resulting in soil erosion and siltation because of the poor catchment area development.
- *Inefficient water usage:* It is estimated that over 70% of the irrigation water is wasted depriving the dry areas of irrigation. Indian farmers have traditionally been practicing flow irrigation which has adverse effects like heavy soil erosion, leaching of fertilizers, increasing the infestation of pests, diseases and also suppressing the crop yields. Distribution of water in open canals, flood irrigation and charging for water based on area irrigated instead of quantity of water supplied are all causing this inefficient use of water resources.

The increasing competition for water in many river basins is narrowing down the gap between the rising water demand and available water supply thus, highlighting the need for better water governance for which water accounting is a key to move forward. The high dependence on water urges for its efficient use and sustainable water management for which maintaining the water accounts is a necessity.

Accounting for water can provide information on how the water supplies are changing as a result of changing climate, pollution, population, changing land use and others. It can also improve the water governance by providing information for decision-making which is in line with the phrase that 'We cannot plan and manage what we do not measure'.



MINERALS- THE BUILDING BLOCKS

The earth beneath our feet contains a wealth of "hidden treasures" to satisfy every man's needs

- Anonymous

CHAPTER 4

MINERALS-THE BUILDING BLOCKS

Introduction

The term 'Mineral' means a class of substances occurring in nature, of definite chemical composition and usually, a characteristic crystal structure, but sometimes also includes rocks formed by these substances. A mineral is an element or chemical compound that has been formed as a result of geological processes. Mineral resources are found on or in the earth in reasonable amounts and are mined for their potential uses or their intrinsic values. Mineral resources are non-renewable and include **metals (e.g. iron, copper, and aluminum), and non-metals (e.g. salt, gypsum, clay, sand, phosphates).** Earth's economic resources include thousands of minerals and every segment of human society uses the mineral resources, in one form or another, everyday, directly or indirectly. Minerals are referred to as the essential building blocks of the geosphere, but in view of their immense commercial and industrial importance, these are literally the building blocks of the economy.

Minerals in general have been categorized into three classes: **fuel, metallic and non-metallic.** Minerals are valuable natural resources being finite in nature. They constitute the vital raw materials for many basic industries and are a major resource for development. Demand for minerals is increasing world-wide with the increase in population and the associated consumption demands of individuals. The mining of earth's natural resources is, therefore, accelerating and it has accompanying environmental consequences.

Minerals include deposits of oil resources, natural gas resources, coal and lignite resources, metallic and non-metallic minerals. Since the resources are generally found underground (hence commonly referred to as subsoil assets), the quantity of resources that one might reasonably expect to be extracted is not known with any large degree of precision. Consequently, a key factor in the measurement of mineral and energy resources is the concentration and quality of the minerals and energy resources in the deposit, since this will influence not only the cost of extraction, but also the degree of confidence regarding the quantity that can be extracted in future.

Ores are concentrations of minerals in rock that are high enough to be economically extracted for use. An ore is an occurrence of rock or sediment that contains sufficient minerals with economically important elements, typically metals, that can be economically extracted from the deposit.

From an economic view-point and based on the content and usage of the minerals, these can be categorized as given in **Table 4.1**.

Table 4.1: Classification of minerals

S. No.	Group	Minerals
1.	Metallic Minerals (Ferrous Group)	Chromite, Iron, Manganese
2.	Metallic Minerals (Non-Ferrous Group)	Antimony, Bauxite, Copper, Lead & Zinc, Platinum group of metals
3.	Precious & Semi-precious Minerals	Diamond, Emerald, Garnet, Gold, Ruby, Sapphire, Silver
4.	Strategic Minerals	Cobalt, Molybdenum, Nickel, Rare Earth Elements, Tin, Titanium, Tungsten, Vanadium
5.	Fertilizer Minerals	Phosphate(Apatite), Rock Phosphate, Potash, Pyrite, Sulphur
6.	Refractory Minerals	Andalusite, Graphite, Kyanite, Magnesite, Sillimanite
7.	Ceramic and Glass Mineral	Wollastonite
8.	Other Industrial Minerals	Asbestos, Borax, Diatomite, Fluorite, Limestone, Marl, Perlite, Rock Salt, Vermiculite, Zircon
9.	Minor Minerals	Ball Clay, Barytes, Bentonite, Calcite, Chalk, China Clay, Corundum, Diaspore, Dolomite, Dunite, Feldspar, Fire Clay, Fuller's Earth, Granite, Gypsum, Laterite, Marble, Mica, Ochre, Pyrophyllite, Quartz & Silica Sand, Quartzite, Talc/Steatite/Soapstone, Shale, Slate

Classification of Mineral Resources

In order to allow for comparability across countries, a standard classification, 'United Nations Framework Classification for Fossil Energy and Mineral Reserves and Resources' (UNFC), is prescribed for presenting the mineral resources of the country. UNFC is a generic principle-based system in which quantities are classified on the basis of three fundamental criteria i.e. **economic viability, feasibility study and geological knowledge** of the deposit, by using a numeric codification.

As per UNFC, the resources are broadly categorised into 'reserves' and 'remaining resources'. According to the norms of this system, **economically mineable part of measured and/or indicated mineral resources have been placed under 'reserve' category**. Those quantities which have not been found economically viable due to the present techno-economic, environmental, social, legal, etc. factors and also the quantities estimated based on only geological assessments have been placed under 'remaining resources' category.

The UNFC consists of a three-dimensional system with the three axes- **Geological Assessment, Feasibility Assessment and Economic Viability** – representing the respective criteria. In this three-digit-code-based system, the first digit denotes the economic viability axis, the second digit denotes the feasibility axis, and the third digit, the geologic axis. The three axes are further discussed in the following paragraphs.

Geological Assessment: The process of geological assessment is generally conducted in stages of increasing details and the successive stages of geological investigations, i.e., reconnaissance, prospecting, general exploration and detailed exploration, generate resource data with a clearly defined increasing degree of geological assurance. At the initial reconnaissance stage, estimates are based on regional geological studies and mapping, airborne and indirect methods, preliminary field inspections as well as geological inference and extrapolation, while at the end of the detailed exploration, tonnage, densities, shape, physical characteristics, grade and mineral content of the resource can be estimated with a high level of confidence. These four stages are, therefore, used as geological assessment categories in the classification and are represented by the 4 codes, i.e., 1 (detailed exploration), 2 (general exploration), 3 (prospecting) and 4 (reconnaissance).

Feasibility Assessment: An essential part of the process of assessing a mining project is the feasibility assessment studies. The successive stages of feasibility assessment, i.e., geological study as initial stage followed by prefeasibility study and feasibility study/mining report are described in the UNFC by the codes 3, 2 and 1 respectively.

Economic Viability: The degree of economic viability (economic or sub-economic) is assessed in the course of prefeasibility and feasibility studies. A prefeasibility study provides a preliminary assessment with a lower level of accuracy as compared to that of a feasibility study which assesses the economic viability in detail. **The three categories of economic viability have codes 1, 2 and 3 in decreasing order, with 1 representing resources that are economically mineable, '2' representing those**

which are possibly economically viable subject to changes in technological, economic, environmental and/or other relevant condition and '3' representing the remaining resources.

Thus, the highest category of resources under UNFC system will have the code (111) and lowest category, the code (334).

Under the SEEA-Central Framework, a slightly different categorization is adopted, wherein resources are classified under three classes –A, B and C.

Class A: Commercially recoverable resources (Including on-production projects, projects approved for development and projects justified for development)

Class B: Potentially commercially recoverable resources (Including economic and marginal development projects pending and development projects on hold)

Class C: Non-commercial and other known deposits (Potential commercial projects may also satisfy the requirements for Extraction and sale have been confirmed to be economically viable)

Mineral Accounts

Mineral and energy resources are a unique type of environmental asset that can be extracted and used in economic activity but cannot be renewed on any human timescale. Since they cannot be renewed, there is particular interest in understanding the rate at which these assets are extracted and depleted, the overall availability of these assets, and the sustainability of the industries that exploit them.

Asset accounts for mineral and energy resources organize relevant information, including the quantities and values of stocks of the resources and the changes in these over accounting periods. Flows of extraction, depletion and discoveries are central to the asset account and these, in turn, can provide valuable information regarding the availability of individual resources, allowing an analysis of how the stocks change over time as a result of these activities and the changes in the economic conditions.

Mineral asset accounts can be made up as either a physical accounts or as a monetary account. The unit used for the physical accounts can be tonnes, cubic meters and oil equivalents depending on what is most appropriate for the asset in focus. The important thing is of course that the same unit is used throughout the account so that the book keeping system of the account can be maintained (i.e. adding changes to the opening stock gives the closing stock). For the monetary

accounts, the currency unit of the country owning the assets will typically be used. Both current prices and fixed prices can in principle be applied. Viewed narrowly, the process of accounting for subsoil assets are confined to define and measure the level of stocks in physical terms and to place a value on these.

Physical asset accounts for mineral and energy

Physical asset accounts for mineral and energy resources should be compiled by type of resource and include estimates of the opening and closing stock of mineral and energy resource and changes in the stock over the accounting period. The measurement units used to compile and present the relevant information will vary by type of resource. However, for accounting purposes, the same measurement unit should be used, for a single resource, to record the opening and closing stocks and the changes in the stocks over an accounting period. It is noted that a total for each class of deposit across different resource types cannot be meaningfully estimated owing to the use of different measurement units for different resources. It may, nevertheless, be possible to aggregate certain subsets of resources, for example, energy resources, by using a common measurement unit such as joules or other energy units.

The changes in the stock in physical terms should consider all types of changes – discoveries, reappraisals, extraction, catastrophic losses and reclassifications.

A basic physical asset account for mineral resources is as shown in **Table 4.2** below.

Table 4.2: Physical asset account for mineral and energy resources

Item	Type of mineral and energy resources				
	Oil resources	**Natural gas resources**	**Coal resources**	**Non-metallic minerals**	**Metallic minerals**
Opening stock of mineral and energy resources					
Addition to stock					
Discoveries					
Upward reappraisals					
Reclassifications					
Total additions to stock					
Reductions in stock					
Extractions					
Catastrophic losses					
Downward reappraisals					
Reclassifications					
Total reductions in stock					
Closing stock of mineral and energy resources					

Present Scenario of minerals in India

Mineral resources are finite and non-renewable and their judicious use and conservation are very essential for the survival of human civilization. In Indian context, it can be seen that we have a fairly large variety of mineral deposits and our endowment is quite adequate with exception of few deficient minerals. Considering the ever-increasing population, growth rate of economy and demand, these mineral resources are bound to get exhausted sometime in future. Thus, the knowledge of endowment of mineral resources and their effective management are of utmost importance in order to provide an uninterrupted sustainable supply of minerals to meet the domestic demand as well as for foreign trade in order to boost the national economy. In this journey of mineral exploitation, concept of conservation and ecological balance should always be remembered.

The country is endowed with huge resources of many metallic and non-metallic minerals. India has significant mineral resources of Coal (4th largest reserves in the world), Iron ore, Manganese ore (7th largest reserve in the world as in 2013), Mica, Bauxite (5th largest reserve in the world as in 2013), Chromite, Natural gas, Diamonds, Limestone, Titanium and Thorium (world's largest along coast of Kerala shores). India's oil reserves, found in Bombay High off the coast of Maharashtra, Gujarat, Rajasthan and in eastern Assam meet 25% of the country's demand.

Not surprisingly, therefore, mining sector is an important segment of the Indian economy. Since independence, there has been a pronounced growth in the mineral production both in terms of quantity and value. India produces as many as 95 minerals, which includes 4 fuel, 10 metallic, 23 non-metallic, 3 atomic and 55 minor minerals (including building and other materials)[1]. Mining sector, being one of the core sector of economy, provides basic raw materials to many important industries like power generation (thermal), iron and steel, cement, petroleum and natural gas, petro-chemicals, fertilisers, precious & semi-precious metals/stones, electrical & electronics equipment, glass and ceramics etc. The rapid urbanization and projected growth in the manufacturing sector in India is likely to result in a surge in the demand for minerals. India occupies a dominant position in the production of many minerals across the globe. India's ranking in 2015 as compared to world production was 2nd in barytes, and talc/ steatite/ pyrophyllite, 3rd in chromite, coal & lignite and zinc (slab), 4th in kyanite/ andalusite/ sillimanite, 5th in iron ore, and Steel (Crude), 6th in bauxite ore, 7th in manganese ore and 8th in aluminium.

[1]Source: Annual Report 2017-18, Ministry of Mines

Though the percentage share of "mining and quarrying" in GDP in India ranges between 2.5 to 3, in view of its use as a major input in the secondary sector – manufacturing, construction, electricity, gas and water supply, the "indirect share" of the industry is much higher and hence, the industry cannot be disregarded in any of the plans formulated for the country's economic growth.

Spatial distribution of resources

Most of the metallic minerals in India occur in the peninsular plateau region in the old crystalline rocks. Over 97 per cent of coal reserves occur in the valleys of Damodar, Sone, Mahanadi and Godavari. Petroleum reserves are located in the sedimentary basins of Assam, Gujarat and Mumbai High i.e. off-shore region in the Arabian Sea. New reserves have been located in the Krishna-Godavari and Kaveri basins. Most of the major mineral resources occur to the east of a line linking Mangaluru and Kanpur. Minerals are generally concentrated in three broad belts in India. There may be some sporadic occurrences here and there in isolated pockets. These belts are:

The North-Eastern Plateau Region: This belt covers Chhotanagpur (Jharkhand), Odisha Plateau, West Bengal and parts of Chhattisgarh. It has variety of minerals viz. iron ore coal, manganese, bauxite, mica.

The South-Western Plateau Region: This belt extends over Karnataka, Goa and contiguous Tamil Nadu uplands and Kerala. This belt is rich in ferrous metals and bauxite. It also contains high grade iron ore, manganese and limestone. This belt packs in coal deposits except Neyveli lignite. This belt does not have as diversified mineral deposits as the north-eastern belt. Kerala has deposits of monazite and thorium, bauxite clay. Goa has iron ore deposits.

The North-Western Region: This belt extends along Aravali in Rajasthan and part of Gujarat and minerals are associated with Dharwar system of rocks. Copper, zinc has been major minerals. Rajasthan is rich in building stones i.e. sandstone, granite, marble. Gypsum and Fuller's earth deposits are also extensive. Dolomite and limestone provide raw materials for cement industry. Gujarat is known for its petroleum deposits.

The Himalayan belt is another mineral belt where copper, lead, zinc, cobalt and tungsten are known to occur. They occur on both the eastern and western parts. Assam valley has mineral oil deposits. Besides oil resources are also found in off-shore-areas near Mumbai Coast (Mumbai High).

At the state level, the top five mineral rich States are Rajasthan, Andhra Pradesh, Karnataka, Jharkhand, and Tamil Nadu. The prominent minerals of some of the mineral-rich States are shown in the **Table 4.3**.

Table 4.3: Important minerals in the States of India

S. No.	State	Prominent Minerals
1	Andhra Pradesh	Garnet, Barytes, Ball clay, China clay, Dolomite, Feldspar, Fireclay, Iron, Quartzite, Manganese, Laterite, Mica, Ochre, Quartz/silica sand, Talc/soapstone/ steatite, Vermiculite
2	Assam	Petroleum & Natural Gas, Coal
3	Chhattisgarh	Coal, Dolomite, Bauxite, Iron, Fireclay, Limestone, Quartzite, Quartz/silica sand
4	Goa	Iron, Bauxite
5	Gujarat	Bauxite, Marl, Petroleum & Natural Gas, Chalk, Bentonite, China clay, Dolomite, Lignite, Limestone, Laterite, Quartz/silica sand, Fireclay, Manganese, Talc/soapstone/ steatite
6	Jharkhand	Coal, Graphite, Bauxite, Iron, Copper, Kyanite, Dolomite, Manganese, Talc/soapstone/ steatite
7	Karnataka	Gold, Iron, Manganese, Limestone, Dolomite, Dunite, Magnesite, Quartz/silica sand, Granite, Silver, China clay, Chromite, Copper, Quartzite
8	Madhya Pradesh	Diamond, Copper, Manganese, Rock phosphate, Limestone, Diaspore, Laterite, Bauxite, Coal, Pyrophyllite, Dolomite, Iron, Ochre, China clay
9	Maharashtra	Fluorite, Kyanite, Bauxite, Manganese, Coal, Iron, Limestone, Quartz/ silica sand, Quartzite, Sillimanite, Dolomite
10	Odisha	Chromite, Garnet, Bauxite, Manganese, Iron, Quartzite, Dolomite, Coal, Pyrophyllite, Titanium Minerals, Dunite, Limestone, Quartz/ silica sand
11	Rajasthan	Lead & zinc, Wollastonite, Silver, Copper, Limestone, Rock phosphate, Talc/soapstone/ steatite, Gypsum, Ochre, Bentonite, Fuller's earth, Feldspar, Calcite, Ball clay, China clay, Dolomite, Fireclay, Iron, Lignite, Mica, Quartz/silica sand, Granite, Manganese
12	Tamil Nadu	Vermiculite, Dunite, Fireclay, Graphite, Lignite, Limestone, Magnesite, Quartz/silica sand, Titanium Minerals, Zircon, Sillimanite, Bauxite, Feldspar
13	Telangana	Coal, Manganese, Limestone, Barytes, Dolomite, Feldspar, Quartz/silica sand, Laterite, Shale, China clay, Iron
14	Uttar Pradesh	Diaspore, Pyrophyllite, Silica sand, Coal

S. No.	State	Prominent Minerals
15	West Bengal	Coal, China clay, Fireclay, Granite, Quartz/silica sand

Asset Accounts of Minerals

Asset account of India at National level giving the status of proved, probable, remaining and total mineral reserves for 2005, 2010 and 2015 is at **Statements 4.1** and the State-wise Balance Recoverable Reserves of Crude Oil and Natural Gas is at **Statement 4.2**. These have been compiled using the following publications:

1. Coal & lignite: Provisional Coal Statistics, 2005-06 and Coal Directory of India 2007-08, 2009-10, 2015-16;
2. Petroleum and Natural Gas: Indian Petroleum and Natural Gas Statistics, 2010-11 and Petroleum and Natural Gas Statistics, 2016-17; and
3. Minerals: National Mineral Inventory at a Glance at 2005, 2010, and 2015.

The state-wise details of these accounts are given in **Annexure- 4.1.**

Highlights of the asset accounts

1. Addition of proved reserves: Reserves of several minor minerals as also some other minerals have seen significant change during 2005-2015, with an increase of more than 100% in some cases, as indicated in **Table 4.4**.

Table 4.4: Addition in proved reserves during 2005-15

S. No.	Mineral Group	Minerals	States with significant addition in proved reserves
1.	Metallic Mineral (Ferrous)	Iron Ore (Magnetite)	Rajasthan
2.	Metallic Minerals (Non-Ferrous)	Bauxite	Gujarat, Jharkhand
3.	Energy	Crude oil	Andhra Pradesh
4.	Refractory Mineral	Graphite	Jharkhand
5.	Refractory Mineral	Magnesite	Karnataka, Tamil Nadu
6.	Minor Mineral	Ball Clay	Rajasthan
7.	Minor Mineral	China Clay	Rajasthan
8.	Minor Mineral	Dolomite	Odisha
9.	Minor Mineral	Dunite	Karnataka
10.	Minor Mineral	Feldspar	Rajasthan

S. No.	Mineral Group	Minerals	States with significant addition in proved reserves
11.	Minor Mineral	Mica	Rajasthan
12.	Minor Mineral	Ochre	Madhya Pradesh
13.	Minor Mineral	Pyrophyllite	Uttar Pradesh
14.	Minor Mineral	Quartzite	Andhra Pradesh, Odisha
15.	Minor Mineral	Quartz-Silica Sand	West Bengal
16.	Other Industrial Mineral	Vermiculite	Andhra Pradesh

2. Addition of total resources: Notable increase of more than 10 times has also been observed in the total resources (proved + probable + remaining resources). These include precious & semi-precious minerals, coal and fertilizer minerals, which are significant importance to the economy. These cases are highlighted in **Table 4.5**.

Table 4.5: Increase in total resources

S. No.	Mineral Group	Minerals	States with significant addition in total resources
1.	Metallic Minerals (Non-Ferrous)	Lead Metal& Lead-Zinc Ore	Andhra Pradesh
2.	Energy	Coal	Nagaland
3.	Fertilizer Mineral	Potash	Uttar Pradesh
4.	Precious & Semi-precious Mineral	Diamond	Madhya Pradesh
5.	Precious & Semi-precious Mineral	Garnet	Jharkhand
6.	Precious & Semi-precious Mineral	Gold Metal (Primary)	Jharkhand
7.	Precious & Semi-precious Mineral	Gold Ore (Primary)	Chhattisgarh, Jharkhand
8.	Precious & Semi-precious Mineral	Silver Metal& Ore	Andhra Pradesh
9.	Refractory Mineral	Graphite	Madhya Pradesh, Odisha
10.	Minor Mineral	Barytes	Karnataka
11.	Minor Mineral	Corundum	Karnataka
12.	Minor Mineral	Feldspar	Madhya Pradesh, Rajasthan
13.	Minor Mineral	Granite (Dimension Stone)	Gujarat

S. No.	Mineral Group	Minerals	States with significant addition in total resources
14.	Minor Mineral	Pyrophyllite	Andhra Pradesh, Maharashtra
15.	Minor Mineral	Quartzite	Andhra Pradesh, Jammu & Kashmir, Karnataka, Maharashtra
16.	Minor Mineral	Quartz-Silica Sand	Chhattisgarh
17.	Other Indl. Mineral	Asbestos	Andhra Pradesh

Other Indl. Mineral: Other Industrial Mineral

3. **New discoveries in proved reserves: Table 4.6** gives the cases where the proved reserves, which were not existing in 2005, now have a positive value, depicting thereby a scope for newer activities in the State.

Table 4.6: New discoveries in proved reserves

S. No.	Mineral group	Minerals	State with nil proved reserves in 2005 and a positive entry in 2015
1.	Metallic Mineral (Ferrous)	Iron Ore (Magnetite)	Chhattisgarh, Karnataka, Odisha
2.	Metallic Mineral (Ferrous)	Manganese Ore	Gujarat
3.	Fertilizer Mineral	Apatite	Andhra Pradesh
4.	Precious & Semi-precious Mineral	Garnet	Odisha
5.	Precious & Semi-precious Mineral	Gold Ore (Primary)	Jharkhand
6.	Refractory Mineral	Graphite	Chhattisgarh
7.	Refractory Mineral	Sillimanite	Andhra Pradesh
8.	Strategic Mineral	Titanium Minerals	Odisha
9.	Minor Mineral	Ball Clay	Gujarat
10.	Minor Mineral	Bentonite	Gujarat, Rajasthan
11.	Minor Mineral	Chalk	Gujarat
12.	Minor Mineral	Dolomite	Uttarakhand
13.	Minor Mineral	Feldspar	West Bengal
14.	Minor Mineral	Fire Clay	Chhattisgarh
15.	Minor Mineral	Fuller's Earth	Rajasthan
16.	Minor Mineral	Granite (Dimension	Rajasthan

S. No.	Mineral group	Minerals	State with nil proved reserves in 2005 and a positive entry in 2015
		Stone)	
17.	Minor Mineral	Laterite	Andhra Pradesh, Gujarat, Madhya Pradesh
18.	Minor Mineral	Mica	Andhra Pradesh
19.	Minor Mineral	Pyrophyllite	Jharkhand
20.	Minor Mineral	Quartzite	Jammu & Kashmir
21.	Minor Mineral	Quartz-Silica Sand	Himachal Pradesh
22.	Minor Mineral	Shale	Andhra Pradesh, Madhya Pradesh
23.	Minor Mineral	Slate	Andhra Pradesh, Haryana
24.	Other Indl. Mineral	Marl	Gujarat

Other Indl. Mineral: Other Industrial Mineral

4. Exhaustion of proved reserves: That the stock of minerals is finite is already being experienced in the country, with a vast number of minerals vanishing from the economic sphere. **Table 4.7** lists the cases where the proved reserves have reduced to 'zero' during 2005-2015.

Table 4.7: Exhaustion of proved reserves

S. No.	Mineral Group	Minerals	States where mineral has been exhausted
1.	Metallic Mineral (Ferrous)	Chromite	Maharashtra
2.	Metallic Mineral (Ferrous)	Iron Ore (Magnetite)	Jharkhand
3.	Metallic Mineral (Ferrous)	Manganese Ore	Goa
4.	Metallic Minerals (Non-Ferrous)	Bauxite	Andhra Pradesh, Kerala
5.	Metallic Minerals (Non-Ferrous)	Copper Metal& Ore	Andhra Pradesh
6.	Metallic Minerals (Non-Ferrous)	Lead Metal& Lead-Zinc Ore	Andhra Pradesh, Odisha
7.	Fertilizer Mineral	Apatite	West Bengal
8.	Fertilizer Mineral	Pyrite	Bihar, Rajasthan
9.	Fertilizer Mineral	Rock Phosphate	Uttarakhand
10.	Precious & Semi-precious Mineral	Gold Metal& Ore (Primary)	Andhra Pradesh
11.	Precious & Semi-precious	Ruby	Odisha

S. No.	Mineral Group	Minerals	States where mineral has been exhausted
	Mineral		
12.	Precious & Semi-precious Mineral	Silver Metal& Ore	Andhra Pradesh, Odisha
13.	Refractory Mineral	Graphite	Karnataka, Rajasthan
14.	Refractory Mineral	Kyanite	Karnataka, Rajasthan
15.	Refractory Mineral	Magnesite	Rajasthan
16.	Refractory Mineral	Sillimanite	Rajasthan
17.	Strategic Mineral	Tin Metal& Ore	Odisha
18.	Strategic Mineral	Titanium Minerals	Kerala, Maharashtra
19.	Strategic Mineral	Vanadium Metal & Ore	Maharashtra
20.	Minor Mineral	Barytes	Himachal Pradesh
21.	Minor Mineral	Calcite	Madhya Pradesh
22.	Minor Mineral	China Clay	Delhi, Maharashtra, Odisha
23.	Minor Mineral	Corundum	Chhattisgarh
24.	Minor Mineral	Feldspar	Karnataka, Maharashtra
25.	Minor Mineral	Fire Clay	Jharkhand, Maharashtra
26.	Minor Mineral	Ochre	Jharkhand, Karnataka
27.	Minor Mineral	Pyrophyllite	Maharashtra
28.	Minor Mineral	Quartzite	Bihar, Haryana
29.	Minor Mineral	Quartz-Silica Sand	Haryana, Jharkhand
30.	Minor Mineral	Talc-Steatite-Soapstone	Bihar, Gujarat, Odisha, Tamil Nadu
31.	Other Indl. Mineral	Asbestos	Odisha, Rajasthan
32.	Other Indl. Mineral	Diatomite	Rajasthan
33.	Other Indl. Mineral	Fluorite	Gujarat, Rajasthan
34.	Other Indl. Mineral	Limestone	Nagaland, Uttarakhand
35.	Other Indl. Mineral	Perlite	Gujarat
36.	Other Indl. Mineral	Rock Salt	Himachal Pradesh
37.	Other Indl. Mineral	Vermiculite	Rajasthan

Other Indl. Mineral: Other Industrial Mineral

Conclusion

The asset accounts presented in the statements and the annexure related to this chapter are abridged, in the sense that they give only the stock position and not the 'flows' as given in **Table 4.2** i.e., discoveries, extractions, upward or downward appraisals and reclassifications. Lack of these details does affect the usability of these accounts, but nevertheless can be used as an indicator of the status of minerals in the country. Minerals being a significant input to any economic activity, a proper assessment of their stocks can help in planning for the sustainable growth of the economy.

Statement 4.1: Mineral Resources at National Level

S. No.	Mineral	Unit	2005				2010				2015			
			Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources
1	Andalusite	000 tonnes		0	18450	18450	0	0	18450	18450	0	0	28201	28201
2	Antimony Metal	tonne		0	174	174	0	0	174	174	0	0	174	174
3	Antimony Ore	tonne		0	10588	10588	0	0	10588	10588	0	0	10588	10588
4	Apatite	000 tonnes	6126	20	20719	26865	2089	2	22139	24229	28	2	24016	24045
5	Asbestos	000 tonnes	2974	3067	15696	21736	1700	811	19656	22167	20	5	22923	22947
6	Ball Clay	000 tonnes	14787	17743	46761	79291	12293	4485	66616	83394	33526	15967	85250	134743
7	Barytes	000 tonnes	31640	2673	39891	74203	29558	2026	41150	72734	50449	898	35324	86671
8	Bauxite	000 tonnes	538946	360441	2390433	3289820	321258	271681	2886681	3479620	434043	222378	3240442	3896863
9	Bentonite	000 tonnes	0	25061	505513	530573	0	25061	543307	568367	13926	659	568303	582888
10	Borax	tonne		0	74204	74204	0	0	74204	74204	0	0	74204	74204
11	Calcite	000 tonnes	3218	3524	15832	22574	1265	1399	18281	20945	928	2521	19555	23004
12	Chalk	000 tonnes					3266	1065	585	4916	4215	848	1687	6750
13	China Clay	000 tonnes	101522	120600	2373539	2595661	124117	53040	2528050	2705207	140456	89012	2711775	2941243
14	Chromite	000 tonnes	30892	35236	146936	213064	31652	22318	149377	203347	64465	37745	241805	344015
15	Coal	Million tonnes	92959	117089	37795	247843	109800	130654	36359	276813	131614	143242	31741	306597
16	Cobalt	Million tonnes		0	45	45	0	0	45	45	0	0	45	45
17	Copper Metal	000 tonnes	1644	2740	7034	11418	1605	3164	7518	12287	2128	607	9424	12158
18	Copper Ore	000 tonnes	135461	231851	1024933	1392245	133388	260983	1164086	1558457	162971	44795	1303730	1511496
19	Corundum	tonne	317	288	83191	83796	0	598	740194	740792	200	0	293496	293696
20	Diamond	000 carats	606	600	3376	4582	1045	0	30876	31922	960	0	30876	31836
21	Diaspore	tonne	1662218	1462815	2212362	5337395	1469687	1389987	3125144	5984818	3242363	4640071	2310817	10193251
22	Diatomite	000 tonnes	634	0	2251	2885	0	0	2885	2885	0	0	2885	2885
23	Dolomite	000 tonnes	407794	577361	6547953	7533108	431567	306619	6992372	7730558	431749	246133	7737008	8414890
24	Dunite	000 tonnes	12714	115359	39855	167928	14894	2243	168231	185368	10848	1919	175050	187817
25	Emerald	Kg.									0	0	55869	55869
26	Feldspar	000 tonnes	19221	18829	52732	90782	24545	19958	87832	132335	173383	146459	313726	633567
27	Fire Clay	000 tonnes	26898	32403	645462	704763	14375	15730	683416	713521	13294	13742	695792	722828
28	Fluorite	000 tonnes	8585	629	10952	20166	4566	146	13502	18214	225	64	17893	18182
29	Fuller's Earth	000 tonnes	0	58	256594	256652	0	58	256594	256652	3941	0	257438	261379
30	Garnet	000 tonnes	6720	14256	36680	57656	3252	16073	37638	56963	9918	2866	43377	56161
31	Gold Metal	tonne		0	6	6	0	0	6	6	0	0	6	6

S. No.	Mineral	Unit	2005				2010				2015			
			Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources
	(Placer)													
32	Gold Metal (Primary)	tonne	67	18	406	491	71	40	549	660	53	17	585	655
33	Gold Ore (Placer)	000 tonnes	0	0	26121	26121	0	0	26121	26121	0	0	26121	26121
34	Gold Ore (Primary)	000 tonnes	15554	3700	371035	390289	16046	8079	469570	493695	10404	6824	484611	501840
35	Granite (Dimension Stone)	000 cu.m.	23010	1107014	36295978	37426002	35742	227951	45966609	46230302	35742	227951	46056100	46319793
36	Graphite	000 tonnes	5164	5586	158025	168775	3685	4347	166818	174850	4230	3731	186926	194887
37	Gypsum	000 tonnes	40803	27855	1168218	1236876	22494	16603	1247402	1286499	35141	1481	1292891	1329513
38	Iron Ore (Haematite)	000 tonnes	4945328	2058840	7626220	14630388	5982042	2111505	9788551	17882098	4053033	1368719	17065215	22486967
39	Iron Ore (Magnetite)	000 tonnes	14339	44165	10560977	10619481	15972	5783	10622304	10644059	30351	22349	10736455	10789155
40	Kyanite	000 tonnes	922	452	101239	102613	552	1023	101671	103246	639	49	104293	104982
41	Laterite	000 tonnes					13935	10778	446119	470832	98598	26134	581817	706549
42	Lead Metal	000 tonnes	1263	1328	4617	7207	398	1847	9304	11549	625	1858	10522	13004
43	Lead-Zinc Metal	000 tonnes		0	118	118	0	0	118	118	0	0	143	143
44	Lead-Zinc Ore	000 tonnes	62860	62894	396826	522580	20215	88765	576614	685594	31662	74454	643344	749460
45	Lignite	Million tonnes	4559	12747	19848	37154	6146	25344	8408	39897	6182	26282	11650	44114
46	Limestone	Million tonnes	7492	5223	162630	175346	8979	5948	170009	184935	9439	6897	186889	203225
47	Magnesite	000 tonnes	20862	55271	261749	337882	20852	21099	293222	335173	77867	4409	311711	393987
48	Manganese Ore	000 tonnes	76843	61307	240418	378568	97426	44553	288004	429983	62983	30494	402399	495876
49	Marble	000 tonnes		4701	1787934	1792635	103736	172759	1654968	1931463	0	4551	1941341	1945892
50	Marl	000 tonnes					133236	6740	11705	151681	117116	6740	11705	135561
51	Mica	tonne	1271	67299	325286	393855	169841	20901	341496	532237	82188	32245	520869	635302
52	Molybdenum Contained MoS2	tonne		1050	11590	12640	0	0	12640	12640	0	0	12668	12668
53	Molybdenum	000 tonnes	0	1500	17787	19287	0	0	19287	19287	0	0	19372	19372

S. No.	Mineral	Unit	2005				2010				2015			
			Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources
	Ore													
54	Nickel Ore	Million tonnes		0	189	189	0	0	188	188	0	0	189	189
55	Ochre	000 tonnes	25747	22120	45573	93441	39863	15079	89319	144261	21960	14974	130859	167793
56	Perlite	000 tonnes	188	316	1385	1889	140	288	1978	2406	0	0	2406	2406
57	Platinum Group of Metals	tonne		0	14	14	0	0	16	16	0	0	16	16
58	Potash	Million tonnes		0	21815	21815	0	0	21815	21815	0	0	22508	22508
59	Pyrite	000 tonnes	27129	29597	1617675	1674401	0	0	1674401	1674401	0	0	1674401	1674401
60	Pyrophyllite	000 tonnes	9585	9905	14205	33695	12146	11129	32807	56083	16575	8357	34683	59616
61	Quartzite	000 tonnes	26419	72126	1046414	1144959	59004	27595	1164650	1251249	47759	35714	1575324	1658797
62	Quartz-Silica Sand	000 tonnes	271614	499895	2466704	3238213	272971	156249	3069809	3499029	433013	214509	3260298	3907820
63	Rare Earth Elements	tonne									0	0	25493	25493
64	Rock Phosphate	000 tonnes	33090	19633	252585	305309	20697	14081	261506	296284	43833	1975	266871	312679
65	Rock Salt	000 tonnes	8470	5060	0	13530	10036	5990	0	16026	0	0	16025	16025
66	Ruby	Kg.	143	1782	3346	5271	143	93	5113	5349	0	0	5349	5349
67	Sapphire	Kg.		0	450	450	0	0	450	450	0	0	450	450
68	Shale	000 tonnes					14992	339	580	15911	15027	445	3781	19253
69	Sillimanite	000 tonnes	457	10967	62916	74340	1693	2392	62902	66987	323	6179	63702	70204
70	Silver Metal	tonne	2283	3775	4154	10213	1592	6448	19589	27628	4310	2862	22810	29982
71	Silver Ore	000 tonnes	55752	60161	128721	244633	46109	141449	279426	466985	69277	81167	361511	511955
72	Slate	000 tonnes					0	0	2369	2369	19619	667	2586	22872
73	Sulphur (Native)	000 tonnes		0	210	210	0	0	210	210	0	0	210	210
74	Talc-Steatite-Soapstone	000 tonnes	65013	50516	196809	312338	54614	35413	178996	269023	72172	34319	209432	315923
75	Tin Metal	tonne	108	26	101103	101237	926	207	101142	102275	45	110	102259	102413
76	Tin Ore	000 tonnes	201	49	86303	86552	4	3	83719	83726	2	2	83721	83725
77	Titanium Minerals	000 tonnes	13621	11528	363240	388388	15271	6759	371966	393996	13552	868	399205	413626

S. No.	Mineral	Unit	2005				2010				2015			
			Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources
78	Tungsten Contained WO3	tonne		0	142094	142094	0	0	142094	142094	0	0	142094	142094
79	Tungsten Ore	000 tonnes	0	0	87387	87387	0	0	87387	87387	0	0	87387	87387
80	Vanadium Metal	tonne	1914	8856	54620	65390	1145	458	63284	64887	0	0	64594	64594
81	Vanadium Ore	000 tonnes	491	5828	18529	24848	294	117	24308	24719	0	0	24634	24634
82	Vermiculite	tonne	1556664	206966	674631	2438261	1628475	75532	803003	2507010	1582906	49979	719582	2352467
83	Wollastonite	000 tonnes	7424	1109	11708	20242	2290	197	14083	16570	1953	288	14228	16469
84	Zinc Metal	000 tonnes	5503	5590	13167	24260	1938	10515	24212	36665	2872	7128	26363	36363
85	Zircon	tonne	2484687	1221225	569748	4275660	1025942	321528	1786483	3133953	1012205	146085	2264913	3423203
Source: 1. Provisional Coal Statistics, 2005-06;														
2. Coal Directory of India 2007-08, 2009-10, 2015-16;														
3. National Mineral Inventory at a Glance at 2005, 2010 and 2015.														

Statement 4.2: State-wise Balance Recoverable Reserves of Crude Oil and Natural Gas

Area/State	Crude Oil(MMT)			Natural Gas(BCM)		
	2005	2010	2015	2005	2010	2015
Arunachal Pradesh	**	3.53	1.64	**	2.07	0.79
Andhra Pradesh	4.71	3.68	10.94	42.28	36.09	41.79
Assam	171.59	168.18	165.91	174.94	134.01	149.38
Gujarat	191.98	121.78	119.41	93.11	69.27	63.79
Jharkhand (CBM)	0.00	0.00	0.00	0.00	3.78	29.01
Madhya Pradesh(CBM)	0.00	0.00	0.00	0.00	32.14	32.13
Nagaland	0.00	2.38	2.38	0.00	0.09	0.09
Rajasthan	#	80.48	37.32	#	13.57	36.93
Tamil Nadu	8.18	7.69	8.47	29.57	34.04	35.36
Tripura	**	0.08	0.07	**	27.11	30.74
West Bengal(CBM)	0.00	0.00	0.00	#	37.96	39.33
Offshore	409.58	295.70	289.46	763.09	707.40	792.66
Total Reserves	**786.04**	**683.51**	**635.59**	**1102.99**	**1097.54**	**1251.99**

Note: **:Included in Assam

#: Included in Offshore

Source: Petroleum and Natural Gas: Indian Petroleum and Natural Gas Statistics, 2010-11 and Petroleum and Natural Gas Statistics, 2016-17

ANNEXURE

Annexure 1.1

State-wise Asset Account for Land Cover

(Area in Sq. Km)

S. No.	L1	L2	ANDHRA PRADESH				ARUNACHAL PRADESH			
			Opening Stock (2005-06)	Addition to Stock	Reduction in Stock	Closing Stock (2011-12)	Opening Stock (2005-06)	Addition to Stock	Reduction in Stock	Closing Stock (2011-12)
1	Agriculture	Crop land	75794.39	3592.88	1815.74	77571.53	2552.29	177.47	51.57	2678.20
		Current Shifting cultivation	16.19	0.07	0.95	15.31	988.09	462.05	556.45	893.69
		Plantation	5931.85	1516.74	30.99	7417.60	31.68	18.36		50.05
		Farmland*	**81742.43**	**5109.69**	**1847.68**	**85004.44**	**3572.06**	**657.88**	**608.02**	**3621.93**
		Fallow	13564.25	88.39	3825.92	9826.73	42.09	45.83	17.81	70.11
		Sub Total 1	**95306.68**	**5198.08**	**5673.59**	**94831.17**	**3614.16**	**703.72**	**625.83**	**3692.04**
2	Barren/uncultivable/ Wastelands	Barren Rocky	2143.93		10.16	2133.77	133.12	42.65		175.76
		Gullied / Ravinous Land	250.92		0.64	250.28				
		Rann								
		Salt Affected Land	1294.81	65.05	7.24	1352.62				
		Sandy Area	565.96	2.05	80.40	487.61	7.53	0.00		7.53
		Scrub Land	12092.91	0.91	200.90	11892.92	2527.63	6.51	134.31	2399.83
		Sub Total 2	**16348.53**	**68.01**	**299.34**	**16117.20**	**2668.27**	**49.15**	**134.31**	**2583.11**
3	Builtup	Mining	383.52	127.24	6.20	504.57	0.61			0.61
		Rural	2904.76	6.02	1.94	2908.83	397.74	0.32		398.06
		Urban	1073.43	393.75	0.58	1466.60	122.74	0.30		123.04
		Sub Total 3	**4361.72**	**527.00**	**8.72**	**4880.00**	**521.09**	**0.62**		**521.71**
4	Forest	Deciduous	257.00	25329.26	257.00	25329.26	123.95	15.88	2.48	137.36
		Evergreen/Semi evergreen	25406.18	257.00	25406.18	257.00	60031.74	340.34	816.85	59555.23
		Forest Plantation	629.98	120.65	84.41	666.22	22.48	1.90	0.28	24.11
		Scrub Forest	8397.46	118.09	76.02	8439.53	607.08	843.73	103.34	1347.47
		Swamp / Mangroves	325.98	48.27	2.48	371.77				
		Sub Total 4	**35016.60**	**25873.27**	**25826.10**	**35063.77**	**60785.25**	**1201.86**	**922.94**	**61064.18**
5	Grass / Grazing	Grass / Grazing	98.20			98.20	5935.64	259.26	412.14	5782.76
		Sub Total 5	**98.20**			**98.20**	**5935.64**	**259.26**	**412.14**	**5782.76**
6	Snow and Glacier	Snow and Glacier					8706.29	39.30	198.07	8547.52
		Sub Total 6					**8706.29**	**39.30**	**198.07**	**8547.52**
7	Wet lands / Water bodies	Inland Wetland	221.95	231.30	0.20	453.05	4.16			4.16
		Coastal Wetland	1132.50	5.80	56.20	1082.11				
		River/Stream/Canals	3564.61	185.06	7.72	3741.95	1472.64	44.74	6.11	1511.27
		Water bodies	6938.20	365.17	581.82	6721.55	35.49	0.76		36.25
		Sub Total 7	**11857.27**	**787.33**	**645.94**	**11998.66**	**1512.29**	**45.50**	**6.11**	**1551.68**
	Grand Total		**162989.00**	**32453.69**	**32453.69**	**162989.00**	**83743.00**	**2299.41**	**2299.41**	**83743.00**

Note: 1. Totals may not match due to rounding off.

2. *: Farmland = Crop Land + Current Shifting Cultivation + Plantation

Annexure 1.1 Contd.

State-wise Asset Account for Land Cover

(Area in Sq. Km)

S. No.	L1	L2	ASSAM				BIHAR			
			Opening Stock (2005-06)	Addition to Stock	Reduction in Stock	Closing Stock (2011-12)	Opening Stock (2005-06)	Addition to Stock	Reduction in Stock	Closing Stock (2011-12)
1	Agriculture	Crop land	23655.61	618.21	977.23	23296.60	59677.25	7801.26	2399.74	65078.77
		Current Shifting cultivation	150.28	82.08	109.52	122.83				
		Plantation	3815.57	33.66	19.77	3829.46	2434.34	29.04	17.55	2445.83
		Farmland*	**27621.46**	**733.95**	**1106.52**	**27248.88**	**62111.59**	**7830.31**	**2417.30**	**67524.60**
		Fallow	247.84	386.41	9.98	624.27	10808.08	2128.90	6997.56	5939.42
		Sub Total 1	**27869.30**	**1120.36**	**1116.50**	**27873.16**	**72919.67**	**9959.21**	**9414.86**	**73464.02**
2	Barren/uncultivable/ Wastelands	Barren Rocky	7.37	0.15		7.52	150.28			150.28
		Gullied / Ravinous Land	6.80			6.80	60.71	0.71	4.55	56.87
		Rann								
		Salt Affected Land								
		Sandy Area	69.69	146.56		216.25	6.79	3.71	4.61	5.89
		Scrub Land	3764.61	86.25	68.36	3782.50	3256.16	685.17	882.40	3058.93
		Sub Total 2	**3848.47**	**232.97**	**68.36**	**4013.08**	**3473.95**	**689.59**	**891.57**	**3271.97**
3	Builtup	Mining	34.82	25.87	0.00	60.68	45.97	7.50		53.47
		Rural	556.99	58.15	0.06	615.08	4448.57	27.26	1.40	4474.44
		Urban	560.72	18.62		579.34	797.51	37.95		835.46
		Sub Total 3	**1152.52**	**102.64**	**0.06**	**1255.10**	**5292.05**	**72.71**	**1.40**	**5363.37**
4	Forest	Deciduous	23972.25	69.17	254.09	23787.33	4637.14	51.83	1.42	4687.55
		Evergreen/Semi evergreen	7938.60	54.64	133.23	7860.01				
		Forest Plantation	124.42	1.62	2.15	123.88	2.81			2.81
		Scrub Forest	2040.32	228.32	84.08	2184.56	1074.56	0.16	50.20	1024.52
		Swamp / Mangroves								
		Sub Total 4	**34075.58**	**353.75**	**473.55**	**33955.78**	**5714.51**	**51.99**	**51.62**	**5714.88**
5	Grass / Grazing	Grass / Grazing	2675.25	926.06	557.82	3043.49	17.80	8.63	5.14	21.28
		Sub Total 5	**2675.25**	**926.06**	**557.82**	**3043.49**	**17.80**	**8.63**	**5.14**	**21.28**
6	Snow and Glacier	Snow and Glacier								
		Sub Total 6								
7	Wet lands / Water bodies	Inland Wetland	1805.03	123.23	433.13	1495.13	2021.44	236.08	417.86	1839.66
		Coastal Wetland								
		River/Stream/Canals	6941.86	942.54	1156.00	6728.40	4556.52	570.20	802.49	4324.23
		Water bodies	69.98	5.95	2.08	73.86	175.07	1.99	5.47	171.59
		Sub Total 7	**8816.87**	**1071.72**	**1591.20**	**8297.38**	**6753.03**	**808.27**	**1225.82**	**6335.48**
	Grand Total		**78438.00**	**3807.50**	**3807.50**	**78438.00**	**94171.00**	**11590.40**	**11590.40**	**94171.00**

Note: 1. Totals may not match due to rounding off.

2. *: Farmland = Crop Land + Current Shifting Cultivation + Plantation

Annexure 1.1 Contd.

State-wise Asset Account for Land Cover

(Area in Sq. Km)

S. No.	L1	L2	CHHATTISGARH				GOA			
			Opening Stock (2005-06)	Addition to Stock	Reduction in Stock	Closing Stock (2011-12)	Opening Stock (2005-06)	Addition to Stock	Reduction in Stock	Closing Stock (2011-12)
1	Agriculture	Crop land	57594.88	3283.62	2327.09	58551.41	564.19	0.46	5.00	559.65
		Current Shifting cultivation	1.84	18.54		20.39				
		Plantation	221.37	104.05	88.21	237.21	176.67	0.21	2.77	174.11
		Farmland*	**57818.09**	**3406.21**	**2415.29**	**58809.01**	**740.86**	**0.67**	**7.77**	**733.77**
		Fallow	3268.64	1673.53	1926.79	3015.37	28.93	1.99	0.36	30.56
		Sub Total 1	**61086.73**	**5079.74**	**4342.09**	**61824.38**	**769.79**	**2.66**	**8.13**	**764.33**
2	Barren/uncultu rable/ Wastelands	Barren Rocky	573.21		6.52	566.69	57.59			57.59
		Gullied / Ravinous Land	65.26		41.95	23.31				
		Rann								
		Salt Affected Land	0.29			0.29				
		Sandy Area	98.04	12.55	22.22	88.36	2.42			2.42
		Scrub Land	4543.76	455.48	681.51	4317.73	269.97	0.25	5.88	264.34
		Sub Total 2	**5280.56**	**468.03**	**752.20**	**4996.39**	**329.98**	**0.25**	**5.88**	**324.35**
3	Builtup	Mining	238.30	57.66		295.96	72.73	11.00		83.73
		Rural	3114.70			3114.70	19.84	0.06		19.90
		Urban	712.10	137.31	0.04	849.37	289.53	2.69		292.22
		Sub Total 3	**4065.10**	**194.97**	**0.04**	**4260.03**	**382.10**	**13.75**		**395.85**
4	Forest	Deciduous	58129.63	5.24	798.72	57336.15	1157.14	0.50	2.40	1155.24
		Evergreen/Semi evergreen					608.37			608.37
		Forest Plantation	51.10	7.56		58.66	41.00			41.00
		Scrub Forest	3393.89	3.97	17.09	3380.77	207.52			207.52
		Swamp / Mangroves					17.31			17.31
		Sub Total 4	**61574.62**	**16.76**	**815.81**	**60775.57**	**2031.35**	**0.50**	**2.40**	**2029.45**
5	Grass / Grazing	Grass / Grazing					0.09			0.09
		Sub Total 5					**0.09**			**0.09**
6	Snow and Glacier	Snow and Glacier								
		Sub Total 6								
7	Wet lands / Water bodies	Inland Wetland	0.05	0.45		0.50	55.18		0.61	54.57
		Coastal Wetland					23.28			23.28
		River/Stream/Canals	1753.77	20.39	7.85	1766.31	79.96	0.10		80.07
		Water bodies	1433.18	170.41	32.77	1570.82	30.26		0.25	30.01
		Sub Total 7	**3186.99**	**191.26**	**40.62**	**3337.63**	**188.68**	**0.10**	**0.86**	**187.93**
	Grand Total		**135194.00**	**5950.76**	**5950.76**	**135194.00**	**3702.00**	**17.26**	**17.26**	**3702.00**

Note: 1. Totals may not match due to rounding off.

2. *: Farmland = Crop Land + Current Shifting Cultivation + Plantation

Annexure 1.1 Contd.

State-wise Asset Account for Land Cover

(Area in Sq. Km)

S. No.	L1	L2	GUJARAT				HARYANA			
			Opening Stock (2005-06)	Addition to Stock	Reduction in Stock	Closing Stock (2011-12)	Opening Stock (2005-06)	Addition to Stock	Reduction in Stock	Closing Stock (2011-12)
1	Agriculture	Crop land	110184.09	167.78	749.93	109601.94	37806.42	664.26	798.89	37671.80
		Current Shifting cultivation								
		Plantation	310.20	20.13	0.29	330.05	140.56	54.71	57.08	138.19
		Farmland*	**110494.29**	**187.92**	**750.22**	**109931.99**	**37946.98**	**718.97**	**855.97**	**37809.98**
		Fallow	14017.14	552.30	243.13	14326.31	762.73	278.52	554.93	486.32
		Sub Total 1	**124511.44**	**740.22**	**993.35**	**124258.31**	**38709.71**	**997.49**	**1410.90**	**38296.30**
2	Barren/uncultivable/ Wastelands	Barren Rocky	203.43			203.43	188.56		1.39	187.16
		Gullied / Ravinous Land	439.15	6.18	0.94	444.39				
		Rann	16868.79		0.28	16868.50				
		Salt Affected Land	964.49	4.66	5.70	963.45	69.71	5.60	22.56	52.75
		Sandy Area	196.25		1.26	195.00	37.16		14.95	22.21
		Scrub Land	18668.03	30.07	105.12	18592.98	698.91	27.39	63.82	662.49
		Sub Total 2	**37340.14**	**40.91**	**113.31**	**37267.74**	**994.34**	**32.99**	**102.72**	**924.61**
3	Builtup	Mining	111.92	13.83	0.22	125.54	73.98	35.38		109.35
		Rural	1494.67	0.27	0.45	1494.50	796.15	88.26	3.69	880.71
		Urban	1706.41	260.57		1966.98	1220.20	405.20	0.04	1625.36
		Sub Total 3	**3313.01**	**274.68**	**0.67**	**3587.02**	**2090.32**	**528.83**	**3.73**	**2615.43**
4	Forest	Deciduous	10121.97		4.30	10117.67	891.68	1.89	0.18	893.39
		Evergreen/Semi evergreen	10.21			10.21	1.24			1.24
		Forest Plantation	187.88		0.40	187.47	10.57			10.57
		Scrub Forest	1933.99			1933.99	155.14	0.00	2.03	153.11
		Swamp / Mangroves	635.39	58.33	0.49	693.22				
		Sub Total 4	**12889.44**	**58.33**	**5.20**	**12942.57**	**1058.63**	**1.89**	**2.21**	**1058.31**
5	Grass / Grazing	Grass / Grazing	17.20	2.78	0.39	19.59	856.09	63.24	137.31	782.01
		Sub Total 5	**17.20**	**2.78**	**0.39**	**19.59**	**856.09**	**63.24**	**137.31**	**782.01**
6	Snow and Glacier	Snow and Glacier								
		Sub Total 6								
7	Wet lands / Water bodies	Inland Wetland	990.65	8.77	6.74	992.68	43.43	7.97	2.43	48.97
		Coastal Wetland	9176.93	20.45	103.19	9094.20				
		River/Stream/Canals	3041.08	12.33	0.12	3053.29	336.85	14.65	3.07	348.42
		Water bodies	4744.11	65.67	1.18	4808.60	122.63	17.59	2.28	137.95
		Sub Total 7	**17952.77**	**107.23**	**111.23**	**17948.77**	**502.91**	**40.21**	**7.78**	**535.34**
	Grand Total		**196024.00**	**1224.14**	**1224.14**	**196024.00**	**44212.00**	**1664.65**	**1664.65**	**44212.00**

Note: 1. Totals may not match due to rounding off.

2. *: Farmland = Crop Land + Current Shifting Cultivation + Plantation

Annexure 1.1 Contd.

State-wise Asset Account for Land Cover

(Area in Sq. Km)

S. No.	L1	L2	HIMACHAL PRADESH				JAMMU & KASHMIR			
			Opening Stock (2005-06)	Addition to Stock	Reduction in Stock	Closing Stock (2011-12)	Opening Stock (2005-06)	Addition to Stock	Reduction in Stock	Closing Stock (2011-12)
1	Agriculture	Crop land	6608.07	243.82	348.51	6503.38	10929.98	4.21	17.61	10916.58
		Current Shifting cultivation								
		Plantation	2156.28	48.30	161.70	2042.88	2073.73	6.95	1.63	2079.06
		Farmland*	**8764.35**	**292.12**	**510.21**	**8546.26**	**13003.71**	**11.16**	**19.24**	**12995.64**
		Fallow	1.66			1.66	158.72	0.10	5.55	153.27
		Sub Total 1	**8766.01**	**292.12**	**510.21**	**8547.92**	**13162.43**	**11.26**	**24.79**	**13148.90**
2	Barren/uncultivable/ Wastelands	Barren Rocky	6590.22	3626.83	665.08	9551.97	94384.80	10935.09	1163.09	104156.80
		Gullied / Ravinous Land	144.14	0.27	15.11	129.30	608.47	0.94		609.41
		Rann								
		Salt Affected Land	2.41			2.41	73.31			73.31
		Sandy Area	25.11	0.70	3.38	22.43	1952.46	20.05	4.48	1968.03
		Scrub Land	3632.66	495.24	228.42	3899.48	7212.67	791.22	72.37	7931.52
		Sub Total 2	**10394.54**	**4123.04**	**911.99**	**13605.59**	**104231.71**	**11747.29**	**1239.95**	**114739.06**
3	Builtup	Mining	11.42	3.46		14.88	8.32	0.58		8.90
		Rural	397.20		92.21	304.99	370.33	2.99	0.10	373.22
		Urban	203.73	95.35		299.09	396.98	15.17		412.15
		Sub Total 3	**612.36**	**98.81**	**92.21**	**618.96**	**775.62**	**18.74**	**0.10**	**794.27**
4	Forest	Deciduous	2316.55	54.25	38.43	2332.37	2657.27		720.60	1936.67
		Evergreen/Semi evergreen	11135.54	32.50	112.72	11055.31	14169.62	997.01	1.87	15164.77
		Forest Plantation	5.73			5.73	16.31		0.70	15.61
		Scrub Forest	1210.40	30.07	46.40	1194.06	22873.52	3825.87	387.73	26311.66
		Swamp / Mangroves	0.32			0.32				
		Sub Total 4	**14668.54**	**116.82**	**197.56**	**14587.80**	**39716.72**	**4822.88**	**1110.89**	**43428.72**
5	Grass / Grazing	Grass / Grazing	9035.16	216.32	700.55	8550.94	4531.80	378.76	0.47	4910.09
		Sub Total 5	**9035.16**	**216.32**	**700.55**	**8550.94**	**4531.80**	**378.76**	**0.47**	**4910.09**
6	Snow and Glacier	Snow and Glacier	10760.11	1179.36	3623.25	8316.22	55765.58	1145.53	15751.04	41160.07
		Sub Total 6	**10760.11**	**1179.36**	**3623.25**	**8316.22**	**55765.58**	**1145.53**	**15751.04**	**41160.07**
7	Wet lands / Water bodies	Inland Wetland	7.66		4.20	3.46	708.81	2.14	0.91	710.04
		Coastal Wetland								
		River/Stream/Canals	1002.69	12.69	2.91	1012.47	2098.16	6.47	27.48	2077.14
		Water bodies	425.94	3.71		429.65	1245.17	23.67	1.12	1267.71
		Sub Total 7	**1436.29**	**16.40**	**7.11**	**1445.58**	**4052.13**	**32.27**	**29.51**	**4054.89**
	Grand Total		**55673.00**	**6042.88**	**6042.88**	**55673.00**	**222236.00**	**18156.74**	**18156.74**	**222236.00**

Note: 1. Totals may not match due to rounding off.

2. *: Farmland = Crop Land + Current Shifting Cultivation + Plantation

Annexure 1.1 Contd.

State-wise Asset Account for Land Cover

(Area in Sq. Km)

S. No.	L1	L2	JHARKHAND				KARNATAKA			
			Opening Stock (2005-06)	Addition to Stock	Reduction in Stock	Closing Stock (2011-12)	Opening Stock (2005-06)	Addition to Stock	Reduction in Stock	Closing Stock (2011-12)
1	Agriculture	Crop land	32752.22	418.20	111.63	33058.79	111474.43	973.15	282.83	112164.75
		Current Shifting cultivation								
		Plantation	23.86	23.60		47.45	19369.34	155.74	24.45	19500.62
		Farmland*	**32776.07**	**441.80**	**111.63**	**33106.25**	**130843.77**	**1128.89**	**307.28**	**131665.38**
		Fallow	4931.50	23.59	434.26	4520.83	4989.81	7.63	1065.05	3932.39
		Sub Total 1	**37707.58**	**465.39**	**545.89**	**37627.08**	**135833.58**	**1136.52**	**1372.33**	**135597.77**
2	Barren/uncultivable/ Wastelands	Barren Rocky	465.18		3.80	461.38	1136.22		6.32	1129.90
		Gullied / Ravinous Land	79.43	0.02	0.00	79.45	61.94	0.15	0.09	62.00
		Rann								
		Salt Affected Land					520.56	0.10	0.79	519.87
		Sandy Area					13.05		0.07	12.98
		Scrub Land	6046.70	1.70	41.78	6006.62	6889.58	1.50	24.00	6867.08
		Sub Total 2	**6591.31**	**1.72**	**45.58**	**6547.45**	**8621.35**	**1.75**	**31.27**	**8591.83**
3	Builtup	Mining	485.66	70.60	3.11	553.15	554.31	25.50	1.50	578.31
		Rural	2957.01	0.02	3.48	2953.55	2976.35	1.39	0.85	2976.89
		Urban	962.61	36.46		999.07	2332.81	258.05		2590.87
		Sub Total 3	**4405.29**	**107.08**	**6.60**	**4505.77**	**5863.47**	**284.95**	**2.35**	**6146.07**
4	Forest	Deciduous	23712.21	3.01	39.83	23675.39	15748.96	0.16	4.14	15744.98
		Evergreen/Semi evergreen					9875.78		0.81	9874.97
		Forest Plantation	18.66	8.57		27.23	2996.15	8.43	3.02	3001.56
		Scrub Forest	5310.17	14.23	13.57	5310.83	4951.22	0.81	21.39	4930.64
		Swamp / Mangroves					8.37			8.37
		Sub Total 4	**29041.03**	**25.81**	**53.40**	**29013.44**	**33580.49**	**9.40**	**29.36**	**33560.52**
5	Grass / Grazing	Grass / Grazing					667.59	0.24	0.90	666.93
		Sub Total 5					**667.59**	**0.24**	**0.90**	**666.93**
6	Snow and Glacier	Snow and Glacier								
		Sub Total 6								
7	Wet lands / Water bodies	Inland Wetland	12.98			12.98	27.14		0.52	26.62
		Coastal Wetland					43.62			43.62
		River/Stream/Canals	1301.90	13.35	12.24	1303.00	1993.42	3.04	0.01	1996.45
		Water bodies	645.91	53.15	2.79	696.27	5160.34	1.39	0.54	5161.19
		Sub Total 7	**1960.79**	**66.50**	**15.03**	**2012.26**	**7224.51**	**4.43**	**1.07**	**7227.88**
	Grand Total		**79706.00**	**666.49**	**666.49**	**79706.00**	**191791.00**	**1437.29**	**1437.29**	**191791.00**

Note: 1. Totals may not match due to rounding off.

2. *: Farmland = Crop Land + Current Shifting Cultivation + Plantation

Annexure 1.1 Contd.

State-wise Asset Account for Land Cover

(Area in Sq. Km)

S. No.	L1	L2	KERALA				MADHYA PRADESH			
			Opening Stock (2005-06)	Addition to Stock	Reduction in Stock	Closing Stock (2011-12)	Opening Stock (2005-06)	Addition to Stock	Reduction in Stock	Closing Stock (2011-12)
1	Agriculture	Crop land	2683.56	74.55	123.90	2634.22	183032.89	412.82	956.94	182488.78
		Current Shifting cultivation								
		Plantation	19009.88	208.34	293.75	18924.47	50.08	5.89	0.27	55.70
		Farmland*	**21693.44**	**282.90**	**417.65**	**21558.69**	**183082.97**	**418.72**	**957.21**	**182544.48**
		Fallow	77.70	51.39	30.30	98.78	6580.39	2.45	790.29	5792.55
		Sub Total 1	**21771.14**	**334.29**	**447.95**	**21657.47**	**189663.37**	**421.16**	**1747.50**	**188337.02**
2	Barren/uncultu rable/ Wastelands	Barren Rocky	258.93		1.71	257.21	433.63		15.43	418.20
		Gullied / Ravinous Land					1463.85		1.30	1462.55
		Rann								
		Salt Affected Land					1.77		1.77	
		Sandy Area	19.06	1.31	5.32	15.04				
		Scrub Land	1373.87	90.07	76.52	1387.42	23764.84	3.65	259.76	23508.74
		Sub Total 2	**1651.85**	**91.38**	**83.56**	**1659.67**	**25664.09**	**3.65**	**278.26**	**25389.49**
3	Builtup	Mining	53.22	2.40		55.62	228.23	62.80	3.93	287.09
		Rural	2423.11	11.95	9.28	2425.78	2783.01	1.55	3.07	2781.49
		Urban	554.88	108.77		663.65	1406.49	184.75		1591.25
		Sub Total 3	**3031.21**	**123.12**	**9.28**	**3145.05**	**4417.73**	**249.11**	**7.01**	**4659.83**
4	Forest	Deciduous	1595.65		22.99	1572.67	69128.87	3.99	147.27	68985.59
		Evergreen/Semi evergreen	6040.41		19.30	6021.11	0.10			0.10
		Forest Plantation	2127.65	5.05	10.22	2122.48	34.80	31.47	0.06	66.21
		Scrub Forest	889.32	28.32	2.03	915.61	12192.43	1.51	73.54	12120.40
		Swamp / Mangroves	0.24			0.24				
		Sub Total 4	**10653.27**	**33.38**	**54.54**	**10632.10**	**81356.21**	**36.97**	**220.88**	**81172.30**
5	Grass / Grazing	Grass / Grazing	198.39	0.11	0.04	198.46	1.89		0.28	1.60
		Sub Total 5	**198.39**	**0.11**	**0.04**	**198.46**	**1.89**		**0.28**	**1.60**
6	Snow and Glacier	Snow and Glacier								
		Sub Total 6								
7	Wet lands / Water bodies	Inland Wetland	254.43	10.72	0.87	264.28				
		Coastal Wetland	105.73	0.04	0.49	105.28				
		River/Stream/Canals	572.98	0.44	1.37	572.05	3447.66	14.47	14.25	3447.88
		Water bodies	624.00	5.13	0.50	628.62	3701.06	1543.58	0.76	5243.88
		Sub Total 7	**1557.14**	**16.33**	**3.23**	**1570.24**	**7148.71**	**1558.05**	**15.00**	**8691.75**
	Grand Total		**38863.00**	**598.61**	**598.61**	**38863.00**	**308252.00**	**2268.94**	**2268.94**	**308252.00**

Note: 1. Totals may not match due to rounding off.

2. *: Farmland = Crop Land + Current Shifting Cultivation + Plantation

Annexure 1.1 Contd.

State-wise Asset Account for Land Cover

(Area in Sq. Km)

S. No.	L1	L2	MAHARASHTRA				MANIPUR			
			Opening Stock (2005-06)	Addition to Stock	Reduction in Stock	Closing Stock (2011-12)	Opening Stock (2005-06)	Addition to Stock	Reduction in Stock	Closing Stock (2011-12)
1	Agriculture	Crop land	184746.07	8054.14	4696.28	188103.93	1578.80	2.18	22.16	1558.83
		Current Shifting cultivation					490.63	193.49	230.58	453.54
		Plantation	6259.43	150.79	276.85	6133.37	38.90	0.85		39.75
		Farmland*	**191005.51**	**8204.93**	**4973.13**	**194237.30**	**2108.33**	**196.52**	**252.73**	**2052.12**
		Fallow	19233.42	3639.08	8182.77	14689.73	9.61			9.61
		Sub Total 1	**210238.93**	**11844.00**	**13155.91**	**208927.03**	**2117.93**	**196.52**	**252.73**	**2061.73**
2	Barren/uncultur able/ Wastelands	Barren Rocky	1103.44	2.01	11.25	1094.20				
		Gullied / Ravinous Land	500.83	8.68	24.66	484.86				
		Rann								
		Salt Affected Land	16.91		8.81	8.10				
		Sandy Area	0.86	0.09		0.95				
		Scrub Land	22422.58	46.25	299.49	22169.34	3177.61	2.42	86.50	3093.52
		Sub Total 2	**24044.62**	**57.03**	**344.21**	**23757.45**	**3177.61**	**2.42**	**86.50**	**3093.52**
3	Builtup	Mining	293.74	55.57		349.31				
		Rural	2982.16	157.02	54.89	3084.29	297.46	7.90	0.12	305.24
		Urban	3106.62	742.52	0.10	3849.04	93.77	1.46		95.24
		Sub Total 3	**6382.52**	**955.12**	**54.99**	**7282.64**	**391.23**	**9.37**	**0.12**	**400.48**
4	Forest	Deciduous	40396.15	45.69	447.81	39994.02	11686.48	2766.66	11686.48	2766.66
		Evergreen/Semi evergreen	7165.69		1.72	7163.96	2785.75	11583.59	2785.75	11583.59
		Forest Plantation	263.18	91.96	0.21	354.94	1.85			1.85
		Scrub Forest	8780.72	316.69	83.23	9014.18	1597.37	257.70	11.13	1843.94
		Swamp / Mangroves	310.95		0.00	310.95				
		Sub Total 4	**56916.69**	**454.34**	**532.98**	**56838.05**	**16071.45**	**14607.96**	**14483.36**	**16196.05**
5	Grass / Grazing	Grass / Grazing	2.11		0.01	2.10	2.72			2.72
		Sub Total 5	**2.11**		**0.01**	**2.10**	**2.72**			**2.72**
6	Snow and Glacier	Snow and Glacier								
		Sub Total 6								
7	Wet lands / Water bodies	Inland Wetland	2.44	0.57	0.63	2.39	312.39			312.39
		Coastal Wetland	1002.93	0.68	4.76	998.85				
		River/Stream/Canals	3892.92	37.69	25.54	3905.06	133.93	6.57	0.12	140.38
		Water bodies	5206.13	769.59		5975.72	119.73			119.73
		Sub Total 7	**10104.42**	**808.53**	**30.93**	**10882.02**	**566.06**	**6.57**	**0.12**	**572.50**
	Grand Total		**307689.29**	**14119.02**	**14119.02**	**307689.29**	**22327.00**	**14822.84**	**14822.84**	**22327.00**

Note: 1. Totals may not match due to rounding off.

2. *: Farmland = Crop Land + Current Shifting Cultivation + Plantation

Annexure 1.1 Contd.

State-wise Asset Account for Land Cover

(Area in Sq. Km)

S. No.	L1	L2	MEGHALAYA				MIZORAM			
			Opening Stock (2005-06)	Addition to Stock	Reduction in Stock	Closing Stock (2011-12)	Opening Stock (2005-06)	Addition to Stock	Reduction in Stock	Closing Stock (2011-12)
1	Agriculture	Crop land	1262.61	29.70	0.96	1291.35	165.23	15.77	7.10	173.91
		Current Shifting cultivation	322.49	173.95	263.41	233.04	919.57	693.35	822.40	790.52
		Plantation	565.72	1.32	2.82	564.21	78.82	5.07	0.03	83.86
		Farmland*	**2150.82**	**204.97**	**267.19**	**2088.60**	**1163.63**	**714.18**	**829.53**	**1048.28**
		Fallow	0.40	1.08		1.49				
		Sub Total 1	**2151.22**	**206.05**	**267.19**	**2090.09**	**1163.63**	**714.18**	**829.53**	**1048.28**
2	Barren/uncultur able/ Wastelands	Barren Rocky	262.84			262.84	0.20	4.88		5.07
		Gullied / Ravinous Land								
		Rann								
		Salt Affected Land								
		Sandy Area	4.39			4.39				
		Scrub Land	2834.70	234.50	232.49	2836.70	119.83	32.58	12.60	139.81
		Sub Total 2	**3101.92**	**234.50**	**232.49**	**3103.93**	**120.03**	**37.45**	**12.60**	**144.89**
3	Builtup	Mining	1.35	0.43		1.77				
		Rural	727.55	45.77		773.32	118.75	5.19	0.03	123.91
		Urban	83.77	4.43		88.19	63.68	1.69		65.37
		Sub Total 3	**812.66**	**50.62**		**863.28**	**182.43**	**6.87**	**0.03**	**189.28**
4	Forest	Deciduous	14632.81	295.94	287.25	14641.51	7475.49	649.39	900.77	7224.11
		Evergreen/Semi evergreen	756.69		2.97	753.72	7148.77	74.39	214.55	7008.61
		Forest Plantation	13.59			13.59	100.86	4.88		105.74
		Scrub Forest	604.28	146.13	137.50	612.91	4644.29	1188.76	741.55	5091.50
		Swamp / Mangroves	0.58			0.58				
		Sub Total 4	**16007.95**	**442.07**	**427.72**	**16022.30**	**19369.40**	**1917.43**	**1856.87**	**19429.97**
5	Grass / Grazing	Grass / Grazing	0.03			0.03	112.72		0.28	112.44
		Sub Total 5	**0.03**			**0.03**	**112.72**		**0.28**	**112.44**
6	Snow and Glacier	Snow and Glacier								
		Sub Total 6								
7	Wet lands / Water bodies	Inland Wetland	61.50		5.70	55.80	0.04			0.04
		Coastal Wetland								
		River/Stream/Canals	275.18	0.04	0.13	275.10	130.20	0.35		130.55
		Water bodies	18.53	0.26	0.32	18.47	2.54	23.01		25.56
		Sub Total 7	**355.21**	**0.30**	**6.15**	**349.37**	**132.79**	**23.36**		**156.15**
	Grand Total		**22429.00**	**933.55**	**933.55**	**22429.00**	**21081.00**	**2699.30**	**2699.30**	**21081.00**

Note: 1. Totals may not match due to rounding off.

2. *: Farmland = Crop Land + Current Shifting Cultivation + Plantation

Annexure 1.1 Contd.

State-wise Asset Account for Land Cover

(Area in Sq. Km)

S. No.	L1	L2	NAGALAND				ODISHA			
			Opening Stock (2005-06)	Addition to Stock	Reduction in Stock	Closing Stock (2011-12)	Opening Stock (2005-06)	Addition to Stock	Reduction in Stock	Closing Stock (2011-12)
1	Agriculture	Crop land	581.35	15.86	15.54	581.68	76648.12	122.98	732.10	76039.01
		Current Shifting cultivation	1135.15	951.35	920.83	1165.67	1050.85	233.36	567.79	716.42
		Plantation	8.98	0.44		9.42	333.84	5.04	1.61	337.26
		Farmland*	**1725.48**	**967.65**	**936.37**	**1756.77**	**78032.81**	**361.38**	**1301.50**	**77092.69**
		Fallow	14.05	15.10	8.42	20.73	2105.20	391.47	211.16	2285.51
		Sub Total 1	**1739.53**	**982.75**	**944.79**	**1777.50**	**80138.01**	**752.85**	**1512.66**	**79378.20**
2	Barren/uncultu rable/ Wastelands	Barren Rocky	0.86			0.86	482.71			482.71
		Gullied / Ravinous Land					716.38	1.23		717.62
		Rann								
		Salt Affected Land					28.58		13.25	15.33
		Sandy Area					51.92	2.09	2.60	51.41
		Scrub Land	2128.90	431.98	207.72	2353.17	10711.00	166.54	107.46	10770.09
		Sub Total 2	**2129.77**	**431.98**	**207.72**	**2354.03**	**11990.60**	**169.86**	**123.31**	**12037.15**
3	Builtup	Mining	8.99			8.99	165.17	56.63		221.79
		Rural	240.68	11.30		251.98	4971.50	9.29	14.71	4966.08
		Urban	88.46	1.07		89.53	852.08	227.01		1079.09
		Sub Total 3	**338.14**	**12.36**		**350.50**	**5988.75**	**292.93**	**14.71**	**6266.97**
4	Forest	Deciduous	9916.95	204.49	619.55	9501.90	43235.38	124.97	205.48	43154.88
		Evergreen/Semi evergreen	348.39		1.16	347.24				
		Forest Plantation	127.61		0.70	126.91	873.17	5.24	4.11	874.29
		Scrub Forest	1759.51	780.10	637.95	1901.66	5970.32	656.34	205.40	6421.25
		Swamp / Mangroves					243.96	27.82	1.73	270.05
		Sub Total 4	**12152.46**	**984.59**	**1259.35**	**11877.71**	**50322.83**	**814.37**	**416.73**	**50720.47**
5	Grass / Grazing	Grass / Grazing	17.87			17.87				
		Sub Total 5	**17.87**			**17.87**				
6	Snow and Glacier	Snow and Glacier								
		Sub Total 6								
7	Wet lands / Water bodies	Inland Wetland					467.99	8.48	12.65	463.83
		Coastal Wetland					1192.39	12.33	61.18	1143.54
		River/Stream/Canals	180.35	0.01	0.08	180.28	3116.38	9.73	9.68	3116.44
		Water bodies	20.88	0.23		21.12	2490.05	96.18	5.82	2580.41
		Sub Total 7	**201.23**	**0.24**	**0.08**	**201.40**	**7266.81**	**126.72**	**89.33**	**7304.21**
	Grand Total		**16579.00**	**2411.93**	**2411.93**	**16579.00**	**155707.00**	**2156.74**	**2156.74**	**155707.00**

Note: 1. Totals may not match due to rounding off.

2. *: Farmland = Crop Land + Current Shifting Cultivation + Plantation

Annexure 1.1 Contd.

State-wise Asset Account for Land Cover

(Area in Sq. Km)

S. No.	L1	L2	PUNJAB				RAJASTHAN			
			Opening Stock (2005-06)	Addition to Stock	Reduction in Stock	Closing Stock (2011-12)	Opening Stock (2005-06)	Addition to Stock	Reduction in Stock	Closing Stock (2011-12)
1	Agriculture	Crop land	43186.54	394.49	775.36	42805.67	138908.65	34497.65	18369.16	155037.14
		Current Shifting cultivation								
		Plantation	562.50	280.73	26.06	817.17	100.17	17.25	11.12	106.30
		Farmland*	**43749.04**	**675.22**	**801.42**	**43622.84**	**139008.82**	**34514.90**	**18380.28**	**155143.44**
		Fallow	28.13	55.65	14.11	69.67	77078.17	19670.73	30927.56	65821.34
		Sub Total 1	**43777.16**	**730.87**	**815.53**	**43692.51**	**216086.99**	**54185.63**	**49307.83**	**220964.79**
2	Barren/uncultu rable/ Wastelands	Barren Rocky					4995.21		15.60	4979.61
		Gullied / Ravinous Land	37.98		2.81	35.17	2649.53	57.69	196.93	2510.29
		Rann					196.23	0.10		196.33
		Salt Affected Land	59.36	4.10	37.85	25.60	938.61	2.76	143.04	798.34
		Sandy Area	438.64	0.79	310.86	128.57	30155.02	64.14	5205.39	25013.77
		Scrub Land	338.15	42.91	25.72	355.34	41168.08	4422.75	4180.75	41410.09
		Sub Total 2	**874.13**	**47.80**	**377.24**	**544.69**	**80102.69**	**4547.44**	**9741.69**	**74908.44**
3	Builtup	Mining	48.51	76.58	3.04	122.05	332.18	66.51	0.40	398.29
		Rural	1654.80	80.90		1735.70	3037.56	29.98	4.61	3062.94
		Urban	1566.81	253.18		1819.99	1708.95	230.59		1939.54
		Sub Total 3	**3270.12**	**410.66**	**3.04**	**3677.74**	**5078.70**	**327.08**	**5.01**	**5400.77**
4	Forest	Deciduous	1422.25	9.41	12.42	1419.24	16898.74	502.89	35.69	17365.93
		Evergreen/Semi evergreen	12.75			12.75				
		Forest Plantation	16.20	0.72	2.11	14.80	119.00	26.53	6.04	139.49
		Scrub Forest	68.77	10.07	8.87	69.97	11483.62	24.20	487.26	11020.56
		Swamp / Mangroves								
		Sub Total 4	**1519.97**	**20.19**	**23.40**	**1516.76**	**28501.36**	**553.61**	**528.99**	**28525.98**
5	Grass / Grazing	Grass / Grazing		0.00		0.00	6056.70	29.21	490.46	5595.45
		Sub Total 5		**0.00**		**0.00**	**6056.70**	**29.21**	**490.46**	**5595.45**
6	Snow and Glacier	Snow and Glacier								
		Sub Total 6								
7	Wet lands / Water bodies	Inland Wetland	124.96	19.21	29.82	114.35	203.03	49.43	7.42	245.04
		Coastal Wetland								
		River/Stream/Canals	712.41	44.55	29.52	727.44	3388.32	22.94	10.79	3400.46
		Water bodies	83.24	5.28		88.51	2821.21	396.87	20.02	3198.07
		Sub Total 7	**920.61**	**69.04**	**59.35**	**930.30**	**6412.56**	**469.24**	**38.23**	**6843.57**
	Grand Total		**50362.00**	**1278.56**	**1278.56**	**50362.00**	**342239.00**	**60112.22**	**60112.22**	**342239.00**

Note: 1. Totals may not match due to rounding off.

2. *: Farmland = Crop Land + Current Shifting Cultivation + Plantation

Annexure 1.1 Contd.

State-wise Asset Account for Land Cover

(Area in Sq. Km)

S. No.	L1	L2	SIKKIM				TAMIL NADU			
			Opening Stock (2005-06)	Addition to Stock	Reduction in Stock	Closing Stock (2011-12)	Opening Stock (2005-06)	Addition to Stock	Reduction in Stock	Closing Stock (2011-12)
1	Agriculture	Crop land	583.93	0.51	1.52	582.92	64582.16	438.75	785.20	64235.71
		Current Shifting cultivation								
		Plantation	6.23			6.23	9433.10	147.15	126.48	9453.77
		Farmland*	**590.16**	**0.51**	**1.52**	**589.15**	**74015.27**	**585.89**	**911.67**	**73689.49**
		Fallow	0.57			0.57	14001.11	516.75	643.07	13874.79
		Sub Total 1	**590.73**	**0.51**	**1.52**	**589.71**	**88016.38**	**1102.65**	**1554.74**	**87564.28**
2	Barren/uncultu rable/ Wastelands	Barren Rocky	992.61	16.69	198.35	810.95	280.35		12.07	268.27
		Gullied / Ravinous Land	0.43	7.05		7.48	67.46	3.71	0.09	71.09
		Rann								
		Salt Affected Land					536.74	0.20	4.63	532.31
		Sandy Area	3.63	0.05	0.05	3.62	218.17	0.34	13.70	204.81
		Scrub Land	20.56	0.18	1.18	19.56	4892.09	66.38	60.90	4897.57
		Sub Total 2	**1017.23**	**23.97**	**199.58**	**841.61**	**5994.81**	**70.63**	**91.39**	**5974.05**
3	Builtup	Mining		0.09		0.09	231.94	151.56		383.50
		Rural	5.37	0.16		5.54	3715.76	60.88		3776.65
		Urban	17.29	1.57		18.86	2096.69	238.90		2335.59
		Sub Total 3	**22.66**	**1.82**		**24.48**	**6044.40**	**451.34**		**6495.74**
4	Forest	Deciduous	181.22	0.62	0.33	181.51	11178.86	0.10	3.19	11175.76
		Evergreen/Semi evergreen	2678.10	11.14	25.86	2663.38	5031.58	2.55		5034.14
		Forest Plantation	3.90	0.11	0.15	3.85	1370.63	0.19	1.05	1369.76
		Scrub Forest	47.19	10.38	10.79	46.78	2641.37	0.27	2.60	2639.04
		Swamp / Mangroves					111.85			111.85
		Sub Total 4	**2910.40**	**22.25**	**37.14**	**2895.51**	**20334.29**	**3.11**	**6.84**	**20330.56**
5	Grass / Grazing	Grass / Grazing	690.83	2.10	65.53	627.40	174.35		2.29	172.07
		Sub Total 5	**690.83**	**2.10**	**65.53**	**627.40**	**174.35**		**2.29**	**172.07**
6	Snow and Glacier	Snow and Glacier	1809.68	271.86	22.66	2058.89				
		Sub Total 6	**1809.68**	**271.86**	**22.66**	**2058.89**				
7	Wet lands / Water bodies	Inland Wetland					44.68	5.80		50.48
		Coastal Wetland					988.91	9.27	14.35	983.82
		River/Stream/Canals	40.68	0.01	0.00	40.69	1774.01	1.95	52.05	1723.90
		Water bodies	13.78	3.95	0.04	17.69	6686.17	77.95	1.01	6763.11
		Sub Total 7	**54.47**	**3.96**	**0.04**	**58.38**	**9493.77**	**94.96**	**67.42**	**9521.31**
	Grand Total		**7096.00**	**326.47**	**326.47**	**7096.00**	**130058.00**	**1722.68**	**1722.68**	**130058.00**

Note: 1. Totals may not match due to rounding off.

2. *: Farmland = Crop Land + Current Shifting Cultivation + Plantation

Annexure 1.1 Contd.

State-wise Asset Account for Land Cover

(Area in Sq. Km)

S. No.	L1	L2	TELANGANA				TRIPURA			
			Opening Stock (2005-06)	Addition to Stock	Reduction in Stock	Closing Stock (2011-12)	Opening Stock (2005-06)	Addition to Stock	Reduction in Stock	Closing Stock (2011-12)
1	Agriculture	Crop land	57450.52	2907.60	435.04	59923.08	1388.16	26.97	12.40	1402.73
		Current Shifting cultivation					80.89	119.40	74.78	125.52
		Plantation	866.59	254.76	1.05	1120.29	756.38	3.56	29.24	730.71
		Farmland*	**58317.11**	**3162.36**	**436.10**	**61043.37**	**2225.44**	**149.94**	**116.42**	**2258.95**
		Fallow	12371.90	1.56	3220.24	9153.22	17.68	16.31	1.74	32.26
		Sub Total 1	**70689.00**	**3163.92**	**3656.34**	**70196.59**	**2243.12**	**166.25**	**118.16**	**2291.21**
2	Barren/uncultura ble/ Wastelands	Barren Rocky	769.04		9.43	759.61				
		Gullied / Ravinous Land	121.97		0.34	121.63	0.08			0.08
		Rann								
		Salt Affected Land	256.82		2.76	254.06				
		Sandy Area	2.43			2.43	4.66	0.06	0.05	4.67
		Scrub Land	5141.59		139.27	5002.32	566.36	84.84	33.95	617.25
		Sub Total 2	**6291.85**		**151.80**	**6140.05**	**571.10**	**84.90**	**34.00**	**622.00**
3	Builtup	Mining	355.21	128.87	6.01	478.06	4.95	0.42		5.37
		Rural	2012.36	4.79	0.67	2016.48	468.41	24.16		492.57
		Urban	1518.77	358.46		1877.23	332.48	9.83		342.31
		Sub Total 3	**3886.33**	**492.12**	**6.68**	**4371.77**	**805.84**	**34.41**		**840.25**
4	Forest	Deciduous	19465.09	0.03	219.96	19245.16	1958.69	5.28	26.93	1937.04
		Evergreen/Semi evergreen					3981.21	0.87	116.14	3865.94
		Forest Plantation	395.88	44.32	21.41	418.79	310.74		3.48	307.26
		Scrub Forest	4569.07	184.14	24.36	4728.85	500.66	93.59	83.39	510.86
		Swamp / Mangroves								
		Sub Total 4	**24430.04**	**228.50**	**265.74**	**24392.80**	**6751.30**	**99.75**	**229.95**	**6621.10**
5	Grass / Grazing	Grass / Grazing	31.50	0.50	1.23	30.77				
		Sub Total 5	**31.50**	**0.50**	**1.23**	**30.77**				
6	Snow and Glacier	Snow and Glacier								
		Sub Total 6								
7	Wet lands / Water bodies	Inland Wetland	15.73			15.73	7.17		1.65	5.52
		Coastal Wetland								
		River/Stream/Canals	2139.54	56.71	4.60	2191.65	51.49		0.92	50.57
		Water bodies	4595.01	148.92	4.29	4739.64	55.98	0.21	0.84	55.36
		Sub Total 7	**6750.28**	**205.63**	**8.89**	**6947.03**	**114.64**	**0.21**	**3.41**	**111.45**
	Grand Total		**112079.00**	**4090.67**	**4090.67**	**112079.00**	**10486.00**	**385.52**	**385.52**	**10486.00**

Note: 1. Totals may not match due to rounding off.

2. *: Farmland = Crop Land + Current Shifting Cultivation + Plantation

Annexure 1.1 Contd.

State-wise Asset Account for Land Cover

(Area in Sq. Km)

S. No.	L1	L2	UTTAR PRADESH				UTTARAKHAND			
			Opening Stock (2005-06)	Addition to Stock	Reduction in Stock	Closing Stock (2011-12)	Opening Stock (2005-06)	Addition to Stock	Reduction in Stock	Closing Stock (2011-12)
1	Agriculture	Crop land	170454.40	12997.52	2110.95	181340.97	9564.97	52.61	38.78	9578.81
		Current Shifting cultivation								
		Plantation	4382.35	246.34	78.98	4549.71	174.42		3.75	170.67
		Farmland*	**174836.75**	**13243.86**	**2189.93**	**185890.69**	**9739.39**	**52.61**	**42.53**	**9749.47**
		Fallow	12468.50	1456.69	8611.75	5313.44	1014.59	10.02	47.53	977.09
		Sub Total 1	**187305.25**	**14700.55**	**10801.68**	**191204.13**	**10753.99**	**62.63**	**90.06**	**10726.56**
2	Barren/uncultu rable/ Wastelands	Barren Rocky	684.23		8.68	675.54	3123.14	2951.97	36.94	6038.17
		Gullied / Ravinous Land	3120.05	9.60	246.80	2882.85	4.27			4.27
		Rann								
		Salt Affected Land	4466.83	147.35	863.98	3750.20				
		Sandy Area	94.31	0.51	85.24	9.58	7.09			7.09
		Scrub Land	9910.88	328.68	3237.75	7001.80	681.15	20.29	3.50	697.93
		Sub Total 2	**18276.30**	**486.14**	**4442.45**	**14319.99**	**3815.64**	**2972.26**	**40.44**	**6747.46**
3	Builtup	Mining	95.92	18.26	0.07	114.12	19.61	0.31		19.91
		Rural	6995.53	14.11	51.54	6958.10	210.31	0.29		210.59
		Urban	4197.40	184.33	1.08	4380.65	382.59	2.99		385.58
		Sub Total 3	**11288.86**	**216.70**	**52.69**	**11452.87**	**612.50**	**3.59**		**616.09**
4	Forest	Deciduous	8875.48	98.39	72.10	8901.77	6570.88	0.01	6.70	6564.20
		Evergreen/Semi evergreen					16132.86	0.55	2.46	16130.95
		Forest Plantation	72.27	6.95	2.34	76.87	804.91		1.78	803.13
		Scrub Forest	3444.76	42.46	98.81	3388.41	2330.20	1.47	3.12	2328.55
		Swamp / Mangroves	191.10		2.81	188.29	8.83			8.83
		Sub Total 4	**12583.61**	**147.79**	**176.07**	**12555.33**	**25847.69**	**2.03**	**14.06**	**25835.66**
5	Grass / Grazing	Grass / Grazing	362.85	3.84	69.48	297.20	4150.58	265.03	3.86	4411.75
		Sub Total 5	**362.85**	**3.84**	**69.48**	**297.20**	**4150.58**	**265.03**	**3.86**	**4411.75**
6	Snow and Glacier	Snow and Glacier					7066.26	24.68	3220.04	3870.91
		Sub Total 6					**7066.26**	**24.68**	**3220.04**	**3870.91**
7	Wet lands / Water bodies	Inland Wetland	2754.56	50.42	499.21	2305.77	0.05			0.05
		Coastal Wetland								
		River/Stream/Canals	6619.93	719.44	334.41	7004.96	1054.16	32.53	13.90	1072.80
		Water bodies	1736.65	69.55	18.45	1787.76	182.13	19.63	0.02	201.73
		Sub Total 7	**11111.14**	**839.41**	**852.06**	**11098.49**	**1236.35**	**52.16**	**13.93**	**1274.58**
	Grand Total		**240928.00**	**16394.43**	**16394.43**	**240928.00**	**53483.00**	**3382.38**	**3382.38**	**53483.00**

Note: 1. Totals may not match due to rounding off.

2. *: Farmland = Crop Land + Current Shifting Cultivation + Plantation

Annexure 1.1 Contd.

State-wise Asset Account for Land Cover

(Area in Sq. Km)

S. No.	L1	L2	WEST BENGAL				ANDAMAN & NICOBAR ISLANDS			
			Opening Stock (2005-06)	Addition to Stock	Reduction in Stock	Closing Stock (2011-12)	Opening Stock (2005-06)	Addition to Stock	Reduction in Stock	Closing Stock (2011-12)
1	Agriculture	Crop land	51992.58	236.08	544.09	51684.57	317.25	1.25		318.50
		Current Shifting cultivation								
		Plantation	2403.82	107.28	11.32	2499.78	73.75			73.75
		Farmland*	**54396.40**	**343.36**	**555.41**	**54184.35**	**391.00**	**1.25**		**392.25**
		Fallow	154.13	1.51	112.67	42.97				
		Sub Total 1	**54550.53**	**344.86**	**668.08**	**54227.32**	**391.00**	**1.25**		**392.25**
2	Barren/uncultur able/ Wastelands	Barren Rocky	61.63	0.13	3.84	57.92				
		Gullied / Ravinous Land	19.07		0.61	18.47				
		Rann								
		Salt Affected Land	0.18	0.67		0.84				
		Sandy Area	40.89	14.20	23.44	31.65	7.50			7.50
		Scrub Land	1515.74	120.65	103.79	1532.60	1.09			1.09
		Sub Total 2	**1637.51**	**135.64**	**131.68**	**1641.47**	**8.59**			**8.59**
3	Builtup	Mining	182.47	68.81	0.28	251.00				
		Rural	13234.94	8.84	7.12	13236.66	1.44			1.44
		Urban	2225.01	142.29	0.32	2366.97	63.92			63.92
		Sub Total 3	**15642.42**	**219.93**	**7.72**	**15854.63**	**65.36**			**65.36**
4	Forest	Deciduous	6309.03	100.37	84.43	6324.97	1395.62		3.78	1391.84
		Evergreen/Semi evergreen	197.51	0.32	0.01	197.82	5096.91	3.63	0.08	5100.46
		Forest Plantation	652.37	108.15	5.32	755.20				
		Scrub Forest	581.45	51.42	95.18	537.68	273.45	0.15	0.65	272.94
		Swamp / Mangroves	2493.35	17.08	22.61	2487.83	822.10		1.23	820.88
		Sub Total 4	**10233.71**	**277.36**	**207.56**	**10303.51**	**7588.09**	**3.78**	**5.74**	**7586.12**
5	Grass / Grazing	Grass / Grazing	145.19	38.02	73.70	109.52				
		Sub Total 5	**145.19**	**38.02**	**73.70**	**109.52**				
6	Snow and Glacier	Snow and Glacier								
		Sub Total 6								
7	Wet lands / Water bodies	Inland Wetland	367.26	2.02	3.55	365.74	18.86			18.86
		Coastal Wetland	512.11	9.45	14.86	506.70	114.10	0.96		115.05
		River/Stream/Canals	4585.83	212.58	287.08	4511.33	55.96			55.96
		Water bodies	1077.33	160.84	6.50	1231.67	7.05		0.25	6.80
		Sub Total 7	**6542.53**	**384.89**	**311.99**	**6615.43**	**195.96**	**0.96**	**0.25**	**196.68**
	Grand Total		**88751.89**	**1400.71**	**1400.71**	**88751.89**	**8249.00**	**5.99**	**5.99**	**8249.00**

Note: 1. Totals may not match due to rounding off.

2. *: Farmland = Crop Land + Current Shifting Cultivation + Plantation

Annexure 1.1 Contd.

State-wise Asset Account for Land Cover

(Area in Sq. Km)

S. No.	L1	L2	CHANDIGARH				DADRA & NAGAR HAVELI			
			Opening Stock (2005-06)	Addition to Stock	Reduction in Stock	Closing Stock (2011-12)	Opening Stock (2005-06)	Addition to Stock	Reduction in Stock	Closing Stock (2011-12)
1	Agriculture	Crop land	13.91		1.06	12.85	120.75		8.24	112.51
		Current Shifting cultivation								
		Plantation	0.93	0.09		1.02	16.15		0.84	15.31
		Farmland*	**14.84**	**0.09**	**1.06**	**13.87**	**136.90**		**9.08**	**127.82**
		Fallow	3.82	0.18	2.91	1.08	91.51		1.57	89.93
		Sub Total 1	**18.65**	**0.27**	**3.97**	**14.96**	**228.40**		**10.65**	**217.75**
2	Barren/uncultur able/ Wastelands	Barren Rocky								
		Gullied / Ravinous Land	0.07			0.07				
		Rann								
		Salt Affected Land								
		Sandy Area								
		Scrub Land	1.18	0.33	0.17	1.35	43.22		0.86	42.36
		Sub Total 2	**1.25**	**0.33**	**0.17**	**1.42**	**43.22**		**0.86**	**42.36**
3	Builtup	Mining	0.12		0.12		0.86	0.17		1.03
		Rural	2.79	0.11		2.90	0.52	1.21		1.74
		Urban	80.23	3.62		83.85	20.67	10.19		30.86
		Sub Total 3	**83.15**	**3.73**	**0.12**	**86.75**	**22.06**	**11.57**		**33.63**
4	Forest	Deciduous	8.75		0.16	8.59	119.07		0.55	118.51
		Evergreen/Semi evergreen					6.87	0.52	0.54	6.85
		Forest Plantation								
		Scrub Forest					50.44	0.59		51.03
		Swamp / Mangroves								
		Sub Total 4	**8.75**		**0.16**	**8.59**	**176.38**	**1.11**	**1.09**	**176.39**
5	Grass / Grazing	Grass / Grazing								
		Sub Total 5								
6	Snow and Glacier	Snow and Glacier								
		Sub Total 6								
7	Wet lands / Water bodies	Inland Wetland	0.02			0.02				
		Coastal Wetland								
		River/Stream/Canals	0.75			0.75	8.05			8.05
		Water bodies	1.43	0.09		1.52	12.88		0.06	12.82
		Sub Total 7	**2.19**	**0.09**		**2.28**	**20.94**		**0.06**	**20.87**
	Grand Total		**114.00**	**4.42**	**4.42**	**114.00**	**491.00**	**12.67**	**12.67**	**491.00**

Note: 1. Totals may not match due to rounding off.

2. *: Farmland = Crop Land + Current Shifting Cultivation + Plantation

Annexure 1.1 Contd.

State-wise Asset Account for Land Cover

(Area in Sq. Km)

S. No.	L1	L2	DAMAN & DIU				DELHI			
			Opening Stock (2005-06)	Addition to Stock	Reduction in Stock	Closing Stock (2011-12)	Opening Stock (2005-06)	Addition to Stock	Reduction in Stock	Closing Stock (2011-12)
1	Agriculture	Crop land	37.71		0.04	37.67	469.40	0.82	17.77	452.45
		Current Shifting cultivation								
		Plantation	9.03			9.03	2.43	13.51		15.95
		Farmland*	**46.74**		**0.04**	**46.70**	**471.83**	**14.33**	**17.77**	**468.39**
		Fallow	10.62			10.62	91.54	0.70	15.57	76.68
		Sub Total 1	**57.36**		**0.04**	**57.32**	**563.37**	**15.04**	**33.34**	**545.07**
2	Barren/uncultura ble/ Wastelands	Barren Rocky					0.10			0.10
		Gullied / Ravinous Land	0.40			0.40	6.75		0.69	6.06
		Rann								
		Salt Affected Land	0.92			0.92	0.15			0.15
		Sandy Area								
		Scrub Land	7.37			7.37	65.51		3.27	62.24
		Sub Total 2	**8.69**			**8.69**	**72.52**		**3.96**	**68.55**
3	Builtup	Mining	1.01			1.01	0.89		0.22	0.67
		Rural	0.78			0.78	49.90	0.79		50.70
		Urban	20.61	0.04		20.65	735.97	18.28		754.25
		Sub Total 3	**22.39**	**0.04**		**22.43**	**786.76**	**19.07**	**0.22**	**805.62**
4	Forest	Deciduous	1.07			1.07	9.09	1.50		10.59
		Evergreen/Semi evergreen								
		Forest Plantation					0.38			0.38
		Scrub Forest					12.06			12.06
		Swamp / Mangroves	0.89			0.89				
		Sub Total 4	**1.96**			**1.96**	**21.53**	**1.50**		**23.03**
5	Grass / Grazing	Grass / Grazing					6.23		0.53	5.70
		Sub Total 5					**6.23**		**0.53**	**5.70**
6	Snow and Glacier	Snow and Glacier								
		Sub Total 6								
7	Wet lands / Water bodies	Inland Wetland	8.25			8.25	4.10	0.11	0.11	4.10
		Coastal Wetland	8.29			8.29				
		River/Stream/Canals	4.51			4.51	24.70	2.44		27.14
		Water bodies	0.55			0.55	3.78			3.78
		Sub Total 7	**21.59**			**21.59**	**32.59**	**2.55**	**0.11**	**35.03**
	Grand Total		**112.00**	**0.04**	**0.04**	**112.00**	**1483.00**	**38.16**	**38.16**	**1483.00**

Note: 1. Totals may not match due to rounding off.

2. *: Farmland = Crop Land + Current Shifting Cultivation + Plantation

Annexure 1.1 Contd.

State-wise Asset Account for Land Cover

(Area in Sq. Km)

S. No.	L1	L2	LAKSHADWEEP				PUDUCHERRY			
			Opening Stock (2005-06)	Addition to Stock	Reduction in Stock	Closing Stock (2011-12)	Opening Stock (2005-06)	Addition to Stock	Reduction in Stock	Closing Stock (2011-12)
1	Agriculture	Crop land					236.43	0.03	1.44	235.02
		Current Shifting cultivation								
		Plantation					21.65		0.24	21.41
		Farmland*					**258.08**	**0.03**	**1.68**	**256.42**
		Fallow					67.82	0.61	1.99	66.45
		Sub Total 1					**325.90**	**0.64**	**3.67**	**322.87**
2	Barren/uncultura ble/ Wastelands	Barren Rocky								
		Gullied / Ravinous Land					0.04			0.04
		Rann								
		Salt Affected Land					0.10			0.10
		Sandy Area					2.43			2.43
		Scrub Land					9.14	0.05	0.95	8.24
		Sub Total 2					**11.70**	**0.05**	**0.95**	**10.80**
3	Builtup	Mining					0.08			0.08
		Rural	0.00			0.00	34.70	0.05		34.75
		Urban	0.46			0.46	67.44	6.24		73.68
		Sub Total 3	**0.46**			**0.46**	**102.22**	**6.29**		**108.51**
4	Forest	Deciduous					0.17			0.17
		Evergreen/Semi evergreen								
		Forest Plantation					0.03			0.03
		Scrub Forest								
		Swamp / Mangroves					1.70			1.70
		Sub Total 4					**1.90**			**1.90**
5	Grass / Grazing	Grass / Grazing								
		Sub Total 5								
6	Snow and Glacier	Snow and Glacier								
		Sub Total 6								
7	Wet lands / Water bodies	Inland Wetland					0.04	0.86		0.90
		Coastal Wetland	31.54			31.54	8.28	0.39	1.21	7.46
		River/Stream/Canals					16.21			16.21
		Water bodies	0.00			0.00	25.75	0.15	2.55	23.34
		Sub Total 7	**31.54**			**31.54**	**50.28**	**1.41**	**3.77**	**47.92**
	Grand Total		**32.00**			**32.00**	**492.00**	**8.39**	**8.39**	**492.00**

Note: 1. Totals may not match due to rounding off.

2. *: Farmland = Crop Land + Current Shifting Cultivation + Plantation

Annexure 1.1 Contd.

State-wise Asset Account for Land Cover

(Area in Sq. Km)

S. No.	L1	L2	INDIA(Total)			
			Opening Stock (2005-06)	Addition to Stock	Reduction in Stock	Closing Stock (2011-12)
1	Agriculture	Crop land	1519600.64	78227.66	39541.78	1558286.52
		Current Shifting cultivation	5155.97	2927.64	3546.70	4536.90
		Plantation	81840.63	3459.89	1268.86	84031.66
		Farmland*	**1606597.23**	**84615.18**	**44357.33**	**1646855.08**
		Fallow	198242.26	31018.47	67905.01	161355.73
		Sub Total 1	**1804839.50**	**115633.66**	**112262.34**	**1808210.82**
2	Barren/uncultura ble/ Wastelands	Barren Rocky	119482.81	17580.40	2169.66	134893.55
		Gullied / Ravinous Land	10425.99	96.23	537.49	9984.74
		Rann	17065.02	0.10	0.28	17064.83
		Salt Affected Land	9232.56	230.47	1112.38	8350.65
		Sandy Area	34025.43	269.21	5778.04	28516.60
		Scrub Land	200499.06	8676.76	11583.50	197592.32
		Sub Total 2	**390730.87**	**26853.17**	**21181.35**	**396402.69**
3	Builtup	Mining	4045.99	1068.01	25.09	5088.91
		Rural	66403.71	661.00	250.24	66814.47
		Urban	31663.85	4393.62	2.16	36055.31
		Sub Total 3	**102113.55**	**6122.64**	**277.50**	**107958.69**
4	Forest	Deciduous	416187.55	30340.93	16907.44	429621.05
		Evergreen/Semi evergreen	186560.87	13359.06	29642.20	170277.74
		Forest Plantation	11396.09	474.30	149.98	11720.41
		Scrub Forest	114596.56	8859.55	3509.24	119946.86
		Swamp / Mangroves	5172.92	151.51	31.36	5293.07
		Sub Total 4	**733913.99**	**53185.35**	**50240.21**	**736859.13**
5	Grass / Grazing	Grass / Grazing	35788.81	2194.09	2522.42	35460.48
		Sub Total 5	**35788.81**	**2194.09**	**2522.42**	**35460.48**
6	Snow and Glacier	Snow and Glacier	84107.93	2660.73	22815.05	63953.61
		Sub Total 6	**84107.93**	**2660.73**	**22815.05**	**63953.61**
7	Wet lands / Water bodies	Inland Wetland	10545.98	757.58	1428.20	9875.36
		Coastal Wetland	14340.61	59.37	256.23	14143.74
		River/Stream/Canals	60369.63	2988.01	2810.46	60547.18
		Water bodies	50512.13	4030.88	691.72	53851.29
		Sub Total 7	**135768.35**	**7835.84**	**5186.61**	**138417.58**
	Grand Total		**3287263.00**	**214485.47**	**214485.47**	**3287263.00**

Note: 1. Totals may not match due to rounding off.

2. *: Farmland = Crop Land + Current Shifting Cultivation + Plantation

Annexure 1.2

India Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			INDIA																
			2011-12																
			1: Agriculture						2:Barren/unculturable/ Wastelands							3: Builtup			
			1.1	1.2	1.3	FL	1.4	Sub Total	2.1	2.2	2.3	2.4	2.5	2.6	Sub Total	3.1	3.2	3.3	Sub Total
2005-06	1: Agriculture	1.1: Crop land	1480058.86	3.79	2493.22	**1482555.87**	28801.05	**1511356.92**	0.16	5.17		15.62	48.88	1055.29	**1125.14**	332.64	345.44	2333.61	**3011.69**
		1.2: Current Shifting cultivation	2.34	1609.27		**1611.61**	0.13	**1611.73**	0.35					283.03	**283.38**		2.65	0.10	**2.74**
		1.3: Plantation	695.49		80571.77	**81267.27**	172.44	**81439.71**				0.05	0.65	148.03	**148.74**	6.74	20.32	157.51	**184.57**
		Farmland (FL) = 1.1+1.2+1.3	**1480756.69**	**1613.06**	**83064.99**	**1565434.74**	**28973.62**	**1594408.36**	**0.51**	**5.17**		**15.68**	**49.53**	**1486.36**	**1557.25**	**339.38**	**368.40**	**2491.22**	**3199.01**
		1.4: Fallow	64487.65	1.62	613.84	**65103.11**	130337.26	**195440.37**		4.03		102.13	3.72	438.79	**548.67**	148.16	70.25	892.15	**1110.57**
		Sub Total	**1545244.34**	**1614.68**	**83678.83**	**1630537.85**	**159310.88**	**1789848.73**	**0.51**	**9.21**		**117.80**	**53.25**	**1925.15**	**2105.92**	**487.54**	**438.66**	**3383.37**	**4309.58**
	2:Barren/unculturable/ Wastelands	2.1: Barren Rocky							117313.15					256.30	**117569.46**	61.64	1.60	14.38	**77.62**
		2.2:Gullied / Ravinous Land	389.62		3.40	**393.02**	6.61	**399.63**	0.09	9888.50		5.16		105.68	**9999.43**	2.43	0.31	7.03	**9.77**
		2.3: Rann									17064.73				**17064.73**			0.28	**0.28**
		2.4: Salt Affected Land	858.20		6.63	**864.83**	45.35	**910.18**		2.19		8120.18	0.24	143.78	**8266.40**	0.83	0.94	18.55	**20.31**
		2.5: Sandy Area	1496.46		48.98	**1545.44**	21.80	**1567.24**		0.30		0.13	28247.40	3990.03	**32237.86**	19.70	1.52	28.20	**49.42**
		2.6: Scrub Land	6644.92	292.54	236.90	**7174.35**	1615.54	**8789.89**	21.75	77.08		100.82	51.27	188915.56	**189166.47**	312.07	73.66	537.86	**923.59**
		Sub Total	**9389.20**	**292.54**	**295.91**	**9977.64**	**1689.30**	**11666.95**	**117334.98**	**9968.07**	**17064.73**	**8226.30**	**28298.91**	**193411.36**	**374304.35**	**396.66**	**78.03**	**606.31**	**1081.01**
	3: Builtup	3.1: Mining	2.23		0.28	**2.52**		**2.52**						2.01	**2.01**	4020.90		13.66	**4034.56**
		3.2: Rural												1.55	**1.55**	2.28	66153.47	238.30	**66394.05**
		3.3: Urban														1.97		31661.68	**31663.65**
		Sub Total	**2.23**		**0.28**	**2.52**		**2.52**						**3.56**	**3.56**	**4025.14**	**66153.47**	**31913.64**	**102092.26**
	4: Forest	4.1: Deciduous	819.42	1279.04	14.30	**2112.76**	4.20	**2116.96**	4.00	0.50		0.09	2.94	115.67	**123.20**	74.71	37.28	38.97	**150.96**
		4.2: Evergreen/Semi evergreen	112.54	566.95	7.24	**686.73**	2.18	**688.92**	19.43	5.18			0.06	0.06	**24.73**	5.19	2.07	0.87	**8.13**
		4.3: Forest Plantation		3.99		**3.99**		**3.99**					0.09	0.50	**0.59**	1.33	10.53	6.54	**18.40**
		4.4: Scrub Forest	28.22	779.64	2.33	**810.19**	1.04	**811.23**	84.58	0.74			0.24	677.73	**763.29**	36.79	8.30	15.92	**61.02**
		4.5: Swamp / Mangroves	1.17			**1.17**		**1.17**					3.26		**3.26**	0.01		1.28	**1.29**
		Sub Total	**961.35**	**2629.63**	**23.87**	**3614.85**	**7.42**	**3622.27**	**108.00**	**6.43**		**0.09**	**6.58**	**793.96**	**915.07**	**118.03**	**58.18**	**63.58**	**239.79**
	5: Grass / Grazing	5.1: Grass / Grazing	**332.21**	**0.05**	**15.28**	**347.54**	**207.50**	**555.04**	**3.71**	**0.85**		**1.57**	**42.48**	**236.66**	**285.27**	**6.29**	**82.08**	**39.92**	**128.29**
	6:Snow and Glacier	6.1: Snow and Glacier							**17446.34**				**14.49**	**414.77**	**17875.60**				
	7: Wet lands / Water bodies	7.1: Inland Wetland	1222.34		3.41	**1225.74**	33.14	**1258.89**			0.10	4.49	10.39	28.67	**43.64**	1.34	2.56	10.48	**14.38**
		2.7.2: Coastal Wetland	10.22		5.41	**15.63**	5.04	**20.67**				0.15	0.86	26.70	**27.71**	0.14	0.24	23.77	**24.15**
		7.3: River/Stream/Canals	775.06		4.14	**779.20**	55.83	**835.03**		0.18		0.26	89.65	747.08	**837.17**	48.08	0.68	1.46	**50.23**
		7.4: Water bodies	349.57		4.53	**354.10**	46.62	**400.73**						4.41	**4.41**	5.68	0.56	12.77	**19.01**
		Sub Total	**2357.18**		**17.50**	**2374.68**	**140.63**	**2515.31**		**0.18**	**0.10**	**4.90**	**100.90**	**806.86**	**912.93**	**55.25**	**4.04**	**48.48**	**107.77**
	Grand Total		1558286.52	4536.90	84031.66	1646855.08	161355.73	1808210.82	134893.55	9984.74	17064.83	8350.65	28516.60	197592.32	396402.69	5088.91	66814.47	36055.31	107958.69

Note: Totals may not match due to rounding off.

India Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			INDIA 2011-12													
			4: Forest						5: Grass / Grazing	6:Snow and Glacier	7: Wet lands / Water bodies					Grand Total
			4.1	4.2	4.3	4.4	4.5	Sub Total	5.1	6.1	7.1	7.2	7.3	7.4	Sub Total	
2005-06	1: Agriculture	1.1: Crop land	46.09	5.16	2.33	11.18		**64.76**	54.07	0.56	219.20	14.37	1307.92	2446.02	**3987.50**	**1519600.64**
		1.2: Current Shifting cultivation	422.22	1.80	0.71	2833.39		**3258.12**								**5155.97**
		1.3: Plantation	0.16					**0.16**	3.23		1.75	6.86	25.11	30.50	**64.22**	**81840.63**
		Farmland (FL) = 1.1+1.2+1.3	**468.47**	**6.95**	**3.04**	**2844.57**		**3323.03**	**57.30**	**0.56**	**220.96**	**21.23**	**1333.03**	**2476.51**	**4051.73**	**1606597.23**
		1.4: Fallow	6.35		0.05	0.44		**6.84**	3.30		142.92	4.87	402.79	581.95	**1132.52**	**198242.26**
		Sub Total	**474.82**	**6.95**	**3.09**	**2845.01**		**3329.87**	**60.60**	**0.56**	**363.88**	**26.10**	**1735.81**	**3058.46**	**5184.25**	**1804839.50**
	2:Barren/uncultura ble/ Wastelands	2.1: Barren Rocky	1.79	0.91				**2.70**	16.17	1784.72			1.85	30.29	**32.14**	**119482.81**
		2.2:Gullied / Ravinous Land	8.94			2.06		**11.00**					2.66	3.49	**6.16**	**10425.99**
		2.3: Rann														**17065.02**
		2.4: Salt Affected Land					0.60	**0.60**	0.71		6.54	0.35	4.51	22.95	**34.36**	**9232.56**
		2.5: Sandy Area	21.47		17.71		0.57	**39.75**	16.63		1.55	3.08	99.14	10.77	**114.54**	**34025.43**
		2.6: Scrub Land	406.89	45.50	6.01	55.10		**513.50**	131.85	104.54	73.20	11.52	358.11	426.39	**869.22**	**200499.06**
		Sub Total	**439.10**	**46.41**	**23.71**	**57.16**	**1.17**	**567.54**	**165.36**	**1889.25**	**81.29**	**14.95**	**466.28**	**493.89**	**1056.41**	**390730.87**
	3: Builtup	3.1: Mining	5.16		0.27			**5.43**					0.90	0.57	**1.48**	**4045.99**
		3.2: Rural											6.15	1.96	**8.11**	**66403.71**
		3.3: Urban	0.03					**0.03**					0.11	0.06	**0.17**	**31663.85**
		Sub Total	**5.19**		**0.27**			**5.46**					**7.17**	**2.59**	**9.75**	**102113.55**
	4: Forest	4.1: Deciduous	399280.12	12569.22	177.69	1445.57		**413472.59**	9.57		0.25	0.18	115.51	198.33	**314.27**	**416187.55**
		4.2: Evergreen/Semi evergreen	28114.04	156918.67	40.39	553.91		**185627.02**	155.56	19.41	0.30		25.83	10.97	**37.11**	**186560.87**
		4.3: Forest Plantation	3.87		11246.11	120.44	0.32	**11370.74**				0.34	1.16	0.87	**2.37**	**11396.09**
		4.4: Scrub Forest	1260.19	106.19	227.31	111087.32		**112681.00**	13.12	143.90		0.65	20.25	102.10	**123.00**	**114596.56**
		4.5: Swamp / Mangroves					5141.56	**5141.56**	1.00		0.25	3.43	20.00	0.96	**24.64**	**5172.92**
		Sub Total	**428658.22**	**169594.08**	**11691.49**	**113207.23**	**5141.88**	**728292.91**	**179.26**	**163.31**	**0.80**	**4.61**	**182.75**	**313.23**	**501.38**	**733913.99**
	5: Grass / Grazing	5.1: Grass / Grazing	**31.57**	**348.93**		**2.46**		**382.96**	**33266.38**	**604.18**	**19.86**		**538.09**	**8.74**	**566.68**	**35788.81**
	6:Snow and Glacier	6.1: Snow and Glacier		**281.31**		**3828.52**		**4109.84**	**820.31**	**61292.88**			**2.17**	**7.13**	**9.30**	**84107.93**
	7: Wet lands / Water bodies	7.1: Inland Wetland	3.17	0.06		0.15	3.47	**6.85**	40.96		9117.79	0.04	41.50	21.94	**9181.27**	**10545.98**
		2.7.2: Coastal Wetland			1.27		124.85	**126.12**			11.11	14084.37	7.47	39.01	**14141.96**	**14340.61**
		7.3: River/Stream/Canals	8.84		0.57	6.33	4.75	**20.49**	927.13	2.62	43.40	8.48	57559.17	85.91	**57696.97**	**60369.63**
		7.4: Water bodies	0.14				16.95	**17.09**	0.48	0.80	237.23	5.20	6.76	49820.41	**50069.61**	**50512.13**
		Sub Total	**12.15**	**0.06**	**1.85**	**6.48**	**150.01**	**170.55**	**968.57**	**3.42**	**9409.53**	**14098.09**	**57614.91**	**49967.26**	**131089.80**	**135768.35**
	Grand Total		**429621.05**	**170277.74**	**11720.41**	**119946.86**	**5293.07**	**736859.13**	**35460.48**	**63953.61**	**9875.36**	**14143.74**	**60547.18**	**53851.29**	**138417.58**	**3287263.00**

Note: Totals may not match due to rounding off.

Annexure 1.3

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

ANDHRA PRADESH

2011-12

LULC_ CLASSES			1: Agriculture						2: Barren/unculturable/ Wastelands							3: Builtup			
			1.1	1.2	1.3	FL	1.4	Sub Total	2.1	2.2	2.3	2.4	2.5	2.6	Sub Total	3.1	3.2	3.3	Sub Total
2005-06	1: Agriculture	1.1: Crop land	73978.65		1126.59	**75105.24**	39.70	**75144.94**								30.21	2.84	223.73	**256.78**
		1.2: Current Shifting cultivation		15.24		**15.24**		**15.24**											
		1.3: Plantation	0.09		5900.86	**5900.96**	0.04	**5901.00**						0.44	**0.44**	0.06		15.01	**15.07**
		Farmland (FL) = 1.1+1.2+1.3	**73978.75**	**15.24**	**7027.45**	**81021.43**	**39.74**	**81061.18**						**0.44**	**0.44**	**30.27**	**2.84**	**238.74**	**271.85**
		1.4: Fallow	3298.07		268.26	**3566.33**	9738.34	**13304.67**				65.05		0.18	**65.22**	31.25	0.60	94.62	**126.46**
		Sub Total	**77276.82**	**15.24**	**7295.71**	**84587.77**	**9778.08**	**94365.85**				**65.05**		**0.62**	**65.66**	**61.51**	**3.44**	**333.36**	**398.32**
	2:Barren/uncultur able/ Wastelands	2.1: Barren Rocky							2133.77						**2133.77**	7.88	0.40	1.89	**10.16**
		2.2:Gullied / Ravinous Land								250.28					**250.28**	0.28		0.30	**0.58**
		2.3: Rann																	
		2.4: Salt Affected Land			1.24	**1.24**	0.39	**1.63**				1287.57			**1287.57**			1.98	**1.98**
		2.5: Sandy Area	10.28		28.58	**38.86**		**38.86**					485.56	0.11	**485.67**	14.83		0.80	**15.62**
		2.6: Scrub Land	0.04		86.66	**86.69**		**86.69**						11892.01	**11892.01**	38.01	1.78	37.37	**77.15**
		Sub Total	**10.32**		**116.48**	**126.80**	**0.39**	**127.19**	**2133.77**	**250.28**		**1287.57**	**485.56**	**11892.12**	**16049.30**	**60.99**	**2.18**	**42.33**	**105.50**
	3: Builtup	3.1: Mining			0.07	**0.07**		**0.07**								377.33		5.31	**382.64**
		3.2: Rural															2902.82	1.47	**2904.28**
		3.3: Urban														0.58		1072.85	**1073.43**
		Sub Total			**0.07**	**0.07**		**0.07**								**377.91**	**2902.82**	**1079.63**	**4360.35**
	4: Forest	4.1: Deciduous																	
		4.2: Evergreen/Semi evergreen														3.02		0.50	**3.51**
		4.3: Forest Plantation																	
		4.4: Scrub Forest		0.07		**0.07**		**0.07**								1.01		1.19	**2.20**
		4.5: Swamp / Mangroves											1.63		**1.63**			0.37	**0.37**
		Sub Total		**0.07**		**0.07**		**0.07**					**1.63**		**1.63**	**4.03**		**2.06**	**6.08**
	5: Grass / Grazing	5.1: Grass / Grazing																	
	6:Snow and Glacier	6.1: Snow and Glacier																	
	7: Wet lands / Water bodies	7.1: Inland Wetland																	
		7.2: Coastal Wetland	9.05		1.19	**10.24**	5.04	**15.28**					0.42	0.18	**0.60**	0.06		3.68	**3.74**
		7.3: River/Stream/Canals	1.04			**1.04**		**1.04**								0.08		0.90	**0.98**
		7.4: Water bodies	274.30		4.15	**278.46**	43.22	**321.68**									0.39	4.64	**5.03**
		Sub Total	**284.39**		**5.34**	**289.74**	**48.26**	**338.00**					**0.42**	**0.18**	**0.60**	**0.13**	**0.39**	**9.22**	**9.75**
	Grand Total		**77571.53**	**15.31**	**7417.60**	**85004.44**	**9826.73**	**94831.17**	**2133.77**	**250.28**		**1352.62**	**487.61**	**11892.92**	**16117.20**	**504.57**	**2908.83**	**1466.60**	**4880.00**

Note: Totals may not match due to rounding off.

Annexure 1.3 Contd.

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			ANDHRA PRADESH 2011-12													
			4: Forest						5: Grass / Grazing	6:Snow and Glacier	7: Wet lands / Water bodies					Grand Total
			4.1	4.2	4.3	4.4	4.5	Sub Total	5.1	6.1	7.1	7.2	7.3	7.4	Sub Total	
2005-06	1: Agriculture	1.1: Crop land											102.69	289.98	**392.67**	**75794.39**
		1.2: Current Shifting cultivation				0.95		**0.95**								**16.19**
		1.3: Plantation											10.74	4.60	**15.34**	**5931.85**
		Farmland (FL) = 1.1+1.2+1.3				**0.95**		**0.95**					**113.43**	**294.59**	**408.01**	**81742.43**
		1.4: Fallow											40.85	27.05	**67.90**	**13564.25**
		Sub Total				**0.95**		**0.95**					**154.28**	**321.64**	**475.91**	**95306.68**
	2:Barren/uncultu rable/ Wastelands	2.1: Barren Rocky														**2143.93**
		2.2:Gullied / Ravinous Land											0.04	0.01	**0.05**	**250.92**
		2.3: Rann														
		2.4: Salt Affected Land											0.95	2.68	**3.64**	**1294.81**
		2.5: Sandy Area	0.09		17.47		0.43	**17.99**				1.72	0.02	6.07	**7.81**	**565.96**
		2.6: Scrub Land											21.72	15.33	**37.05**	**12092.91**
		Sub Total	**0.09**		**17.47**		**0.43**	**17.99**				**1.72**	**22.74**	**24.09**	**48.55**	**16348.53**
	3: Builtup	3.1: Mining											0.50	0.32	**0.82**	**383.52**
		3.2: Rural											0.06	0.41	**0.48**	**2904.76**
		3.3: Urban														**1073.43**
		Sub Total											**0.57**	**0.73**	**1.30**	**4361.72**
	4: Forest	4.1: Deciduous		257.00				**257.00**								**257.00**
		4.2: Evergreen/Semi evergreen	25329.16		34.30	32.85		**25396.31**					1.01	5.35	**6.36**	**25406.18**
		4.3: Forest Plantation			545.56	84.29		**629.86**					0.12		**0.12**	**629.98**
		4.4: Scrub Forest			68.89	8321.44		**8390.33**					2.27	2.60	**4.87**	**8397.46**
		4.5: Swamp / Mangroves					323.50	**323.50**						0.47	**0.47**	**325.98**
		Sub Total	**25329.16**	**257.00**	**648.75**	**8438.58**	**323.50**	**34997.00**					**3.40**	**8.42**	**11.82**	**35016.60**
	5: Grass / Grazing	5.1: Grass / Grazing							**98.20**							**98.20**
	6:Snow and Glacier	6.1: Snow and Glacier														
	7: Wet lands / Water bodies	7.1: Inland Wetland									221.75			0.20	**221.95**	**221.95**
		7.2: Coastal Wetland					32.20	**32.20**				1076.31		4.38	**1080.68**	**1132.50**
		7.3: River/Stream/Canals											3556.89	5.71	**3562.60**	**3564.61**
		7.4: Water bodies					15.63	**15.63**			231.30	4.07	4.09	6356.38	**6595.85**	**6938.20**
		Sub Total					**47.84**	**47.84**			**453.05**	**1080.38**	**3560.97**	**6366.67**	**11461.08**	**11857.27**
	Grand Total		**25329.26**	**257.00**	**666.22**	**8439.53**	**371.77**	**35063.77**	**98.20**		**453.05**	**1082.11**	**3741.95**	**6721.55**	**11998.66**	**162989.00**

Note: Totals may not match due to rounding off.

Annexure 1.3

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

ARUNACHAL PRADESH

2011-12

LULC_ CLASSES			1: Agriculture						2:Barren/unculturable/ Wastelands							3: Builtup			
			1.1	1.2	1.3	FL	1.4	Sub Total	2.1	2.2	2.3	2.4	2.5	2.6	Sub Total	2.3.1	2.3.2	2.3.3	Sub Total
2005-06	1: Agriculture	1.1: Crop land	2500.72		14.88	**2515.60**	33.48	**2549.08**									0.28	0.23	**0.51**
		1.2: Current Shifting cultivation	1.73	431.64		**433.37**	0.13	**433.49**	0.35					0.23	**0.57**			0.07	**0.07**
		1.3: Plantation			31.68	**31.68**		**31.68**											
		Farmland(FL) = 1.1+1.2+1.3	**2502.45**	**431.64**	**46.56**	2980.65	**33.61**	3014.26	**0.35**					**0.23**	**0.57**		**0.28**	**0.30**	**0.58**
		1.4: Fallow	17.78			**17.78**	24.28	**42.05**									0.04		**0.04**
		Sub Total	**2520.22**	**431.64**	**46.56**	2998.43	**57.89**	3056.31	**0.35**					**0.23**	**0.57**		**0.32**	**0.30**	**0.62**
	2:Barren/uncult urable/ Wastelands	2.1: Barren Rocky							133.12						**133.12**				
		2.2:Gullied / Ravinous Land																	
		2.3: Rann																	
		2.4: Salt Affected Land																	
		2.5: Sandy Area											7.53		**7.53**				
		2.6: Scrub Land	15.31	34.96	0.57	**50.84**		**50.84**	19.75					2393.32	**2413.07**				
		Sub Total	**15.31**	**34.96**	**0.57**	50.84		50.84	**152.86**				**7.53**	**2393.32**	2553.71				
	3: Builtup	3.1: Mining														0.61			**0.61**
		3.2: Rural															397.74		**397.74**
		3.3: Urban																122.74	**122.74**
		Sub Total														**0.61**	**397.74**	**122.74**	**521.09**
	4: Forest	4.1: Deciduous	1.34			**1.34**		**1.34**											
		4.2: Evergreen/Semi evergreen	110.46	333.27	2.28	**446.01**		**446.01**	19.43						**19.43**				
		4.3: Forest Plantation																	
		4.4: Scrub Forest	0.68	93.76		**94.44**		**94.44**						6.28	**6.28**				
		4.5: Swamp / Mangroves																	
		Sub Total	**112.48**	**427.03**	**2.28**	541.79		541.79	**19.43**					**6.28**	25.71				
	5: Grass / Grazing	5.1: Grass / Grazing	**24.06**	**0.05**	**0.63**	**24.75**	**12.22**	**36.97**											
	6:Snow and Glacier	6.1: Snow and Glacier							**3.12**						**3.12**				
	7: Wet lands / Water bodies	7.1: Inland Wetland																	
		7.2: Coastal Wetland																	
		7.3: River/Stream/Canals	6.11			**6.11**		**6.11**					0.00		**0.00**				
		7.4: Water bodies																	
		Sub Total	**6.11**			**6.11**		**6.11**							**0.00**				
	Grand Total		**2678.20**	**893.69**	**50.05**	3621.93	**70.11**	3692.04	**175.76**				**7.53**	2399.83	2583.11	**0.61**	**398.06**	**123.04**	**521.71**

Note: Totals may not match due to rounding off.

Annexure 1.3 Contd.

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

ARUNACHAL PRADESH

2011-12

LULC_ CLASSES			4: Forest						5: Grass / Grazing	6:Snow and Glacier	7: Wet lands / Water bodies					Grand Total
			2.4.1	2.4.2	2.4.3	2.4.4	2.4.5	Sub Total	2.5.1	2.6.1	2.7.1	2.7.2	2.7.3	2.7.4	Sub Total	
2005-06	1: Agriculture	1.1: Crop land				0.14		**0.14**					2.56		**2.56**	**2552.29**
		1.2: Current Shifting cultivation				553.95		**553.95**								**988.09**
		1.3: Plantation														**31.68**
		Farmland(FL) = 1.1+1.2+1.3				**554.09**		**554.09**					**2.56**		**2.56**	**3572.06**
		1.4: Fallow														**42.09**
		Sub Total				**554.09**		**554.09**					**2.56**		**2.56**	**3614.16**
	2:Barren/uncultivable/ Wastelands	2.1: Barren Rocky														**133.12**
		2.2:Gullied / Ravinous Land														
		2.3: Rann														
		2.4: Salt Affected Land														
		2.5: Sandy Area														**7.53**
		2.6: Scrub Land	11.28			20.09		**31.36**		32.36						**2527.63**
		Sub Total	**11.28**			**20.09**		**31.36**		**32.36**						**2668.27**
	3: Builtup	3.1: Mining														**0.61**
		3.2: Rural														**397.74**
		3.3: Urban														**122.74**
		Sub Total														**521.09**
	4: Forest	4.1: Deciduous	121.48	1.14				**122.61**								**123.95**
		4.2: Evergreen/Semi evergreen	4.47	59214.89	1.87	269.28		**59490.52**	68.62	3.36			3.80		**3.80**	**60031.74**
		4.3: Forest Plantation			22.21	0.28		**22.48**								**22.48**
		4.4: Scrub Forest	0.13	2.46	0.03	503.74		**506.36**								**607.08**
		4.5: Swamp / Mangroves														
		Sub Total	**126.09**	**59218.48**	**24.11**	**773.29**		**60141.97**	**68.62**	**3.36**			**3.80**		**3.80**	**60785.25**
	5: Grass / Grazing	5.1: Grass / Grazing		**332.44**				**332.44**	**5523.51**	**3.58**			**38.38**	**0.76**	**39.14**	**5935.64**
	6:Snow and Glacier	6.1: Snow and Glacier		**4.31**				**4.31**	**190.64**	**8508.22**						**8706.29**
	7: Wet lands / Water bodies	7.1: Inland Wetland									4.16				**4.16**	**4.16**
		7.2: Coastal Wetland														
		7.3: River/Stream/Canals											1466.53		**1466.53**	**1472.64**
		7.4: Water bodies												35.49	**35.49**	**35.49**
		Sub Total									**4.16**		**1466.53**	**35.49**	**1506.17**	**1512.29**
	Grand Total		**137.36**	**59555.23**	**24.11**	**1347.47**		**61064.18**	**5782.76**	**8547.52**	**4.16**		**1511.27**	**36.25**	**1551.68**	**83743.00**

Note: Totals may not match due to rounding off.

Annexure 1.3

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			ASSAM 2011-12																
			1: Agriculture						2:Barren/unculturable/ Wastelands							3: Builtup			
			1.1	1.2	1.3	FL	1.4	Sub Total	2.1	2.2	2.3	2.4	2.5	2.6	Sub Total	3.1	3.2	3.3	Sub Total
2005-06	1: Agriculture	1.1: Crop land	22678.38		28.60	**22706.99**	374.30	**23081.29**					26.12	0.25	**26.37**	21.21	50.81	11.37	**83.38**
		1.2: Current Shifting cultivation		40.75		**40.75**		**40.75**						44.43	**44.43**				
		1.3: Plantation	3.75		3795.80	**3799.55**	1.48	**3801.03**					0.05		**0.05**	0.06	3.48	3.72	**7.26**
		Farmland (FL) = 1.1+1.2+1.3	**22682.14**	**40.75**	**3824.40**	**26547.29**	**375.78**	**26923.07**					**26.17**	**44.68**	**70.86**	**21.26**	**54.29**	**15.09**	**90.65**
		1.4: Fallow	4.45			**4.45**	237.86	**242.31**					0.03		**0.03**	1.37	0.07	0.89	**2.33**
		Sub Total	**22686.59**	**40.75**	**3824.40**	**26551.74**	**613.64**	**27165.38**					**26.21**	**44.68**	**70.89**	**22.63**	**54.36**	**15.98**	**92.98**
	2:Barren/uncult urable/ Wastelands	2.1: Barren Rocky							7.37						**7.37**				
		2.2:Gullied / Ravinous Land								6.80					**6.80**				
		2.3: Rann																	
		2.4: Salt Affected Land																	
		2.5: Sandy Area											69.69		**69.69**				
		2.6: Scrub Land		34.97		**34.97**		**34.97**	0.15				2.89	3696.25	**3699.29**	0.26			**0.26**
		Sub Total		**34.97**		**34.97**		**34.97**	**7.52**	**6.80**			**72.58**	**3696.25**	**3783.15**	**0.26**			**0.26**
	3: Builtup	3.1: Mining														34.82			**34.82**
		3.2: Rural															556.93		**556.93**
		3.3: Urban																560.72	**560.72**
		Sub Total														**34.82**	**556.93**	**560.72**	**1152.46**
	4: Forest	4.1: Deciduous	28.47	22.67		**51.15**		**51.15**					2.71		**2.71**	0.97	0.46	1.76	**3.19**
		4.2: Evergreen/Semi evergreen		17.75	4.89	**22.63**	1.10	**23.73**					0.06		**0.06**	1.30			**1.30**
		4.3: Forest Plantation		1.39		**1.39**		**1.39**											
		4.4: Scrub Forest	5.06	5.31		**10.37**		**10.37**					0.10	36.16	**36.27**	0.45	1.41	0.36	**2.22**
		4.5: Swamp / Mangroves																	
		Sub Total	**33.54**	**47.11**	**4.89**	**85.54**	**1.10**	**86.63**					**2.87**	**36.16**	**39.03**	**2.71**	**1.87**	**2.13**	**6.71**
	5: Grass / Grazing	5.1: Grass / Grazing	**62.97**		**0.16**	**63.13**		**63.13**					**30.30**		**30.30**	**0.26**			**0.26**
	6:Snow and Glacier	6.1: Snow and Glacier																	
	7: Wet lands / Water bodies	7.1: Inland Wetland	342.20			**342.20**	8.61	**350.80**					10.39	1.25	**11.64**		1.91	0.52	**2.42**
		2.7.2: Coastal Wetland																	
		7.3: River/Stream/Canals	170.28			**170.28**	0.93	**171.21**					73.91	4.15	**78.06**		0.01		**0.01**
		7.4: Water bodies	1.02			**1.02**		**1.02**											
		Sub Total	**513.50**			**513.50**	**9.53**	**523.04**					**84.30**	**5.41**	**89.70**		**1.92**	**0.52**	**2.43**
	Grand Total		**23296.60**	**122.83**	**3829.46**	**27248.88**	**624.27**	**27873.16**	**7.52**	**6.80**			**216.25**	**3782.50**	**4013.08**	**60.68**	**615.08**	**579.34**	**1255.10**

Note: Totals may not match due to rounding off.

Annexure 1.3 Contd.

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			ASSAM 2011-12													
			4: Forest						5: Grass / Grazing	6:Snow and Glacier	7: Wet lands / Water bodies					Grand Total
			4.1	4.2	4.3	4.4	4.5	Sub Total	5.1	6.1	7.1	7.2	7.3	7.4	Sub Total	
2005-06	1: Agriculture	1.1: Crop land									82.54		380.01	2.02	**464.57**	**23655.61**
		1.2: Current Shifting cultivation	1.92			63.17		**65.09**								**150.28**
		1.3: Plantation									0.41		6.82		**7.23**	**3815.57**
		Farmland (FL) = 1.1+1.2+1.3	**1.92**			**63.17**		**65.09**			**82.95**		**386.82**	**2.02**	**471.80**	**27621.46**
		1.4: Fallow									2.64		0.52		**3.16**	**247.84**
		Sub Total	**1.92**			**63.17**		**65.09**			**85.59**		**387.34**	**2.02**	**474.96**	**27869.30**
	2:Barren/uncultivable/ Wastelands	2.1: Barren Rocky														**7.37**
		2.2:Gullied / Ravinous Land														**6.80**
		2.3: Rann														
		2.4: Salt Affected Land														
		2.5: Sandy Area														**69.69**
		2.6: Scrub Land	21.89			0.83		**22.73**	0.39		0.22		6.71	0.05	**6.98**	**3764.61**
		Sub Total	**21.89**			**0.83**		**22.73**	**0.39**		**0.22**		**6.71**	**0.05**	**6.98**	**3848.47**
	3: Builtup	3.1: Mining											0.00		**0.00**	**34.82**
		3.2: Rural											0.06		**0.06**	**556.99**
		3.3: Urban														**560.72**
		Sub Total											**0.06**		**0.06**	**1152.52**
	4: Forest	4.1: Deciduous	23718.16	54.58		74.45		**23847.19**	0.00		0.13		67.88		**68.01**	**23972.25**
		4.2: Evergreen/Semi evergreen		7805.37		89.13		**7894.50**			0.30		18.70		**19.01**	**7938.60**
		4.3: Forest Plantation	0.40		122.26			**122.66**					0.37		**0.37**	**124.42**
		4.4: Scrub Forest	24.20		1.62	1956.24		**1982.05**					9.41		**9.41**	**2040.32**
		4.5: Swamp / Mangroves														
		Sub Total	**23742.75**	**7859.95**	**123.88**	**2119.82**		**33846.41**	**0.00**		**0.43**		**96.36**		**96.80**	**34075.58**
	5: Grass / Grazing	5.1: Grass / Grazing	**16.32**					**16.32**	**2117.43**		**17.60**		**430.08**	**0.12**	**447.80**	**2675.25**
	6:Snow and Glacier	6.1: Snow and Glacier														
	7: Wet lands / Water bodies	7.1: Inland Wetland	2.35	0.06		0.15		**2.57**	40.96		1371.90		21.56	3.17	**1396.64**	**1805.03**
		2.7.2: Coastal Wetland														
		7.3: River/Stream/Canals	1.94			0.59		**2.53**	884.68		18.92		5785.87	0.59	**5805.37**	**6941.86**
		7.4: Water bodies	0.14					**0.14**	0.03		0.46		0.42	67.90	**68.78**	**69.98**
		Sub Total	**4.44**	**0.06**		**0.74**		**5.24**	**925.67**		**1391.28**		**5807.85**	**71.66**	**7270.80**	**8816.87**
	Grand Total		**23787.33**	**7860.01**	**123.88**	**2184.56**		**33955.78**	**3043.49**		**1495.13**		**6728.40**	**73.86**	**8297.38**	**78438.00**

Note: Totals may not match due to rounding off.

Annexure 1.3

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			BIHAR 2011-12																
			1: Agriculture						2:Barren/unculturable/ Wastelands							3: Builtup			
			1.1	1.2	1.3	FL	1.4	Sub Total	2.1	2.2	2.3	2.4	2.5	2.6	Sub Total	3.1	3.2	3.3	Sub Total
2005-06	1: Agriculture	1.1: Crop land	57277.51		16.38	**57293.89**	1978.00	**59271.89**					3.64	108.67	**112.31**	5.29	25.14	19.11	**49.54**
		1.2: Current Shifting cultivation																	
		1.3: Plantation	12.44		2416.79	**2429.23**	3.61	**2432.83**						0.26	**0.26**			0.07	**0.07**
		Farmland (FL) = 1.1+1.2+1.3	**57289.94**		**2433.17**	**59723.11**	**1981.61**	**61704.72**					**3.64**	**108.93**	**112.57**	**5.29**	**25.14**	**19.18**	**49.61**
		1.4: Fallow	6579.09		9.73	**6588.81**	3810.52	**10399.34**		0.19			0.07	99.94	**100.20**	1.53	1.81	15.59	**18.93**
		Sub Total	**63869.03**		**2442.90**	**66311.93**	**5792.13**	**72104.06**		**0.19**			**3.71**	**208.87**	**212.76**	**6.82**	**26.94**	**34.77**	**68.53**
	2:Barren/unculturable/ Wastelands	2.1: Barren Rocky							150.28						**150.28**				
		2.2:Gullied / Ravinous Land			0.08	**0.08**		**0.08**		56.16				3.12	**59.28**				
		2.3: Rann																	
		2.4: Salt Affected Land																	
		2.5: Sandy Area	0.68			**0.68**	2.07	**2.76**					2.18	1.75	**3.93**				
		2.6: Scrub Land	556.04		1.74	**557.78**	76.02	**633.80**		0.52				2373.76	**2374.28**	0.50	0.10	1.49	**2.08**
		Sub Total	**556.72**		**1.82**	**558.54**	**78.09**	**636.63**	**150.28**	**56.68**			**2.18**	**2378.63**	**2587.77**	**0.50**	**0.10**	**1.49**	**2.08**
	3: Builtup	3.1: Mining														45.97			**45.97**
		3.2: Rural															4447.18		**4447.18**
		3.3: Urban																797.51	**797.51**
		Sub Total														**45.97**	**4447.18**	**797.51**	**5290.65**
	4: Forest	4.1: Deciduous																0.08	**0.08**
		4.2: Evergreen/Semi evergreen																	
		4.3: Forest Plantation																	
		4.4: Scrub Forest																	
		4.5: Swamp / Mangroves																	
		Sub Total																**0.08**	**0.08**
	5: Grass / Grazing	5.1: Grass / Grazing	**1.65**			**1.65**		**1.65**						**1.09**	**1.09**				
	6:Snow and Glacier	6.1: Snow and Glacier																	
	7: Wet lands / Water bodies	7.1: Inland Wetland	382.50		0.35	**382.86**	21.84	**404.70**						7.66	**7.66**	0.18	0.22	1.62	**2.02**
		2.7.2: Coastal Wetland																	
		7.3: River/Stream/Canals	266.12		0.76	**266.88**	47.29	**314.17**						461.07	**461.07**				
		7.4: Water bodies	2.75			**2.75**	0.07	**2.82**						1.61	**1.61**				
		Sub Total	**651.37**		**1.12**	**652.48**	**69.20**	**721.68**						**470.35**	**470.35**	**0.18**	**0.22**	**1.62**	**2.02**
	Grand Total		**65078.77**		**2445.83**	**67524.60**	**5939.42**	**73464.02**	**150.28**	**56.87**			**5.89**	**3058.93**	**3271.97**	**53.47**	**4474.44**	**835.46**	**5363.37**

Note: Totals may not match due to rounding off.

Annexure 1.3 Contd.

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			BIHAR 2011-12													
			4: Forest						5: Grass / Grazing	6:Snow and Glacier	7: Wet lands / Water bodies					Grand Total
			4.1	4.2	4.3	4.4	4.5	Sub Total	5.1	6.1	7.1	7.2	7.3	7.4	Sub Total	
2005-06	1: Agriculture	1.1: Crop land									40.52		202.38	0.62	**243.51**	**59677.25**
		1.2: Current Shifting cultivation														
		1.3: Plantation									0.30		0.88		**1.18**	**2434.34**
		Farmland (FL) = 1.1+1.2+1.3									**40.82**		**203.26**	**0.62**	**244.70**	**62111.59**
		1.4: Fallow	0.12					**0.12**			115.43		173.62	0.46	**289.51**	**10808.08**
		Sub Total	**0.12**					**0.12**			**156.25**		**376.87**	**1.08**	**534.20**	**72919.67**
	2:Barren/uncultivable/ Wastelands	2.1: Barren Rocky														**150.28**
		2.2:Gullied / Ravinous Land	1.35					**1.35**								**60.71**
		2.3: Rann														
		2.4: Salt Affected Land														
		2.5: Sandy Area	0.03					**0.03**					0.08		**0.08**	**6.79**
		2.6: Scrub Land	0.69					**0.69**	3.25		56.90		184.81	0.35	**242.06**	**3256.16**
		Sub Total	**2.07**					**2.07**	**3.25**		**56.90**		**184.89**	**0.35**	**242.14**	**3473.95**
	3: Builtup	3.1: Mining														**45.97**
		3.2: Rural											1.40		**1.40**	**4448.57**
		3.3: Urban														**797.51**
		Sub Total											**1.40**		**1.40**	**5292.05**
	4: Forest	4.1: Deciduous	4635.72			0.16		**4635.88**					1.15	0.03	**1.18**	**4637.14**
		4.2: Evergreen/Semi evergreen														
		4.3: Forest Plantation			2.81			**2.81**								**2.81**
		4.4: Scrub Forest	49.64			1024.36		**1073.99**					0.38	0.18	**0.57**	**1074.56**
		4.5: Swamp / Mangroves														
		Sub Total	**4685.36**		**2.81**	**1024.52**		**5712.68**					**1.53**	**0.21**	**1.75**	**5714.51**
	5: Grass / Grazing	5.1: Grass / Grazing							**12.65**		**0.04**		**2.36**		**2.40**	**17.80**
	6:Snow and Glacier	6.1: Snow and Glacier														
	7: Wet lands / Water bodies	7.1: Inland Wetland									1603.58		3.13	0.34	**1607.06**	**2021.44**
		2.7.2: Coastal Wetland														
		7.3: River/Stream/Canals							5.38		21.88		3754.03		**3775.90**	**4556.52**
		7.4: Water bodies									1.02		0.01	169.60	**170.64**	**175.07**
		Sub Total							**5.38**		**1626.48**		**3757.18**	**169.94**	**5553.60**	**6753.03**
	Grand Total		**4687.55**		**2.81**	**1024.52**		**5714.88**	**21.28**		**1839.66**		**4324.23**	**171.59**	**6335.48**	**94171.00**

Note: Totals may not match due to rounding off.

Annexure 1.3

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

CHHATTISGARH

2011-12

LULC_ CLASSES			1: Agriculture						2:Barren/unculturable/ Wastelands							3: Builtup			
			1.1	1.2	1.3	FL	1.4	Sub Total	2.1	2.2	2.3	2.4	2.5	2.6	Sub Total	3.1	3.2	3.3	Sub Total
2005-06	1: Agriculture	1.1: Crop land	55267.79		86.49	**55354.28**	1665.37	**57019.65**					10.97	345.48	**356.45**	19.15		105.40	**124.55**
		1.2: Current Shifting cultivation		1.84		**1.84**		**1.84**											
		1.3: Plantation	75.21		133.16	**208.38**	6.65	**215.02**					0.05	4.65	**4.70**			0.86	**0.86**
		Farmland (FL) = 1.1+1.2+1.3	**55343.00**	**1.84**	**219.65**	**55564.50**	**1672.02**	**57236.52**					**11.01**	**350.13**	**361.15**	**19.15**		**106.26**	**125.41**
		1.4: Fallow	1797.98		1.87	**1799.85**	1341.85	**3141.70**					1.31	103.36	**104.66**	3.11		4.45	**7.56**
		Sub Total	**57140.98**	**1.84**	**221.53**	**57364.35**	**3013.87**	**60378.22**					**12.32**	**453.49**	**465.81**	**22.26**		**110.71**	**132.98**
	2:Barren/unculturable/ Wastelands	2.1: Barren Rocky							566.69						**566.69**	1.31		1.33	**2.64**
		2.2:Gullied / Ravinous Land	39.96			**39.96**		**39.96**		23.31				1.99	**25.30**				
		2.3: Rann																	
		2.4: Salt Affected Land										0.29			**0.29**				
		2.5: Sandy Area	3.99			**3.99**		**3.99**					75.81		**75.81**				
		2.6: Scrub Land	593.11		15.69	**608.79**	0.56	**609.36**					0.04	3862.25	**3862.29**	22.60		23.27	**45.87**
		Sub Total	**637.05**		**15.69**	**652.74**	**0.56**	**653.31**	**566.69**	**23.31**		**0.29**	**75.85**	**3864.25**	**4530.39**	**23.91**		**24.61**	**48.52**
	3: Builtup	3.1: Mining														238.30			**238.30**
		3.2: Rural															3114.70		**3114.70**
		3.3: Urban														0.04		712.06	**712.10**
		Sub Total														**238.34**	**3114.70**	**712.06**	**4065.10**
	4: Forest	4.1: Deciduous	736.68	17.01		**753.69**		**753.69**					0.08		**0.08**	6.43		1.62	**8.05**
		4.2: Evergreen/Semi evergreen																	
		4.3: Forest Plantation																	
		4.4: Scrub Forest		1.54		**1.54**	0.94	**2.48**								3.89			**3.89**
		4.5: Swamp / Mangroves																	
		Sub Total	**736.68**	**18.54**		**755.22**	**0.94**	**756.17**					**0.08**		**0.08**	**10.32**		**1.62**	**11.94**
	5: Grass / Grazing	5.1: Grass / Grazing																	
	6:Snow and Glacier	6.1: Snow and Glacier																	
	7: Wet lands / Water bodies	7.1: Inland Wetland																	
		7.2: Coastal Wetland																	
		7.3: River/Stream/Canals	5.42			**5.42**		**5.42**					0.11		**0.11**				
		7.4: Water bodies	31.27			**31.27**		**31.27**								1.13		0.37	**1.50**
		Sub Total	**36.70**			**36.70**		**36.70**					**0.11**		**0.11**	**1.13**		**0.37**	**1.50**
	Grand Total		**58551.41**	**20.39**	**237.21**	**58809.01**	**3015.37**	**61824.38**	**566.69**	**23.31**		**0.29**	**88.36**	**4317.73**	**4996.39**	**295.96**	**3114.70**	**849.37**	**4260.03**

Note: Totals may not match due to rounding off.

Annexure 1.3 Contd.

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			CHHATTISGARH 2011-12													
			4: Forest						5: Grass / Grazing	6:Snow and Glacier	7: Wet lands / Water bodies					Grand Total
			4.1	4.2	4.3	4.4	4.5	Sub Total	5.1	6.1	7.1	7.2	7.3	7.4	Sub Total	
2005-06	1: Agriculture	1.1: Crop land	3.38		0.03			**3.40**			0.35		2.60	87.87	**90.82**	**57594.88**
		1.2: Current Shifting cultivation														**1.84**
		1.3: Plantation											0.17	0.62	**0.79**	**221.37**
		Farmland (FL) = 1.1+1.2+1.3	**3.38**		**0.03**			**3.40**			**0.35**		**2.76**	**88.49**	**91.61**	**57818.09**
		1.4: Fallow	0.83		0.05			**0.88**					0.07	13.77	**13.84**	**3268.64**
		Sub Total	**4.21**		**0.08**			**4.28**			**0.35**		**2.84**	**102.26**	**105.45**	**61086.73**
	2:Barren/uncultivable/ Wastelands	2.1: Barren Rocky											0.12	3.75	**3.88**	**573.21**
		2.2:Gullied / Ravinous Land														**65.26**
		2.3: Rann														
		2.4: Salt Affected Land														**0.29**
		2.5: Sandy Area	0.05					**0.05**					16.84	1.34	**18.18**	**98.04**
		2.6: Scrub Land	0.98		5.32			**6.31**			0.10			19.83	**19.93**	**4543.76**
		Sub Total	**1.03**		**5.32**			**6.35**			**0.10**		**16.97**	**24.93**	**42.00**	**5280.56**
	3: Builtup	3.1: Mining														**238.30**
		3.2: Rural														**3114.70**
		3.3: Urban														**712.10**
		Sub Total														**4065.10**
	4: Forest	4.1: Deciduous	57330.91			3.97		**57334.88**					0.53	32.40	**32.93**	**58129.63**
		4.2: Evergreen/Semi evergreen														
		4.3: Forest Plantation			51.10			**51.10**								**51.10**
		4.4: Scrub Forest			2.16	3376.80		**3378.96**					0.06	8.50	**8.57**	**3393.89**
		4.5: Swamp / Mangroves														
		Sub Total	**57330.91**		**53.25**	**3380.77**		**60764.93**					**0.59**	**40.91**	**41.50**	**61574.62**
	5: Grass / Grazing	5.1: Grass / Grazing														
	6:Snow and Glacier	6.1: Snow and Glacier														
	7: Wet lands / Water bodies	7.1: Inland Wetland									0.05				**0.05**	**0.05**
		7.2: Coastal Wetland														
		7.3: River/Stream/Canals											1745.91	2.32	**1748.23**	**1753.77**
		7.4: Water bodies												1400.41	**1400.41**	**1433.18**
		Sub Total									**0.05**		**1745.91**	**1402.73**	**3148.69**	**3186.99**
	Grand Total		**57336.15**		**58.66**	**3380.77**		**60775.57**			**0.50**		**1766.31**	**1570.82**	**3337.63**	**135194.00**

Note: Totals may not match due to rounding off.

Annexure 1.3

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			GOA 2011-12																
			1: Agriculture						2:Barren/unculturable/ Wastelands							3: Builtup			
			1.1	1.2	1.3	FL	1.4	Sub Total	2.1	2.2	2.3	2.4	2.5	2.6	Sub Total	3.1	3.2	3.3	Sub Total
2005-06	1: Agriculture	1.1: Crop land	559.19			**559.19**	1.30	**560.50**								2.51		1.19	**3.70**
		1.2: Current Shifting cultivation																	
		1.3: Plantation	0.10		173.90	**174.01**	0.68	**174.69**								1.85		0.13	**1.98**
		Farmland (FL) = 1.1+1.2+1.3	**559.29**		**173.90**	**733.20**	**1.99**	**735.19**								**4.36**		**1.32**	**5.67**
		1.4: Fallow	0.36			**0.36**	28.57	**28.93**											
		Sub Total	**559.65**		**173.90**	**733.56**	**30.56**	**764.12**								**4.36**		**1.32**	**5.67**
	2:Barren/uncultu rable/ Wastelands	2.1: Barren Rocky							57.59						**57.59**				
		2.2:Gullied / Ravinous Land																	
		2.3: Rann																	
		2.4: Salt Affected Land																	
		2.5: Sandy Area											2.42		**2.42**				
		2.6: Scrub Land			0.21	**0.21**		**0.21**						264.09	**264.09**	4.27	0.06	1.34	**5.67**
		Sub Total			**0.21**	**0.21**		**0.21**	**57.59**				**2.42**	**264.09**	**324.10**	**4.27**	**0.06**	**1.34**	**5.67**
	3: Builtup	3.1: Mining														72.73			**72.73**
		3.2: Rural															19.84		**19.84**
		3.3: Urban																289.53	**289.53**
		Sub Total														**72.73**	**19.84**	**289.53**	**382.10**
	4: Forest	4.1: Deciduous														2.37		0.03	**2.40**
		4.2: Evergreen/Semi evergreen																	
		4.3: Forest Plantation																	
		4.4: Scrub Forest																	
		4.5: Swamp / Mangroves																	
		Sub Total														**2.37**		**0.03**	**2.40**
	5: Grass / Grazing	5.1: Grass / Grazing																	
	6:Snow and Glacier	6.1: Snow and Glacier																	
	7: Wet lands / Water bodies	7.1: Inland Wetland																	
		7.2: Coastal Wetland																	
		7.3: River/Stream/Canals																	
		7.4: Water bodies												0.25	**0.25**				
		Sub Total												**0.25**	**0.25**				
	Grand Total		**559.65**		**174.11**	**733.77**	**30.56**	**764.33**	**57.59**				**2.42**	**264.34**	**324.35**	**83.73**	**19.90**	**292.22**	**395.85**

Note: Totals may not match due to rounding off.

Annexure 1.3 Contd.

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			GOA 2011-12													
			4: Forest						5: Grass / Grazing	6:Snow and Glacier	7: Wet lands / Water bodies					Grand Total
			4.1	4.2	4.3	4.4	4.5	Sub Total	5.1	6.1	7.1	7.2	7.3	7.4	Sub Total	
2005-06	1: Agriculture	1.1: Crop land														564.19
		1.2: Current Shifting cultivation														
		1.3: Plantation														176.67
		Farmland (FL) = 1.1+1.2+1.3														740.86
		1.4: Fallow														28.93
		Sub Total														769.79
	2:Barren/uncultura ble/ Wastelands	2.1: Barren Rocky														57.59
		2.2:Gullied / Ravinous Land														
		2.3: Rann														
		2.4: Salt Affected Land														
		2.5: Sandy Area														2.42
		2.6: Scrub Land														269.97
		Sub Total														329.98
	3: Builtup	3.1: Mining														72.73
		3.2: Rural														19.84
		3.3: Urban														289.53
		Sub Total														382.10
	4: Forest	4.1: Deciduous	1154.74					**1154.74**								1157.14
		4.2: Evergreen/Semi evergreen		608.37				**608.37**								608.37
		4.3: Forest Plantation			41.00			**41.00**								41.00
		4.4: Scrub Forest				207.52		**207.52**								207.52
		4.5: Swamp / Mangroves					17.31	**17.31**								17.31
		Sub Total	**1154.74**	**608.37**	**41.00**	**207.52**	**17.31**	**2028.95**								2031.35
	5: Grass / Grazing	5.1: Grass / Grazing							**0.09**							**0.09**
	6:Snow and Glacier	6.1: Snow and Glacier														
	7: Wet lands / Water bodies	7.1: Inland Wetland	0.50					**0.50**			54.57		0.10		**54.68**	55.18
		7.2: Coastal Wetland										23.28			**23.28**	23.28
		7.3: River/Stream/Canals											79.96		**79.96**	79.96
		7.4: Water bodies												30.01	**30.01**	30.26
		Sub Total	**0.50**					**0.50**			**54.57**	**23.28**	**80.07**	**30.01**	**187.93**	**188.68**
	Grand Total		**1155.24**	**608.37**	**41.00**	**207.52**	**17.31**	**2029.45**	**0.09**		**54.57**	**23.28**	**80.07**	**30.01**	**187.93**	**3702.00**

Note: Totals may not match due to rounding off.

Annexure 1.3

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES		GUJARAT 2011-12																
		1: Agriculture						2:Barren/unculturable/ Wastelands							3: Builtup			
		1.1	1.2	1.3	FL	1.4	Sub Total	2.1	2.2	2.3	2.4	2.5	2.6	Sub Total	3.1	3.2	3.3	Sub Total
2005-06	1: Agriculture	1.1: Crop land	109434.16		18.91	**109453.07**	552.02	**110005.09**				0.18		2.10	**2.27**	0.32	0.20	128.03	**128.55**
		1.2: Current Shifting cultivation																	
		1.3: Plantation			309.92	**309.92**	0.29	**310.20**											
		Farmland (FL) = 1.1+1.2+1.3	**109434.16**		**328.83**	**109762.99**	**552.30**	**110315.29**				**0.18**		**2.10**	**2.27**	**0.32**	**0.20**	**128.03**	**128.55**
		1.4: Fallow	158.53		0.38	**158.90**	13774.01	**13932.91**				4.48		2.27	**6.75**		0.08	63.38	**63.46**
		Sub Total	**109592.69**		**329.20**	**109921.89**	**14326.31**	**124248.20**				**4.66**		**4.36**	**9.02**	**0.32**	**0.27**	**191.41**	**192.01**
	2:Barren/uncultur able/ Wastelands	2.1: Barren Rocky							203.43						**203.43**				
		2.2:Gullied / Ravinous Land	0.75			**0.75**		**0.75**		438.21					**438.21**			0.19	**0.19**
		2.3: Rann									16868.50				**16868.50**			0.28	**0.28**
		2.4: Salt Affected Land										958.79			**958.79**			1.42	**1.42**
		2.5: Sandy Area											195.00		**195.00**			1.26	**1.26**
		2.6: Scrub Land	8.20		0.85	**9.05**		**9.05**		6.12				18562.91	**18569.03**	13.30		54.23	**67.53**
		Sub Total	**8.95**		**0.85**	**9.80**		**9.80**	**203.43**	**444.33**	**16868.50**	**958.79**	**195.00**	**18562.91**	**37232.95**	**13.30**		**57.38**	**70.69**
	3: Builtup	3.1: Mining														111.70		0.22	**111.92**
		3.2: Rural															1494.22	0.45	**1494.67**
		3.3: Urban																1706.41	**1706.41**
		Sub Total														**111.70**	**1494.22**	**1707.08**	**3313.01**
	4: Forest	4.1: Deciduous																1.25	**1.25**
		4.2: Evergreen/Semi evergreen																	
		4.3: Forest Plantation																	
		4.4: Scrub Forest																	
		4.5: Swamp / Mangroves																0.49	**0.49**
		Sub Total																**1.74**	**1.74**
	5: Grass / Grazing	5.1: Grass / Grazing																**0.39**	**0.39**
	6:Snow and Glacier	6.1: Snow and Glacier																	
	7: Wet lands / Water bodies	7.1: Inland Wetland	0.30			**0.30**		**0.30**								0.21		3.60	**3.81**
		7.2: Coastal Wetland												25.71	**25.71**			4.19	**4.19**
		7.3: River/Stream/Canals								0.06					**0.06**				
		7.4: Water bodies																1.18	**1.18**
		Sub Total	**0.30**			**0.30**		**0.30**		**0.06**				**25.71**	**25.77**	**0.21**		**8.97**	**9.18**
	Grand Total		**109601.94**		**330.05**	**109931.99**	**14326.31**	**124258.31**	**203.43**	**444.39**	**16868.50**	**963.45**	**195.00**	**18592.98**	**37267.74**	**125.54**	**1494.50**	**1966.98**	**3587.02**

Note: Totals may not match due to rounding off.

Annexure 1.3 Contd.

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			GUJARAT 2011-12													
			4: Forest						5: Grass / Grazing	6:Snow and Glacier	7: Wet lands / Water bodies					Grand Total
			4.1	4.2	4.3	4.4	4.5	Sub Total	5.1	6.1	7.1	7.2	7.3	7.4	Sub Total	
2005-06	1: Agriculture	1.1: Crop land										7.85	1.27	39.06	**48.18**	**110184.09**
		1.2: Current Shifting cultivation														
		1.3: Plantation														**310.20**
		Farmland (FL) = 1.1+1.2+1.3										**7.85**	**1.27**	**39.06**	**48.18**	**110494.29**
		1.4: Fallow										1.27	2.91	9.85	**14.02**	**14017.14**
		Sub Total										**9.12**	**4.18**	**48.90**	**62.20**	**124511.44**
	2:Barren/uncultur able/ Wastelands	2.1: Barren Rocky														**203.43**
		2.2:Gullied / Ravinous Land														**439.15**
		2.3: Rann														**16868.79**
		2.4: Salt Affected Land											0.93	3.35	**4.28**	**964.49**
		2.5: Sandy Area														**196.25**
		2.6: Scrub Land							2.78			11.34	2.50	5.80	**19.64**	**18668.03**
		Sub Total							**2.78**			**11.34**	**3.43**	**9.16**	**23.92**	**37340.14**
	3: Builtup	3.1: Mining														**111.92**
		3.2: Rural														**1494.67**
		3.3: Urban														**1706.41**
		Sub Total														**3313.01**
	4: Forest	4.1: Deciduous	10117.67					**10117.67**						3.05	**3.05**	**10121.97**
		4.2: Evergreen/Semi evergreen		10.21				**10.21**								**10.21**
		4.3: Forest Plantation			187.47			**187.47**						0.40	**0.40**	**187.88**
		4.4: Scrub Forest				1933.99		**1933.99**								**1933.99**
		4.5: Swamp / Mangroves					634.89	**634.89**								**635.39**
		Sub Total	**10117.67**	**10.21**	**187.47**	**1933.99**	**634.89**	**12884.25**						**3.45**	**3.45**	**12889.44**
	5: Grass / Grazing	5.1: Grass / Grazing							**16.81**							**17.20**
	6:Snow and Glacier	6.1: Snow and Glacier														
	7: Wet lands / Water bodies	7.1: Inland Wetland					1.59	**1.59**			983.91			1.04	**984.95**	**990.65**
		7.2: Coastal Wetland					56.74	**56.74**			8.77	9073.75	4.72	3.06	**9090.30**	**9176.93**
		7.3: River/Stream/Canals											3040.96	0.06	**3041.02**	**3041.08**
		7.4: Water bodies												4742.92	**4742.92**	**4744.11**
		Sub Total					**58.33**	**58.33**			**992.68**	**9073.75**	**3045.68**	**4747.08**	**17859.19**	**17952.77**
	Grand Total		**10117.67**	**10.21**	**187.47**	**1933.99**	**693.22**	**12942.57**	**19.59**		**992.68**	**9094.20**	**3053.29**	**4808.60**	**17948.77**	**196024.00**

Note: Totals may not match due to rounding off.

Annexure 1.3

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			HARYANA 2011-12																
			1: Agriculture						2:Barren/unculturable/ Wastelands							3: Builtup			
			1.1	1.2	1.3	FL	1.4	Sub Total	2.1	2.2	2.3	2.4	2.5	2.6	Sub Total	3.1	3.2	3.3	Sub Total
2005-06	1: Agriculture	1.1: Crop land	37007.53		54.04	**37061.57**	273.22	**37334.80**				3.48		18.77	**22.26**	29.53	6.41	330.97	**366.91**
		1.2: Current Shifting cultivation																	
		1.3: Plantation	45.16		83.48	**128.64**	2.16	**130.80**				0.05		1.73	**1.79**	0.08		4.35	**4.43**
		Farmland (FL) = 1.1+1.2+1.3	**37052.70**		**137.52**	**37190.22**	**275.38**	**37465.60**				**3.54**		**20.51**	**24.04**	**29.61**	**6.41**	**335.32**	**371.33**
		1.4: Fallow	538.86		0.43	**539.29**	207.80	**747.09**				0.05		0.39	**0.43**	1.73		12.27	**14.00**
		Sub Total	**37591.56**		**137.95**	**37729.51**	**483.18**	**38212.69**				**3.58**		**20.89**	**24.48**	**31.33**	**6.41**	**347.59**	**385.33**
	2:Barren/unculturable/ Wastelands	2.1: Barren Rocky							187.16						**187.16**	1.39			**1.39**
		2.2:Gullied / Ravinous Land																	
		2.3: Rann																	
		2.4: Salt Affected Land	13.35			**13.35**	0.10	**13.44**				47.15		1.51	**48.66**	0.82		5.92	**6.74**
		2.5: Sandy Area	10.92			**10.92**	1.13	**12.05**					22.21	2.24	**24.46**			0.22	**0.22**
		2.6: Scrub Land	26.37			**26.37**	0.92	**27.29**				1.45		635.10	**636.55**	1.54		24.93	**26.47**
		Sub Total	**50.64**			**50.64**	**2.15**	**52.79**	**187.16**			**48.60**	**22.21**	**638.85**	**896.83**	**3.75**		**31.07**	**34.82**
	3: Builtup	3.1: Mining														73.98			**73.98**
		3.2: Rural															792.45	3.69	**796.15**
		3.3: Urban																1220.16	**1220.16**
		Sub Total														**73.98**	**792.45**	**1223.86**	**2090.29**
	4: Forest	4.1: Deciduous												0.02	**0.02**			0.05	**0.05**
		4.2: Evergreen/Semi evergreen																	
		4.3: Forest Plantation																	
		4.4: Scrub Forest														0.14			**0.14**
		4.5: Swamp / Mangroves																	
		Sub Total												**0.02**	**0.02**	**0.14**		**0.05**	**0.19**
	5: Grass / Grazing	5.1: Grass / Grazing	**22.72**		**0.15**	**22.88**	**0.93**	**23.81**				**0.56**		**2.60**	**3.16**	**0.15**	**81.85**	**22.61**	**104.61**
	6:Snow and Glacier	6.1: Snow and Glacier																	
	7: Wet lands / Water bodies	7.1: Inland Wetland	2.30			**2.30**		**2.30**						0.13	**0.13**				
		7.2: Coastal Wetland																	
		7.3: River/Stream/Canals	3.04			**3.04**	0.00	**3.04**											
		7.4: Water bodies	1.54		0.08	**1.62**	0.07	**1.68**										0.19	**0.19**
		Sub Total	**6.88**		**0.08**	**6.96**	**0.07**	**7.02**						**0.13**	**0.13**			**0.19**	**0.19**
	Grand Total		**37671.80**		**138.19**	**37809.98**	**486.32**	**38296.30**	**187.16**			**52.75**	**22.21**	**662.49**	**924.61**	**109.35**	**880.71**	**1625.36**	**2615.43**

Note: Totals may not match due to rounding off.

Annexure 1.3 Contd.

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			HARYANA 2011-12													
			4: Forest						5: Grass / Grazing	6:Snow and Glacier	7: Wet lands / Water bodies					Grand Total
			4.1	4.2	4.3	4.4	4.5	Sub Total	5.1	6.1	7.1	7.2	7.3	7.4	Sub Total	
2005-06	1: Agriculture	1.1: Crop land							53.51		6.15		13.14	9.67	**28.96**	**37806.42**
		1.2: Current Shifting cultivation														
		1.3: Plantation							2.95		0.35			0.24	**0.59**	**140.56**
		Farmland (FL) = 1.1+1.2+1.3							**56.46**		**6.50**		**13.14**	**9.90**	**29.54**	**37946.98**
		1.4: Fallow							0.67		0.15		0.12	0.28	**0.55**	**762.73**
		Sub Total							**57.13**		**6.65**		**13.25**	**10.18**	**30.09**	**38709.71**
	2:Barren/uncultu rable/ Wastelands	2.1: Barren Rocky														**188.56**
		2.2:Gullied / Ravinous Land														
		2.3: Rann														
		2.4: Salt Affected Land							0.09		0.48			0.31	**0.78**	**69.71**
		2.5: Sandy Area											0.31	0.12	**0.44**	**37.16**
		2.6: Scrub Land							5.61		0.76		0.84	1.39	**2.99**	**698.91**
		Sub Total							**5.70**		**1.24**		**1.15**	**1.82**	**4.21**	**994.34**
	3: Builtup	3.1: Mining														**73.98**
		3.2: Rural														**796.15**
		3.3: Urban												0.04	**0.04**	**1220.20**
		Sub Total												**0.04**	**0.04**	**2090.32**
	4: Forest	4.1: Deciduous	891.50			0.00		**891.50**					0.11		**0.11**	**891.68**
		4.2: Evergreen/Semi evergreen		1.24				**1.24**								**1.24**
		4.3: Forest Plantation			10.57			**10.57**								**10.57**
		4.4: Scrub Forest	1.89			153.11		**155.00**								**155.14**
		4.5: Swamp / Mangroves														
		Sub Total	**893.39**	**1.24**	**10.57**	**153.11**		**1058.31**					**0.11**		**0.11**	**1058.63**
	5: Grass / Grazing	5.1: Grass / Grazing							**718.78**		**0.08**		**0.13**	**5.53**	**5.74**	**856.09**
	6:Snow and Glacier	6.1: Snow and Glacier														
	7: Wet lands / Water bodies	7.1: Inland Wetland									41.00				**41.00**	**43.43**
		7.2: Coastal Wetland														
		7.3: River/Stream/Canals											333.78	0.03	**333.80**	**336.85**
		7.4: Water bodies							0.41					120.35	**120.35**	**122.63**
		Sub Total							**0.41**		**41.00**		**333.78**	**120.38**	**495.16**	**502.91**
	Grand Total		**893.39**	**1.24**	**10.57**	**153.11**		**1058.31**	**782.01**		**48.97**		**348.42**	**137.95**	**535.34**	**44212.00**

Note: Totals may not match due to rounding off.

Annexure 1.3

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			HIMACHAL PRADESH 2011-12																
			1: Agriculture						2:Barren/unculturable/ Wastelands							3: Builtup			
			1.1	1.2	1.3	FL	1.4	Sub Total	2.1	2.2	2.3	2.4	2.5	2.6	Sub Total	3.1	3.2	3.3	Sub Total
2005-06	1: Agriculture	1.1: Crop land	6259.55		39.93	**6299.48**		**6299.48**		0.03				272.85	**272.88**	0.34		3.04	**3.38**
		1.2: Current Shifting cultivation																	
		1.3: Plantation	139.54		1994.58	**2134.12**		**2134.12**						22.16	**22.16**				
		Farmland (FL) = 1.1+1.2+1.3	**6399.09**		**2034.51**	**8433.60**		**8433.60**		**0.03**				**295.01**	**295.04**	**0.34**		**3.04**	**3.38**
		1.4: Fallow					1.66	**1.66**											
		Sub Total	**6399.09**		**2034.51**	**8433.60**	**1.66**	**8435.26**		**0.03**				**295.01**	**295.04**	**0.34**		**3.04**	**3.38**
	2:Barren/uncult urable/ Wastelands	2.1: Barren Rocky							5925.14					28.29	**5953.43**	0.69			**0.69**
		2.2:Gullied / Ravinous Land							0.09	129.03				8.58	**137.69**				
		2.3: Rann																	
		2.4: Salt Affected Land										2.41			**2.41**				
		2.5: Sandy Area	0.61			**0.61**		**0.61**					21.73	2.39	**24.12**				
		2.6: Scrub Land	103.08		1.35	**104.43**		**104.43**		0.24				3404.24	**3404.48**	0.78			**0.78**
		Sub Total	**103.69**		**1.35**	**105.04**		**105.04**	**5925.23**	**129.26**		**2.41**	**21.73**	**3443.49**	**9522.13**	**1.47**			**1.47**
	3: Builtup	3.1: Mining														11.42			**11.42**
		3.2: Rural															304.99	92.21	**397.20**
		3.3: Urban																203.73	**203.73**
		Sub Total														**11.42**	**304.99**	**295.94**	**612.36**
	4: Forest	4.1: Deciduous	0.04			**0.04**		**0.04**						25.12	**25.12**	0.13		0.10	**0.23**
		4.2: Evergreen/Semi evergreen																	
		4.3: Forest Plantation																	
		4.4: Scrub Forest							4.37					3.44	**7.81**				
		4.5: Swamp / Mangroves																	
		Sub Total	**0.04**			**0.04**		**0.04**	**4.37**					**28.56**	**32.93**	**0.13**		**0.10**	**0.23**
	5: Grass / Grazing	5.1: Grass / Grazing			**7.03**	**7.03**		**7.03**	**3.71**					**131.16**	**134.87**	**0.33**			**0.33**
	6:Snow and Glacier	6.1: Snow and Glacier							**3618.67**						**3618.67**				
	7: Wet lands / Water bodies	7.1: Inland Wetland														0.88			**0.88**
		7.2: Coastal Wetland																	
		7.3: River/Stream/Canals	0.55			**0.55**		**0.55**					0.70	1.25	**1.95**	0.31			**0.31**
		7.4: Water bodies																	
		Sub Total	**0.55**			**0.55**		**0.55**					**0.70**	**1.25**	**1.95**	**1.19**			**1.19**
	Grand Total		**6503.38**		**2042.88**	**8546.26**	**1.66**	**8547.92**	**9551.97**	**129.30**		**2.41**	**22.43**	**3899.48**	**13605.59**	**14.88**	**304.99**	**299.09**	**618.96**

Note: Totals may not match due to rounding off.

Annexure 1.3 Contd.

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			HIMACHAL PRADESH 2011-12													
			4: Forest						5: Grass / Grazing	6:Snow and Glacier	7: Wet lands / Water bodies					Grand Total
			4.1	4.2	4.3	4.4	4.5	Sub Total	5.1	6.1	7.1	7.2	7.3	7.4	Sub Total	
2005-06	1: Agriculture	1.1: Crop land	28.71					**28.71**					1.51	2.10	**3.61**	**6608.07**
		1.2: Current Shifting cultivation														
		1.3: Plantation														**2156.28**
		Farmland (FL) = 1.1+1.2+1.3	**28.71**					**28.71**					**1.51**	**2.10**	**3.61**	**8764.35**
		1.4: Fallow														**1.66**
		Sub Total	**28.71**					**28.71**					**1.51**	**2.10**	**3.61**	**8766.01**
	2:Barren/uncultivable/ Wastelands	2.1: Barren Rocky								635.11			0.40	0.59	**0.98**	**6590.22**
		2.2:Gullied / Ravinous Land	5.59			0.72		**6.31**					0.13		**0.13**	**144.14**
		2.3: Rann														
		2.4: Salt Affected Land														**2.41**
		2.5: Sandy Area											0.38		**0.38**	**25.11**
		2.6: Scrub Land	7.46					**7.46**	106.92	3.68			4.35	0.57	**4.91**	**3632.66**
		Sub Total	**13.06**			**0.72**		**13.78**	**106.92**	**638.79**			**5.26**	**1.15**	**6.41**	**10394.54**
	3: Builtup	3.1: Mining														**11.42**
		3.2: Rural														**397.20**
		3.3: Urban														**203.73**
		Sub Total														**612.36**
	4: Forest	4.1: Deciduous	2278.12			3.44		**2281.56**	9.46				0.14		**0.14**	**2316.55**
		4.2: Evergreen/Semi evergreen		11022.81		19.09		**11041.90**	86.95	6.69						**11135.54**
		4.3: Forest Plantation			5.73			**5.73**								**5.73**
		4.4: Scrub Forest	7.71	16.02		1163.99		**1187.73**	12.99	1.88						**1210.40**
		4.5: Swamp / Mangroves					0.32	**0.32**								**0.32**
		Sub Total	**2285.83**	**11038.83**	**5.73**	**1186.52**	**0.32**	**14517.24**	**109.40**	**8.56**			**0.14**		**0.14**	**14668.54**
	5: Grass / Grazing	5.1: Grass / Grazing	**4.77**	**16.48**		**2.24**		**23.49**	**8334.61**	**532.00**			**2.73**	**0.09**	**2.82**	**9035.16**
	6:Snow and Glacier	6.1: Snow and Glacier				**4.58**		**4.58**		**7136.86**						**10760.11**
	7: Wet lands / Water bodies	7.1: Inland Wetland									3.46		3.06	0.26	**6.78**	**7.66**
		7.2: Coastal Wetland														
		7.3: River/Stream/Canals											999.78	0.10	**999.88**	**1002.69**
		7.4: Water bodies												425.94	**425.94**	**425.94**
		Sub Total									**3.46**		**1002.84**	**426.30**	**1432.60**	**1436.29**
	Grand Total		**2332.37**	**11055.31**	**5.73**	**1194.06**	**0.32**	**14587.80**	**8550.94**	**8316.22**	**3.46**		**1012.47**	**429.65**	**1445.58**	**55673.00**

Note: Totals may not match due to rounding off.

Annexure 1.3

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

JAMMU & KASHMIR

2011-12

LULC_ CLASSES			1: Agriculture						2:Barren/unculturable/ Wastelands							3: Builtup			
			1.1	1.2	1.3	FL	1.4	Sub Total	2.1	2.2	2.3	2.4	2.5	2.6	Sub Total	3.1	3.2	3.3	Sub Total
2005-06	1: Agriculture	1.1: Crop land	10912.37		3.43	**10915.79**	0.10	**10915.89**		0.09				0.00	**0.09**	0.58	1.84	6.93	**9.36**
		1.2: Current Shifting cultivation																	
		1.3: Plantation			2072.11	**2072.11**		**2072.11**					0.09		**0.09**		0.35	1.08	**1.42**
		Farmland (FL) = 1.1+1.2+1.3	**10912.37**		**2075.54**	**12987.90**	**0.10**	**12988.00**		**0.09**			**0.09**	**0.00**	**0.19**	**0.58**	**2.19**	**8.01**	**10.78**
		1.4: Fallow	2.53		2.44	**4.97**	153.17	**158.14**									0.10	0.48	**0.58**
		Sub Total	**10914.90**		**2077.98**	**12992.87**	**153.27**	**13146.14**		**0.09**			**0.09**	**0.00**	**0.19**	**0.58**	**2.28**	**8.49**	**11.36**
	2:Barren/unculturable/ Wastelands	2.1: Barren Rocky							93221.71					228.01	**93449.72**			1.99	**1.99**
		2.2:Gullied / Ravinous Land								608.47					**608.47**				
		2.3: Rann																	
		2.4: Salt Affected Land										73.31			**73.31**				
		2.5: Sandy Area	1.68		0.87	**2.55**		**2.55**					1947.98		**1947.98**		0.29	0.97	**1.26**
		2.6: Scrub Land			0.21	**0.21**		**0.21**		0.68				7140.29	**7140.98**			2.73	**2.73**
		Sub Total	**1.68**		**1.08**	**2.76**		**2.76**	**93221.71**	**609.16**		**73.31**	**1947.98**	**7368.31**	**103220.46**		**0.29**	**5.69**	**5.98**
	3: Builtup	3.1: Mining														8.32			**8.32**
		3.2: Rural															370.22	0.10	**370.33**
		3.3: Urban																396.98	**396.98**
		Sub Total														**8.32**	**370.22**	**397.08**	**775.62**
	4: Forest	4.1: Deciduous																	
		4.2: Evergreen/Semi evergreen																	
		4.3: Forest Plantation																	
		4.4: Scrub Forest							79.21	0.16				165.86	**245.22**			0.01	**0.01**
		4.5: Swamp / Mangroves																	
		Sub Total							**79.21**	**0.16**				**165.86**	**245.22**			**0.01**	**0.01**
	5: Grass / Grazing	5.1: Grass / Grazing															**0.16**		**0.16**
	6:Snow and Glacier	6.1: Snow and Glacier							**10855.88**				**14.49**	**395.56**	**11265.93**				
	7: Wet lands / Water bodies	7.1: Inland Wetland															0.03	0.88	**0.91**
		7.2: Coastal Wetland																	
		7.3: River/Stream/Canals											5.47	1.79	**7.26**		0.23		**0.23**
		7.4: Water bodies																	
		Sub Total											**5.47**	**1.79**	**7.26**		**0.26**	**0.88**	**1.14**
	Grand Total		**10916.58**		**2079.06**	**12995.64**	**153.27**	**13148.90**	**104156.80**	**609.41**		**73.31**	**1968.03**	**7931.52**	**114739.06**	**8.90**	**373.22**	**412.15**	**794.27**

Note: Totals may not match due to rounding off.

Annexure 1.3 Contd.

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			JAMMU & KASHMIR 2011-12													
			4: Forest						5: Grass / Grazing	6:Snow and Glacier	7: Wet lands / Water bodies					Grand Total
			4.1	4.2	4.3	4.4	4.5	Sub Total	5.1	6.1	7.1	7.2	7.3	7.4	Sub Total	
2005-06	1: Agriculture	1.1: Crop land								0.56	1.82		0.80	1.46	**4.08**	**10929.98**
		1.2: Current Shifting cultivation														
		1.3: Plantation											0.11		**0.11**	**2073.73**
		Farmland (FL) = 1.1+1.2+1.3								**0.56**	**1.82**		**0.91**	**1.46**	**4.19**	**13003.71**
		1.4: Fallow														**158.72**
		Sub Total								**0.56**	**1.82**		**0.91**	**1.46**	**4.19**	**13162.43**
	2:Barren/uncultur able/ Wastelands	2.1: Barren Rocky								931.50			0.55	1.04	**1.59**	**94384.80**
		2.2:Gullied / Ravinous Land														**608.47**
		2.3: Rann														
		2.4: Salt Affected Land														**73.31**
		2.5: Sandy Area											0.68		**0.68**	**1952.46**
		2.6: Scrub Land								67.79				0.95	**0.95**	**7212.67**
		Sub Total								**999.29**			**1.23**	**1.99**	**3.22**	**104231.71**
	3: Builtup	3.1: Mining														**8.32**
		3.2: Rural														**370.33**
		3.3: Urban														**396.98**
		Sub Total														**775.62**
	4: Forest	4.1: Deciduous	1936.67	720.12		0.48		**2657.27**								**2657.27**
		4.2: Evergreen/Semi evergreen		14167.76		0.26		**14168.02**					1.61		**1.61**	**14169.62**
		4.3: Forest Plantation			15.61	0.70		**16.31**								**16.31**
		4.4: Scrub Forest				22485.80		**22485.80**		141.94			0.55		**0.55**	**22873.52**
		4.5: Swamp / Mangroves														
		Sub Total	**1936.67**	**14887.88**	**15.61**	**22487.23**		**39327.39**		**141.94**			**2.15**		**2.15**	**39716.72**
	5: Grass / Grazing	5.1: Grass / Grazing							**4531.33**	**0.32**						**4531.80**
	6:Snow and Glacier	6.1: Snow and Glacier		**276.89**		**3823.95**		**4100.84**	**378.76**	**40014.55**			**2.17**	**3.33**	**5.50**	**55765.58**
	7: Wet lands / Water bodies	7.1: Inland Wetland									707.90				**707.90**	**708.81**
		7.2: Coastal Wetland														
		7.3: River/Stream/Canals				0.48		**0.48**		2.62			2070.67	16.88	**2087.56**	**2098.16**
		7.4: Water bodies								0.80	0.32			1244.05	**1244.37**	**1245.17**
		Sub Total				**0.48**		**0.48**		**3.42**	**708.22**		**2070.67**	**1260.93**	**4039.83**	**4052.13**
	Grand Total		**1936.67**	**15164.77**	**15.61**	**26311.66**		**43428.72**	**4910.09**	**41160.07**	**710.04**		**2077.14**	**1267.71**	**4054.89**	**222236.00**

Note: Totals may not match due to rounding off.

Annexure 1.3

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			JHARKHAND 2011-12																
			1: Agriculture						2:Barren/unculturable/ Wastelands							3: Builtup			
			1.1	1.2	1.3	FL	1.4	Sub Total	2.1	2.2	2.3	2.4	2.5	2.6	Sub Total	3.1	3.2	3.3	Sub Total
2005-06	1: Agriculture	1.1: Crop land	32640.59		8.20	**32648.79**	23.59	**32672.38**		0.02				0.05	**0.08**	21.57		20.19	**41.75**
		1.2: Current Shifting cultivation																	
		1.3: Plantation			23.86	**23.86**		**23.86**											
		Farmland (FL) = 1.1+1.2+1.3	**32640.59**		**32.06**	**32672.65**	**23.59**	**32696.24**		**0.02**				**0.05**	**0.08**	**21.57**		**20.19**	**41.75**
		1.4: Fallow	404.53		9.62	**414.15**	4497.24	**4911.39**						0.00	**0.00**	7.68	0.00	3.01	**10.69**
		Sub Total	**33045.12**		**41.68**	**33086.80**	**4520.83**	**37607.63**		**0.02**				**0.05**	**0.08**	**29.25**	**0.00**	**23.20**	**52.45**
	2:Barren/uncult urable/ Wastelands	2.1: Barren Rocky							461.38						**461.38**	3.69		0.11	**3.80**
		2.2:Gullied / Ravinous Land	0.00			**0.00**		**0.00**		79.43					**79.43**				
		2.3: Rann																	
		2.4: Salt Affected Land																	
		2.5: Sandy Area																	
		2.6: Scrub Land	1.57		5.78	**7.34**	0.00	**7.34**						6004.93	**6004.93**	16.42		6.79	**23.21**
		Sub Total	**1.57**		**5.78**	**7.34**	**0.00**	**7.34**	**461.38**	**79.43**				**6004.93**	**6545.73**	**20.11**		**6.90**	**27.01**
	3: Builtup	3.1: Mining												1.54	**1.54**	482.55		0.08	**482.63**
		3.2: Rural															2953.53	3.48	**2957.01**
		3.3: Urban																962.61	**962.61**
		Sub Total												**1.54**	**1.54**	**482.55**	**2953.53**	**966.17**	**4402.25**
	4: Forest	4.1: Deciduous	0.00			**0.00**		**0.00**						0.00	**0.00**	20.32		1.79	**22.11**
		4.2: Evergreen/Semi evergreen																	
		4.3: Forest Plantation																	
		4.4: Scrub Forest														0.86		1.01	**1.86**
		4.5: Swamp / Mangroves																	
		Sub Total	**0.00**			**0.00**		**0.00**						**0.00**	**0.00**	**21.17**		**2.80**	**23.97**
	5: Grass / Grazing	5.1: Grass / Grazing																	
	6:Snow and Glacier	6.1: Snow and Glacier																	
	7: Wet lands / Water bodies	7.1: Inland Wetland																	
		7.2: Coastal Wetland																	
		7.3: River/Stream/Canals	9.38			**9.38**		**9.38**						0.10	**0.10**		0.02		**0.02**
		7.4: Water bodies	2.72			**2.72**		**2.72**								0.07			**0.07**
		Sub Total	**12.10**			**12.10**		**12.10**						**0.10**	**0.10**	**0.07**	**0.02**		**0.09**
	Grand Total		**33058.79**		**47.45**	**33106.25**	**4520.83**	**37627.08**	**461.38**	**79.45**				**6006.62**	**6547.45**	**553.15**	**2953.55**	**999.07**	**4505.77**

Note: Totals may not match due to rounding off.

Annexure 1.3 Contd.

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			JHARKHAND 2011-12													
			4: Forest						5: Grass / Grazing	6:Snow and Glacier	7: Wet lands / Water bodies					Grand Total
			4.1	4.2	4.3	4.4	4.5	Sub Total	5.1	6.1	7.1	7.2	7.3	7.4	Sub Total	
2005-06	1: Agriculture	1.1: Crop land	0.00			1.63		**1.63**					10.30	26.08	**36.38**	**32752.22**
		1.2: Current Shifting cultivation														
		1.3: Plantation														**23.86**
		Farmland (FL) = 1.1+1.2+1.3	**0.00**			**1.63**		**1.63**					**10.30**	**26.08**	**36.38**	**32776.07**
		1.4: Fallow	0.01			0.00		**0.01**					0.56	8.85	**9.41**	**4931.50**
		Sub Total	**0.01**			**1.63**		**1.64**					**10.87**	**34.93**	**45.79**	**37707.58**
	2:Barren/uncultivable/ Wastelands	2.1: Barren Rocky														**465.18**
		2.2:Gullied / Ravinous Land														**79.43**
		2.3: Rann														
		2.4: Salt Affected Land														
		2.5: Sandy Area														
		2.6: Scrub Land	0.00		0.55			**0.55**					2.14	8.53	**10.66**	**6046.70**
		Sub Total	**0.00**		**0.55**			**0.55**					**2.14**	**8.53**	**10.66**	**6591.31**
	3: Builtup	3.1: Mining	1.23		0.27			**1.50**								**485.66**
		3.2: Rural														**2957.01**
		3.3: Urban														**962.61**
		Sub Total	**1.23**		**0.27**			**1.50**								**4405.29**
	4: Forest	4.1: Deciduous	23672.38		1.10	12.60		**23686.07**					0.31	3.72	**4.02**	**23712.21**
		4.2: Evergreen/Semi evergreen														
		4.3: Forest Plantation			18.66			**18.66**								**18.66**
		4.4: Scrub Forest	1.78		6.64	5296.60		**5305.02**					0.04	3.25	**3.29**	**5310.17**
		4.5: Swamp / Mangroves														
		Sub Total	**23674.16**		**26.40**	**5309.19**		**29009.75**					**0.35**	**6.96**	**7.31**	**29041.03**
	5: Grass / Grazing	5.1: Grass / Grazing														
	6:Snow and Glacier	6.1: Snow and Glacier														
	7: Wet lands / Water bodies	7.1: Inland Wetland									12.98				**12.98**	**12.98**
		7.2: Coastal Wetland														
		7.3: River/Stream/Canals	0.00					**0.00**					1289.66	2.73	**1292.39**	**1301.90**
		7.4: Water bodies												643.12	**643.12**	**645.91**
		Sub Total	**0.00**					**0.00**			**12.98**		**1289.66**	**645.86**	**1948.50**	**1960.79**
	Grand Total		**23675.39**		**27.23**	**5310.83**		**29013.44**			**12.98**		**1303.00**	**696.27**	**2012.26**	**79706.00**

Note: Totals may not match due to rounding off.

Annexure 1.3

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			KARNATAKA 2011-12																
			1: Agriculture						2:Barren/unculturable/ Wastelands							3: Builtup			
			1.1	1.2	1.3	FL	1.4	Sub Total	2.1	2.2	2.3	2.4	2.5	2.6	Sub Total	3.1	3.2	3.3	Sub Total
2005-06	1: Agriculture	1.1: Crop land	111191.60		78.98	**111270.58**	4.81	**111275.40**						0.49	**0.49**		0.33	194.77	**195.10**
		1.2: Current Shifting cultivation																	
		1.3: Plantation	3.59		19344.89	**19348.48**	2.32	**19350.80**						0.00	**0.00**		0.79	17.44	**18.23**
		Farmland (FL) = 1.1+1.2+1.3	**111195.19**		**19423.87**	**130619.06**	**7.13**	**130626.19**						**0.49**	**0.49**		**1.12**	**212.22**	**213.34**
		1.4: Fallow	969.55		75.23	**1044.79**	3924.76	**4969.55**				0.10		0.64	**0.74**	0.00	0.27	18.97	**19.25**
		Sub Total	**112164.75**		**19499.10**	**131663.85**	**3931.90**	**135595.74**				**0.10**		**1.13**	**1.23**	**0.00**	**1.39**	**231.19**	**232.58**
	2:Barren/uncultur able/ Wastelands	2.1: Barren Rocky							1129.90						**1129.90**	4.57		1.75	**6.32**
		2.2:Gullied / Ravinous Land								61.85					**61.85**			0.09	**0.09**
		2.3: Rann																	
		2.4: Salt Affected Land					0.50	**0.50**				519.76		0.15	**519.91**			0.15	**0.15**
		2.5: Sandy Area											12.98		**12.98**				
		2.6: Scrub Land			1.52	**1.52**		**1.52**		0.15				6865.58	**6865.73**	5.24		17.06	**22.30**
		Sub Total			**1.52**	**1.52**	**0.50**	**2.02**	**1129.90**	**62.00**		**519.76**	**12.98**	**6865.73**	**8590.38**	**9.81**		**19.05**	**28.86**
	3: Builtup	3.1: Mining														552.81		1.50	**554.31**
		3.2: Rural															2975.49	0.85	**2976.35**
		3.3: Urban																2332.81	**2332.81**
		Sub Total														**552.81**	**2975.49**	**2335.17**	**5863.47**
	4: Forest	4.1: Deciduous														1.92			**1.92**
		4.2: Evergreen/Semi evergreen																	
		4.3: Forest Plantation																3.02	**3.02**
		4.4: Scrub Forest														13.61		0.85	**14.47**
		4.5: Swamp / Mangroves																	
		Sub Total														**15.53**		**3.88**	**19.41**
	5: Grass / Grazing	5.1: Grass / Grazing												**0.03**	**0.03**			**0.88**	**0.88**
	6:Snow and Glacier	6.1: Snow and Glacier																	
	7: Wet lands / Water bodies	7.1: Inland Wetland																0.52	**0.52**
		7.2: Coastal Wetland																	
		7.3: River/Stream/Canals	0.01			**0.01**		**0.01**											
		7.4: Water bodies												0.20	**0.20**	0.16		0.19	**0.34**
		Sub Total	**0.01**			**0.01**		**0.01**						**0.20**	**0.20**	**0.16**		**0.71**	**0.86**
	Grand Total		**112164.75**		**19500.62**	**131665.38**	**3932.39**	**135597.77**	**1129.90**	**62.00**		**519.87**	**12.98**	**6867.08**	**8591.83**	**578.31**	**2976.89**	**2590.87**	**6146.07**

Note: Totals may not match due to rounding off.

Annexure 1.3 Contd.

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

KARNATAKA

2011-12

LULC_ CLASSES			4: Forest						5: Grass / Grazing	6:Snow and Glacier	7: Wet lands / Water bodies					Grand Total
			4.1	4.2	4.3	4.4	4.5	Sub Total	5.1	6.1	7.1	7.2	7.3	7.4	Sub Total	
2005-06	1: Agriculture	1.1: Crop land											2.09	1.35	**3.44**	**111474.43**
		1.2: Current Shifting cultivation														
		1.3: Plantation	0.16					**0.16**					0.15		**0.15**	**19369.34**
		Farmland (FL) = 1.1+1.2+1.3	**0.16**					**0.16**					**2.24**	**1.35**	**3.59**	**130843.77**
		1.4: Fallow											0.23	0.04	**0.27**	**4989.81**
		Sub Total	**0.16**					**0.16**					**2.47**	**1.39**	**3.86**	**135833.58**
	2:Barren/uncultura ble/ Wastelands	2.1: Barren Rocky														**1136.22**
		2.2:Gullied / Ravinous Land														**61.94**
		2.3: Rann														
		2.4: Salt Affected Land														**520.56**
		2.5: Sandy Area											0.07		**0.07**	**13.05**
		2.6: Scrub Land											0.02		**0.02**	**6889.58**
		Sub Total											**0.09**		**0.09**	**8621.35**
	3: Builtup	3.1: Mining														**554.31**
		3.2: Rural														**2976.35**
		3.3: Urban														**2332.81**
		Sub Total														**5863.47**
	4: Forest	4.1: Deciduous	15744.82		1.63			**15746.46**	0.11				0.48		**0.48**	**15748.96**
		4.2: Evergreen/Semi evergreen		9874.97		0.81		**9875.78**								**9875.78**
		4.3: Forest Plantation			2993.13			**2993.13**								**2996.15**
		4.4: Scrub Forest			6.79	4929.83		**4936.63**	0.13							**4951.22**
		4.5: Swamp / Mangroves					8.37	**8.37**								**8.37**
		Sub Total	**15744.82**	**9874.97**	**3001.56**	**4930.64**	**8.37**	**33560.36**	**0.24**				**0.48**		**0.48**	**33580.49**
	5: Grass / Grazing	5.1: Grass / Grazing							**666.69**							**667.59**
	6:Snow and Glacier	6.1: Snow and Glacier														
	7: Wet lands / Water bodies	7.1: Inland Wetland									26.62				**26.62**	**27.14**
		7.2: Coastal Wetland										43.62			**43.62**	**43.62**
		7.3: River/Stream/Canals											1993.41		**1993.41**	**1993.42**
		7.4: Water bodies												5159.80	**5159.80**	**5160.34**
		Sub Total									**26.62**	**43.62**	**1993.41**	**5159.80**	**7223.45**	**7224.51**
	Grand Total		**15744.98**	**9874.97**	**3001.56**	**4930.64**	**8.37**	**33560.52**	**666.93**		**26.62**	**43.62**	**1996.45**	**5161.19**	**7227.88**	**191791.00**

Note: Totals may not match due to rounding off.

Annexure 1.3

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			KERALA																
			2011-12																
			1: Agriculture						2:Barren/unculturable/ Wastelands							3: Builtup			
			1.1	1.2	1.3	FL	1.4	Sub Total	2.1	2.2	2.3	2.4	2.5	2.6	Sub Total	3.1	3.2	3.3	Sub Total
2005-06	1: Agriculture	1.1: Crop land	2559.66		115.01	**2674.68**	3.65	**2678.33**								0.66		4.15	**4.80**
		1.2: Current Shifting cultivation																	
		1.3: Plantation	69.94		18716.13	**18786.07**	47.69	**18833.76**					0.12	88.45	**88.57**	0.28	0.19	87.09	**87.56**
		Farmland (FL) = 1.1+1.2+1.3	**2629.61**		**18831.14**	**21460.75**	**51.35**	**21512.09**					**0.12**	**88.45**	**88.57**	**0.94**	**0.19**	**91.23**	**92.36**
		1.4: Fallow	4.19		11.26	**15.45**	47.40	**62.85**										0.64	**0.64**
		Sub Total	**2633.80**		**18842.40**	**21476.20**	**98.74**	**21574.94**					**0.12**	**88.45**	**88.57**	**0.94**	**0.19**	**91.88**	**93.00**
	2:Barren/uncultivable/ Wastelands	2.1: Barren Rocky							257.21						**257.21**	0.44		1.28	**1.71**
		2.2:Gullied / Ravinous Land																	
		2.3: Rann																	
		2.4: Salt Affected Land																	
		2.5: Sandy Area			0.19	**0.19**		**0.19**					13.73		**13.73**			4.69	**4.69**
		2.6: Scrub Land			72.53	**72.53**		**72.53**						1297.35	**1297.35**			3.22	**3.22**
		Sub Total			**72.72**	**72.72**		**72.72**	**257.21**				**13.73**	**1297.35**	**1568.29**	**0.44**		**9.19**	**9.63**
	3: Builtup	3.1: Mining														53.22			**53.22**
		3.2: Rural												1.55	**1.55**	0.57	2413.83	7.16	**2421.56**
		3.3: Urban																554.88	**554.88**
		Sub Total												**1.55**	**1.55**	**53.78**	**2413.83**	**562.04**	**3029.65**
	4: Forest	4.1: Deciduous			9.18	**9.18**		**9.18**								0.13			**0.13**
		4.2: Evergreen/Semi evergreen														0.34			**0.34**
		4.3: Forest Plantation															10.22		**10.22**
		4.4: Scrub Forest			0.16	**0.16**		**0.16**									1.13		**1.13**
		4.5: Swamp / Mangroves																	
		Sub Total			**9.34**	**9.34**		**9.34**								**0.46**	**11.36**		**11.82**
	5: Grass / Grazing	5.1: Grass / Grazing					**0.04**	**0.04**											
	6:Snow and Glacier	6.1: Snow and Glacier																	
	7: Wet lands / Water bodies	7.1: Inland Wetland	0.42			**0.42**		**0.42**									0.40		**0.40**
		7.2: Coastal Wetland																0.49	**0.49**
		7.3: River/Stream/Canals											1.19	0.07	**1.26**				
		7.4: Water bodies																0.05	**0.05**
		Sub Total	**0.42**			**0.42**		**0.42**					**1.19**	**0.07**	**1.26**		**0.40**	**0.54**	**0.95**
	Grand Total		**2634.22**		**18924.47**	**21558.69**	**98.78**	**21657.47**	**257.21**				**15.04**	**1387.42**	**1659.67**	**55.62**	**2425.78**	**663.65**	**3145.05**

Note: Totals may not match due to rounding off.

Annexure 1.3 Contd.

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			KERALA													
			2011-12													
			4: Forest						5: Grass / Grazing	6:Snow and Glacier	7: Wet lands / Water bodies					Grand Total
			4.1	4.2	4.3	4.4	4.5	Sub Total	5.1	6.1	7.1	7.2	7.3	7.4	Sub Total	
2005-06	1: Agriculture	1.1: Crop land												0.42	**0.42**	**2683.56**
		1.2: Current Shifting cultivation														
		1.3: Plantation														**19009.88**
		Farmland (FL) = 1.1+1.2+1.3												**0.42**	**0.42**	**21693.44**
		1.4: Fallow									9.50			4.70	**14.21**	**77.70**
		Sub Total									**9.50**			**5.13**	**14.63**	**21771.14**
	2:Barren/uncultivable/ Wastelands	2.1: Barren Rocky														**258.93**
		2.2:Gullied / Ravinous Land														
		2.3: Rann														
		2.4: Salt Affected Land														
		2.5: Sandy Area											0.44		**0.44**	**19.06**
		2.6: Scrub Land									0.77				**0.77**	**1373.87**
		Sub Total									**0.77**		**0.44**		**1.21**	**1651.85**
	3: Builtup	3.1: Mining														**53.22**
		3.2: Rural														**2423.11**
		3.3: Urban														**554.88**
		Sub Total														**3031.21**
	4: Forest	4.1: Deciduous	1572.67		4.32	9.36		**1586.35**								**1595.65**
		4.2: Evergreen/Semi evergreen		6021.11		18.96		**6040.07**								**6040.41**
		4.3: Forest Plantation			2117.43			**2117.43**								**2127.65**
		4.4: Scrub Forest			0.74	887.28		**888.02**								**889.32**
		4.5: Swamp / Mangroves					0.24	**0.24**								**0.24**
		Sub Total	**1572.67**	**6021.11**	**2122.48**	**915.61**	**0.24**	**10632.10**								**10653.27**
	5: Grass / Grazing	5.1: Grass / Grazing							**198.35**							**198.39**
	6:Snow and Glacier	6.1: Snow and Glacier														
	7: Wet lands / Water bodies	7.1: Inland Wetland									253.56	0.04			**253.60**	**254.43**
		7.2: Coastal Wetland										105.25			**105.25**	**105.73**
		7.3: River/Stream/Canals							0.11				571.61		**571.61**	**572.98**
		7.4: Water bodies									0.45			623.49	**623.95**	**624.00**
		Sub Total							**0.11**		**254.01**	**105.28**	**571.61**	**623.49**	**1554.40**	**1557.14**
	Grand Total		**1572.67**	**6021.11**	**2122.48**	**915.61**	**0.24**	**10632.10**	**198.46**		**264.28**	**105.28**	**572.05**	**628.62**	**1570.24**	**38863.00**

Note: Totals may not match due to rounding off.

Annexure 1.3

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			MADHYA PRADESH 2011-12																
			1: Agriculture						2:Barren/unculturable/ Wastelands							3: Builtup			
			1.1	1.2	1.3	FL	1.4	Sub Total	2.1	2.2	2.3	2.4	2.5	2.6	Sub Total	3.1	3.2	3.3	Sub Total
2005-06	1: Agriculture	1.1: Crop land	182075.95		2.38	**182078.34**	1.90	**182080.24**						3.34	**3.34**		0.43	76.52	**76.95**
		1.2: Current Shifting cultivation																	
		1.3: Plantation	0.27		49.81	**50.08**		**50.08**											
		Farmland (FL) = 1.1+1.2+1.3	**182076.22**		**52.19**	**182128.42**	**1.90**	**182130.32**						**3.34**	**3.34**		**0.43**	**76.52**	**76.95**
		1.4: Fallow	376.54		1.23	**377.78**	5790.10	**6167.88**								21.86	0.58	73.46	**95.90**
		Sub Total	**182452.77**		**53.42**	**182506.19**	**5792.00**	**188298.19**						**3.34**	**3.34**	**21.86**	**1.01**	**149.98**	**172.85**
	2:Barren/uncult urable/ Wastelands	2.1: Barren Rocky							418.20						**418.20**	1.57		0.15	**1.72**
		2.2:Gullied / Ravinous Land	0.33			**0.33**		**0.33**		1462.55				0.12	**1462.67**				
		2.3: Rann																	
		2.4: Salt Affected Land																	
		2.5: Sandy Area																	
		2.6: Scrub Land	13.33		2.28	**15.61**	0.45	**16.06**						23505.08	**23505.08**	26.83	0.54	29.73	**57.10**
		Sub Total	**13.66**		**2.28**	**15.94**	**0.45**	**16.39**	**418.20**	**1462.55**				**23505.20**	**25385.95**	**28.40**	**0.54**	**29.88**	**58.82**
	3: Builtup	3.1: Mining														224.29			**224.29**
		3.2: Rural															2779.94	3.07	**2783.01**
		3.3: Urban																1406.49	**1406.49**
		Sub Total														**224.29**	**2779.94**	**1409.57**	**4413.80**
	4: Forest	4.1: Deciduous	0.89			**0.89**		**0.89**								11.48		0.83	**12.31**
		4.2: Evergreen/Semi evergreen																	
		4.3: Forest Plantation																	
		4.4: Scrub Forest	21.18			**21.18**	0.10	**21.27**								1.06		0.42	**1.48**
		4.5: Swamp / Mangroves																	
		Sub Total	**22.06**			**22.06**	**0.10**	**22.16**								**12.54**		**1.25**	**13.79**
	5: Grass / Grazing	5.1: Grass / Grazing	**0.28**			**0.28**		**0.28**											
	6:Snow and Glacier	6.1: Snow and Glacier																	
	7: Wet lands / Water bodies	7.1: Inland Wetland																	
		7.2: Coastal Wetland																	
		7.3: River/Stream/Canals																	
		7.4: Water bodies												0.19	**0.19**			0.56	**0.56**
		Sub Total												**0.19**	**0.19**			**0.56**	**0.56**
	Grand Total		**182488.78**		**55.70**	**182544.48**	**5792.55**	**188337.02**	**418.20**	**1462.55**				**23508.74**	**25389.49**	**287.09**	**2781.49**	**1591.25**	**4659.83**

Note: Totals may not match due to rounding off.

Annexure 1.3 Contd.

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			MADHYA PRADESH 2011-12													
			4: Forest						5: Grass / Grazing	6:Snow and Glacier	7: Wet lands / Water bodies					Grand Total
			4.1	4.2	4.3	4.4	4.5	Sub Total	5.1	6.1	7.1	7.2	7.3	7.4	Sub Total	
2005-06	1: Agriculture	1.1: Crop land											5.25	867.12	**872.37**	**183032.89**
		1.2: Current Shifting cultivation														
		1.3: Plantation														**50.08**
		Farmland (FL) = 1.1+1.2+1.3											**5.25**	**867.12**	**872.37**	**183082.97**
		1.4: Fallow											4.43	312.19	**316.62**	**6580.39**
		Sub Total											**9.68**	**1179.31**	**1188.98**	**189663.37**
	2:Barren/uncultivable/ Wastelands	2.1: Barren Rocky											0.10	13.61	**13.71**	**433.63**
		2.2:Gullied / Ravinous Land												0.84	**0.84**	**1463.85**
		2.3: Rann														
		2.4: Salt Affected Land												1.77	**1.77**	**1.77**
		2.5: Sandy Area														
		2.6: Scrub Land											3.24	183.36	**186.60**	**23764.84**
		Sub Total											**3.34**	**199.59**	**202.93**	**25664.09**
	3: Builtup	3.1: Mining	3.93					**3.93**								**228.23**
		3.2: Rural														**2783.01**
		3.3: Urban														**1406.49**
		Sub Total	**3.93**					**3.93**								**4417.73**
	4: Forest	4.1: Deciduous	68981.60		25.77	1.51		**69008.87**					0.69	106.11	**106.80**	**69128.87**
		4.2: Evergreen/Semi evergreen		0.10				**0.10**								**0.10**
		4.3: Forest Plantation	0.06		34.74			**34.80**								**34.80**
		4.4: Scrub Forest			5.70	12118.90		**12124.59**					0.77	44.32	**45.09**	**12192.43**
		4.5: Swamp / Mangroves														
		Sub Total	**68981.66**	**0.10**	**66.21**	**12120.40**		**81168.37**					**1.45**	**150.44**	**151.89**	**81356.21**
	5: Grass / Grazing	5.1: Grass / Grazing							**1.60**							**1.89**
	6:Snow and Glacier	6.1: Snow and Glacier														
	7: Wet lands / Water bodies	7.1: Inland Wetland														
		7.2: Coastal Wetland														
		7.3: River/Stream/Canals											3433.41	14.25	**3447.66**	**3447.66**
		7.4: Water bodies												3700.30	**3700.30**	**3701.06**
		Sub Total											**3433.41**	**3714.54**	**7147.95**	**7148.71**
	Grand Total		**68985.59**	**0.10**	**66.21**	**12120.40**		**81172.30**	**1.60**				**3447.88**	**5243.88**	**8691.75**	**308252.00**

Note: Totals may not match due to rounding off.

Annexure 1.3

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			MAHARASHTRA																
			2011-12																
			1: Agriculture						2:Barren/unculturable/ Wastelands							3: Builtup			
			1.1	1.2	1.3	FL	1.4	Sub Total	2.1	2.2	2.3	2.4	2.5	2.6	Sub Total	3.1	3.2	3.3	Sub Total
2005-06	1: Agriculture	1.1: Crop land	180049.79		96.92	**180146.71**	3569.72	**183716.43**	0.16	1.30				6.90	**8.36**		107.68	333.74	**441.42**
		1.2: Current Shifting cultivation																	
		1.3: Plantation	199.72		5982.58	**6182.30**	62.04	**6244.34**									2.43	5.93	**8.36**
		Farmland (FL) = 1.1+1.2+1.3	**180249.51**		**6079.50**	**186329.01**	**3631.76**	**189960.77**	**0.16**	**1.30**				**6.90**	**8.36**		**110.11**	**339.67**	**449.78**
		1.4: Fallow	7768.84		44.61	**7813.45**	11050.65	**18864.10**		0.12				13.56	**13.68**	6.82	33.40	218.20	**258.42**
		Sub Total	**188018.35**		**6124.11**	**194142.46**	**14682.41**	**208824.88**	**0.16**	**1.42**				**20.46**	**22.04**	**6.82**	**143.51**	**557.87**	**708.20**
	2:Barren/unculturable/ Wastelands	2.1: Barren Rocky							1092.19						**1092.19**	4.71	0.80	3.43	**8.94**
		2.2:Gullied / Ravinous Land	2.49			**2.49**		**2.49**		476.18				19.37	**495.55**		0.25	0.32	**0.57**
		2.3: Rann																	
		2.4: Salt Affected Land	0.04			**0.04**		**0.04**				8.10		6.41	**14.52**			2.36	**2.36**
		2.5: Sandy Area											0.86		**0.86**				
		2.6: Scrub Land	73.98		9.18	**83.16**	6.45	**89.61**	1.85	7.27				22123.09	**22132.20**	37.89	10.45	113.32	**161.67**
		Sub Total	**76.51**		**9.18**	**85.69**	**6.45**	**92.14**	**1094.04**	**483.44**		**8.10**	**0.86**	**22148.88**	**23735.32**	**42.60**	**11.51**	**119.43**	**173.54**
	3: Builtup	3.1: Mining														293.74			**293.74**
		3.2: Rural															2927.27	53.56	**2980.83**
		3.3: Urban														0.10		3106.51	**3106.62**
		Sub Total														**293.84**	**2927.27**	**3160.07**	**6381.18**
	4: Forest	4.1: Deciduous	7.42		0.08	**7.50**	0.86	**8.36**								4.93	0.80	1.68	**7.40**
		4.2: Evergreen/Semi evergreen														0.47	0.06		**0.53**
		4.3: Forest Plantation																	
		4.4: Scrub Forest														0.66	0.91	6.58	**8.15**
		4.5: Swamp / Mangroves																	
		Sub Total	**7.42**		**0.08**	**7.50**	**0.86**	**8.36**								**6.05**	**1.76**	**8.26**	**16.08**
	5: Grass / Grazing	5.1: Grass / Grazing																	
	6:Snow and Glacier	6.1: Snow and Glacier																	
	7: Wet lands / Water bodies	7.1: Inland Wetland	0.63			**0.63**		**0.63**											
		7.2: Coastal Wetland	1.03			**1.03**		**1.03**					0.09		**0.09**		0.24	3.40	**3.64**
		7.3: River/Stream/Canals																	
		7.4: Water bodies																	
		Sub Total	**1.65**			**1.65**		**1.65**					**0.09**		**0.09**		**0.24**	**3.40**	**3.64**
	Grand Total		**188103.93**		**6133.37**	**194237.30**	**14689.73**	**208927.03**	**1094.20**	**484.86**		**8.10**	**0.95**	**22169.34**	**23757.45**	**349.31**	**3084.29**	**3849.04**	**7282.64**

Note: Totals may not match due to rounding off.

Annexure 1.3 Contd.

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			MAHARASHTRA 2011-12													
			4: Forest						5: Grass / Grazing	6:Snow and Glacier	7: Wet lands / Water bodies					Grand Total
			4.1	4.2	4.3	4.4	4.5	Sub Total	5.1	6.1	7.1	7.2	7.3	7.4	Sub Total	
2005-06	1: Agriculture	1.1: Crop land	0.26					**0.26**			0.57	0.65	25.50	552.87	**579.59**	**184746.07**
		1.2: Current Shifting cultivation														
		1.3: Plantation											0.01	6.73	**6.74**	**6259.43**
		Farmland (FL) = 1.1+1.2+1.3	**0.26**					**0.26**			**0.57**	**0.65**	**25.50**	**559.60**	**586.33**	**191005.51**
		1.4: Fallow										0.02	5.00	92.20	**97.23**	**19233.42**
		Sub Total	**0.26**					**0.26**			**0.57**	**0.67**	**30.51**	**651.81**	**683.56**	**210238.93**
	2:Barren/uncul turable/ Wastelands	2.1: Barren Rocky												2.31	**2.31**	**1103.44**
		2.2:Gullied / Ravinous Land											0.80	1.41	**2.21**	**500.83**
		2.3: Rann														
		2.4: Salt Affected Land														**16.91**
		2.5: Sandy Area														**0.86**
		2.6: Scrub Land										0.01	2.11	36.98	**39.10**	**22422.58**
		Sub Total										**0.01**	**2.91**	**40.70**	**43.62**	**24044.62**
	3: Builtup	3.1: Mining														**293.74**
		3.2: Rural												1.33	**1.33**	**2982.16**
		3.3: Urban														**3106.62**
		Sub Total												**1.33**	**1.33**	**6382.52**
	4: Forest	4.1: Deciduous	39948.34		88.67	316.69		**40353.70**					3.78	22.91	**26.69**	**40396.15**
		4.2: Evergreen/Semi evergreen		7163.96				**7163.96**						1.20	**1.20**	**7165.69**
		4.3: Forest Plantation	0.21		262.97			**263.18**								**263.18**
		4.4: Scrub Forest	45.21		3.29	8697.49		**8745.99**					0.49	26.09	**26.58**	**8780.72**
		4.5: Swamp / Mangroves					310.95	**310.95**					0.00		**0.00**	**310.95**
		Sub Total	**39993.76**	**7163.96**	**354.94**	**9014.18**	**310.95**	**56837.79**					**4.28**	**50.19**	**54.47**	**56916.69**
	5: Grass / Grazing	5.1: Grass / Grazing							**2.10**					**0.01**	**0.01**	**2.11**
	6:Snow and Glacier	6.1: Snow and Glacier														
	7: Wet lands / Water bodies	7.1: Inland Wetland									1.81				**1.81**	**2.44**
		7.2: Coastal Wetland										998.17			**998.17**	**1002.93**
		7.3: River/Stream/Canals											3867.38	25.54	**3892.92**	**3892.92**
		7.4: Water bodies												5206.13	**5206.13**	**5206.13**
		Sub Total									**1.81**	**998.17**	**3867.38**	**5231.67**	**10099.03**	**10104.42**
	Grand Total		**39994.02**	**7163.96**	**354.94**	**9014.18**	**310.95**	**56838.05**	**2.10**		**2.39**	**998.85**	**3905.06**	**5975.72**	**10882.02**	**307689.29**

Note: Totals may not match due to rounding off.

Annexure 1.3

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			MANIPUR 2011-12																
			1: Agriculture						2:Barren/unculturable/ Wastelands							3: Builtup			
			1.1	1.2	1.3	FL	1.4	Sub Total	2.1	2.2	2.3	2.4	2.5	2.6	Sub Total	3.1	3.2	3.3	Sub Total
2005-06	1: Agriculture	1.1: Crop land	1556.65	1.29		**1557.94**		**1557.94**									0.93	1.46	**2.39**
		1.2: Current Shifting cultivation		260.05		**260.05**		**260.05**						1.10	**1.10**		0.12		**0.12**
		1.3: Plantation			38.90	**38.90**		**38.90**											
		Farmland (FL) = 1.1+1.2+1.3	**1556.65**	**261.35**	**38.90**	**1856.89**		**1856.89**						**1.10**	**1.10**		**1.04**	**1.46**	**2.51**
		1.4: Fallow					9.61	**9.61**											
		Sub Total	**1556.65**	**261.35**	**38.90**	**1856.89**	**9.61**	**1866.50**						**1.10**	**1.10**		**1.04**	**1.46**	**2.51**
	2:Barren/uncultivable/ Wastelands	2.1: Barren Rocky																	
		2.2:Gullied / Ravinous Land																	
		2.3: Rann																	
		2.4: Salt Affected Land																	
		2.5: Sandy Area																	
		2.6: Scrub Land	1.39	17.09	0.85	**19.33**		**19.33**						3091.11	**3091.11**		1.55		**1.55**
		Sub Total	**1.39**	**17.09**	**0.85**	**19.33**		**19.33**						**3091.11**	**3091.11**		**1.55**		**1.55**
	3: Builtup	3.1: Mining																	
		3.2: Rural															297.34		**297.34**
		3.3: Urban																93.77	**93.77**
		Sub Total															**297.34**	**93.77**	**391.11**
	4: Forest	4.1: Deciduous	0.52	148.17		**148.69**		**148.69**						1.32	**1.32**		2.91		**2.91**
		4.2: Evergreen/Semi evergreen	0.08	18.54		**18.62**		**18.62**									0.21		**0.21**
		4.3: Forest Plantation																	
		4.4: Scrub Forest	0.08	8.39		**8.47**		**8.47**									2.19		**2.19**
		4.5: Swamp / Mangroves																	
		Sub Total	**0.67**	**175.10**		**175.77**		**175.77**						**1.32**	**1.32**		**5.31**		**5.31**
	5: Grass / Grazing	5.1: Grass / Grazing																	
	6:Snow and Glacier	6.1: Snow and Glacier																	
	7: Wet lands / Water bodies	7.1: Inland Wetland																	
		7.2: Coastal Wetland																	
		7.3: River/Stream/Canals	0.12			**0.12**		**0.12**											
		7.4: Water bodies																	
		Sub Total	**0.12**			**0.12**		**0.12**											
	Grand Total		**1558.83**	**453.54**	**39.75**	**2052.12**	**9.61**	**2061.73**						**3093.52**	**3093.52**		**305.24**	**95.24**	**400.48**

Note: Totals may not match due to rounding off.

Annexure 1.3 Contd.

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			MANIPUR 2011-12													
			4: Forest						5: Grass / Grazing	6:Snow and Glacier	7: Wet lands / Water bodies					Grand Total
			4.1	4.2	4.3	4.4	4.5	Sub Total	5.1	6.1	7.1	7.2	7.3	7.4	Sub Total	
2005-06	1: Agriculture	1.1: Crop land		4.84		9.40		**14.24**					4.23		**4.23**	**1578.80**
		1.2: Current Shifting cultivation		1.80		227.56		**229.36**								**490.63**
		1.3: Plantation														**38.90**
		Farmland (FL) = 1.1+1.2+1.3		**6.64**		**236.97**		**243.60**					**4.23**		**4.23**	**2108.33**
		1.4: Fallow														**9.61**
		Sub Total		**6.64**		**236.97**		**243.60**					**4.23**		**4.23**	**2117.93**
	2:Barren/uncultivable/ Wastelands	2.1: Barren Rocky														
		2.2:Gullied / Ravinous Land														
		2.3: Rann														
		2.4: Salt Affected Land														
		2.5: Sandy Area														
		2.6: Scrub Land		45.50		18.25		**63.75**					1.87		**1.87**	**3177.61**
		Sub Total		**45.50**		**18.25**		**63.75**					**1.87**		**1.87**	**3177.61**
	3: Builtup	3.1: Mining														
		3.2: Rural											0.12		**0.12**	**297.46**
		3.3: Urban														**93.77**
		Sub Total											**0.12**		**0.12**	**391.23**
	4: Forest	4.1: Deciduous		11531.37		2.20		**11533.57**								**11686.48**
		4.2: Evergreen/Semi evergreen	2766.36			0.29		**2766.65**					0.27		**0.27**	**2785.75**
		4.3: Forest Plantation			1.85			**1.85**								**1.85**
		4.4: Scrub Forest	0.30	0.09		1586.24		**1586.63**					0.08		**0.08**	**1597.37**
		4.5: Swamp / Mangroves														
		Sub Total	**2766.66**	**11531.46**	**1.85**	**1588.73**		**15888.70**					**0.35**		**0.35**	**16071.45**
	5: Grass / Grazing	5.1: Grass / Grazing							**2.72**							**2.72**
	6:Snow and Glacier	6.1: Snow and Glacier														
	7: Wet lands / Water bodies	7.1: Inland Wetland									312.39				**312.39**	**312.39**
		7.2: Coastal Wetland														
		7.3: River/Stream/Canals											133.81		**133.81**	**133.93**
		7.4: Water bodies												119.73	**119.73**	**119.73**
		Sub Total									**312.39**		**133.81**	**119.73**	**565.93**	**566.06**
	Grand Total		**2766.66**	**11583.59**	**1.85**	**1843.94**		**16196.05**	**2.72**		**312.39**		**140.38**	**119.73**	**572.50**	**22327.00**

Note: Totals may not match due to rounding off.

Annexure 1.3

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			MEGHALAYA 2011-12																
			1: Agriculture						2:Barren/unculturable/ Wastelands							3: Builtup			
			1.1	1.2	1.3	FL	1.4	Sub Total	2.1	2.2	2.3	2.4	2.5	2.6	Sub Total	3.1	3.2	3.3	Sub Total
2005-06	1: Agriculture	1.1: Crop land	1261.65			**1261.65**		**1261.65**						0.29	**0.29**			0.14	**0.14**
		1.2: Current Shifting cultivation		59.08		**59.08**		**59.08**						44.86	**44.86**		0.53		**0.53**
		1.3: Plantation	2.82		562.90	**565.72**		**565.72**											
		Farmland (FL) = 1.1+1.2+1.3	**1264.48**	**59.08**	**562.90**	**1886.46**		**1886.46**						**45.15**	**45.15**		**0.53**	**0.14**	**0.67**
		1.4: Fallow					0.40	**0.40**											
		Sub Total	**1264.48**	**59.08**	**562.90**	**1886.46**	**0.40**	**1886.86**						**45.15**	**45.15**		**0.53**	**0.14**	**0.67**
	2:Barren/unculturable/ Wastelands	2.1: Barren Rocky							262.84						**262.84**				
		2.2:Gullied / Ravinous Land																	
		2.3: Rann																	
		2.4: Salt Affected Land																	
		2.5: Sandy Area											4.39		**4.39**				
		2.6: Scrub Land		0.04	0.04	**0.08**		**0.08**						2602.20	**2602.20**		20.77	1.38	**22.14**
		Sub Total		**0.04**	**0.04**	**0.08**		**0.08**	**262.84**				**4.39**	**2602.20**	**2869.43**		**20.77**	**1.38**	**22.14**
	3: Builtup	3.1: Mining														1.35			**1.35**
		3.2: Rural															727.55		**727.55**
		3.3: Urban																83.77	**83.77**
		Sub Total														**1.35**	**727.55**	**83.77**	**812.66**
	4: Forest	4.1: Deciduous	20.72	155.70	1.03	**177.45**		**177.45**						80.25	**80.25**	0.43	24.29	2.91	**27.62**
		4.2: Evergreen/Semi evergreen		1.71		**1.71**	1.08	**2.79**											
		4.3: Forest Plantation																	
		4.4: Scrub Forest		16.51	0.25	**16.75**		**16.75**						109.10	**109.10**		0.19		**0.19**
		4.5: Swamp / Mangroves																	
		Sub Total	**20.72**	**173.92**	**1.28**	**195.92**	**1.08**	**197.00**						**189.35**	**189.35**	**0.43**	**24.47**	**2.91**	**27.81**
	5: Grass / Grazing	5.1: Grass / Grazing																	
	6:Snow and Glacier	6.1: Snow and Glacier																	
	7: Wet lands / Water bodies	7.1: Inland Wetland	5.70			**5.70**		**5.70**											
		7.2: Coastal Wetland																	
		7.3: River/Stream/Canals	0.13			**0.13**		**0.13**											
		7.4: Water bodies	0.32			**0.32**		**0.32**											
		Sub Total	**6.15**			**6.15**		**6.15**											
	Grand Total		**1291.35**	**233.04**	**564.21**	**2088.60**	**1.49**	**2090.09**	**262.84**				**4.39**	**2836.70**	**3103.93**	**1.77**	**773.32**	**88.19**	**863.28**

Note: Totals may not match due to rounding off.

Annexure 1.3 Contd.

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			MEGHALAYA 2011-12													
			4: Forest						5: Grass / Grazing	6:Snow and Glacier	7: Wet lands / Water bodies					Grand Total
			4.1	4.2	4.3	4.4	4.5	Sub Total	5.1	6.1	7.1	7.2	7.3	7.4	Sub Total	
2005-06	1: Agriculture	1.1: Crop land	0.27					**0.27**					0.04	0.22	**0.26**	**1262.61**
		1.2: Current Shifting cultivation	73.99			144.03		**218.02**								**322.49**
		1.3: Plantation														**565.72**
		Farmland (FL) = 1.1+1.2+1.3	**74.26**			**144.03**		**218.28**					**0.04**	**0.22**	**0.26**	**2150.82**
		1.4: Fallow														**0.40**
		Sub Total	**74.26**			**144.03**		**218.28**					**0.04**	**0.22**	**0.26**	**2151.22**
	2:Barren/uncultu rable/ Wastelands	2.1: Barren Rocky														**262.84**
		2.2:Gullied / Ravinous Land														
		2.3: Rann														
		2.4: Salt Affected Land														
		2.5: Sandy Area														**4.39**
		2.6: Scrub Land	210.23					**210.23**						0.04	**0.04**	**2834.70**
		Sub Total	**210.23**					**210.23**						**0.04**	**0.04**	**3101.92**
	3: Builtup	3.1: Mining														**1.35**
		3.2: Rural														**727.55**
		3.3: Urban														**83.77**
		Sub Total														**812.66**
	4: Forest	4.1: Deciduous	14345.56			1.93		**14347.49**								**14632.81**
		4.2: Evergreen/Semi evergreen		753.72		0.18		**753.90**								**756.69**
		4.3: Forest Plantation			13.59			**13.59**								**13.59**
		4.4: Scrub Forest	11.46			466.78		**478.24**								**604.28**
		4.5: Swamp / Mangroves					0.58	**0.58**								**0.58**
		Sub Total	**14357.02**	**753.72**	**13.59**	**468.88**	**0.58**	**15593.79**								**16007.95**
	5: Grass / Grazing	5.1: Grass / Grazing							**0.03**							**0.03**
	6:Snow and Glacier	6.1: Snow and Glacier														
	7: Wet lands / Water bodies	7.1: Inland Wetland									55.80				**55.80**	**61.50**
		7.2: Coastal Wetland														
		7.3: River/Stream/Canals											275.05		**275.05**	**275.18**
		7.4: Water bodies												18.21	**18.21**	**18.53**
		Sub Total									**55.80**		**275.05**	**18.21**	**349.06**	**355.21**
	Grand Total		**14641.51**	**753.72**	**13.59**	**612.91**	**0.58**	**16022.30**	**0.03**		**55.80**		**275.10**	**18.47**	**349.37**	**22429.00**

Note: Totals may not match due to rounding off.

Annexure 1.3

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			MIZORAM 2011-12																
			1: Agriculture						2:Barren/unculturable/ Wastelands							3: Builtup			
			1.1	1.2	1.3	FL	1.4	Sub Total	2.1	2.2	2.3	2.4	2.5	2.6	Sub Total	3.1	3.2	3.3	Sub Total
2005-06	1: Agriculture	1.1: Crop land	158.14		0.70	**158.83**		**158.83**						4.30	**4.30**				
		1.2: Current Shifting cultivation	0.15	97.17		**97.32**		**97.32**						0.82	**0.82**				
		1.3: Plantation			78.79	**78.79**		**78.79**											
		Farmland (FL) = 1.1+1.2+1.3	**158.29**	**97.17**	**79.49**	**334.95**		**334.95**						**5.12**	**5.12**				
		1.4: Fallow																	
		Sub Total	**158.29**	**97.17**	**79.49**	**334.95**		**334.95**						**5.12**	**5.12**				
	2:Barren/uncultivable/ Wastelands	2.1: Barren Rocky							0.20						**0.20**				
		2.2:Gullied / Ravinous Land																	
		2.3: Rann																	
		2.4: Salt Affected Land																	
		2.5: Sandy Area																	
		2.6: Scrub Land												107.23	**107.23**			0.37	**0.37**
		Sub Total							**0.20**					**107.23**	**107.43**			**0.37**	**0.37**
	3: Builtup	3.1: Mining																	
		3.2: Rural															118.72		**118.72**
		3.3: Urban																63.68	**63.68**
		Sub Total															**118.72**	**63.68**	**182.40**
	4: Forest	4.1: Deciduous	12.48	299.55	2.38	**314.40**		**314.40**	3.87						**3.87**		1.38	0.85	**2.23**
		4.2: Evergreen/Semi evergreen	1.92	103.95	0.07	**105.95**		**105.95**									1.63		**1.63**
		4.3: Forest Plantation																	
		4.4: Scrub Forest	1.22	289.85	1.92	**292.98**		**292.98**	1.01					27.46	**28.47**		2.17	0.47	**2.64**
		4.5: Swamp / Mangroves																	
		Sub Total	**15.62**	**693.35**	**4.37**	**713.33**		**713.33**	**4.88**					**27.46**	**32.33**		**5.19**	**1.31**	**6.50**
	5: Grass / Grazing	5.1: Grass / Grazing																	
	6:Snow and Glacier	6.1: Snow and Glacier																	
	7: Wet lands / Water bodies	7.1: Inland Wetland																	
		7.2: Coastal Wetland																	
		7.3: River/Stream/Canals																	
		7.4: Water bodies																	
		Sub Total																	
	Grand Total		**173.91**	**790.52**	**83.86**	**1048.28**		**1048.28**	**5.07**					**139.81**	**144.89**		**123.91**	**65.37**	**189.28**

Note: Totals may not match due to rounding off.

Annexure 1.3 Contd.

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			MIZORAM 2011-12													
			4: Forest						5: Grass / Grazing	6:Snow and Glacier	7: Wet lands / Water bodies					Grand Total
			4.1	4.2	4.3	4.4	4.5	Sub Total	5.1	6.1	7.1	7.2	7.3	7.4	Sub Total	
2005-06	1: Agriculture	1.1: Crop land		0.19				**0.19**						1.91	**1.91**	**165.23**
		1.2: Current Shifting cultivation	293.99		0.71	526.73		**821.43**								**919.57**
		1.3: Plantation												0.03	**0.03**	**78.82**
		Farmland (FL) = 1.1+1.2+1.3	**293.99**	**0.19**	**0.71**	**526.73**		**821.62**						**1.93**	**1.93**	**1163.63**
		1.4: Fallow														
		Sub Total	**293.99**	**0.19**	**0.71**	**526.73**		**821.62**						**1.93**	**1.93**	**1163.63**
	2:Barren/uncultivable/ Wastelands	2.1: Barren Rocky														**0.20**
		2.2:Gullied / Ravinous Land														
		2.3: Rann														
		2.4: Salt Affected Land														
		2.5: Sandy Area														
		2.6: Scrub Land	12.19					**12.19**						0.04	**0.04**	**119.83**
		Sub Total	**12.19**					**12.19**						**0.04**	**0.04**	**120.03**
	3: Builtup	3.1: Mining														
		3.2: Rural												0.03	**0.03**	**118.75**
		3.3: Urban														**63.68**
		Sub Total												**0.03**	**0.03**	**182.43**
	4: Forest	4.1: Deciduous	6574.72			570.44		**7145.16**					0.35	9.48	**9.83**	**7475.49**
		4.2: Evergreen/Semi evergreen	8.98	6934.22	4.11	91.37		**7038.67**						2.51	**2.51**	**7148.77**
		4.3: Forest Plantation			100.86			**100.86**								**100.86**
		4.4: Scrub Forest	334.18	74.20	0.07	3902.74		**4311.18**						9.03	**9.03**	**4644.29**
		4.5: Swamp / Mangroves														
		Sub Total	**6917.87**	**7008.42**	**105.03**	**4564.55**		**18595.87**					**0.35**	**21.02**	**21.37**	**19369.40**
	5: Grass / Grazing	5.1: Grass / Grazing	**0.06**			**0.22**		**0.28**	**112.44**							**112.72**
	6:Snow and Glacier	6.1: Snow and Glacier														
	7: Wet lands / Water bodies	7.1: Inland Wetland									0.04				**0.04**	**0.04**
		7.2: Coastal Wetland														
		7.3: River/Stream/Canals											130.20		**130.20**	**130.20**
		7.4: Water bodies												2.54	**2.54**	**2.54**
		Sub Total									**0.04**		**130.20**	**2.54**	**132.79**	**132.79**
	Grand Total		**7224.11**	**7008.61**	**105.74**	**5091.50**		**19429.97**	**112.44**		**0.04**		**130.55**	**25.56**	**156.15**	**21081.00**

Note: Totals may not match due to rounding off.

Annexure 1.3

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			NAGALAND 2011-12																
			1: Agriculture						2:Barren/unculturable/ Wastelands							3: Builtup			
			1.1	1.2	1.3	FL	1.4	Sub Total	2.1	2.2	2.3	2.4	2.5	2.6	Sub Total	3.1	3.2	3.3	Sub Total
2005-06	1: Agriculture	1.1: Crop land	565.81			**565.81**	15.10	**580.91**									0.40	0.04	**0.43**
		1.2: Current Shifting cultivation	0.46	214.32		**214.77**		**214.77**						173.60	**173.60**		1.68	0.03	**1.71**
		1.3: Plantation			8.98	**8.98**		**8.98**											
		Farmland (FL) = 1.1+1.2+1.3	**566.27**	**214.32**	**8.98**	**789.57**	**15.10**	**804.67**						**173.60**	**173.60**		**2.07**	**0.07**	**2.14**
		1.4: Fallow	8.36			**8.36**	5.63	**13.99**											
		Sub Total	**574.63**	**214.32**	**8.98**	**797.93**	**20.73**	**818.66**						**173.60**	**173.60**		**2.07**	**0.07**	**2.14**
	2:Barren/uncult urable/ Wastelands	2.1: Barren Rocky							0.86						**0.86**				
		2.2:Gullied / Ravinous Land																	
		2.3: Rann																	
		2.4: Salt Affected Land																	
		2.5: Sandy Area																	
		2.6: Scrub Land	4.06	159.39	0.32	**163.77**		**163.77**						1921.18	**1921.18**		1.98	0.64	**2.63**
		Sub Total	**4.06**	**159.39**	**0.32**	**163.77**		**163.77**	**0.86**					**1921.18**	**1922.05**		**1.98**	**0.64**	**2.63**
	3: Builtup	3.1: Mining														8.99			**8.99**
		3.2: Rural															240.68		**240.68**
		3.3: Urban																88.46	**88.46**
		Sub Total														**8.99**	**240.68**	**88.46**	**338.14**
	4: Forest	4.1: Deciduous	2.99	543.41	0.12	**546.52**		**546.52**						0.73	**0.73**		6.73	0.36	**7.09**
		4.2: Evergreen/Semi evergreen		1.12		**1.12**		**1.12**									0.03		**0.03**
		4.3: Forest Plantation		0.22		**0.22**		**0.22**									0.17		**0.17**
		4.4: Scrub Forest		247.20		**247.20**		**247.20**						257.59	**257.59**		0.31		**0.31**
		4.5: Swamp / Mangroves																	
		Sub Total	**2.99**	**791.95**	**0.12**	**795.07**		**795.07**						**258.31**	**258.31**		**7.24**	**0.36**	**7.60**
	5: Grass / Grazing	5.1: Grass / Grazing																	
	6:Snow and Glacier	6.1: Snow and Glacier																	
	7: Wet lands / Water bodies	7.1: Inland Wetland																	
		7.2: Coastal Wetland																	
		7.3: River/Stream/Canals												0.08	**0.08**				
		7.4: Water bodies																	
		Sub Total												**0.08**	**0.08**				
	Grand Total		**581.68**	**1165.67**	**9.42**	**1756.77**	**20.73**	**1777.50**	**0.86**					**2353.17**	**2354.03**	**8.99**	**251.98**	**89.53**	**350.50**

Note: Totals may not match due to rounding off.

Annexure 1.3 Contd.

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			NAGALAND 2011-12													
			4: Forest						5: Grass / Grazing	6:Snow and Glacier	7: Wet lands / Water bodies					Grand Total
			4.1	4.2	4.3	4.4	4.5	Sub Total	5.1	6.1	7.1	7.2	7.3	7.4	Sub Total	
2005-06	1: Agriculture	1.1: Crop land											0.01		**0.01**	**581.35**
		1.2: Current Shifting cultivation	46.41			698.66		**745.07**								**1135.15**
		1.3: Plantation														**8.98**
		Farmland (FL) = 1.1+1.2+1.3	**46.41**			**698.66**		**745.07**					**0.01**		**0.01**	**1725.48**
		1.4: Fallow	0.06					**0.06**								**14.05**
		Sub Total	**46.47**			**698.66**		**745.13**					**0.01**		**0.01**	**1739.53**
	2:Barren/uncultivable/ Wastelands	2.1: Barren Rocky														**0.86**
		2.2:Gullied / Ravinous Land														
		2.3: Rann														
		2.4: Salt Affected Land														
		2.5: Sandy Area														
		2.6: Scrub Land	25.16			15.93		**41.09**						0.23	**0.23**	**2128.90**
		Sub Total	**25.16**			**15.93**		**41.09**						**0.23**	**0.23**	**2129.77**
	3: Builtup	3.1: Mining														**8.99**
		3.2: Rural														**240.68**
		3.3: Urban														**88.46**
		Sub Total														**338.14**
	4: Forest	4.1: Deciduous	9297.41			65.21		**9362.62**								**9916.95**
		4.2: Evergreen/Semi evergreen		347.24				**347.24**								**348.39**
		4.3: Forest Plantation			126.91	0.30		**127.21**					0.00		**0.00**	**127.61**
		4.4: Scrub Forest	132.86			1121.56		**1254.42**								**1759.51**
		4.5: Swamp / Mangroves														
		Sub Total	**9430.27**	**347.24**	**126.91**	**1187.07**		**11091.48**					**0.00**		**0.00**	**12152.46**
	5: Grass / Grazing	5.1: Grass / Grazing							**17.87**							**17.87**
	6:Snow and Glacier	6.1: Snow and Glacier														
	7: Wet lands / Water bodies	7.1: Inland Wetland														
		7.2: Coastal Wetland														
		7.3: River/Stream/Canals											180.27		**180.27**	**180.35**
		7.4: Water bodies												20.88	**20.88**	**20.88**
		Sub Total											**180.27**	**20.88**	**201.16**	**201.23**
	Grand Total		**9501.90**	**347.24**	**126.91**	**1901.66**		**11877.71**	**17.87**				**180.28**	**21.12**	**201.40**	**16579.00**

Note: Totals may not match due to rounding off.

Annexure 1.3

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			ODISHA 2011-12																
			1: Agriculture						2:Barren/unculturable/ Wastelands							3: Builtup			
			1.1	1.2	1.3	FL	1.4	Sub Total	2.1	2.2	2.3	2.4	2.5	2.6	Sub Total	3.1	3.2	3.3	Sub Total
2005-06	1: Agriculture	1.1: Crop land	75916.02	2.50	1.57	**75920.10**	387.68	**76307.78**					1.33	114.76	**116.09**	13.84	7.98	136.31	**158.12**
		1.2: Current Shifting cultivation		483.06		**483.06**		**483.06**						2.07	**2.07**				
		1.3: Plantation	0.68		332.23	**332.90**		**332.90**						0.42	**0.42**			0.51	**0.51**
		Farmland (FL) = 1.1+1.2+1.3	**75916.70**	**485.56**	**333.80**	**76736.06**	**387.68**	**77123.74**					**1.33**	**117.25**	**118.58**	**13.84**	**7.98**	**136.82**	**158.63**
		1.4: Fallow	103.76	1.62	2.76	**108.15**	1894.04	**2002.19**		1.10				39.04	**40.14**	8.10	1.18	42.57	**51.85**
		Sub Total	**76020.46**	**487.18**	**336.56**	**76844.21**	**2281.72**	**79125.93**		**1.10**			**1.33**	**156.29**	**158.72**	**21.94**	**9.16**	**179.39**	**210.48**
	2:Barren/uncult urable/ Wastelands	2.1: Barren Rocky							482.71						**482.71**				
		2.2:Gullied / Ravinous Land								716.38					**716.38**				
		2.3: Rann																	
		2.4: Salt Affected Land	2.03			**2.03**		**2.03**				15.33			**15.33**				
		2.5: Sandy Area											49.32		**49.32**	0.44		0.19	**0.62**
		2.6: Scrub Land	6.36	46.08	0.70	**53.14**		**53.14**		0.13				10603.55	**10603.68**	14.38		15.99	**30.36**
		Sub Total	**8.38**	**46.08**	**0.70**	**55.17**		**55.17**	**482.71**	**716.52**		**15.33**	**49.32**	**10603.55**	**11867.42**	**14.81**		**16.17**	**30.99**
	3: Builtup	3.1: Mining														165.17			**165.17**
		3.2: Rural														1.52	4956.79	12.95	**4971.26**
		3.3: Urban																852.08	**852.08**
		Sub Total														**166.69**	**4956.79**	**865.04**	**5988.51**
	4: Forest	4.1: Deciduous		78.98		**78.98**		**78.98**						6.07	**6.07**	14.74		8.36	**23.11**
		4.2: Evergreen/Semi evergreen																	
		4.3: Forest Plantation											0.09	0.50	**0.59**	0.62	0.14	1.39	**2.16**
		4.4: Scrub Forest		104.17		**104.17**		**104.17**					0.08	2.93	**3.01**	2.99		0.54	**3.53**
		4.5: Swamp / Mangroves																0.41	**0.41**
		Sub Total		**183.15**		**183.15**		**183.15**					**0.16**	**9.51**	**9.67**	**18.36**	**0.14**	**10.71**	**29.20**
	5: Grass / Grazing	5.1: Grass / Grazing																	
	6:Snow and Glacier	6.1: Snow and Glacier																	
	7: Wet lands / Water bodies	7.1: Inland Wetland	5.30			**5.30**	1.73	**7.03**						0.09	**0.09**				
		7.2: Coastal Wetland	0.11			**0.11**		**0.11**					0.05		**0.05**			6.65	**6.65**
		7.3: River/Stream/Canals	4.61			**4.61**		**4.61**					0.54		**0.54**			0.07	**0.07**
		7.4: Water bodies	0.15			**0.15**	2.06	**2.21**						0.65	**0.65**			1.07	**1.07**
		Sub Total	**10.16**			**10.16**	**3.79**	**13.95**					**0.59**	**0.74**	**1.33**			**7.79**	**7.79**
	Grand Total		**76039.01**	**716.42**	**337.26**	**77092.69**	**2285.51**	**79378.20**	**482.71**	**717.62**		**15.33**	**51.41**	**10770.09**	**12037.15**	**221.79**	**4966.08**	**1079.09**	**6266.97**

Note: Totals may not match due to rounding off.

Annexure 1.3 Contd.

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			ODISHA 2011-12													
			4: Forest						5: Grass / Grazing	6:Snow and Glacier	7: Wet lands / Water bodies					Grand Total
			4.1	4.2	4.3	4.4	4.5	Sub Total	5.1	6.1	7.1	7.2	7.3	7.4	Sub Total	
2005-06	1: Agriculture	1.1: Crop land			2.25			**2.25**			6.46	5.13	5.37	46.92	**63.89**	**76648.12**
		1.2: Current Shifting cultivation	5.91			559.81		**565.72**								**1050.85**
		1.3: Plantation														**333.84**
		Farmland (FL) = 1.1+1.2+1.3	**5.91**		**2.25**	**559.81**		**567.97**			**6.46**	**5.13**	**5.37**	**46.92**	**63.89**	**78032.81**
		1.4: Fallow	2.39			0.39		**2.78**			2.00	1.38	0.17	4.69	**8.24**	**2105.20**
		Sub Total	**8.30**		**2.25**	**560.20**		**570.75**			**8.46**	**6.52**	**5.54**	**51.62**	**72.13**	**80138.01**
	2:Barren/uncultivable/ Wastelands	2.1: Barren Rocky														**482.71**
		2.2:Gullied / Ravinous Land														**716.38**
		2.3: Rann														
		2.4: Salt Affected Land					0.60	**0.60**				0.35	0.46	9.82	**10.62**	**28.58**
		2.5: Sandy Area			0.23			**0.23**				0.68	1.07		**1.74**	**51.92**
		2.6: Scrub Land	22.91					**22.91**					0.24	0.67	**0.91**	**10711.00**
		Sub Total	**22.91**		**0.23**		**0.60**	**23.75**				**1.02**	**1.77**	**10.49**	**13.28**	**11990.60**
	3: Builtup	3.1: Mining														**165.17**
		3.2: Rural											0.24		**0.24**	**4971.50**
		3.3: Urban														**852.08**
		Sub Total											**0.24**		**0.24**	**5988.75**
	4: Forest	4.1: Deciduous	43029.91		0.74	96.13		**43126.78**				0.09		0.35	**0.44**	**43235.38**
		4.2: Evergreen/Semi evergreen														
		4.3: Forest Plantation			869.05		0.32	**869.37**				0.34	0.28	0.43	**1.05**	**873.17**
		4.4: Scrub Forest	93.76		0.75	5764.92		**5859.43**					0.14	0.04	**0.19**	**5970.32**
		4.5: Swamp / Mangroves					242.22	**242.22**				1.10		0.22	**1.32**	**243.96**
		Sub Total	**43123.67**		**870.54**	**5861.05**	**242.54**	**50097.80**				**1.54**	**0.42**	**1.04**	**3.00**	**50322.83**
	5: Grass / Grazing	5.1: Grass / Grazing														
	6:Snow and Glacier	6.1: Snow and Glacier														
	7: Wet lands / Water bodies	7.1: Inland Wetland					1.87	**1.87**			455.34			3.65	**459.00**	**467.99**
		7.2: Coastal Wetland			1.27		23.85	**25.13**				1131.21	1.49	27.75	**1160.45**	**1192.39**
		7.3: River/Stream/Canals					0.22	**0.22**			0.02	2.59	3106.70	1.63	**3110.95**	**3116.38**
		7.4: Water bodies					0.95	**0.95**				0.66	0.28	2484.23	**2485.17**	**2490.05**
		Sub Total			**1.27**		**26.90**	**28.17**			**455.37**	**1134.47**	**3108.47**	**2517.26**	**7215.57**	**7266.81**
	Grand Total		**43154.88**		**874.29**	**6421.25**	**270.05**	**50720.47**			**463.83**	**1143.54**	**3116.44**	**2580.41**	**7304.21**	**155707.00**

Note: Totals may not match due to rounding off.

Annexure 1.3

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			PUNJAB 2011-12																
			1: Agriculture						2:Barren/unculturable/ Wastelands							3: Builtup			
			1.1	1.2	1.3	FL	1.4	Sub Total	2.1	2.2	2.3	2.4	2.5	2.6	Sub Total	3.1	3.2	3.3	Sub Total
2005-06	1: Agriculture	1.1: Crop land	42411.18		268.22	**42679.40**	52.88	**42732.28**				3.64	0.34	18.56	**22.54**	72.35	80.71	231.23	**384.29**
		1.2: Current Shifting cultivation																	
		1.3: Plantation	24.97		536.44	**561.40**	0.55	**561.95**						0.19	**0.19**		0.02	0.20	**0.22**
		Farmland (FL) = 1.1+1.2+1.3	**42436.15**		**804.66**	**43240.81**	**53.43**	**43294.24**				**3.64**	**0.34**	**18.76**	**22.73**	**72.35**	**80.74**	**231.42**	**384.51**
		1.4: Fallow	11.29		0.48	**11.78**	14.02	**25.79**					0.01	0.29	**0.30**	0.58		1.18	**1.76**
		Sub Total	**42447.44**		**805.14**	**43252.58**	**67.45**	**43320.03**				**3.64**	**0.36**	**19.04**	**23.03**	**72.93**	**80.74**	**232.60**	**386.27**
	2:Barren/uncult urable/ Wastelands	2.1: Barren Rocky																	
		2.2:Gullied / Ravinous Land	0.28		1.69	**1.97**		**1.97**		35.17				0.20	**35.37**	0.35		0.25	**0.60**
		2.3: Rann																	
		2.4: Salt Affected Land	32.34		0.65	**32.99**	0.08	**33.07**				21.51		3.64	**25.14**			0.47	**0.47**
		2.5: Sandy Area	260.90		6.38	**267.28**	0.74	**268.02**					127.78	11.14	**138.92**	2.84		13.85	**16.70**
		2.6: Scrub Land	15.82		0.91	**16.73**	1.38	**18.12**						312.43	**312.43**	0.16	0.16	3.56	**3.89**
		Sub Total	**309.34**		**9.63**	**318.97**	**2.21**	**321.18**		**35.17**		**21.51**	**127.78**	**327.40**	**511.86**	**3.36**	**0.16**	**18.13**	**21.65**
	3: Builtup	3.1: Mining	2.23			**2.23**		**2.23**								45.47		0.81	**46.28**
		3.2: Rural															1654.80		**1654.80**
		3.3: Urban																1566.81	**1566.81**
		Sub Total	**2.23**			**2.23**		**2.23**								**45.47**	**1654.80**	**1567.62**	**3267.89**
	4: Forest	4.1: Deciduous	0.49			**0.49**		**0.49**						0.28	**0.28**	0.29		1.64	**1.93**
		4.2: Evergreen/Semi evergreen																	
		4.3: Forest Plantation																	
		4.4: Scrub Forest											0.06		**0.06**				
		4.5: Swamp / Mangroves																	
		Sub Total	**0.49**			**0.49**		**0.49**					**0.06**	**0.28**	**0.34**	**0.29**		**1.64**	**1.93**
	5: Grass / Grazing	5.1: Grass / Grazing																	
	6:Snow and Glacier	6.1: Snow and Glacier																	
	7: Wet lands / Water bodies	7.1: Inland Wetland	24.75		2.00	**26.75**	0.01	**26.76**				0.46		1.73	**2.19**				
		7.2: Coastal Wetland																	
		7.3: River/Stream/Canals	21.41		0.39	**21.81**		**21.81**					0.38	6.89	**7.26**				
		7.4: Water bodies																	
		Sub Total	**46.16**		**2.40**	**48.56**	**0.01**	**48.57**				**0.46**	**0.38**	**8.62**	**9.45**				
	Grand Total		**42805.67**		**817.17**	**43622.84**	**69.67**	**43692.51**		**35.17**		**25.60**	**128.57**	**355.34**	**544.69**	**122.05**	**1735.70**	**1819.99**	**3677.74**

Note: Totals may not match due to rounding off.

Annexure 1.3 Contd.

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			PUNJAB 2011-12													
			4: Forest						5: Grass / Grazing	6:Snow and Glacier	7: Wet lands / Water bodies					Grand Total
			4.1	4.2	4.3	4.4	4.5	Sub Total	5.1	6.1	7.1	7.2	7.3	7.4	Sub Total	
2005-06	1: Agriculture	1.1: Crop land									17.91		25.76	3.76	**47.42**	**43186.54**
		1.2: Current Shifting cultivation														
		1.3: Plantation									0.03		0.11		**0.14**	**562.50**
		Farmland (FL) = 1.1+1.2+1.3									**17.93**		**25.87**	**3.76**	**47.56**	**43749.04**
		1.4: Fallow									0.27				**0.27**	**28.13**
		Sub Total									**18.21**		**25.87**	**3.76**	**47.83**	**43777.16**
	2:Barren/uncultivable/ Wastelands	2.1: Barren Rocky														
		2.2:Gullied / Ravinous Land											0.03		**0.03**	**37.98**
		2.3: Rann														
		2.4: Salt Affected Land									0.04			0.63	**0.67**	**59.36**
		2.5: Sandy Area									0.19		14.82		**15.01**	**438.64**
		2.6: Scrub Land									0.32		2.97	0.43	**3.71**	**338.15**
		Sub Total									**0.55**		**17.82**	**1.06**	**19.43**	**874.13**
	3: Builtup	3.1: Mining														**48.51**
		3.2: Rural														**1654.80**
		3.3: Urban														**1566.81**
		Sub Total														**3270.12**
	4: Forest	4.1: Deciduous	1409.84		0.14	9.14		**1419.12**	0.00				0.05	0.38	**0.43**	**1422.25**
		4.2: Evergreen/Semi evergreen		12.75				**12.75**								**12.75**
		4.3: Forest Plantation	1.19		14.08	0.92		**16.20**								**16.20**
		4.4: Scrub Forest	8.22		0.58	59.90		**68.70**					0.01		**0.01**	**68.77**
		4.5: Swamp / Mangroves														
		Sub Total	**1419.24**	**12.75**	**14.80**	**69.97**		**1516.76**	**0.00**				**0.06**	**0.38**	**0.44**	**1519.97**
	5: Grass / Grazing	5.1: Grass / Grazing														
	6:Snow and Glacier	6.1: Snow and Glacier														
	7: Wet lands / Water bodies	7.1: Inland Wetland									95.14		0.80	0.08	**96.02**	**124.96**
		7.2: Coastal Wetland														
		7.3: River/Stream/Canals									0.45		682.89		**683.34**	**712.41**
		7.4: Water bodies												83.24	**83.24**	**83.24**
		Sub Total									**95.59**		**683.69**	**83.31**	**862.59**	**920.61**
	Grand Total		**1419.24**	**12.75**	**14.80**	**69.97**		**1516.76**	**0.00**		**114.35**		**727.44**	**88.51**	**930.30**	**50362.00**

Note: Totals may not match due to rounding off.

Annexure 1.3

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			RAJASTHAN 2011-12																
			1: Agriculture						2:Barren/unculturable/ Wastelands							3: Builtup			
			1.1	1.2	1.3	FL	1.4	Sub Total	2.1	2.2	2.3	2.4	2.5	2.6	Sub Total	3.1	3.2	3.3	Sub Total
2005-06	1: Agriculture	1.1: Crop land	120539.49		6.11	**120545.60**	17924.92	**138470.52**		0.02			4.10	124.42	**128.55**	0.02	4.29	63.36	**67.67**
		1.2: Current Shifting cultivation																	
		1.3: Plantation	6.22		89.06	**95.28**	0.22	**95.50**						4.31	**4.31**				
		Farmland (FL) = 1.1+1.2+1.3	**120545.71**		**95.16**	**120640.87**	**17925.15**	**138566.02**		**0.02**			**4.10**	**128.73**	**132.85**	**0.02**	**4.29**	**63.36**	**67.67**
		1.4: Fallow	30643.98		1.15	**30645.13**	46150.61	**76795.74**		0.31			0.01	140.16	**140.48**		11.28	44.82	**56.11**
		Sub Total	**151189.69**		**96.31**	**151286.00**	**64075.76**	**215361.76**		**0.33**			**4.11**	**268.89**	**273.33**	**0.02**	**15.57**	**108.19**	**123.78**
	2:Barren/uncult urable/ Wastelands	2.1: Barren Rocky							4979.61						**4979.61**	12.18	0.35	1.77	**14.31**
		2.2:Gullied / Ravinous Land	151.11		0.50	**151.61**	2.92	**154.52**		2452.60				36.27	**2488.87**	1.80	0.06	3.39	**5.24**
		2.3: Rann									196.23				**196.23**				
		2.4: Salt Affected Land	27.05		2.86	**29.92**	36.79	**66.71**				795.57		68.88	**864.45**	0.01	0.94	0.12	**1.07**
		2.5: Sandy Area	1175.53		0.77	**1176.31**	17.85	**1194.16**					24949.63	3961.48	**28911.11**	1.17	0.77	6.18	**8.12**
		2.6: Scrub Land	2290.12		1.08	**2291.19**	1497.38	**3788.57**		56.85		1.31	48.13	36987.34	**37093.63**	40.12	11.75	90.18	**142.06**
		Sub Total	**3643.81**		**5.21**	**3649.02**	**1554.95**	**5203.97**	**4979.61**	**2509.46**	**196.23**	**796.89**	**24997.76**	**41053.96**	**74533.92**	**55.29**	**13.87**	**101.64**	**170.79**
	3: Builtup	3.1: Mining												0.35	**0.35**	331.79		0.05	**331.84**
		3.2: Rural															3032.95	4.61	**3037.56**
		3.3: Urban																1708.95	**1708.95**
		Sub Total												**0.35**	**0.35**	**331.79**	**3032.95**	**1713.61**	**5078.36**
	4: Forest	4.1: Deciduous	0.54			**0.54**	1.32	**1.86**		0.50				1.86	**2.36**	1.01	0.43	1.05	**2.48**
		4.2: Evergreen/Semi evergreen																	
		4.3: Forest Plantation																	
		4.4: Scrub Forest														6.64			**6.64**
		4.5: Swamp / Mangroves																	
		Sub Total	**0.54**			**0.54**	**1.32**	**1.86**		**0.50**				**1.86**	**2.36**	**7.65**	**0.43**	**1.05**	**9.12**
	5: Grass / Grazing	5.1: Grass / Grazing	**171.81**		**4.75**	**176.56**	**189.08**	**365.64**				**0.32**	**11.90**	**83.12**	**95.34**	**3.43**	**0.07**	**14.82**	**18.32**
	6:Snow and Glacier	6.1: Snow and Glacier																	
	7: Wet lands / Water bodies	7.1: Inland Wetland	1.05			**1.05**	0.24	**1.28**			0.10	1.13		1.93	**3.15**				
		7.2: Coastal Wetland																	
		7.3: River/Stream/Canals	10.66		0.04	**10.70**	0.00	**10.71**										0.01	**0.01**
		7.4: Water bodies	19.57			**19.57**		**19.57**								0.12	0.04	0.23	**0.39**
		Sub Total	**31.28**		**0.04**	**31.32**	**0.24**	**31.56**			**0.10**	**1.13**		**1.93**	**3.15**	**0.12**	**0.04**	**0.24**	**0.40**
	Grand Total		**155037.14**		**106.30**	**155143.44**	**65821.34**	**220964.79**	**4979.61**	**2510.29**	**196.33**	**798.34**	**25013.77**	**41410.09**	**74908.44**	**398.29**	**3062.94**	**1939.54**	**5400.77**

Note: Totals may not match due to rounding off.

Annexure 1.3 Contd.

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			RAJASTHAN													
			2011-12													
			4: Forest						5: Grass / Grazing	6:Snow and Glacier	7: Wet lands / Water bodies					Grand Total
			4.1	4.2	4.3	4.4	4.5	Sub Total	5.1	6.1	7.1	7.2	7.3	7.4	Sub Total	
2005-06	1: Agriculture	1.1: Crop land	0.00					**0.00**	0.04		32.16		7.22	202.49	**241.87**	**138908.65**
		1.2: Current Shifting cultivation														
		1.3: Plantation											0.36		**0.36**	**100.17**
		Farmland (FL) = 1.1+1.2+1.3	**0.00**					**0.00**	**0.04**		**32.16**		**7.59**	**202.49**	**242.24**	**139008.82**
		1.4: Fallow									8.04		5.15	72.66	**85.84**	**77078.17**
		Sub Total	**0.00**					**0.00**	**0.04**		**40.20**		**12.74**	**275.15**	**328.08**	**216086.99**
	2:Barren/uncultu rable/ Wastelands	2.1: Barren Rocky												1.29	**1.29**	**4995.21**
		2.2:Gullied / Ravinous Land	0.52					**0.52**						0.37	**0.37**	**2649.53**
		2.3: Rann														**196.23**
		2.4: Salt Affected Land									4.61		0.26	1.50	**6.37**	**938.61**
		2.5: Sandy Area	20.77					**20.77**	16.26		1.12		2.58	0.89	**4.60**	**30155.02**
		2.6: Scrub Land	21.82					**21.82**	12.90		2.02		4.90	102.18	**109.10**	**41168.08**
		Sub Total	**43.12**					**43.12**	**29.17**		**7.75**		**7.74**	**106.23**	**121.73**	**80102.69**
	3: Builtup	3.1: Mining														**332.18**
		3.2: Rural														**3037.56**
		3.3: Urban														**1708.95**
		Sub Total														**5078.70**
	4: Forest	4.1: Deciduous	16863.04		1.89	19.23		**16884.17**					2.17	5.70	**7.87**	**16898.74**
		4.2: Evergreen/Semi evergreen														
		4.3: Forest Plantation	1.11		112.96	4.94		**119.00**								**119.00**
		4.4: Scrub Forest	449.27		24.64	10996.36		**11470.27**					0.24	6.47	**6.71**	**11483.62**
		4.5: Swamp / Mangroves														
		Sub Total	**17313.42**		**139.49**	**11020.53**		**28473.44**					**2.41**	**12.17**	**14.58**	**28501.36**
	5: Grass / Grazing	5.1: Grass / Grazing	**9.34**					**9.34**	**5566.24**		**1.48**			**0.34**	**1.82**	**6056.70**
	6:Snow and Glacier	6.1: Snow and Glacier														
	7: Wet lands / Water bodies	7.1: Inland Wetland									195.61			2.99	**198.59**	**203.03**
		7.2: Coastal Wetland														
		7.3: River/Stream/Canals	0.05			0.02		**0.07**					3377.53		**3377.53**	**3388.32**
		7.4: Water bodies											0.05	2801.20	**2801.25**	**2821.21**
		Sub Total	**0.05**			**0.02**		**0.07**			**195.61**		**3377.58**	**2804.18**	**6377.37**	**6412.56**
	Grand Total		**17365.93**		**139.49**	**11020.56**		**28525.98**	**5595.45**		**245.04**		**3400.46**	**3198.07**	**6843.57**	**342239.00**

Note: Totals may not match due to rounding off.

Annexure 1.3

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			SIKKIM 2011-12																
			1: Agriculture						2:Barren/unculturable/ Wastelands							3: Builtup			
			1.1	1.2	1.3	FL	1.4	Sub Total	2.1	2.2	2.3	2.4	2.5	2.6	Sub Total	3.1	3.2	3.3	Sub Total
2005-06	1: Agriculture	1.1: Crop land	582.41			**582.41**		**582.41**		0.31				0.17	**0.48**		0.03	1.00	**1.03**
		1.2: Current Shifting cultivation																	
		1.3: Plantation			6.23	**6.23**		**6.23**											
		Farmland (FL) = 1.1+1.2+1.3	**582.41**		**6.23**	**588.64**		**588.64**		**0.31**				**0.17**	**0.48**		**0.03**	**1.00**	**1.03**
		1.4: Fallow					0.57	**0.57**											
		Sub Total	**582.41**		**6.23**	**588.64**	**0.57**	**589.21**		**0.31**				**0.17**	**0.48**		**0.03**	**1.00**	**1.03**
	2:Barren/unculturable/ Wastelands	2.1: Barren Rocky							794.26						**794.26**				
		2.2:Gullied / Ravinous Land								0.43					**0.43**				
		2.3: Rann																	
		2.4: Salt Affected Land																	
		2.5: Sandy Area											3.57		**3.57**			0.05	**0.05**
		2.6: Scrub Land	0.19			**0.19**		**0.19**		0.12			0.05	19.37	**19.54**			0.02	**0.02**
		Sub Total	**0.19**			**0.19**		**0.19**	**794.26**	**0.55**			**3.62**	**19.37**	**817.81**			**0.08**	**0.08**
	3: Builtup	3.1: Mining																	
		3.2: Rural															5.37		**5.37**
		3.3: Urban																17.29	**17.29**
		Sub Total															**5.37**	**17.29**	**22.66**
	4: Forest	4.1: Deciduous	0.32			**0.32**		**0.32**						0.02	**0.02**				
		4.2: Evergreen/Semi evergreen								5.18					**5.18**	0.07	0.14	0.37	**0.58**
		4.3: Forest Plantation														0.02		0.12	**0.14**
		4.4: Scrub Forest								0.58					**0.58**				
		4.5: Swamp / Mangroves																	
		Sub Total	**0.32**			**0.32**		**0.32**		**5.77**				**0.02**	**5.78**	**0.09**	**0.14**	**0.49**	**0.72**
	5: Grass / Grazing	5.1: Grass / Grazing								**0.85**					**0.85**				
	6:Snow and Glacier	6.1: Snow and Glacier							**16.69**						**16.69**				
	7: Wet lands / Water bodies	7.1: Inland Wetland																	
		7.2: Coastal Wetland																	
		7.3: River/Stream/Canals																0.00	**0.00**
		7.4: Water bodies																	
		Sub Total																**0.00**	**0.00**
	Grand Total		**582.92**		**6.23**	**589.15**	**0.57**	**589.71**	**810.95**	**7.48**			**3.62**	**19.56**	**841.61**	**0.09**	**5.54**	**18.86**	**24.48**

Note: Totals may not match due to rounding off.

Annexure 1.3 Contd.

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			SIKKIM 2011-12													
			4: Forest						5: Grass / Grazing	6:Snow and Glacier	7: Wet lands / Water bodies					Grand Total
			4.1	4.2	4.3	4.4	4.5	Sub Total	5.1	6.1	7.1	7.2	7.3	7.4	Sub Total	
2005-06	1: Agriculture	1.1: Crop land											0.01		**0.01**	**583.93**
		1.2: Current Shifting cultivation														
		1.3: Plantation														**6.23**
		Farmland (FL) = 1.1+1.2+1.3											**0.01**		**0.01**	**590.16**
		1.4: Fallow														**0.57**
		Sub Total											**0.01**		**0.01**	**590.73**
	2:Barren/uncultur able/ Wastelands	2.1: Barren Rocky		0.91				**0.91**		197.44						**992.61**
		2.2:Gullied / Ravinous Land														**0.43**
		2.3: Rann														
		2.4: Salt Affected Land														
		2.5: Sandy Area														**3.63**
		2.6: Scrub Land	0.09					**0.09**		0.71						**20.56**
		Sub Total	**0.09**	**0.91**				**1.00**		**198.15**						**1017.23**
	3: Builtup	3.1: Mining														
		3.2: Rural														**5.37**
		3.3: Urban														**17.29**
		Sub Total														**22.66**
	4: Forest	4.1: Deciduous	180.89					**180.89**								**181.22**
		4.2: Evergreen/Semi evergreen	0.53	2652.24	0.11	10.36		**2663.23**		9.10						**2678.10**
		4.3: Forest Plantation			3.74	0.02		**3.76**								**3.90**
		4.4: Scrub Forest		10.12		36.40		**46.52**		0.09						**47.19**
		4.5: Swamp / Mangroves														
		Sub Total	**181.42**	**2662.36**	**3.85**	**46.78**		**2894.40**		**9.18**						**2910.40**
	5: Grass / Grazing	5.1: Grass / Grazing							**625.30**	**64.53**				**0.15**	**0.15**	**690.83**
	6:Snow and Glacier	6.1: Snow and Glacier		**0.11**				**0.11**	**2.06**	**1787.03**				**3.80**	**3.80**	**1809.68**
	7: Wet lands / Water bodies	7.1: Inland Wetland														
		7.2: Coastal Wetland														
		7.3: River/Stream/Canals											40.68		**40.68**	**40.68**
		7.4: Water bodies							0.04					13.74	**13.74**	**13.78**
		Sub Total							**0.04**				**40.68**	**13.74**	**54.42**	**54.47**
	Grand Total		**181.51**	**2663.38**	**3.85**	**46.78**		**2895.51**	**627.40**	**2058.89**			**40.69**	**17.69**	**58.38**	**7096.00**

Note: Totals may not match due to rounding off.

Annexure 1.3

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

TAMIL NADU

2011-12

LULC_ CLASSES			1: Agriculture						2:Barren/unculturable/ Wastelands							3: Builtup			
			1.1	1.2	1.3	FL	1.4	Sub Total	2.1	2.2	2.3	2.4	2.5	2.6	Sub Total	3.1	3.2	3.3	Sub Total
2005-06	1: Agriculture	1.1: Crop land	63796.97		50.16	**63847.13**	482.77	**64329.90**		1.85				28.25	**30.11**	32.02	33.63	104.68	**170.34**
		1.2: Current Shifting cultivation																	
		1.3: Plantation	14.22		9306.63	**9320.85**	32.87	**9353.72**					0.34	25.31	**25.66**	4.28	10.33	14.86	**29.47**
		Farmland (FL) = 1.1+1.2+1.3	**63811.19**		**9356.79**	**73167.98**	**515.64**	**73683.62**		**1.85**			**0.34**	**53.57**	**55.76**	**36.30**	**43.96**	**119.55**	**199.81**
		1.4: Fallow	409.02		76.32	**485.35**	13358.04	**13843.39**		1.76				7.53	**9.29**	32.95	16.63	95.71	**145.29**
		Sub Total	**64220.21**		**9433.11**	**73653.32**	**13873.68**	**87527.01**		**3.61**			**0.34**	**61.09**	**65.05**	**69.25**	**60.59**	**215.25**	**345.10**
	2:Barren/unculturable/ Wastelands	2.1: Barren Rocky							268.27						**268.27**	11.92		0.16	**12.07**
		2.2:Gullied / Ravinous Land								67.38					**67.38**			0.09	**0.09**
		2.3: Rann																	
		2.4: Salt Affected Land			0.11	**0.11**		**0.11**		0.10		532.12		3.82	**536.03**			0.18	**0.18**
		2.5: Sandy Area			11.84	**11.84**		**11.84**					204.46	0.66	**205.12**	0.05	0.16		**0.21**
		2.6: Scrub Land	15.50		3.79	**19.29**	0.58	**19.88**						4831.18	**4831.18**	21.52		17.55	**39.07**
		Sub Total	**15.50**		**15.75**	**31.25**	**0.58**	**31.83**	**268.27**	**67.47**		**532.12**	**204.46**	**4835.66**	**5907.99**	**33.48**	**0.16**	**17.97**	**51.62**
	3: Builtup	3.1: Mining														231.94			**231.94**
		3.2: Rural															3715.76		**3715.76**
		3.3: Urban																2096.69	**2096.69**
		Sub Total														**231.94**	**3715.76**	**2096.69**	**6044.40**
	4: Forest	4.1: Deciduous			0.69	**0.69**	0.53	**1.22**								0.05		0.67	**0.73**
		4.2: Evergreen/Semi evergreen																	
		4.3: Forest Plantation																0.78	**0.78**
		4.4: Scrub Forest																0.09	**0.09**
		4.5: Swamp / Mangroves																	
		Sub Total			**0.69**	**0.69**	**0.53**	**1.22**								**0.05**		**1.55**	**1.60**
	5: Grass / Grazing	5.1: Grass / Grazing										**0.20**			**0.20**	**1.64**			**1.64**
	6:Snow and Glacier	6.1: Snow and Glacier																	
	7: Wet lands / Water bodies	7.1: Inland Wetland																	
		7.2: Coastal Wetland			4.22	**4.22**		**4.22**						0.81	**0.81**			4.03	**4.03**
		7.3: River/Stream/Canals														46.99			**46.99**
		7.4: Water bodies														0.15	0.13	0.10	**0.37**
		Sub Total			**4.22**	**4.22**		**4.22**						**0.81**	**0.81**	**47.13**	**0.13**	**4.12**	**51.39**
	Grand Total		**64235.71**		**9453.77**	**73689.49**	**13874.79**	**87564.28**	**268.27**	**71.09**		**532.31**	**204.81**	**4897.57**	**5974.05**	**383.50**	**3776.65**	**2335.59**	**6495.74**

Note: Totals may not match due to rounding off.

Annexure 1.3 Contd.

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			TAMIL NADU 2011-12													
			4: Forest						5: Grass / Grazing	6:Snow and Glacier	7: Wet lands / Water bodies					Grand Total
			4.1	4.2	4.3	4.4	4.5	Sub Total	5.1	6.1	7.1	7.2	7.3	7.4	Sub Total	
2005-06	1: Agriculture	1.1: Crop land	0.10	0.12	0.06			**0.28**			3.29		0.52	47.74	**51.54**	**64582.16**
		1.2: Current Shifting cultivation														
		1.3: Plantation									0.17	6.86		17.23	**24.26**	**9433.10**
		Farmland (FL) = 1.1+1.2+1.3	**0.10**	**0.12**	**0.06**			**0.28**			**3.46**	**6.86**	**0.52**	**64.96**	**75.80**	**74015.27**
		1.4: Fallow										2.02	0.20	0.93	**3.15**	**14001.11**
		Sub Total	**0.10**	**0.12**	**0.06**			**0.28**			**3.46**	**8.88**	**0.71**	**65.89**	**78.95**	**88016.38**
	2:Barren/uncultura ble/ Wastelands	2.1: Barren Rocky														**280.35**
		2.2:Gullied / Ravinous Land														**67.46**
		2.3: Rann														
		2.4: Salt Affected Land												0.41	**0.41**	**536.74**
		2.5: Sandy Area											0.08	0.90	**0.99**	**218.17**
		2.6: Scrub Land			0.13			**0.13**				0.17	0.40	1.27	**1.83**	**4892.09**
		Sub Total			**0.13**			**0.13**				**0.17**	**0.48**	**2.59**	**3.23**	**5994.81**
	3: Builtup	3.1: Mining														**231.94**
		3.2: Rural														**3715.76**
		3.3: Urban														**2096.69**
		Sub Total														**6044.40**
	4: Forest	4.1: Deciduous	11175.66					**11175.66**						1.25	**1.25**	**11178.86**
		4.2: Evergreen/Semi evergreen		5031.58				**5031.58**								**5031.58**
		4.3: Forest Plantation			1369.58	0.27		**1369.85**								**1370.63**
		4.4: Scrub Forest		2.43		2638.77		**2641.20**						0.08	**0.08**	**2641.37**
		4.5: Swamp / Mangroves					111.85	**111.85**								**111.85**
		Sub Total	**11175.66**	**5034.01**	**1369.58**	**2639.04**	**111.85**	**20330.15**						**1.32**	**1.32**	**20334.29**
	5: Grass / Grazing	5.1: Grass / Grazing							**172.07**				**0.33**	**0.12**	**0.45**	**174.35**
	6:Snow and Glacier	6.1: Snow and Glacier														
	7: Wet lands / Water bodies	7.1: Inland Wetland									44.68				**44.68**	**44.68**
		7.2: Coastal Wetland									2.34	974.56		2.96	**979.85**	**988.91**
		7.3: River/Stream/Canals											1721.96	5.07	**1727.02**	**1774.01**
		7.4: Water bodies										0.22	0.42	6685.16	**6685.80**	**6686.17**
		Sub Total									**47.02**	**974.77**	**1722.38**	**6693.18**	**9437.36**	**9493.77**
	Grand Total		**11175.76**	**5034.14**	**1369.76**	**2639.04**	**111.85**	**20330.56**	**172.07**		**50.48**	**983.82**	**1723.90**	**6763.11**	**9521.31**	**130058.00**

Note: Totals may not match due to rounding off.

Annexure 1.3

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			TELANGANA 2011-12																
			1: Agriculture						2:Barren/unculturable/ Wastelands							3: Builtup			
			1.1	1.2	1.3	FL	1.4	Sub Total	2.1	2.2	2.3	2.4	2.5	2.6	Sub Total	3.1	3.2	3.3	Sub Total
2005-06	1: Agriculture	1.1: Crop land	57015.47		156.77	**57172.24**	1.56	**57173.80**								26.30	0.64	122.54	**149.48**
		1.2: Current Shifting cultivation																	
		1.3: Plantation			865.53	**865.53**		**865.53**										0.34	**0.34**
		Farmland (FL) = 1.1+1.2+1.3	**57015.47**		**1022.30**	**58037.77**	**1.56**	**58039.34**								**26.30**	**0.64**	**122.88**	**149.83**
		1.4: Fallow	2905.69		78.24	**2983.92**	9151.66	**12135.58**								28.92	3.64	156.78	**189.33**
		Sub Total	**59921.16**		**1100.53**	**61021.70**	**9153.22**	**70174.91**								**55.22**	**4.28**	**279.66**	**339.16**
	2:Barren/unculturable/ Wastelands	2.1: Barren Rocky							759.61						**759.61**	8.94	0.05	0.44	**9.43**
		2.2:Gullied / Ravinous Land								121.63					**121.63**				
		2.3: Rann																	
		2.4: Salt Affected Land			0.12	**0.12**		**0.12**				254.06			**254.06**			0.60	**0.60**
		2.5: Sandy Area											2.43		**2.43**				
		2.6: Scrub Land			19.54	**19.54**		**19.54**						5002.32	**5002.32**	53.16	0.47	54.21	**107.84**
		Sub Total			**19.66**	**19.66**		**19.66**	**759.61**	**121.63**		**254.06**	**2.43**	**5002.32**	**6140.05**	**62.11**	**0.51**	**55.26**	**117.88**
	3: Builtup	3.1: Mining														349.20		5.64	**354.83**
		3.2: Rural															2011.69	0.41	**2012.10**
		3.3: Urban																1518.77	**1518.77**
		Sub Total														**349.20**	**2011.69**	**1524.81**	**3885.69**
	4: Forest	4.1: Deciduous														5.85		10.10	**15.95**
		4.2: Evergreen/Semi evergreen																	
		4.3: Forest Plantation														0.69		1.12	**1.81**
		4.4: Scrub Forest														4.63		3.76	**8.39**
		4.5: Swamp / Mangroves																	
		Sub Total														**11.17**		**14.99**	**26.16**
	5: Grass / Grazing	5.1: Grass / Grazing																**1.23**	**1.23**
	6:Snow and Glacier	6.1: Snow and Glacier																	
	7: Wet lands / Water bodies	7.1: Inland Wetland																	
		7.2: Coastal Wetland																	
		7.3: River/Stream/Canals	0.16			**0.16**		**0.16**								0.37			**0.37**
		7.4: Water bodies	1.75		0.10	**1.85**		**1.85**										1.28	**1.28**
		Sub Total	**1.91**		**0.10**	**2.01**		**2.01**								**0.37**		**1.28**	**1.65**
	Grand Total		**59923.08**		**1120.29**	**61043.37**	**9153.22**	**70196.59**	**759.61**	**121.63**		**254.06**	**2.43**	**5002.32**	**6140.05**	**478.06**	**2016.48**	**1877.23**	**4371.77**

Note: Totals may not match due to rounding off.

Annexure 1.3 Contd.

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			TELANGANA 2011-12													
			4: Forest						5: Grass / Grazing	6:Snow and Glacier	7: Wet lands / Water bodies					Grand Total
			4.1	4.2	4.3	4.4	4.5	Sub Total	5.1	6.1	7.1	7.2	7.3	7.4	Sub Total	
2005-06	1: Agriculture	1.1: Crop land											32.17	95.06	**127.23**	**57450.52**
		1.2: Current Shifting cultivation														
		1.3: Plantation											0.13	0.58	**0.71**	**866.59**
		Farmland (FL) = 1.1+1.2+1.3											**32.30**	**95.64**	**127.94**	**58317.11**
		1.4: Fallow							0.50				14.64	31.84	**46.48**	**12371.90**
		Sub Total							**0.50**				**46.94**	**127.49**	**174.43**	**70689.00**
	2:Barren/unculturable/ Wastelands	2.1: Barren Rocky														**769.04**
		2.2:Gullied / Ravinous Land											0.25	0.09	**0.34**	**121.97**
		2.3: Rann														
		2.4: Salt Affected Land											0.34	1.71	**2.04**	**256.82**
		2.5: Sandy Area														**2.43**
		2.6: Scrub Land											4.62	7.26	**11.88**	**5141.59**
		Sub Total											**5.21**	**9.06**	**14.26**	**6291.85**
	3: Builtup	3.1: Mining											0.12	0.25	**0.37**	**355.21**
		3.2: Rural											0.08	0.19	**0.26**	**2012.36**
		3.3: Urban														**1518.77**
		Sub Total											**0.20**	**0.44**	**0.64**	**3886.33**
	4: Forest	4.1: Deciduous	19245.12		29.86	164.54		**19439.52**					2.88	6.73	**9.61**	**19465.09**
		4.2: Evergreen/Semi evergreen														
		4.3: Forest Plantation			374.47	19.60		**394.07**								**395.88**
		4.4: Scrub Forest	0.03		14.47	4544.71		**4559.21**					0.34	1.13	**1.47**	**4569.07**
		4.5: Swamp / Mangroves														
		Sub Total	**19245.16**		**418.79**	**4728.85**		**24392.80**					**3.22**	**7.86**	**11.08**	**24430.04**
	5: Grass / Grazing	5.1: Grass / Grazing							**30.27**							**31.50**
	6:Snow and Glacier	6.1: Snow and Glacier														
	7: Wet lands / Water bodies	7.1: Inland Wetland									15.73				**15.73**	**15.73**
		7.2: Coastal Wetland														
		7.3: River/Stream/Canals											2134.94	4.07	**2139.01**	**2139.54**
		7.4: Water bodies											1.15	4590.73	**4591.88**	**4595.01**
		Sub Total									**15.73**		**2136.09**	**4594.80**	**6746.62**	**6750.28**
	Grand Total		**19245.16**		**418.79**	**4728.85**		**24392.80**	**30.77**		**15.73**		**2191.65**	**4739.64**	**6947.03**	**112079.00**

Note: Totals may not match due to rounding off.

Annexure 1.3

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			TRIPURA 2011-12																
			1: Agriculture						2:Barren/unculturable/ Wastelands							3: Builtup			
			1.1	1.2	1.3	FL	1.4	Sub Total	2.1	2.2	2.3	2.4	2.5	2.6	Sub Total	3.1	3.2	3.3	Sub Total
2005-06	1: Agriculture	1.1: Crop land	1375.76		3.44	**1379.20**	8.97	**1388.16**											
		1.2: Current Shifting cultivation		6.11		**6.11**		**6.11**						15.93	**15.93**		0.32		**0.32**
		1.3: Plantation	21.89		727.14	**749.04**	7.35	**756.38**											
		Farmland (FL) = 1.1+1.2+1.3	**1397.65**	**6.11**	**730.58**	**2134.34**	**16.31**	**2150.66**						**15.93**	**15.93**		**0.32**		**0.32**
		1.4: Fallow	1.61		0.13	**1.74**	15.94	**17.68**											
		Sub Total	**1399.26**	**6.11**	**730.71**	**2136.08**	**32.26**	**2168.34**						**15.93**	**15.93**		**0.32**		**0.32**
	2:Barren/unculturable/ Wastelands	2.1: Barren Rocky																	
		2.2:Gullied / Ravinous Land								0.08					**0.08**				
		2.3: Rann																	
		2.4: Salt Affected Land																	
		2.5: Sandy Area	0.05			**0.05**		**0.05**					4.61		**4.61**				
		2.6: Scrub Land											0.06	532.41	**532.47**	0.21	23.84	9.83	**33.88**
		Sub Total	**0.05**			**0.05**		**0.05**		**0.08**			**4.67**	**532.41**	**537.16**	**0.21**	**23.84**	**9.83**	**33.88**
	3: Builtup	3.1: Mining														4.95			**4.95**
		3.2: Rural															468.41		**468.41**
		3.3: Urban																332.48	**332.48**
		Sub Total														**4.95**	**468.41**	**332.48**	**805.84**
	4: Forest	4.1: Deciduous		13.55		**13.55**		**13.55**								0.21			**0.21**
		4.2: Evergreen/Semi evergreen		90.61		**90.61**		**90.61**											
		4.3: Forest Plantation		2.39		**2.39**		**2.39**											
		4.4: Scrub Forest		12.86		**12.86**		**12.86**						68.91	**68.91**				
		4.5: Swamp / Mangroves																	
		Sub Total		**119.40**		**119.40**		**119.40**						**68.91**	**68.91**	**0.21**			**0.21**
	5: Grass / Grazing	5.1: Grass / Grazing																	
	6:Snow and Glacier	6.1: Snow and Glacier																	
	7: Wet lands / Water bodies	7.1: Inland Wetland	1.65			**1.65**		**1.65**											
		7.2: Coastal Wetland																	
		7.3: River/Stream/Canals	0.92			**0.92**		**0.92**											
		7.4: Water bodies	0.84			**0.84**		**0.84**											
		Sub Total	**3.41**			**3.41**		**3.41**											
	Grand Total		**1402.73**	**125.52**	**730.71**	**2258.95**	**32.26**	**2291.21**		**0.08**			**4.67**	**617.25**	**622.00**	**5.37**	**492.57**	**342.31**	**840.25**

Note: Totals may not match due to rounding off.

Annexure 1.3 Contd.

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			TRIPURA 2011-12													
			4: Forest						5: Grass / Grazing	6:Snow and Glacier	7: Wet lands / Water bodies					Grand Total
			4.1	4.2	4.3	4.4	4.5	Sub Total	5.1	6.1	7.1	7.2	7.3	7.4	Sub Total	
2005-06	1: Agriculture	1.1: Crop land														1388.16
		1.2: Current Shifting cultivation				58.53		**58.53**								80.89
		1.3: Plantation														756.38
		Farmland (FL) = 1.1+1.2+1.3				**58.53**		**58.53**								2225.44
		1.4: Fallow														17.68
		Sub Total				**58.53**		**58.53**								2243.12
	2:Barren/uncultura ble/ Wastelands	2.1: Barren Rocky														
		2.2:Gullied / Ravinous Land														0.08
		2.3: Rann														
		2.4: Salt Affected Land														
		2.5: Sandy Area														4.66
		2.6: Scrub Land												0.01	**0.01**	566.36
		Sub Total												**0.01**	**0.01**	571.10
	3: Builtup	3.1: Mining														4.95
		3.2: Rural														468.41
		3.3: Urban														332.48
		Sub Total														805.84
	4: Forest	4.1: Deciduous	1931.76			13.17		**1944.93**								1958.69
		4.2: Evergreen/Semi evergreen	4.54	3865.06		20.80		**3890.40**						0.20	**0.20**	3981.21
		4.3: Forest Plantation			307.26	1.10		**308.35**								310.74
		4.4: Scrub Forest	0.74	0.87		417.27		**418.88**								500.66
		4.5: Swamp / Mangroves														
		Sub Total	**1937.04**	**3865.94**	**307.26**	**452.33**		**6562.57**						**0.20**	**0.20**	6751.30
	5: Grass / Grazing	5.1: Grass / Grazing														
	6:Snow and Glacier	6.1: Snow and Glacier														
	7: Wet lands / Water bodies	7.1: Inland Wetland									5.52				**5.52**	7.17
		7.2: Coastal Wetland														
		7.3: River/Stream/Canals											50.57		**50.57**	51.49
		7.4: Water bodies												55.14	**55.14**	55.98
		Sub Total									**5.52**		**50.57**	**55.14**	**111.23**	114.64
	Grand Total		**1937.04**	**3865.94**	**307.26**	**510.86**		**6621.10**			**5.52**		**50.57**	**55.36**	**111.45**	10486.00

Note: Totals may not match due to rounding off.

Annexure 1.3

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			UTTAR PRADESH 2011-12																
			1: Agriculture						2:Barren/unculturable/ Wastelands							3: Builtup			
			1.1	1.2	1.3	FL	1.4	Sub Total	2.1	2.2	2.3	2.4	2.5	2.6	Sub Total	3.1	3.2	3.3	Sub Total
2005-06	1: Agriculture	1.1: Crop land	168343.45		202.82	**168546.27**	1395.40	**169941.67**		1.54		7.81		2.99	**12.35**	11.74	13.80	84.08	**109.62**
		1.2: Current Shifting cultivation																	
		1.3: Plantation	71.51		4303.37	**4374.88**	4.29	**4379.17**									0.05	1.62	**1.67**
		Farmland (FL) = 1.1+1.2+1.3	**168414.96**		**4506.19**	**172921.15**	**1399.69**	**174320.84**		**1.54**		**7.81**		**2.99**	**12.35**	**11.74**	**13.84**	**85.70**	**111.29**
		1.4: Fallow	8361.82		28.60	**8390.42**	3856.75	**12247.18**		0.55		32.45		29.78	**62.79**	0.31	0.27	24.83	**25.40**
		Sub Total	**176776.78**		**4534.79**	**181311.57**	**5256.45**	**186568.02**		**2.10**		**40.26**		**32.77**	**75.13**	**12.05**	**14.11**	**110.52**	**136.69**
	2:Barren/unculturable/ Wastelands	2.1: Barren Rocky							675.54						**675.54**	0.43			**0.43**
		2.2:Gullied / Ravinous Land	194.65		1.14	**195.79**	3.70	**199.48**		2873.25		5.16		36.02	**2914.43**			1.31	**1.31**
		2.3: Rann																	
		2.4: Salt Affected Land	783.39		1.64	**785.04**	7.50	**792.54**		2.09		3602.86	0.24	59.38	**3664.57**			5.35	**5.35**
		2.5: Sandy Area	21.26			**21.26**		**21.26**		0.30		0.13	9.07	6.05	**15.54**				
		2.6: Scrub Land	2913.01		10.03	**2923.03**	31.74	**2954.77**		5.00		98.06	0.10	6673.12	**6776.27**	3.06		14.38	**17.44**
		Sub Total	**3912.32**		**12.81**	**3925.12**	**42.93**	**3968.05**	**675.54**	**2880.64**		**3706.20**	**9.41**	**6774.56**	**14046.37**	**3.49**		**21.04**	**24.53**
	3: Builtup	3.1: Mining														95.86		0.07	**95.92**
		3.2: Rural														0.12	6943.99	51.42	**6995.53**
		3.3: Urban														1.06		4196.32	**4197.38**
		Sub Total														**97.05**	**6943.99**	**4247.80**	**11288.84**
	4: Forest	4.1: Deciduous	5.00		0.81	**5.81**	1.49	**7.30**				0.09			**0.09**	1.52		0.96	**2.48**
		4.2: Evergreen/Semi evergreen																	
		4.3: Forest Plantation																	
		4.4: Scrub Forest																	
		4.5: Swamp / Mangroves																	
		Sub Total	**5.00**		**0.81**	**5.81**	**1.49**	**7.30**				**0.09**			**0.09**	**1.52**		**0.96**	**2.48**
	5: Grass / Grazing	5.1: Grass / Grazing	**25.60**			**25.60**	**5.23**	**30.83**				**0.49**		**6.54**	**7.02**				
	6:Snow and Glacier	6.1: Snow and Glacier																	
	7: Wet lands / Water bodies	7.1: Inland Wetland	455.43		1.05	**456.49**	0.71	**457.20**				2.90		15.88	**18.78**				
		7.2: Coastal Wetland																	
		7.3: River/Stream/Canals	153.27		0.05	**153.32**	5.43	**158.76**		0.11		0.26	0.17	171.24	**171.79**			0.33	**0.33**
		7.4: Water bodies	12.56		0.20	**12.76**	1.21	**13.97**						0.81	**0.81**				
		Sub Total	**621.27**		**1.30**	**622.57**	**7.35**	**629.92**		**0.11**		**3.16**	**0.17**	**187.93**	**191.37**			**0.33**	**0.33**
	Grand Total		**181340.97**		**4549.71**	**185890.69**	**5313.44**	**191204.13**	**675.54**	**2882.85**		**3750.20**	**9.58**	**7001.80**	**14319.99**	**114.12**	**6958.10**	**4380.65**	**11452.87**

Note: Totals may not match due to rounding off.

Annexure 1.3 Contd.

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			UTTAR PRADESH 2011-12													
			4: Forest						5: Grass / Grazing	6:Snow and Glacier	7: Wet lands / Water bodies					Grand Total
			4.1	4.2	4.3	4.4	4.5	Sub Total	5.1	6.1	7.1	7.2	7.3	7.4	Sub Total	
2005-06	1: Agriculture	1.1: Crop land									27.24		361.74	1.77	**390.76**	**170454.40**
		1.2: Current Shifting cultivation														
		1.3: Plantation									0.50		0.54	0.48	**1.52**	**4382.35**
		Farmland (FL) = 1.1+1.2+1.3									**27.74**		**362.29**	**2.25**	**392.28**	**174836.75**
		1.4: Fallow							0.82		4.89		126.24	1.19	**132.32**	**12468.50**
		Sub Total							**0.82**		**32.63**		**488.53**	**3.44**	**524.60**	**187305.25**
	2:Barren/unculturable / Wastelands	2.1: Barren Rocky											0.54	7.71	**8.25**	**684.23**
		2.2:Gullied / Ravinous Land	1.33			1.34		**2.66**					1.41	0.75	**2.17**	**3120.05**
		2.3: Rann														
		2.4: Salt Affected Land							0.62		1.42		1.58	0.76	**3.76**	**4466.83**
		2.5: Sandy Area									0.24		55.84	1.42	**57.50**	**94.31**
		2.6: Scrub Land	0.36					**0.36**			11.25		110.18	40.60	**162.03**	**9910.88**
		Sub Total	**1.69**			**1.34**		**3.03**	**0.62**		**12.90**		**169.55**	**51.25**	**233.70**	**18276.30**
	3: Builtup	3.1: Mining														**95.92**
		3.2: Rural														**6995.53**
		3.3: Urban												0.02	**0.02**	**4197.40**
		Sub Total												**0.02**	**0.02**	**11288.86**
	4: Forest	4.1: Deciduous	8803.38		4.97	39.72		**8848.06**			0.12		14.31	3.11	**17.54**	**8875.48**
		4.2: Evergreen/Semi evergreen														
		4.3: Forest Plantation	0.91		69.92	1.40		**72.23**						0.04	**0.04**	**72.27**
		4.4: Scrub Forest	95.39		1.98	3345.95		**3443.32**					1.44		**1.44**	**3444.76**
		4.5: Swamp / Mangroves					188.29	**188.29**	1.00				1.81		**1.81**	**191.10**
		Sub Total	**8899.68**		**76.87**	**3387.07**	**188.29**	**12551.90**	**1.00**		**0.12**		**17.57**	**3.14**	**20.83**	**12583.61**
	5: Grass / Grazing	5.1: Grass / Grazing							**293.37**		**0.55**		**31.08**		**31.63**	**362.85**
	6:Snow and Glacier	6.1: Snow and Glacier														
	7: Wet lands / Water bodies	7.1: Inland Wetland	0.31					**0.31**			2255.35		12.71	10.20	**2278.26**	**2754.56**
		7.2: Coastal Wetland														
		7.3: River/Stream/Canals	0.08					**0.08**	1.40		0.54		6285.52	1.50	**6287.57**	**6619.93**
		7.4: Water bodies									3.67			1718.20	**1721.88**	**1736.65**
		Sub Total	**0.40**					**0.40**	**1.40**		**2259.57**		**6298.24**	**1729.91**	**10287.71**	**11111.14**
	Grand Total		**8901.77**		**76.87**	**3388.41**	**188.29**	**12555.33**	**297.20**		**2305.77**		**7004.96**	**1787.76**	**11098.49**	**240928.00**

Note: Totals may not match due to rounding off.

Annexure 1.3

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			UTTARAKHAND 2011-12																
			1: Agriculture						2:Barren/unculturable/ Wastelands							3: Builtup			
			1.1	1.2	1.3	FL	1.4	Sub Total	2.1	2.2	2.3	2.4	2.5	2.6	Sub Total	3.1	3.2	3.3	Sub Total
2005-06	1: Agriculture	1.1: Crop land	9526.19			**9526.19**	8.76	**9534.96**						0.27	**0.27**	0.31	0.15	2.48	**2.94**
		1.2: Current Shifting cultivation																	
		1.3: Plantation	3.18		170.67	**173.85**	0.21	**174.06**						0.10	**0.10**				
		Farmland (FL) = 1.1+1.2+1.3	**9529.38**		**170.67**	**9700.04**	**8.97**	**9709.01**						**0.37**	**0.37**	**0.31**	**0.15**	**2.48**	**2.94**
		1.4: Fallow	41.49			**41.49**	967.07	**1008.55**									0.13	0.13	**0.26**
		Sub Total	**9570.86**		**170.67**	**9741.53**	**976.04**	**10717.56**						**0.37**	**0.37**	**0.31**	**0.29**	**2.62**	**3.21**
	2:Barren/unculturable/ Wastelands	2.1: Barren Rocky							3086.20						**3086.20**				
		2.2:Gullied / Ravinous Land								4.27					**4.27**				
		2.3: Rann																	
		2.4: Salt Affected Land																	
		2.5: Sandy Area											7.09		**7.09**				
		2.6: Scrub Land	0.77			**0.77**	0.05	**0.82**						677.65	**677.65**				
		Sub Total	**0.77**			**0.77**	**0.05**	**0.82**	**3086.20**	**4.27**			**7.09**	**677.65**	**3775.20**				
	3: Builtup	3.1: Mining														19.61			**19.61**
		3.2: Rural															210.31		**210.31**
		3.3: Urban																382.59	**382.59**
		Sub Total														**19.61**	**210.31**	**382.59**	**612.50**
	4: Forest	4.1: Deciduous																0.38	**0.38**
		4.2: Evergreen/Semi evergreen												0.06	**0.06**	0.00			**0.00**
		4.3: Forest Plantation																	
		4.4: Scrub Forest																	
		4.5: Swamp / Mangroves																	
		Sub Total												**0.06**	**0.06**	**0.00**		**0.38**	**0.38**
	5: Grass / Grazing	5.1: Grass / Grazing	**0.11**			**0.11**		**0.11**											
	6:Snow and Glacier	6.1: Snow and Glacier							**2951.97**					**19.21**	**2971.18**				
	7: Wet lands / Water bodies	7.1: Inland Wetland																	
		7.2: Coastal Wetland																	
		7.3: River/Stream/Canals	7.04			**7.04**	1.00	**8.04**						0.65	**0.65**				
		7.4: Water bodies	0.02			**0.02**		**0.02**											
		Sub Total	**7.07**			**7.07**	**1.00**	**8.06**						**0.65**	**0.65**				
	Grand Total		**9578.81**		**170.67**	**9749.47**	**977.09**	**10726.56**	**6038.17**	**4.27**			**7.09**	**697.93**	**6747.46**	**19.91**	**210.59**	**385.58**	**616.09**

Note: Totals may not match due to rounding off.

Annexure 1.3 Contd.

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			UTTARAKHAND													
			2011-12													
			4: Forest						5: Grass / Grazing	6:Snow and Glacier	7: Wet lands / Water bodies					Grand Total
			4.1	4.2	4.3	4.4	4.5	Sub Total	5.1	6.1	7.1	7.2	7.3	7.4	Sub Total	
2005-06	1: Agriculture	1.1: Crop land											18.88	7.91	**26.80**	**9564.97**
		1.2: Current Shifting cultivation														
		1.3: Plantation											0.27		**0.27**	**174.42**
		Farmland (FL) = 1.1+1.2+1.3											**19.15**	**7.91**	**27.06**	**9739.39**
		1.4: Fallow											4.73	1.05	**5.78**	**1014.59**
		Sub Total											**23.88**	**8.96**	**32.84**	**10753.99**
	2:Barren/unculturable/ Wastelands	2.1: Barren Rocky							16.17	20.67			0.09		**0.09**	**3123.14**
		2.2:Gullied / Ravinous Land														**4.27**
		2.3: Rann														
		2.4: Salt Affected Land														
		2.5: Sandy Area														**7.09**
		2.6: Scrub Land											2.25	0.42	**2.68**	**681.15**
		Sub Total							**16.17**	**20.67**			**2.35**	**0.42**	**2.77**	**3815.64**
	3: Builtup	3.1: Mining														**19.61**
		3.2: Rural														**210.31**
		3.3: Urban														**382.59**
		Sub Total														**612.50**
	4: Forest	4.1: Deciduous	6564.19	0.55		0.08		**6564.81**					2.74	2.96	**5.69**	**6570.88**
		4.2: Evergreen/Semi evergreen		16130.40				**16130.40**		0.26			0.43	1.71	**2.14**	**16132.86**
		4.3: Forest Plantation			803.13	1.39		**804.52**					0.39		**0.39**	**804.91**
		4.4: Scrub Forest	0.01			2327.08		**2327.09**					2.74	0.37	**3.11**	**2330.20**
		4.5: Swamp / Mangroves					8.83	**8.83**								**8.83**
		Sub Total	**6564.20**	**16130.95**	**803.13**	**2328.55**	**8.83**	**25835.66**		**0.26**			**6.30**	**5.03**	**11.34**	**25847.69**
	5: Grass / Grazing	5.1: Grass / Grazing							**4146.72**	**3.76**						**4150.58**
	6:Snow and Glacier	6.1: Snow and Glacier							**248.86**	**3846.22**						**7066.26**
	7: Wet lands / Water bodies	7.1: Inland Wetland									0.05				**0.05**	**0.05**
		7.2: Coastal Wetland														
		7.3: River/Stream/Canals											1040.26	5.22	**1045.48**	**1054.16**
		7.4: Water bodies												182.10	**182.10**	**182.13**
		Sub Total									**0.05**		**1040.26**	**187.32**	**1227.64**	**1236.35**
	Grand Total		**6564.20**	**16130.95**	**803.13**	**2328.55**	**8.83**	**25835.66**	**4411.75**	**3870.91**	**0.05**		**1072.80**	**201.73**	**1274.58**	**53483.00**

Note: Totals may not match due to rounding off.

Annexure 1.3

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

WEST BENGAL

2011-12

LULC_ CLASSES			1: Agriculture						2:Barren/unculturable/ Wastelands							3: Builtup			
			1.1	1.2	1.3	FL	1.4	Sub Total	2.1	2.2	2.3	2.4	2.5	2.6	Sub Total	3.1	3.2	3.3	Sub Total
2005-06	1: Agriculture	1.1: Crop land	51448.49		100.14	**51548.63**	0.33	**51548.96**				0.52	2.38	2.27	**5.17**	44.70	4.76	116.84	**166.29**
		1.2: Current Shifting cultivation																	
		1.3: Plantation	0.18		2392.50	**2392.68**		**2392.68**								0.04	2.69	3.32	**6.05**
		Farmland (FL) = 1.1+1.2+1.3	**51448.66**		**2492.64**	**53941.31**	**0.33**	**53941.64**				**0.52**	**2.38**	**2.27**	**5.17**	**44.73**	**7.45**	**120.16**	**172.34**
		1.4: Fallow	78.60		0.25	**78.86**	41.46	**120.32**					2.28	1.52	**3.80**	1.96	0.18	1.80	**3.93**
		Sub Total	**51527.26**		**2492.90**	**54020.16**	**41.79**	**54061.96**				**0.52**	**4.66**	**3.79**	**8.97**	**46.69**	**7.63**	**121.96**	**176.27**
	2:Barren/unculturable / Wastelands	2.1: Barren Rocky							57.79						**57.79**	1.92		0.09	**2.00**
		2.2:Gullied / Ravinous Land	0.04			**0.04**		**0.04**		18.47					**18.47**			0.42	**0.42**
		2.3: Rann																	
		2.4: Salt Affected Land										0.18			**0.18**				
		2.5: Sandy Area	10.54		0.35	**10.89**		**10.89**					17.45	4.22	**21.67**	0.37	0.30		**0.67**
		2.6: Scrub Land	6.68		1.08	**7.76**		**7.76**						1411.95	**1411.95**	11.82	0.21	9.94	**21.97**
		Sub Total	**17.26**		**1.43**	**18.69**		**18.69**	**57.79**	**18.47**		**0.18**	**17.45**	**1416.18**	**1510.05**	**14.11**	**0.51**	**10.45**	**25.07**
	3: Builtup	3.1: Mining														182.19			**182.19**
		3.2: Rural														0.07	13227.82	2.86	**13230.75**
		3.3: Urban														0.18		2224.69	**2224.87**
		Sub Total														**182.44**	**13227.82**	**2227.54**	**15637.81**
	4: Forest	4.1: Deciduous	1.54			**1.54**		**1.54**	0.13				0.16		**0.28**	1.94	0.29	2.29	**4.52**
		4.2: Evergreen/Semi evergreen																	
		4.3: Forest Plantation																0.10	**0.10**
		4.4: Scrub Forest														0.85		0.64	**1.49**
		4.5: Swamp / Mangroves											1.63		**1.63**	0.01			**0.01**
		Sub Total	**1.54**			**1.54**		**1.54**	**0.13**				**1.78**		**1.91**	**2.80**	**0.29**	**3.03**	**6.11**
	5: Grass / Grazing	5.1: Grass / Grazing	**22.99**		**2.55**	**25.55**		**25.55**					**0.27**	**12.14**	**12.41**	**0.47**			**0.47**
	6:Snow and Glacier	6.1: Snow and Glacier																	
	7: Wet lands / Water bodies	7.1: Inland Wetland														0.06		3.35	**3.41**
		7.2: Coastal Wetland	0.04			**0.04**		**0.04**				0.15	0.30		**0.45**	0.09		0.11	**0.20**
		7.3: River/Stream/Canals	114.78		2.90	**117.67**	1.18	**118.85**					7.19	99.80	**106.99**	0.34	0.42	0.15	**0.91**
		7.4: Water bodies	0.70			**0.70**		**0.70**						0.70	**0.70**	4.01		0.38	**4.39**
		Sub Total	**115.52**		**2.90**	**118.41**	**1.18**	**119.59**				**0.15**	**7.49**	**100.50**	**108.13**	**4.50**	**0.42**	**3.99**	**8.91**
	Grand Total		**51684.57**		**2499.78**	**54184.35**	**42.97**	**54227.32**	**57.92**	**18.47**		**0.84**	**31.65**	**1532.60**	**1641.47**	**251.00**	**13236.66**	**2366.97**	**15854.63**

Note: Totals may not match due to rounding off.

Annexure 1.3 Contd.

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			WEST BENGAL												
			2011-12												
			4: Forest						5: Grass / Grazing	6:Snow and Glacier	7: Wet lands / Water bodies				Grand Total
			4.1	4.2	4.3	4.4	4.5	Sub Total	5.1	6.1	7.1	7.2	7.3	7.4	Sub Total	
2005-06	1: Agriculture	1.1: Crop land	13.38					**13.38**	0.52		0.19	0.52	100.09	157.45	**258.26**	**51992.58**
		1.2: Current Shifting cultivation														
		1.3: Plantation							0.28				4.82		**4.82**	**2403.82**
		Farmland (FL) = 1.1+1.2+1.3	**13.38**					**13.38**	**0.80**		**0.19**	**0.52**	**104.91**	**157.45**	**263.08**	**54396.40**
		1.4: Fallow	1.45					**1.45**	1.31				23.12	0.20	**23.32**	**154.13**
		Sub Total	**14.83**					**14.83**	**2.11**		**0.19**	**0.52**	**128.03**	**157.65**	**286.40**	**54550.53**
	2:Barren/unculturable / Wastelands	2.1: Barren Rocky	1.79					**1.79**					0.04		**0.04**	**61.63**
		2.2:Gullied / Ravinous Land	0.15					**0.15**								**19.07**
		2.3: Rann														
		2.4: Salt Affected Land														**0.18**
		2.5: Sandy Area	0.53		0.01		0.14	**0.67**	0.37			0.68	5.92	0.02	**6.62**	**40.89**
		2.6: Scrub Land	71.81					**71.81**					2.25		**2.25**	**1515.74**
		Sub Total	**74.28**		**0.01**		**0.14**	**74.42**	**0.37**			**0.68**	**8.21**	**0.02**	**8.91**	**1637.51**
	3: Builtup	3.1: Mining											0.28		**0.28**	**182.47**
		3.2: Rural											4.20		**4.20**	**13234.94**
		3.3: Urban	0.03					**0.03**					0.11		**0.11**	**2225.01**
		Sub Total	**0.03**					**0.03**					**4.59**		**4.59**	**15642.42**
	4: Forest	4.1: Deciduous	6224.59	0.32	18.60	40.97		**6284.48**				0.09	17.95	0.17	**18.20**	**6309.03**
		4.2: Evergreen/Semi evergreen		197.50				**197.50**					0.01		**0.01**	**197.51**
		4.3: Forest Plantation			647.05	5.22		**652.27**								**652.37**
		4.4: Scrub Forest	3.40		88.97	486.26		**578.64**					1.29	0.03	**1.32**	**581.45**
		4.5: Swamp / Mangroves					2470.75	**2470.75**			0.25	2.26	18.18	0.28	**20.97**	**2493.35**
		Sub Total	**6228.00**	**197.82**	**754.62**	**532.45**	**2470.75**	**10183.65**			**0.25**	**2.36**	**37.43**	**0.47**	**40.50**	**10233.71**
	5: Grass / Grazing	5.1: Grass / Grazing	**1.07**					**1.07**	**71.49**				**32.58**	**1.62**	**34.20**	**145.19**
	6:Snow and Glacier	6.1: Snow and Glacier														
	7: Wet lands / Water bodies	7.1: Inland Wetland									363.71		0.13		**363.85**	**367.26**
		7.2: Coastal Wetland					12.05	**12.05**				497.25	1.26	0.86	**499.37**	**512.11**
		7.3: River/Stream/Canals	6.76		0.57	5.23	4.53	**17.09**	35.55		1.58	5.89	4298.75	0.22	**4306.44**	**4585.83**
		7.4: Water bodies					0.37	**0.37**					0.34	1070.83	**1071.17**	**1077.33**
		Sub Total	**6.76**		**0.57**	**5.23**	**16.95**	**29.52**	**35.55**		**365.29**	**503.14**	**4300.49**	**1071.91**	**6240.83**	**6542.53**
	Grand Total		**6324.97**	**197.82**	**755.20**	**537.68**	**2487.83**	**10303.51**	**109.52**		**365.74**	**506.70**	**4511.33**	**1231.67**	**6615.43**	**88751.89**

Note: Totals may not match due to rounding off.

Annexure 1.3

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

ANDAMAN & NICOBAR ISLANDS

2011-12

LULC_ CLASSES			1: Agriculture						2:Barren/unculturable/ Wastelands							3: Builtup			
			1.1	1.2	1.3	FL	1.4	Sub Total	2.1	2.2	2.3	2.4	2.5	2.6	Sub Total	3.1	3.2	3.3	Sub Total
2005-06	1: Agriculture	1.1: Crop land	317.25			**317.25**		**317.25**											
		1.2: Current Shifting cultivation																	
		1.3: Plantation			73.75	**73.75**		**73.75**											
		Farmland (FL) = 1.1+1.2+1.3	**317.25**		**73.75**	**391.00**		**391.00**											
		1.4: Fallow																	
		Sub Total	**317.25**		**73.75**	**391.00**		**391.00**											
	2:Barren/unculturable/ Wastelands	2.1: Barren Rocky																	
		2.2:Gullied / Ravinous Land																	
		2.3: Rann																	
		2.4: Salt Affected Land																	
		2.5: Sandy Area											7.50		**7.50**				
		2.6: Scrub Land												1.09	**1.09**				
		Sub Total											**7.50**	**1.09**	**8.59**				
	3: Builtup	3.1: Mining																	
		3.2: Rural															1.44		**1.44**
		3.3: Urban																63.92	**63.92**
		Sub Total															**1.44**	**63.92**	**65.36**
	4: Forest	4.1: Deciduous																	
		4.2: Evergreen/Semi evergreen	0.08			**0.08**		**0.08**											
		4.3: Forest Plantation																	
		4.4: Scrub Forest																	
		4.5: Swamp / Mangroves	1.17			**1.17**		**1.17**											
		Sub Total	**1.25**			**1.25**		**1.25**											
	5: Grass / Grazing	5.1: Grass / Grazing																	
	6:Snow and Glacier	6.1: Snow and Glacier																	
	7: Wet lands / Water bodies	7.1: Inland Wetland																	
		7.2: Coastal Wetland																	
		7.3: River/Stream/Canals																	
		7.4: Water bodies																	
		Sub Total																	
	Grand Total		**318.50**		**73.75**	**392.25**		**392.25**					**7.50**	**1.09**	**8.59**		**1.44**	**63.92**	**65.36**

Note: Totals may not match due to rounding off.

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			ANDAMAN & NICOBAR ISLANDS 2011-12													
			4: Forest						5: Grass / Grazing	6:Snow and Glacier	7: Wet lands / Water bodies					Grand Total
			4.1	4.2	4.3	4.4	4.5	Sub Total	5.1	6.1	7.1	7.2	7.3	7.4	Sub Total	
2005-06	1: Agriculture	1.1: Crop land														317.25
		1.2: Current Shifting cultivation														
		1.3: Plantation														73.75
		Farmland (FL) = 1.1+1.2+1.3														391.00
		1.4: Fallow														
		Sub Total														391.00
	2:Barren/unculturable/ Wastelands	2.1: Barren Rocky														
		2.2:Gullied / Ravinous Land														
		2.3: Rann														
		2.4: Salt Affected Land														
		2.5: Sandy Area														7.50
		2.6: Scrub Land														1.09
		Sub Total														8.59
	3: Builtup	3.1: Mining														
		3.2: Rural														1.44
		3.3: Urban														63.92
		Sub Total														65.36
	4: Forest	4.1: Deciduous	1391.84	3.63		0.15		**1395.62**								1395.62
		4.2: Evergreen/Semi evergreen		5096.83				**5096.83**								5096.91
		4.3: Forest Plantation														
		4.4: Scrub Forest				272.80		**272.80**				0.65			**0.65**	273.45
		4.5: Swamp / Mangroves					820.88	**820.88**				0.06			**0.06**	822.10
		Sub Total	**1391.84**	**5100.46**		**272.94**	**820.88**	**7586.12**				**0.71**			**0.71**	7588.09
	5: Grass / Grazing	5.1: Grass / Grazing														
	6:Snow and Glacier	6.1: Snow and Glacier														
	7: Wet lands / Water bodies	7.1: Inland Wetland									18.86				**18.86**	18.86
		7.2: Coastal Wetland										114.10			**114.10**	114.10
		7.3: River/Stream/Canals											55.96		**55.96**	55.96
		7.4: Water bodies										0.25		6.80	**7.05**	7.05
		Sub Total									**18.86**	**114.34**	**55.96**	**6.80**	**195.96**	195.96
	Grand Total		**1391.84**	**5100.46**		**272.94**	**820.88**	**7586.12**			**18.86**	**115.05**	**55.96**	**6.80**	**196.68**	8249.00

Note: Totals may not match due to rounding off.

Annexure 1.3

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			CHANDIGARH 2011-12																
			1: Agriculture						2:Barren/unculturable/ Wastelands							3: Builtup			
			1.1	1.2	1.3	FL	1.4	Sub Total	2.1	2.2	2.3	2.4	2.5	2.6	Sub Total	3.1	3.2	3.3	Sub Total
2005-06	1: Agriculture	1.1: Crop land	12.85		0.09	**12.95**	0.18	**13.12**						0.10	**0.10**		0.11	0.57	**0.68**
		1.2: Current Shifting cultivation																	
		1.3: Plantation			0.93	**0.93**		**0.93**											
		Farmland (FL) = 1.1+1.2+1.3	**12.85**		**1.02**	**13.87**	**0.18**	**14.05**						**0.10**	**0.10**		**0.11**	**0.57**	**0.68**
		1.4: Fallow					0.90	**0.90**						0.11	**0.11**			2.81	**2.81**
		Sub Total	**12.85**		**1.02**	**13.87**	**1.08**	**14.96**						**0.21**	**0.21**		**0.11**	**3.38**	**3.49**
	2:Barren/unculturable/ Wastelands	2.1: Barren Rocky																	
		2.2:Gullied / Ravinous Land								0.07					**0.07**				
		2.3: Rann																	
		2.4: Salt Affected Land																	
		2.5: Sandy Area																	
		2.6: Scrub Land												1.02	**1.02**			0.07	**0.07**
		Sub Total								**0.07**				**1.02**	**1.09**			**0.07**	**0.07**
	3: Builtup	3.1: Mining												0.12	**0.12**				
		3.2: Rural															2.79		**2.79**
		3.3: Urban																80.23	**80.23**
		Sub Total												**0.12**	**0.12**		**2.79**	**80.23**	**83.02**
	4: Forest	4.1: Deciduous																0.16	**0.16**
		4.2: Evergreen/Semi evergreen																	
		4.3: Forest Plantation																	
		4.4: Scrub Forest																	
		4.5: Swamp / Mangroves																	
		Sub Total																**0.16**	**0.16**
	5: Grass / Grazing	5.1: Grass / Grazing																	
	6:Snow and Glacier	6.1: Snow and Glacier																	
	7: Wet lands / Water bodies	7.1: Inland Wetland																	
		7.2: Coastal Wetland																	
		7.3: River/Stream/Canals																	
		7.4: Water bodies																	
		Sub Total																	
	Grand Total		**12.85**		**1.02**	**13.87**	**1.08**	**14.96**		**0.07**				**1.35**	**1.42**		**2.90**	**83.85**	**86.75**

Note: Totals may not match due to rounding off.

Annexure 1.3 Contd.

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			CHANDIGARH 2011-12													
			4: Forest						5: Grass / Grazing	6:Snow and Glacier	7: Wet lands / Water bodies					Grand Total
			4.1	4.2	4.3	4.4	4.5	Sub Total	5.1	6.1	7.1	7.2	7.3	7.4	Sub Total	
2005-06	1: Agriculture	1.1: Crop land														13.91
		1.2: Current Shifting cultivation														
		1.3: Plantation														0.93
		Farmland (FL) = 1.1+1.2+1.3														14.84
		1.4: Fallow														3.82
		Sub Total														18.65
	2:Barren/unculturable/ Wastelands	2.1: Barren Rocky														
		2.2:Gullied / Ravinous Land														0.07
		2.3: Rann														
		2.4: Salt Affected Land														
		2.5: Sandy Area														
		2.6: Scrub Land												0.09	**0.09**	1.18
		Sub Total												**0.09**	**0.09**	1.25
	3: Builtup	3.1: Mining														0.12
		3.2: Rural														2.79
		3.3: Urban														80.23
		Sub Total														83.15
	4: Forest	4.1: Deciduous	8.59					**8.59**								8.75
		4.2: Evergreen/Semi evergreen														
		4.3: Forest Plantation														
		4.4: Scrub Forest														
		4.5: Swamp / Mangroves														
		Sub Total	**8.59**					**8.59**								8.75
	5: Grass / Grazing	5.1: Grass / Grazing														
	6:Snow and Glacier	6.1: Snow and Glacier														
	7: Wet lands / Water bodies	7.1: Inland Wetland									0.02				**0.02**	0.02
		7.2: Coastal Wetland														
		7.3: River/Stream/Canals											0.75		**0.75**	0.75
		7.4: Water bodies												1.43	**1.43**	1.43
		Sub Total									**0.02**		**0.75**	**1.43**	**2.19**	2.19
	Grand Total		**8.59**					**8.59**			**0.02**		**0.75**	**1.52**	**2.28**	114.00

Note: Totals may not match due to rounding off.

Annexure 1.3

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

DADRA & NAGAR HAVELI

2011-12

LULC_ CLASSES			1: Agriculture						2:Barren/unculturable/ Wastelands							3: Builtup			
			1.1	1.2	1.3	FL	1.4	Sub Total	2.1	2.2	2.3	2.4	2.5	2.6	Sub Total	3.1	3.2	3.3	Sub Total
2005-06	1: Agriculture	1.1: Crop land	112.51			**112.51**		**112.51**									1.21	7.03	**8.24**
		1.2: Current Shifting cultivation																	
		1.3: Plantation			15.31	**15.31**		**15.31**								0.11		0.74	**0.84**
		Farmland (FL) = 1.1+1.2+1.3	**112.51**		**15.31**	**127.82**		**127.82**								**0.11**	**1.21**	**7.76**	**9.08**
		1.4: Fallow					89.93	**89.93**										1.52	**1.52**
		Sub Total	**112.51**		**15.31**	**127.82**	**89.93**	**217.75**								**0.11**	**1.21**	**9.29**	**10.61**
	2:Barren/unculturable/ Wastelands	2.1: Barren Rocky																	
		2.2:Gullied / Ravinous Land																	
		2.3: Rann																	
		2.4: Salt Affected Land																	
		2.5: Sandy Area																	
		2.6: Scrub Land												42.36	**42.36**			0.86	**0.86**
		Sub Total												**42.36**	**42.36**			**0.86**	**0.86**
	3: Builtup	3.1: Mining														0.86			**0.86**
		3.2: Rural															0.52		**0.52**
		3.3: Urban																20.67	**20.67**
		Sub Total														**0.86**	**0.52**	**20.67**	**22.06**
	4: Forest	4.1: Deciduous																0.03	**0.03**
		4.2: Evergreen/Semi evergreen																	
		4.3: Forest Plantation																	
		4.4: Scrub Forest																	
		4.5: Swamp / Mangroves																	
		Sub Total																**0.03**	**0.03**
	5: Grass / Grazing	5.1: Grass / Grazing																	
	6:Snow and Glacier	6.1: Snow and Glacier																	
	7: Wet lands / Water bodies	7.1: Inland Wetland																	
		7.2: Coastal Wetland																	
		7.3: River/Stream/Canals																	
		7.4: Water bodies														0.06			**0.06**
		Sub Total														**0.06**			**0.06**
	Grand Total		**112.51**		**15.31**	**127.82**	**89.93**	**217.75**						**42.36**	**42.36**	**1.03**	**1.74**	**30.86**	**33.63**

Note: Totals may not match due to rounding off.

Annexure 1.3 Contd.

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			DADRA & NAGAR HAVELI 2011-12													
			4: Forest						5: Grass / Grazing	6:Snow and Glacier	7: Wet lands / Water bodies					Grand Total
			4.1	4.2	4.3	4.4	4.5	Sub Total	5.1	6.1	7.1	7.2	7.3	7.4	Sub Total	
2005-06	1: Agriculture	1.1: Crop land														120.75
		1.2: Current Shifting cultivation														
		1.3: Plantation														16.15
		Farmland (FL) = 1.1+1.2+1.3														136.90
		1.4: Fallow				0.05		**0.05**								91.51
		Sub Total				**0.05**		**0.05**								228.40
	2:Barren/unculturable/ Wastelands	2.1: Barren Rocky														
		2.2:Gullied / Ravinous Land														
		2.3: Rann														
		2.4: Salt Affected Land														
		2.5: Sandy Area														
		2.6: Scrub Land														43.22
		Sub Total														43.22
	3: Builtup	3.1: Mining														0.86
		3.2: Rural														0.52
		3.3: Urban														20.67
		Sub Total														22.06
	4: Forest	4.1: Deciduous	118.51	0.52				**119.03**								119.07
		4.2: Evergreen/Semi evergreen		6.33		0.54		**6.87**								6.87
		4.3: Forest Plantation														
		4.4: Scrub Forest				50.44		**50.44**								50.44
		4.5: Swamp / Mangroves														
		Sub Total	**118.51**	**6.85**		**50.98**		**176.34**								176.38
	5: Grass / Grazing	5.1: Grass / Grazing														
	6:Snow and Glacier	6.1: Snow and Glacier														
	7: Wet lands / Water bodies	7.1: Inland Wetland														
		7.2: Coastal Wetland														
		7.3: River/Stream/Canals											8.05		**8.05**	8.05
		7.4: Water bodies												12.82	**12.82**	12.88
		Sub Total											**8.05**	**12.82**	**20.87**	20.94
	Grand Total		**118.51**	**6.85**		**51.03**		**176.39**					**8.05**	**12.82**	**20.87**	**491.00**

Note: Totals may not match due to rounding off.

Annexure 1.3

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

DAMAN & DIU

2011-12

LULC_ CLASSES			1: Agriculture						2:Barren/unculturable/ Wastelands							3: Builtup			
			1.1	1.2	1.3	FL	1.4	Sub Total	2.1	2.2	2.3	2.4	2.5	2.6	Sub Total	3.1	3.2	3.3	Sub Total
2005-06	1: Agriculture	1.1: Crop land	37.67			**37.67**		**37.67**										0.04	**0.04**
		1.2: Current Shifting cultivation																	
		1.3: Plantation			9.03	**9.03**		**9.03**											
		Farmland (FL) = 1.1+1.2+1.3	**37.67**		**9.03**	**46.70**		**46.70**										**0.04**	**0.04**
		1.4: Fallow					10.62	**10.62**											
		Sub Total	**37.67**		**9.03**	**46.70**	**10.62**	**57.32**										**0.04**	**0.04**
	2:Barren/unculturable/ Wastelands	2.1: Barren Rocky																	
		2.2:Gullied / Ravinous Land								0.40					**0.40**				
		2.3: Rann																	
		2.4: Salt Affected Land										0.92			**0.92**				
		2.5: Sandy Area																	
		2.6: Scrub Land												7.37	**7.37**				
		Sub Total								**0.40**		**0.92**		**7.37**	**8.69**				
	3: Builtup	3.1: Mining														1.01			**1.01**
		3.2: Rural															0.78		**0.78**
		3.3: Urban																20.61	**20.61**
		Sub Total														**1.01**	**0.78**	**20.61**	**22.39**
	4: Forest	4.1: Deciduous																	
		4.2: Evergreen/Semi evergreen																	
		4.3: Forest Plantation																	
		4.4: Scrub Forest																	
		4.5: Swamp / Mangroves																	
		Sub Total																	
	5: Grass / Grazing	5.1: Grass / Grazing																	
	6:Snow and Glacier	6.1: Snow and Glacier																	
	: Wet lands / Water bodie	7.1: Inland Wetland																	
		7.2: Coastal Wetland																	
		7.3: River/Stream/Canals																	
		7.4: Water bodies																	
		Sub Total																	
	Grand Total		**37.67**		**9.03**	**46.70**	**10.62**	**57.32**		**0.40**		**0.92**		**7.37**	**8.69**	**1.01**	**0.78**	**20.65**	**22.43**

Note: Totals may not match due to rounding off.

Annexure 1.3 Contd.

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			DAMAN & DIU 2011-12													
			4: Forest						5: Grass / Grazing	6:Snow and Glacier	7: Wet lands / Water bodies					Grand Total
			4.1	4.2	4.3	4.4	4.5	Sub Total	5.1	6.1	7.1	7.2	7.3	7.4	Sub Total	
2005-06	1: Agriculture	1.1: Crop land														37.71
		1.2: Current Shifting cultivation														
		1.3: Plantation														9.03
		Farmland (FL) = 1.1+1.2+1.3														46.74
		1.4: Fallow														10.62
		Sub Total														57.36
	2:Barren/unculturable/ Wastelands	2.1: Barren Rocky														
		2.2:Gullied / Ravinous Land														0.40
		2.3: Rann														
		2.4: Salt Affected Land														0.92
		2.5: Sandy Area														
		2.6: Scrub Land														7.37
		Sub Total														8.69
	3: Builtup	3.1: Mining														1.01
		3.2: Rural														0.78
		3.3: Urban														20.61
		Sub Total														22.39
	4: Forest	4.1: Deciduous	1.07					**1.07**								1.07
		4.2: Evergreen/Semi evergreen														
		4.3: Forest Plantation														
		4.4: Scrub Forest														
		4.5: Swamp / Mangroves					0.89	**0.89**								0.89
		Sub Total	**1.07**				**0.89**	**1.96**								**1.96**
	5: Grass / Grazing	5.1: Grass / Grazing														
	6:Snow and Glacier	6.1: Snow and Glacier														
	: Wet lands / Water bodie	7.1: Inland Wetland									8.25				**8.25**	**8.25**
		7.2: Coastal Wetland										8.29			**8.29**	**8.29**
		7.3: River/Stream/Canals											4.51		**4.51**	**4.51**
		7.4: Water bodies												0.55	**0.55**	**0.55**
		Sub Total									**8.25**	**8.29**	**4.51**	**0.55**	**21.59**	**21.59**
	Grand Total		**1.07**				**0.89**	**1.96**			**8.25**	**8.29**	**4.51**	**0.55**	**21.59**	**112.00**

Note: Totals may not match due to rounding off.

Annexure 1.3

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			DELHI 2011-12																
			1: Agriculture						2:Barren/unculturable/ Wastelands							3: Builtup			
			1.1	1.2	1.3	FL	1.4	Sub Total	2.1	2.2	2.3	2.4	2.5	2.6	Sub Total	3.1	3.2	3.3	Sub Total
2005-06	1: Agriculture	1.1: Crop land	451.62		12.45	**464.08**	0.70	**464.78**									0.79	2.03	**2.83**
		1.2: Current Shifting cultivation																	
		1.3: Plantation			2.43	**2.43**		**2.43**											
		Farmland (FL) = 1.1+1.2+1.3	**451.62**		**14.89**	**466.51**	**0.70**	**467.21**									**0.79**	**2.03**	**2.83**
		1.4: Fallow	0.71		0.84	**1.56**	75.98	**77.53**										12.28	**12.28**
		Sub Total	**452.34**		**15.73**	**468.07**	**76.68**	**544.75**									**0.79**	**14.31**	**15.11**
	2:Barren/unculturable/ Wastelands	2.1: Barren Rocky							0.10						**0.10**				
		2.2:Gullied / Ravinous Land								6.06					**6.06**			0.69	**0.69**
		2.3: Rann																	
		2.4: Salt Affected Land										0.15			**0.15**				
		2.5: Sandy Area																	
		2.6: Scrub Land												62.24	**62.24**			3.27	**3.27**
		Sub Total							**0.10**	**6.06**		**0.15**		**62.24**	**68.55**			**3.96**	**3.96**
	3: Builtup	3.1: Mining			0.22	**0.22**		**0.22**								0.67			**0.67**
		3.2: Rural															49.90		**49.90**
		3.3: Urban																735.97	**735.97**
		Sub Total			**0.22**	**0.22**		**0.22**								**0.67**	**49.90**	**735.97**	**786.55**
	4: Forest	4.1: Deciduous																	
		4.2: Evergreen/Semi evergreen																	
		4.3: Forest Plantation																	
		4.4: Scrub Forest																	
		4.5: Swamp / Mangroves																	
		Sub Total																	
	5: Grass / Grazing	5.1: Grass / Grazing																	
	6:Snow and Glacier	6.1: Snow and Glacier																	
	7: Wet lands / Water bodies	7.1: Inland Wetland	0.11			**0.11**		**0.11**											
		7.2: Coastal Wetland																	
		7.3: River/Stream/Canals																	
		7.4: Water bodies																	
		Sub Total	**0.11**			**0.11**		**0.11**											
	Grand Total		**452.45**		**15.95**	**468.39**	**76.68**	**545.07**	**0.10**	**6.06**		**0.15**		**62.24**	**68.55**	**0.67**	**50.70**	**754.25**	**805.62**

Note: Totals may not match due to rounding off.

Annexure 1.3 Contd.

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			DELHI													
			2011-12													
			4: Forest						5: Grass / Grazing	6:Snow and Glacier	7: Wet lands / Water bodies					Grand Total
			4.1	4.2	4.3	4.4	4.5	Sub Total	5.1	6.1	7.1	7.2	7.3	7.4	Sub Total	
2005-06	1: Agriculture	1.1: Crop land											1.79		**1.79**	**469.40**
		1.2: Current Shifting cultivation														
		1.3: Plantation														**2.43**
		Farmland (FL) = 1.1+1.2+1.3											**1.79**		**1.79**	**471.83**
		1.4: Fallow	1.50					**1.50**					0.23		**0.23**	**91.54**
		Sub Total	**1.50**					**1.50**					**2.02**		**2.02**	**563.37**
	2:Barren/unculturable/ Wastelands	2.1: Barren Rocky														**0.10**
		2.2:Gullied / Ravinous Land														**6.75**
		2.3: Rann														
		2.4: Salt Affected Land														**0.15**
		2.5: Sandy Area														
		2.6: Scrub Land														**65.51**
		Sub Total														**72.52**
	3: Builtup	3.1: Mining														**0.89**
		3.2: Rural														**49.90**
		3.3: Urban														**735.97**
		Sub Total														**786.76**
	4: Forest	4.1: Deciduous	9.09					**9.09**								**9.09**
		4.2: Evergreen/Semi evergreen														
		4.3: Forest Plantation			0.38			**0.38**								**0.38**
		4.4: Scrub Forest				12.06		**12.06**								**12.06**
		4.5: Swamp / Mangroves														
		Sub Total	**9.09**		**0.38**	**12.06**		**21.53**								**21.53**
	5: Grass / Grazing	5.1: Grass / Grazing							**5.70**		**0.11**		**0.42**		**0.53**	**6.23**
	6:Snow and Glacier	6.1: Snow and Glacier														
	7: Wet lands / Water bodies	7.1: Inland Wetland									3.99				**3.99**	**4.10**
		7.2: Coastal Wetland														
		7.3: River/Stream/Canals											24.70		**24.70**	**24.70**
		7.4: Water bodies												3.78	**3.78**	**3.78**
		Sub Total									**3.99**		**24.70**	**3.78**	**32.48**	**32.59**
	Grand Total		**10.59**		**0.38**	**12.06**		**23.03**	**5.70**		**4.10**		**27.14**	**3.78**	**35.03**	**1483.00**

Note: Totals may not match due to rounding off.

Annexure 1.3

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			LAKSHADWEEP 2011-12																
			1: Agriculture						2:Barren/unculturable/ Wastelands								3: Builtup			
			1.1	1.2	1.3	FL	1.4	Sub Total	2.1	2.2	2.3	2.4	2.5	2.6	Sub Total	3.1	3.2	3.3	Sub Total
2005-06	1: Agriculture	1.1: Crop land																	
		1.2: Current Shifting cultivation																	
		1.3: Plantation																	
		Farmland (FL) = 1.1+1.2+1.3																	
		1.4: Fallow																	
		Sub Total																	
	2:Barren/unculturable/ Wastelands	2.1: Barren Rocky																	
		2.2:Gullied / Ravinous Land																	
		2.3: Rann																	
		2.4: Salt Affected Land																	
		2.5: Sandy Area																	
		2.6: Scrub Land																	
		Sub Total																	
	3: Builtup	3.1: Mining																	
		3.2: Rural															0.00		**0.00**
		3.3: Urban																0.46	**0.46**
		Sub Total															**0.00**	**0.46**	**0.46**
	4: Forest	4.1: Deciduous																	
		4.2: Evergreen/Semi evergreen																	
		4.3: Forest Plantation																	
		4.4: Scrub Forest																	
		4.5: Swamp / Mangroves																	
		Sub Total																	
	5: Grass / Grazing	5.1: Grass / Grazing																	
	6:Snow and Glacier	6.1: Snow and Glacier																	
	7: Wet lands / Water bodies	7.1: Inland Wetland																	
		7.2: Coastal Wetland																	
		7.3: River/Stream/Canals																	
		7.4: Water bodies																	
		Sub Total																	
	Grand Total																**0.00**	**0.46**	**0.46**

Note: Totals may not match due to rounding off.

Annexure 1.3 Contd.

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			LAKSHADWEEP 2011-12													
			4: Forest						5: Grass / Grazing	6:Snow and Glacier	7: Wet lands / Water bodies					Grand Total
			4.1	4.2	4.3	4.4	4.5	Sub Total	5.1	6.1	7.1	7.2	7.3	7.4	Sub Total	
2005-06	1: Agriculture	1.1: Crop land														
		1.2: Current Shifting cultivation														
		1.3: Plantation														
		Farmland (FL) = 1.1+1.2+1.3														
		1.4: Fallow														
		Sub Total														
	2:Barren/unculturable/ Wastelands	2.1: Barren Rocky														
		2.2:Gullied / Ravinous Land														
		2.3: Rann														
		2.4: Salt Affected Land														
		2.5: Sandy Area														
		2.6: Scrub Land														
		Sub Total														
	3: Builtup	3.1: Mining														
		3.2: Rural														**0.00**
		3.3: Urban														**0.46**
		Sub Total														**0.46**
	4: Forest	4.1: Deciduous														
		4.2: Evergreen/Semi evergreen														
		4.3: Forest Plantation														
		4.4: Scrub Forest														
		4.5: Swamp / Mangroves														
		Sub Total														
	5: Grass / Grazing	5.1: Grass / Grazing														
	6:Snow and Glacier	6.1: Snow and Glacier														
	7: Wet lands / Water bodies	7.1: Inland Wetland														
		7.2: Coastal Wetland										31.54			**31.54**	**31.54**
		7.3: River/Stream/Canals														
		7.4: Water bodies												0.00	**0.00**	**0.00**
		Sub Total										**31.54**		**0.00**	**31.54**	**31.54**
	Grand Total											**31.54**		**0.00**	**31.54**	**32.00**

Note: Totals may not match due to rounding off.

Annexure 1.3

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			PUDUCHERRY 2011-12																
			1: Agriculture						2:Barren/unculturable/ Wastelands							3: Builtup			
			1.1	1.2	1.3	FL	1.4	Sub Total	2.1	2.2	2.3	2.4	2.5	2.6	Sub Total	3.1	3.2	3.3	Sub Total
2005-06	1: Agriculture	1.1: Crop land	234.99			**234.99**	0.61	**235.60**									0.05	0.41	**0.46**
		1.2: Current Shifting cultivation																	
		1.3: Plantation			21.41	**21.41**		**21.41**										0.24	**0.24**
		Farmland (FL) = 1.1+1.2+1.3	**234.99**		**21.41**	**256.39**	**0.61**	**257.01**									**0.05**	**0.65**	**0.70**
		1.4: Fallow					65.83	**65.83**						0.05	**0.05**			1.76	**1.76**
		Sub Total	**234.99**		**21.41**	**256.39**	**66.45**	**322.84**						**0.05**	**0.05**		**0.05**	**2.41**	**2.46**
	2:Barren/unculturable/ Wastelands	2.1: Barren Rocky																	
		2.2:Gullied / Ravinous Land								0.04					**0.04**				
		2.3: Rann																	
		2.4: Salt Affected Land										0.10			**0.10**				
		2.5: Sandy Area											2.43		**2.43**				
		2.6: Scrub Land												8.19	**8.19**			0.09	**0.09**
		Sub Total								**0.04**		**0.10**	**2.43**	**8.19**	**10.75**			**0.09**	**0.09**
	3: Builtup	3.1: Mining														0.08			**0.08**
		3.2: Rural															34.70		**34.70**
		3.3: Urban																67.44	**67.44**
		Sub Total														**0.08**	**34.70**	**67.44**	**102.22**
	4: Forest	4.1: Deciduous																	
		4.2: Evergreen/Semi evergreen																	
		4.3: Forest Plantation																	
		4.4: Scrub Forest																	
		4.5: Swamp / Mangroves																	
		Sub Total																	
	5: Grass / Grazing	5.1: Grass / Grazing																	
	6:Snow and Glacier	6.1: Snow and Glacier																	
	: Wet lands / Water bodie	7.1: Inland Wetland																	
		7.2: Coastal Wetland																1.21	**1.21**
		7.3: River/Stream/Canals																	
		7.4: Water bodies	0.03			**0.03**		**0.03**										2.52	**2.52**
		Sub Total	**0.03**			**0.03**		**0.03**										**3.74**	**3.74**
	Grand Total		**235.02**		**21.41**	**256.42**	**66.45**	**322.87**		**0.04**		**0.10**	**2.43**	**8.24**	**10.80**	**0.08**	**34.75**	**73.68**	**108.51**

Note: Totals may not match due to rounding off.

Annexure 1.3 Contd.

Land Use Land Cover (LULC) Change Matrix

(Area in Sq. Km)

LULC_ CLASSES			PUDUCHERRY 2011-12													
			4: Forest						5: Grass / Grazing	6:Snow and Glacier	7: Wet lands / Water bodies					Grand Total
			4.1	4.2	4.3	4.4	4.5	Sub Total	5.1	6.1	7.1	7.2	7.3	7.4	Sub Total	
2005-06	1: Agriculture	1.1: Crop land										0.21		0.15	**0.37**	**236.43**
		1.2: Current Shifting cultivation														
		1.3: Plantation														**21.65**
		Farmland (FL) = 1.1+1.2+1.3										**0.21**		**0.15**	**0.37**	**258.08**
		1.4: Fallow										0.18			**0.18**	**67.82**
		Sub Total										**0.39**		**0.15**	**0.55**	**325.90**
	2:Barren/unculturable/ Wastelands	2.1: Barren Rocky														
		2.2:Gullied / Ravinous Land														**0.04**
		2.3: Rann														
		2.4: Salt Affected Land														**0.10**
		2.5: Sandy Area														**2.43**
		2.6: Scrub Land									0.86				**0.86**	**9.14**
		Sub Total									**0.86**				**0.86**	**11.70**
	3: Builtup	3.1: Mining														**0.08**
		3.2: Rural														**34.70**
		3.3: Urban														**67.44**
		Sub Total														**102.22**
	4: Forest	4.1: Deciduous	0.17					**0.17**								**0.17**
		4.2: Evergreen/Semi evergreen														
		4.3: Forest Plantation			0.03			**0.03**								**0.03**
		4.4: Scrub Forest														
		4.5: Swamp / Mangroves					1.70	**1.70**								**1.70**
		Sub Total	**0.17**		**0.03**		**1.70**	**1.90**								**1.90**
	5: Grass / Grazing	5.1: Grass / Grazing														
	6:Snow and Glacier	6.1: Snow and Glacier														
	7: Wet lands / Water bodie	7.1: Inland Wetland									0.04				**0.04**	**0.04**
		7.2: Coastal Wetland										7.06			**7.06**	**8.28**
		7.3: River/Stream/Canals											16.21		**16.21**	**16.21**
		7.4: Water bodies												23.19	**23.19**	**25.75**
		Sub Total									**0.04**	**7.06**	**16.21**	**23.19**	**46.51**	**50.28**
	Grand Total		**0.17**		**0.03**		**1.70**	**1.90**			**0.90**	**7.46**	**16.21**	**23.34**	**47.92**	**492.00**

Note: Totals may not match due to rounding off.

Annexure 2.1

State wise Forest Cover in India

(Sq.Kms.)

S.No.	States/ Union Territories	Very Dense Forest			Moderately Dense Forest			Open Forest			TOTAL FOREST COVER			Scrub		
		2004-05	2010-11	2015-16	2004-05	2010-11	2015-16	2004-05	2010-11	2015-16	2004-05	2010-11	2015-16	2004-05 *	2010-11	2015-16
1	Andhra Pradesh	820	366	1957	24805	13163	14051	19606	10828	12139	45231	24357	28147	9862	10465	9560
2	Arunachal Pradesh	20859	20828	20721	31632	31414	30955	14981	15079	15288	67472	67321	66964	128	121	247
3	Assam	1464	1444	2797	11653	11345	10192	14641	14882	15116	27758	27671	28105	146	182	217
4	Bihar	232	247	332	3253	3380	3260	3322	3664	3707	6807	7291	7299	129	115	228
5	Chhattisgarh	4166	4153	7064	35146	34865	32215	16617	16603	16268	55929	55621	55547	91	117	552
6	Goa	511	543	538	626	585	576	1019	1091	1115	2156	2219	2229	2	0	0
7	Gujarat	376	376	378	5319	5220	5200	8909	9057	9179	14604	14653	14757	1495	1492	2194
8	Haryana	26	27	28	488	453	452	1090	1106	1108	1604	1586	1588	165	150	154
9	Himachal Pradesh	3224	3224	3110	6386	6381	6705	5056	5078	5285	14666	14683	15100	383	298	308
10	Jammu & Kashmir	4298	4140	4075	8977	8760	8579	9414	9638	10587	22689	22538	23241	2821	2105	573
11	Jharkhand	2595	2587	2598	9892	9667	9686	10235	11219	11269	22722	23473	23553	733	670	669
12	Karnataka	1772	1777	4502	20196	20179	20444	14232	14176	12604	36200	36132	37550	3151	3216	4484
13	Kerala	1443	1529	1663	9404	9401	9407	6437	6992	9251	17284	17922	20321	70	29	23
14	Madhya Pradesh	6648	6632	6563	35035	34921	34571	36056	35969	36280	77739	77522	77414	2172	6389	6279
15	Maharashtra	8747	8720	8736	20847	20770	20652	21067	21142	21294	50661	50632	50682	4248	4157	4160
16	Manipur	689	728	908	5522	6094	6510	10741	10168	9928	16952	16990	17346	39	1	1111
17	Meghalaya	334	449	453	9527	9689	9386	7344	7150	7307	17205	17288	17146	181	372	505
18	Mizoram	134	138	131	6384	5900	5861	12082	13016	12194	18600	19054	18186	0	0	0
19	Nagaland	1280	1298	1279	5072	4736	4587	7313	7010	6623	13665	13044	12489	13	2	503
20	Odisha	7077	7042	6967	21421	21298	21370	20257	22007	23008	48755	50347	51345	4743	4424	4306
21	Punjab	0	0	8	738	736	806	922	1036	1023	1660	1772	1837	15	37	33
22	Rajasthan	72	72	78	4454	4424	4340	11486	11590	12154	16012	16086	16572	4527	4211	4579
23	Sikkim	500	500	1081	2161	2161	1575	696	697	688	3357	3358	3344	363	311	307
24	Tamil Nadu	2925	2948	3672	10189	10199	10979	10200	10697	11630	23314	23844	26281	1808	1212	657
25	Telangana		484	1596		12916	8738		8359	10085		21759	20419			3238
26	Tripura	113	109	656	4816	4641	5246	3244	3116	1824	8173	7866	7726	59	66	15
27	Uttar Pradesh	1626	1623	2617	4569	4550	4069	8151	8176	7993	14346	14349	14679	738	806	551
28	Uttarakhand	4762	4785	4969	14170	14111	12884	5561	5612	6442	24493	24508	24295	320	262	383
29	West Bengal	2992	2971	2994	4646	4146	4147	5332	9688	9706	12970	16805	16847	68	111	136
30	Andaman & Nicobar Islands	3779	3754	5678	2414	2413	684	470	544	380	6663	6711	6742	3	57	1
31	Chandigarh	1	1.36	1.36	10	9.66	13.82	6	6.24	6.38	17	17.26	21.56	1	0.56	0.02
32	Dadra & Nagar Haveli	0	0	0	115	114	80	101	99	127	216	213	207	0	1	5
33	Daman & Diu	0	0	1.40	1	1.87	5.82	5	7.4	13.27	6	9.27	20.49	0	0.96	0.27
34	Delhi	7	6.76	6.72	50	49.38	56.24	120	123.67	129.45	177	179.81	192.41	0.62	2.24	0.67
35	Lakshadweep	0	0	0	16	17.18	17.04	10	9.88	10.06	26	27.06	27.10	0	0	0
36	Puducherry	0	0	0	14	35.23	17.60	28	14.83	36.07	42	50.06	53.67	0	0	0
	TOTAL	**83472**	**83502**	**98158**	**319948**	**318745**	**308318**	**286751**	**295651**	**301797**	**690171**	**697898**	**708273**	**38475**	**41383**	**45979**

*Statewise total for scrub 2004-05 may not match with the scrub total(revised figure) for 2004-05 mentioned in Table 2.3

Source : India State of Forest Report (ISFR), Forest Survey of India (FSI)

Annexure 2.2

State wise Growing Stock in India

(million cum)

S.No.	States/ Union Territories	In Forest			In TOF			Total		
		2006-07	2010-11	2015-16	2006-07	2010-11	2015-16	2006-07	2010-11	2015-16
1	Andhra Pradesh	242.39	195.83	156.04	122.76	102.15	62.35	365.15	297.98	218.39
2	Arunachal Pradesh	492.54	439.51	420.79	79.20	87.94	90.70	571.73	527.45	511.49
3	Assam	174.11	151.90	133.13	42.44	38.09	30.20	216.55	189.99	163.32
4	Bihar	34.83	29.33	28.50	45.13	41.66	37.47	79.96	70.99	65.99
5	Chhattisgarh	335.47	347.11	323.66	72.64	76.31	86.35	408.11	423.42	410.01
6	Goa	7.39	10.33	9.52	4.00	3.91	3.83	11.39	14.24	13.35
7	Gujarat	48.28	50.62	52.03	122.12	109.01	113.99	170.40	159.63	166.02
8	Haryana	4.89	5.39	5.41	15.58	14.19	15.49	20.47	19.58	20.90
9	Himachal Pradesh	322.40	317.30	315.58	21.23	20.76	23.20	343.63	338.06	338.78
10	Jammu & Kashmir	255.12	232.18	232.84	149.46	145.06	146.08	404.59	377.25	378.92
11	Jharkhand	103.78	103.73	117.09	53.32	55.95	64.39	157.11	159.68	181.48
12	Karnataka	314.57	294.63	327.66	105.26	89.53	89.59	419.83	384.16	417.25
13	Kerala	142.72	152.27	167.09	50.05	45.79	51.90	192.77	198.06	218.98
14	Madhya Pradesh	249.66	251.00	285.61	86.49	82.98	97.47	336.15	333.98	383.09
15	Maharashtra	294.17	208.50	252.57	151.40	139.70	164.55	445.58	348.20	417.12
16	Manipur	69.24	50.29	53.20	9.61	9.37	7.75	78.85	59.66	60.95
17	Meghalaya	44.97	39.88	38.72	23.47	20.05	17.25	68.45	59.93	55.97
18	Mizoram	69.35	59.36	19.05	9.51	8.17	42.76	78.86	67.52	61.81
19	Nagaland	41.15	37.08	36.90	13.93	11.89	11.43	55.08	48.97	48.32
20	Odisha	285.32	235.77	258.01	77.21	74.49	81.50	362.53	310.26	339.52
21	Punjab	13.73	13.02	12.94	19.39	17.06	20.01	33.12	30.08	32.95
22	Rajasthan	34.64	34.09	46.27	90.46	79.17	81.87	125.10	113.26	128.14
23	Sikkim	19.82	23.84	26.28	2.53	2.42	1.95	22.35	26.26	28.23
24	Tamil Nadu	142.38	116.04	127.81	73.36	62.14	66.26	215.73	178.18	194.07
25	Telangana			60.46			39.66			100.12
26	Tripura	22.21	22.90	21.74	8.04	6.87	6.50	30.25	29.78	28.24
27	Uttar Pradesh	122.96	134.51	135.85	83.44	76.11	88.34	206.40	210.62	224.19
28	Uttarakhand	459.26	473.08	418.33	19.34	19.34	19.86	478.60	492.42	438.19
29	West Bengal	92.46	83.31	76.63	44.85	41.74	38.10	137.31	125.04	114.73
30	Andaman & Nicobar Islands	52.80	57.95	55.93	0.73	0.55	0.58	53.53	58.50	56.51
31	Chandigarh	0.29	0.26	0.32	0.10	0.08	0.10	0.39	0.34	0.42
32	Dadra & Nagar Haveli	3.93	1.81	1.85	0.85	0.72	0.79	4.79	2.53	2.64
33	Daman & Diu	0.01	0.00	0.00	0.11	0.10	0.12	0.11	0.11	0.12
34	Delhi	1.74	0.47	0.51	1.15	1.05	1.27	2.89	1.52	1.78
35	Lakshadweep	0.00	0.00	0.00	0.05	0.05	0.06	0.05	0.05	0.06
36	Puducherry	0.08	0.08	0.07	0.33	0.29	0.30	0.41	0.38	0.36
	TOTAL*	**4498.66**	**4173.36**	**4218.38**	**1599.57**	**1484.68**	**1604.00**	**6098.23**	**5658.05**	**5822.38**

* Statewise total(i.e column total) may not match with the TOTAL

Source : India State of Forest Report (ISFR), Forest Survey of India (FSI)

Annexure 2.3

State wise Carbon Stock in forest under different carbon pools for the year 2004-05

(000' tonnes)

S.No.	States/ Union Territories	Forest Cover (sq km)	Above ground biomass (AGB)	Below ground biomass (BGB)	Dead wood	Litter	Soil Organic Carbon (SOC)	TOTAL 2
1	Andhra Pradesh	45231	157184	60967	732	4851	174299	398033
2	Arunachal Pradesh	67472	234110	52489	3753	16080	656444	962876
3	Assam	27758	44543	10240	1050	5411	107680	168924
4	Bihar	6807	16431	6173	109	417	23861	46992
5	Chhattisgarh	55929	203701	67632	2407	6435	272032	552207
6	Goa	2156	4118	1097	91	311	11160	16776
7	Gujarat	14604	34842	12598	313	982	64769	113504
8	Haryana	1604	3946	1356	21	74	7285	12681
9	Himachal Pradesh	14666	63436	16718	525	2367	78178	161224
10	Jammu & Kashmir	22689	96096	26259	745	3106	115505	241711
11	Jharkhand	22722	82419	31876	423	1230	97987	213935
12	Karnataka	36200	116562	33784	1420	17056	270612	439433
13	Kerala	17284	59650	15207	862	6027	117794	199539
14	Madhya Pradesh	77739	260335	99435	1535	6990	314233	682529
15	Maharashtra	50661	141161	48813	1878	8681	278009	478542
16	Manipur	16952	26125	8545	503	3828	99152	138154
17	Meghalaya	17205	23191	6333	789	4924	113861	149098
18	Mizoram	18600	15851	3273	656	2743	75405	97928
19	Nagaland	13665	16578	4273	586	2547	105894	129878
20	Odisha	48755	147088	48749	1845	7541	217860	423082
21	Punjab	1660	4365	1613	24	58	7782	13842
22	Rajasthan	16012	32717	12806	202	641	42750	89115
23	Sikkim	3357	10512	3012	156	456	25595	39731
24	Tamil Nadu	23314	73105	24488	795	4695	108400	211483
25	Telangana							
26	Tripura	8173	14142	2909	515	1595	39756	58917
27	Uttar Pradesh	14346	41682	12620	388	1566	57358	113614
28	Uttarakhand	24493	106354	27499	1255	5655	144927	285689
29	West Bengal	12970	36558	11585	288	1762	69564	119757
30	Andaman & Nicobar Islands	6663	33031	10021	1321	3044	52848	100265
31	Chandigarh	17	44	15	0	1	78	139
32	Dadra & Nagar Haveli	216	523	124	13	44	918	1623
33	Daman & Diu	6	3	1	0	1	28	33
34	Delhi	177	199	45	2	9	564	818
35	Lakshadweep	26	50	*0	1	4	91	146
36	Puducherry	42	89	19	1	7	243	358
	TOTAL 1	**690171**	**2100739**	**662573**	**25201**	**121137**	**3752924**	**6662574**

*In Lakshadweep, most of the forest cover is of coconusnucifera for which there was no suitable ratio available for BGB and therefore left unaccounted.

Source : India State of Forest Report (ISFR), Forest Survey of India (FSI)

Note: a)Statewise total for different carbon pools(i.e column total) may not match with the Total 1

b)Carbon pools total for different states (i.e row total) may not match with the Total 2

Annexure 2.4

State wise Carbon Stock in forest under different carbon pools for the year 2015-16

(000' tonnes)

S.No.	States/ Union Territories	Forest Cover (sq km)	Above ground biomass (AGB)	Below ground biomass (BGB)	Dead wood	Litter	Soil Organic Carbon (SOC)	TOTAL
1	Andhra Pradesh	28147	100539	38585	568	4527	118471	262690
2	Arunachal Pradesh	66964	243462	53378	4305	16231	677163	994539
3	Assam	28105	47343	10824	1093	5240	112352	176852
4	Bihar	7299	19063	6707	138	625	28864	55397
5	Chhattisgarh	55547	206678	68159	2588	7628	275927	560980
6	Goa	2229	5153	1512	250	417	11684	19016
7	Gujarat	14757	32668	11719	322	993	64995	110697
8	Haryana	1588	3736	1269	20	74	7312	12411
9	Himachal Pradesh	15100	70655	18691	739	2511	83186	175782
10	Jammu & Kashmir	23241	112919	30083	1004	3529	128391	275926
11	Jharkhand	23553	86006	33173	438	1298	101967	222882
12	Karnataka	37550	128098	35045	2545	19745	289652	475085
13	Kerala	20321	74166	19245	1058	7436	153976	255881
14	Madhya Pradesh	77414	266040	101516	1654	7741	318713	695664
15	Maharashtra	50682	142651	48947	1986	9385	290052	493021
16	Manipur	17346	27253	8821	530	3909	102578	143091
17	Meghalaya	17146	25168	6835	881	5184	117772	155840
18	Mizoram	18186	15359	3173	633	2652	73224	95041
19	Nagaland	12489	16151	4150	666	2432	101661	125060
20	Odisha	51345	152525	50407	2108	9087	238776	452903
21	Punjab	1837	5095	1883	26	63	8971	16038
22	Rajasthan	16572	32558	12736	216	721	43429	89660
23	Sikkim	3344	13379	3735	211	585	30624	48534
24	Tamil Nadu	26281	84067	29252	1006	5579	109434	229338
25	Telangana	20419	72498	28388	333	3117	80639	184975
26	Tripura	7726	15674	3224	556	1613	42341	63408
27	Uttar Pradesh	14679	47752	14264	444	1824	60850	125134
28	Uttarakhand	24295	105173	26961	1316	5665	145549	284664
29	West Bengal	16847	45382	13916	434	2585	100884	163201
30	Andaman & Nicobar Islands	6742	39426	11901	2048	3702	57996	115073
31	Chandigarh	22	61	19	0	2	122	204
32	Dadra & Nagar Haveli	207	447	106	10	35	827	1425
33	Daman & Diu	20	11	2	0	2	76	91
34	Delhi	192	230	52	2	11	653	948
35	Lakshadweep	27	55	*0	1	5	100	161
36	Puducherry	54	108	23	1	8	311	451
	TOTAL	**708273**	**2237549**	**698701**	**30130**	**136161**	**3979522**	**7082063**

* In Lakshadweep, most of the forest cover is of Cocos nucifera for which no suitable ratio for BGB is available.

Source : India State of Forest Report (ISFR), Forest Survey of India (FSI)

Annexure- 3.1

State-wise Inland Water resources in the country

S. No.	States / Union Territories	Rivers & Canals (kms.)	Reservoirs (Lakh Ha)	Tanks & Ponds (Lakh Ha)	Flood plain Derelict Water bodies (Lakh Ha)	Brackish Water (Lakh Ha)	Total Water Bodies (Lakh Ha)
1	Andhra Pradesh*	11514	2.34	5.17	-	0.6	8.11
2	Arunachal Pradesh	2000	-	2.76	0.42	-	3.18
3	Assam	4820	0.02	0.23	1.1	-	1.35
4	Bihar	3200	0.6	0.95	0.05	-	1.6
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	4.26
8	Haryana	5000	Neg.	0.1	0.1	-	0.2
9	Himachal Pradesh	3000	0.42	0.01	-	-	0.43
10	Jammu & Kashmir	27781	0.07	0.17	0.06	-	0.3
11	Jharkhand	4200	0.94	0.29	-	-	1.23
12	Karnataka	9000	4.4	2.9	-	0.1	7.4
13	Kerala	3092	0.3	0.3	2.43	2.4	5.43
14	Madhya Pradesh	17088	2.27	0.6	-	-	2.87
15	Maharashtra	16000	2.99	0.72	-	0.12	3.83
16	Manipur	3360	0.01	0.05	0.04	-	0.1
17	Meghalaya	5600	0.08	0.02	Neg.	-	0.1
18	Mizoram	1395	-	0.02	-	-	0.02
19	Nagaland	1600	0.17	0.5	Neg.	-	0.67
20	Odisha	4500	2.56	1.23	1.8	4.3	9.89
21	Punjab	15270	Neg.	0.07	-	-	0.07
22	Rajasthan	5290	1.2	1.8	-	-	3
23	Sikkim	900	-	-	0.03	-	0.03
24	Tamil Nadu	7420	5.7	0.56	0.07	0.6	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	0.2	0.006	0.003	-	0.209
28	West Bengal	2526	0.17	2.76	0.42	2.1	5.45
29	Andaman & Nicobar Islands	-	0.00367	0.0016	-	0.33	0.33527
30	Chandigarh	2	-	Neg.	Neg.	-	0
31	Dadra & Nagar Haveli	54	0.05	-	-	-	0.05
32	Daman & Diu	12	-	Neg.	-	Neg.	0
33	Delhi	150	0.04	-	-	-	0.04
34	Lakshadweep	-	-	-	-	-	0
35	Puducherry	247	-	Neg.	0.01	Neg.	0.01
	Total**	**195095**	**29.26**	**24.33**	**7.98**	**11.55**	**73.12**

*including Telengana

Note: ** State-wise total (i.e Column total) may not match with the Total.

Source: Annual Report 2016-17, Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture & Farmers Welfare

Annexure- 3.2

River Basin Wise Drainage Area

S. No.	River Basin	Total Catchment Area (Sq. Km)	State wise Drainage Area (Sq. Km)
1	Indus (up to Border)	321289	Jammu & Kashmir (193762), Himachal Pradesh (51356), Punjab (50304), Rajasthan (15814), Haryana (9939), Chandigarh (114)
2	Ganga-Brahmputra-Meghna		
	a) Ganga	861452	Uttar Pradesh (241392), Madhya Pradesh (181066), Rajasthan (112496), Bihar (93580), West Bengal (71489), Uttarakhand (52988), Jharkhand (50389), Haryana (34343), Chhattisgarh (17908), Himachal Pradesh (4317), UT of Delhi (1484)
	b) Brahmaputra	194413	Arunachal Pradesh (81424), Assam (70634), West Bengal (12585), Meghalaya (11667), Nagaland (10803), Sikkim (7300)
	c)Barak & Others	41723	Meghalaya (10650), Manipur (9567), Mizoram (8866), Assam (7224), Tripura (4688), Nagaland (728)
3	Godavari	312812	Maharashtra (152199), Andhra Pradesh (73163), Chhattisgarh (60035), Odisha (17752), Madhya Pradesh (5220), Karnataka (4405), Puducherry (38)
4	Krishna	258948	Karnataka (113271), Andhra Pradesh (76252), Maharashtra (69425)
5	Cauvery	81155	Tamil Nadu & Puducherry (44016), Karnataka (34273), Kerala (2866)
6	Subernarekha	29196	Jharkhand (13685), Odisha (11964), West Bengal (3547)
7	Brahmani & Baitarani	51822	Odisha (34749), Jharkhand (15757), Chhattisgarh (1316)
8	Mahanadi	141589	Chhattisgarh (74982), Odisha (65580), Jharkhand (635), Maharashtra (238), Madhya Pradesh (154)
9	Pennar	55213	Andhra Pradesh (48276), Karnataka (6937)
10	Mahi	34842	Rajasthan (16453), Gujarat (11694), Madhya Pradesh (6695)
11	Sabarmati	21674	Gujarat (17550), Rajasthan (4124)
12	Narmada	98796	Madhya Pradesh (85172), Gujarat (11399), Maharashtra (1538), Chhattisgarh (687)
13	Tapi	65145	Maharashtra (51504), Madhya Pradesh (9804), Gujarat (3837)
14	West Flowing Rivers From Tapi to Tadri	55940	Maharashtra (32573), Gujarat (9666), Karnataka(9545), Goa (3610), Dadra & Nagar Haveli (489), Daman & Diu (57)
15	West Flowing Rivers From Tadri to Kanyakumari	56177	Kerala (35487), Karnataka (15550), Tamil Nadu (4702), Puducherry (438)
16	East Flowing Rivers Between Mahanadi & Pennar	86643	Andhra Pradesh (60863), Odisha (25780)
17	East Flowing Rivers Between Pennar And Kanyakumari	100139	Tamil Nadu (76926), Andhra Pradesh (16478), Karnataka (6256), Puducherry (479)
18	West Flowing Rivers Of Kutch and Saurashtra including Luni	321851	Rajasthan (193392), Gujarat (128420), Diu (39)
19	Area of Inland drainage in Rajasthan	139917.04	Rajasthan (121425.6), Haryana (18491.44)
20	Minor River Draining into Myanmar(Burma) & Bangladesh	36202	Manipur (14494), Mizoram (14091), Nagaland (5606), Tripura (2011)
	Total	**3366938.04**	

Source: River Basin Atlas of India (2012)

Annexure- 3.3

Per Capita Average Annual Availability of Water in India

S. No.	River Basin	Average Annual Water Resources Potential	Estimated Population (Million) #			Estimated per capita Average Annual Water Availability (M^3)		
		(BCM)$	2010	2025	2050	2010	2025	2050
1	Indus (up to Border)	73.3	57.69	69.2	81.41	1270.58	1059.25	900.38
2	Ganga-Brahmputra-Meghna							
	a) Ganga	525	494.47	593.04	697.69	1061.74	885.27	752.48
	b) Brahmaputra	537.2	40.07	48.06	56.54	13406.54	11177.69	9501.24
	c)Barak & Others	48.4	8.54	10.24	12.05	5667.45	4726.56	4016.59
3	Godavari	110.5	74.36	89.18	104.92	1486.01	1239.07	1053.18
4	Krishna	78.1	83.72	100.41	118.13	932.87	777.81	661.14
5	Cauvery	21.4	40.34	48.39	56.93	530.49	442.24	375.9
6	Subernarekha	12.4	12.94	15.52	18.26	958.27	798.97	679.08
7	Brahmani & Baitarani	28.5	13.49	16.18	19.04	2112.68	1761.43	1496.85
8	Mahanadi	66.9	36.63	43.93	51.68	1826.37	1522.88	1294.51
9	Pennar	6.3	13.36	16.02	18.85	471.56	393.26	334.22
10	Mahi	11	14.46	17.34	20.4	760.72	634.37	539.22
11	Sabarmati	3.8	14.46	17.34	20.4	262.79	219.15	186.27
12	Narmada	45.6	20.24	24.28	28.56	2252.96	1878.09	1596.64
13	Tapi	14.9	20.38	24.44	28.75	731.11	609.66	518.26
14	West Flowing Rivers From Tapi to Tadri	87.4	35.53	42.61	50.13	2459.89	2051.16	1743.47
15	West Flowing Rivers From Tadri to Kanyakumari	113.5	44.89	53.84	63.34	2528.4	2108.09	1791.92
16	East Flowing Rivers Between Mahanadi & Pennar	22.5	32.5	38.97	45.85	692.31	577.37	490.73
17	East Flowing Rivers Between Pennar And Kanyakumari	16.5	61.96	74.32	87.43	266.3	222.01	188.72
18	West Flowing Rivers Of Kutch and Saurashtra including Luni	15.1	30.43	36.5	42.94	496.22	413.69	351.65
19	Area of Inland drainage in Rajasthan	Negl.	9.78	11.73	13.79	-	-	-
20	Minor River Draining into Myanmar(Burma) & Bangladesh	31	2.07	2.48	2.91	14975.85	12500	10652.92
Total		**1869.3**	**1162.31**	**1394.02**	**1640**	**1608.26**	**1340.94**	**1139.82**

Source: B.P. Directorate, CWC.

Note: $: Reassessment of Water Resources Potential of India March 1993, CWC.

#: Report of the Standing Sub-Committee for assessment of availability and requirement of water for diverse uses in the country, August 2000

Annexure-3.4

State-wise Ultimate Irrigation Potential

('000 ha)

S.No.	States / Union Territories	Major & Medium	Minor			Total
			Surface	Ground	Sub-total	
1	Andhra Pradesh	5000	2300	3960	6260	11260
2	Arunachal Pradesh	0	150	18	168	168
3	Assam	970	1000	900	1900	2870
4	Bihar	5224	1544	4120	5664	10888
5	Chhattisgarh	1147	81	490	571	1718
6	Goa	62	25	29	54	116
7	Gujarat	3000	347	2756	3103	6103
8	Haryana	3000	50	1462	1512	4512
9	Himachal Pradesh	50	235	68	303	353
10	Jammu & Kashmir	250	400	708	1108	1358
11	Jharkhand	1276	354	830	1184	2460
12	Karnataka	2500	900	2574	3474	5974
13	Kerala	1000	800	879	1679	2679
14	Madhya Pradesh	4853	2111	9250	11361	16214
15	Maharashtra	4100	1200	3652	4852	8952
16	Manipur	135	100	369	469	604
17	Meghalaya	20	85	63	148	168
18	Mizoram	0	65	5	70	70
19	Nagaland	10	70	5	75	85
20	Odisha	3600	1000	4203	5203	8803
21	Punjab	3000	50	2917	2967	5967
22	Rajasthan	2750	600	1778	2378	5128
23	Sikkim	20	50	0	50	70
24	Tamil Nadu	1500	1200	2832	4032	5532
25	Tripura	100	100	81	181	281
26	Uttar Pradesh	12154	1186	16295	17481	29635
27	Uttarakhand	346	14	504	518	864
28	West Bengal	2300	1300	3318	4618	6918
	All States	58367	17317	64066	81383	139750
29	**All UTs**	98	20	26	46	144
	All-India	58465	17337	64092	81429	139894

Source: Water and Related Statistics, 2015, CWC

Annexure 3.5

State-wise Irrigation Potential Created and Utilized, under Major, Medium and Minor Irrigation Schemes

('000 Hectares)

S.No.	States / Union Territories	Minor Irrigation(2013-14)*							Major & Medium Irrigation Projects**		
		Ultimate Irrigation Potential	Ground Water		Surface Water		Total		Ultimate Irrigation Potential	Total Achievement Up to XI Plan (2012)	
			IPC	IPU	IPC	IPU	IPC	IPU		IPC	IPU
1	Andhra Pradesh	6260	1753.14	1387.33	949.05	615.36	2702.19	2002.69	5000	4803.72	3244.60
2	Arunachal Pradesh	168	0.31	0.18	103.58	92.87	103.90	93.04	0	1.20	0.80
3	Assam	1900	268.46	209.10	182.93	111.51	451.39	320.61	970	455.97	211.00
4	Bihar	5664	4325.54	3348.31	159.25	131.49	4484.79	3479.80	5224	3054.46	1814.90
5	Chhattisgarh	571	746.84	718.88	146.59	136.15	893.42	855.04	1147	1269.32	948.20
6	Goa	54	3.15	3.11	4.32	4.27	7.47	7.39	62	55.60	24.12
7	Gujarat	3103	5218.58	3607.09	229.92	200.69	5448.51	3807.78	3000	3679.09	1872.70
8	Haryana	1512	3289.23	3284.56	3.13	3.13	3292.36	3287.70	3000	2206.29	1893.30
9	Himachal Pradesh	303	54.14	46.44	150.81	137.91	204.95	184.35	50	30.50	8.20
10	Jammu & Kashmir	1108	13.54	13.39	167.94	161.57	181.47	174.95	250	325.61	180.61
11	Jharkhand	1184	200.35	168.94	156.52	131.92	356.88	300.86	1277	530.74	245.80
12	Karnataka	3474	2547.98	2424.71	565.19	536.78	3113.17	2961.49	2500	2965.82	2332.12
13	Kerala	1679	46.71	44.43	197.99	181.44	244.70	225.87	1000	715.70	591.40
14	Madhya Pradesh	11361	7141.49	6054.44	1402.41	1218.99	8543.90	7273.43	4853	2506.43	1173.30
15	Maharashtra	4852	5467.22	4980.09	1574.33	1274.37	7041.55	6254.46	4100	4128.76	2313.10
16	Manipur	469	0.00	0.00	21.74	18.44	21.74	18.44	135	158.55	81.40
17	Meghalaya	148	14.92	13.40	119.01	104.25	133.93	117.65	20	0.00	0.00
18	Mizoram	70	0.00	0.00	26.75	16.06	26.75	16.06	0	0.00	0.00
19	Nagaland	75	0.13	0.10	71.00	50.01	71.14	50.11	10	0.00	0.00
20	Odisha	5203	445.87	265.36	738.09	498.64	1183.97	764.00	3600	2147.40	1878.70
21	Punjab	2967	7621.18	6237.83	23.72	23.41	7644.90	6261.24	3000	2684.42	2510.50
22	Rajasthan	2378	7080.84	6379.40	214.78	188.06	7295.62	6567.46	2750	3167.15	2526.10
23	Sikkim	50	0.00	0.00	16.95	13.60	16.95	13.60	20	0.00	0.00
24	Tamil Nadu	4032	4245.63	3281.15	577.22	460.46	4822.85	3741.60	1500	1578.31	1556.90
25	Telangana		2073.75	1773.62	593.06	416.36	2666.81	2189.98		0.00	0.00
26	Tripura	181	17.01	14.10	115.62	95.11	132.64	109.20	100	29.31	10.50
27	Uttar Pradesh	17481	22546.53	16705.86	122.76	90.92	22669.28	16796.78	12154	9288.12	7824.40
28	Uttarakhand	518	371.98	355.49	319.88	294.61	691.86	650.10	346	289.00	191.10
29	West Bengal	4618	2109.61	1694.55	723.85	560.08	2833.46	2254.63	2300	1901.40	1573.60
30	Total of Union Territories	46	41.24	34.10	11.48	9.46	52.72	43.56	98	6.50	3.90
	Total***	81428	77645.36	63045.96	9689.91	7777.92	87335.26	70823.88	58465	47978.96	35011.15

Note:

* 5th Census of Minor Irrigation Schemes

** Compiled based on data available in Water & Related Statistics (2015), CWC

*** State-wise total (i.e Column total) may not match with the Total.

Source: Based on 5th Census of Minor Irrigation Schemes (2017),MoWR and Water & Related Statistics (2015), CWC

Annexure- 3.6

State-wise Live Storage Capacities of Large Dams/Reservoirs/ Projects

(As on 17th March 2015)

S.No.	States / Union Territories	Total Live Storage capacity (BCM)		
		Completed	Under Construction	Total**
1	Andhra Pradesh	7.513	6.98	14.493
2	Andhra Pradesh/Telangana	15.129	0	15.129
3	Telangana	6.066	0.082	6.148
4	Arunachal Pradesh	0.000006	0.241	0.241066
5	Assam	0.012	0.547	0.559
6	Bihar	2.613	0.436	3.049
7	Chhattisgarh	6.736	0.877	7.613
8	Goa	0.29	0	0.29
9	Gujarat	18.359	8.175	26.534
10	Himachal Pradesh	13.792	0.1	13.891
11	Jammu & Kashmir	0.029	0.0002	0.029
12	Jharkhand	2.436	6.039	8.475
13	Karnataka	31.896	0.736	32.632
14	Kerala	9.768	1.264	11.032
15	Madhya Pradesh	33.075	1.695	34.77
16	Maharashtra	37.358	10.736	48.094
17	Manipur	0.407	8.509	8.916
18	Meghalaya	0.479	0.007	0.486
19	Mizoram	0	0.663	0.663
20	Nagaland	1.22	0	1.22
21	Odisha	23.934	0.896	24.83
22	Punjab	2.402	0.00002	2.402
23	Rajasthan	9.708	0.443	10.152
24	Sikkim	0.007	0	0.007
25	Tamil Nadu	7.859	0.013	7.872
26	Tripura	0.312	0	0.312
27	Uttar Pradesh	14.263	0.724	14.987
28	Uttarakhand	5.67	1.613	7.283
29	West Bengal	2.027	0.184	2.212
30	Andaman & Nicobar Islands	0.019	0	0.019
	Grand Total*	**253.38**	**50.96**	**304.34**

Note: * State-wise total (i.e Column total) may not match with the Grand Total.

** Sum of Completed and Under Construction may not match with Total.

Source: Water & Related Statistics (2015), CWC

Annexure- 3.7

State-wise Annual Rainfall

(All figures in mm)

S. No.	States / Union Territories	2012	2013	2014	2015	2016
1	Andhra Pradesh	968.7	1062.3	687.6	940.7	760.4
2	Arunachal Pradesh	2760.9	2042.9	2403.2	2593.2	2706.9
3	Assam	2193.2	1797.7	1899	2155.3	2140.5
4	Bihar	924.2	1069.9	1061	874	1158
5	Chhattisgarh	1366.8	1418.3	1274.7	1136	1315.8
6	Goa	3048.9	3642.6	3491.2	2587.1	3065.1
7	Gujarat	460.6	1006.5	605.6	584.3	604.9
8	Haryana	307.9	452.2	301.3	426.8	392.9
9	Himachal Pradesh	1035.1	1216.9	1019.9	1223.2	921.5
10	Jammu & Kashmir	1116.5	1193.8	1278.4	1572.6	902.8
11	Jharkhand	1102	1253.6	1156.6	1085.6	1264
12	Karnataka	956.1	1235.6	1238.5	1024.9	849.9
13	Kerala	2187.5	3255.4	3046.4	2602.9	1870.9
14	Madhya Pradesh	1049.4	1451.4	891.2	1000.7	1203.2
15	Maharashtra	992.4	1409.8	1001.6	875.7	1272.8
16	Manipur	1647.8	1428.8	987.5	1329.1	1777.4
17	Meghalaya	3203.6	2448.4	3484.4	3870.8	2891.5
18	Mizoram	2142.7	1848.8	2029.9	2310.8	2233.5
19	Nagaland	1170	1350.9	1333.3	1308.3	1364.9
20	Odisha	1430.2	1632.4	1536.9	1210.1	1253.5
21	Punjab	338.9	586.6	382.7	512.6	444
22	Rajasthan	485.4	586.6	470.9	543.6	574.4
23	Sikkim	3006.9	2567.6	2627	2949.1	2756.6
24	Tamil Nadu	708.3	740.9	911.3	1201.9	534.6
25	Telangana				747.9	1043.4
26	Tripura	1882.2	2043.5	2015.7	2334.4	2381.9
27	Uttar Pradesh	746.3	995.2	616.4	596.7	801.7
28	Uttarakhand	1309.7	1735.4	1287.4	1247.6	1308.6
29	West Bengal	1566	1939.9	1483.5	1717	1702.6
30	Andaman & Nicobar Islands	3515.9	3757.8	2622.4	2904.4	2851.9
31	Chandigarh	879	1006.1	707	817.1	614.3
32	Dadra & Nagar Haveli	-	-	-	-	-
33	Daman & Diu		911.8	1821.1	637.1	1858
34	Delhi	451.9	706.8	416.4	757.7	567.9
35	Lakshadweep	1433.2	1426.3	1395	1640	1065.7
36	Puducherry	1119.6	1083.2	1330	1980.6	655.6

Source: Rainfall Statistics of India (2016, 2015, 2014, 2013, 2012), Indian Meteorological Department (IMD), Ministry of Science & Technology

Annexure- 3.8

State-Wise Decadal Water Level Fluctuation across Seasons

S. No.	States / Union Territories	Range in m				Peak proportion of wells showing a fall across seasons
		Rise		Fall		
		Min	Max	Min	Max	%
1	Andhra Pradesh	0	12.45	0.01	17.99	70
2	Arunachal Pradesh	0.04	12.9	0.01	4.18	50
3	Assam	0.01	7.36	0	7.34	66
4	Bihar	0.01	8.07	0	8.36	67
5	Chhattisgarh	0	18.09	0	14.71	74
6	Goa	0	6.73	0	7.5	61
7	Gujarat	0	17.9	0.01	19.81	64
8	Haryana	0.01	11.16	0	17.45	71
9	Himachal Pradesh	0	9.97	0.01	9.63	62
10	Jammu & Kashmir	0	10.48	0	6.81	73
11	Jharkhand	0.01	10.47	0	6.79	59
12	Karnataka	0	14.2	0	18.88	76
13	Kerala	0	16.28	0	13.96	85
14	Madhya Pradesh	0.01	13.83	0	15.97	62
15	Maharashtra	0	17.28	0	16.59	70
16	Meghalaya	0.07	5.03	0.01	3.32	83
17	Odisha	0	5.38	0.01	9.06	66
18	Punjab	0	13.29	0	15.55	89
19	Rajasthan	0	18.44	0	19.19	58
20	Tamil Nadu	0.01	12	0	16.85	92
21	Telangana	0.01	19.14	0	19.75	82
22	Tripura	0	3.25	0.01	2.37	25
23	Uttar Pradesh	0	12.06	0	13.5	85
24	Uttarakhand	0	8.46	0.1	9.26	70
25	West Bengal	0	18.28	0	19.28	66
26	Chandigarh	0.04	5.83	0.01	4.97	83
27	Dadra & Nagar Haveli	0.03	3.92	0.02	5.85	50
28	Daman & Diu	0.01	1.56	0.13	4.26	80
29	Delhi	0	10.02	0.01	8.44	77
30	Puducherry	0.07	1.49	0.1	2.11	100

Source: Based on Ground Water Year Book-India 2016-17, Central Ground Water Board, Ministry of Water Resources

Annexure- 3.9

Categorization of Blocks/ Mandals / Taluks in India

(Data for 2013)

S.No.	States / Union Territories	Total No. of Assessed Units	Safe		Semi-critical		Critical		Over-exploited		Saline	
			No	%	No	%	No	%	No	%	No	%
1	Andhra Pradesh	670	497	74	54	8	17	3	61	9	41	6
2	Arunachal Pradesh	11	11	100	0	0	0	0	0	0	0	0
3	Assam	27	27	100	0	0	0	0	0	0	0	0
4	Bihar	534	520	97	14	3	0	0	0	0	0	0
5	Chhattisgarh	146	125	86	18	12	2	1	1	1	0	0
6	Goa	12	12	100	0	0	0	0	0	0	0	0
7	Gujarat	223	175	78	9	4	6	3	23	10	10	4
8	Haryana	119	30	25	11	9	14	12	64	54	0	0
9	Himachal Pradesh	8	6	75	0	0	1	13	1	13	0	0
10	Jammu & Kashmir	22	22	100	0	0	0	0	0	0	0	0
11	Jharkhand	260	244	94	10	4	2	1	4	2	0	0
12	Karnataka	176	98	56	21	12	14	8	43	24	0	0
13	Kerala	152	131	86	18	12	2	1	1	1	0	0
14	Madhya Pradesh	313	228	73	58	19	2	1	25	8	0	0
15	Maharashtra	353	324	92	19	5	1	0	9	3	0	0
16	Manipur	9	9	100	0	0	0	0	0	0	0	0
17	Meghalaya	11	11	100	0	0	0	0	0	0	0	0
18	Mizoram	22	22	100	0	0	0	0	0	0	0	0
19	Nagaland	11	11	100	0	0	0	0	0	0	0	0
20	Odisha	314	308	98	0	0	0	0	0	0	6	2
21	Punjab	138	26	19	3	2	4	3	105	76	0	0
22	Rajasthan	248	44	18	28	11	9	4	164	66	3	1
23	Sikkim	-	-	-	-	-	-	-	-	-	-	-
24	Tamil Nadu	1139	429	38	212	19	105	9	358	31	35	3
25	Telangana	443	311	70	74	17	12	3	46	10	0	0
26	Tripura	39	39	100	0	0	0	0	0	0	0	0
27	Uttar Pradesh	820	603	74	45	5	59	7	113	14	0	0
28	Uttarakhand	18	16	89	1	6	1	6	0	0	0	0
29	West Bengal	268	191	71	76	28	1	0	0	0	0	0
30	Andaman & Nicobar Islands	34	34	100	0	0	0	0	0	0	0	0
31	Chandigarh	1	1	100	0	0	0	0	0	0	0	0
32	Dadra & Nagar Haveli	1	1	100	0	0	0	0	0	0	0	0
33	Daman & Diu	2	1	50	0	0	1	50	0	0	0	0
34	Delhi	27	5	19	7	26	0	0	15	56	0	0
35	Lakshadweep	9	6	67	3	33	0	0	0	0	0	0
36	Puducherry	4	2	50	0	0	0	0	1	25	1	25
Grand Total*		**6584**	**4520**	**69**	**681**	**10**	**253**	**4**	**1034**	**16**	**96**	**1**

Note:

Blocks- Bihar, Chattisgarh, Haryana, Jharkhand, Kerala, M.P., Manipur, Mizoam, Odisha, Punjab, Rajasthan, Tripura, UP, Uttarakhand, WB

Taluks -Karnataka, Goa, Gujarat, Maharashtra

Mandal - Andhra Pradesh, Telangana

Districts (Valley) - Arunachal Pradesh, Assam, Himachal Pradesh, Jammu & Kashmir, Meghalaya, Mizoram, Nagaland

Islands - Lakshdweep, Andaman & Nicobar Islands

Firka-Tamil Nadu

Region - Puducherry

UT - Chandigarh, Dadar & Nagar Haveli, Daman & Diu

Tehsil-Delhi

Note: *State-wise total (i.e Column total) may not match with the Grand Total.

Source: Dynamic Ground Water Resources of India (As on 31st March, 2013), Central Ground Water Board, Ministry of Water Resources

Annexure- 3.10

State-Wise Summary of Assessment Units

(All data in %)

S.No.	States / Union Territories	2004		2009		2011		2013	
		Safe	Over-Exploited	Safe	Over-Exploited	Safe	Over-Exploited	Safe	Over-Exploited
1	Andhra Pradesh	62	18	78	8	79	7	74	9
2	Arunachal Pradesh	100	0	100	0	100	0	100	0
3	Assam	100	0	100	0	100	0	100	0
4	Bihar	100	0	99	0	98	0	97	0
5	Chhattisgarh	95	0	90	0	86	1	86	1
6	Goa	100	0	100	0	100	0	100	0
7	Gujarat	43	14	70	12	77	11	78	10
8	Haryana	37	49	16	59	20	61	25	54
9	Himachal Pradesh	100	0	75	13	63	13	75	13
10	Jammu & Kashmir	100	0	100	0	100	0	100	0
11	Jharkhand	100	0	96	2	95	3	94	2
12	Karnataka	53	37	57	26	56	23	56	24
13	Kerala	67	3	83	1	83	1	86	1
14	Madhya Pradesh	85	8	72	8	70	8	73	8
15	Maharashtra	90	2	92	3	92	3	92	3
16	Manipur	100	0	100	0	100	0	100	0
17	Meghalaya	100	0	100	0	100	0	100	0
18	Mizoram	100	0	100	0	100	0	100	0
19	Nagaland	100	0	100	0	100	0	100	0
20	Odisha	98	0	98	0	98	0	98	0
21	Punjab	18	75	17	80	16	80	19	76
22	Rajasthan	14	59	13	69	10	71	18	66
23	Sikkim	100	0	100	0	100	0	-	-
24	Tamil Nadu	38	37	35	36	39	33	38	31
25	Telangana							70	10
26	Tripura	100	0	100	0	100	0	100	0
27	Uttar Pradesh	83	5	74	9	68	14	74	14
28	Uttarakhand	71	12	65	0	61	0	89	0
29	West Bengal	86	0	86	0	80	0	71	0
30	Andaman & Nicobar Islands	100	0	100	0	100	0	100	0
31	Chandigarh	100	0	100	0	100	0	100	0
32	Dadra & Nagar Haveli	100	0	100	-	100	0	100	0
33	Daman & Diu	0	50	0	50	0	50	50	0
34	Delhi	22	78	7	74	7	67	19	56
35	Lakshadweep	67	0	56	0	67	0	67	0
36	Puducherry	50	25	50	25	50	25	50	25
	All India	71	15	73	14	69	16	69	16

Source: Dynamic Ground Water Resources of India (As on 31st March, 2004, 2009, 2011 and 2013), Central Ground Water Board, Ministry of Water Resources

Annexure 3.11

State-Wise Summary of Improved & Deteriorated Assessment Units during 2011-13

S.No.	States / Union Territories	Improved	Deteriorated	No Change
1	Andhra Pradesh	9	70	576
2	Arunachal Pradesh	0	0	11
3	Assam	0	0	27
4	Bihar	3	5	525
5	Chhattisgarh	0	0	146
6	Goa	0	0	12
7	Gujarat	5	0	218
8	Haryana	27	11	77
9	Himachal Pradesh	1	0	7
10	Jammu & Kashmir	0	0	14
11	Jharkhand	5	6	196
12	Karnataka*	-	-	-
13	Kerala	11	6	135
14	Madhya Pradesh	13	2	298
15	Maharashtra	5	5	343
16	Manipur	0	0	8
17	Meghalaya	0	0	7
18	Mizoram	0	0	22
19	Nagaland	0	0	8
20	Odisha	0	0	309
21	Punjab	11	3	124
22	Rajasthan	39	9	193
23	Sikkim	-	-	-
24	Tamil Nadu	82	108	935
25	Telangana	27	63	353
26	Tripura	0	0	39
27	Uttar Pradesh	87	31	704
28	Uttarakhand	6	1	11
29	West Bengal	1	24	243
30	Andaman & Nicobar Islands	0	0	34
31	Chandigarh	0	0	1
32	Dadra & Nagar Haveli	0	0	1
33	Daman & Diu	2	0	0
34	Delhi	9	4	14
35	Lakshadweep	0	1	8
36	Puducherry	0	0	4
	Grand Total	343	349	5603

*Karnataka: In 2011, the Ground water Resources assessment was carried out with Command and Non Command areas as Assessment Units. However, during 2013 assessment the same has been done Taluk wise. Therefore, comparison of categorization of Assessment units could not be made.

Source: Dynamic Ground Water Resources of India (As on 31st March, 2013), Central Ground Water Board, Ministry of Water Resources

Annexure- 3.12

State-Wise Ground Water Resources Availability, Utilization and Stage of Development

(As on March 2004)

(In BCM)

S.No.	States / Union Territories	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	Andhra Pradesh	36.5	3.55	32.95	13.88	1.02	14.9	45
2	Arunachal Pradesh	2.56	0.26	2.3	0.0008	0	0.0008	0.04
3	Assam	27.23	2.34	24.89	4.85	0.59	5.44	22
4	Bihar	29.19	1.77	27.42	9.39	1.37	10.77	39
5	Chhattisgarh	14.93	1.25	13.68	2.31	0.48	2.8	20
6	Goa	0.29	0.02	0.27	0.04	0.03	0.07	27
7	Gujarat	15.81	0.79	15.02	10.49	0.99	11.49	76
8	Haryana	9.31	0.68	8.63	9.1	0.35	9.45	109
9	Himachal Pradesh	0.43	0.04	0.39	0.09	0.03	0.12	30
10	Jammu & Kashmir	2.7	0.27	2.43	0.1	0.24	0.33	14
11	Jharkhand	5.58	0.33	5.25	0.7	0.38	1.06	20
12	Karnataka	15.93	0.63	15.3	9.75	0.97	10.71	70
13	Kerala	6.84	0.61	6.23	1.82	1.1	2.92	47
14	Madhya Pradesh	37.19	1.86	35.33	16.08	1.04	17.12	48
15	Maharashtra	32.96	1.75	31.21	14.24	0.85	15.09	48
16	Manipur	0.38	0.04	0.34	0.002	0.0005	0.002	0.65
17	Meghalaya	1.15	0.12	1.04	0	0.002	0.002	0.18
18	Mizoram	0.04	0.004	0.04	0	0.0004	0.0004	0.9
19	Nagaland	0.36	0.04	0.32	0	0.009	0.009	3
20	Odisha	23.09	2.08	21.01	3.01	0.84	3.85	18
21	Punjab	23.78	2.33	21.44	30.34	0.83	31.16	145
22	Rajasthan	11.56	1.18	10.38	11.6	1.39	12.99	125
23	Sikkim	0.08	0	0.08	0	0.01	0.01	16
24	Tamil Nadu	23.07	2.31	20.76	16.77	0.88	17.65	85
25	Tripura	2.19	0.22	1.97	0.08	0.09	0.17	9
26	Uttar Pradesh	76.35	6.17	70.18	45.36	3.42	48.78	70
27	Uttarakhand	2.27	0.17	2.1	1.34	0.05	1.39	66
28	West Bengal	30.36	2.9	27.46	10.83	0.81	11.65	42
29	Andaman & Nicobar Islands	0.33	0.005	0.32	0	0.01	0.01	4
30	Chandigarh	0.023	0.002	0.02	0	0	0	0
31	Dadra & Nagar Haveli	0.063	0.003	0.06	0.001	0.008	0.009	14
32	Daman & Diu	0.009	0.0004	0.008	0.007	0.002	0.009	107
33	Delhi	0.3	0.02	0.28	0.2	0.28	0.48	170
34	Lakshadweep	0.012	0.009	0.004	0	0.002	0.002	63
35	Puducherry	0.16	0.016	0.144	0.121	0.03	0.151	105
	Grand Total*	433.02	33.77	399.25	212.5	18.1	230.59	58

Note: *State-wise total (i.e Column total) may not match with the Grand Total.

** Sum of Irrigation and Domestic & Industrial Uses may not match with Total.

Source: Ground Water Year Book- India 2009-2010, Central Ground Water Board, Ministry of Water Resources

Stage of Development: Over 100%

Stage of Development: 50-100%

Stage of Development: 0-50%

Annexure- 3.12

State-Wise Ground Water Resources Availability, Utilization and Stage of Development

(As on March 2009)

(In BCM)

S.No.	States / Union Territories	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	Andhra Pradesh	33.83	3.07	30.76	12.61	1.54	14.15	46
2	Arunachal Pradesh	4.45	0.45	4.01	0.002	0.001	0.003	0.07
3	Assam	30.35	2.537	27.81	5.333	0.69	6.026	22
4	Bihar	28.63	2.42	26.21	9.79	1.56	11.36	43
5	Chhattisgarh	12.22	0.64	11.58	3.08	0.52	3.6	31
6	Goa	0.221	0.088	0.133	0.014	0.03	0.044	33
7	Gujarat	18.43	1.08	17.35	11.93	1.05	12.99	75
8	Haryana	10.48	0.68	9.8	11.71	0.72	12.43	127
9	Himachal Pradesh	0.59	0.06	0.53	0.23	0.08	0.31	58
10	Jammu & Kashmir	3.7	0.37	3.33	0.15	0.58	0.73	22
11	Jharkhand	5.96	0.55	5.41	1.17	0.44	1.61	30
12	Karnataka	16.81	2	14.81	9.01	1	10.01	68
13	Kerala	6.62	0.59	6.03	1.3	1.5	2.81	47
14	Madhya Pradesh	33.95	1.7	32.25	16.66	1.33	17.99	56
15	Maharashtra	35.73	1.93	33.81	15.91	1.04	16.95	50
16	Manipur	0.44	0.04	0.4	0.0033	0.0007	0.004	1
17	Meghalaya	1.2343	0.1234	1.1109	0.0015	0.0002	0.0017	0.15
18	Mizoram	0.044	0.004	0.039	0	0.0004	0.0004	1
19	Nagaland	0.42	0.04	0.38	-	0.008	0.008	2.14
20	Odisha	17.78	1.09	16.69	3.47	0.89	4.36	26
21	Punjab	22.56	2.21	20.35	33.97	0.69	34.66	170
22	Rajasthan	11.86	1.07	10.79	12.86	1.65	14.52	135
23	Sikkim	-	-	0.046	0.003	0.007	0.01	21
24	Tamil Nadu	22.94	2.29	20.65	14.71	1.85	16.56	80
25	Tripura	2.97	0.23	2.74	0.09	0.07	0.16	6
26	Uttar Pradesh	75.25	6.68	68.57	46	3.49	49.48	72
27	Uttarakhand	2.17	0.1	2.07	1.01	0.03	1.05	51
28	West Bengal	30.5	2.92	27.58	10.11	0.79	10.91	40
29	Andaman & Nicobar Islands	0.31	0.012	0.298	0.0006	0.01	0.011	4
30	Chandigarh	0.022	0.002	0.02	0	0	0	0
31	Dadra & Nagar Haveli	0.059	0.003	0.056	0.001	0.007	0.009	15
32	Daman & Diu	0.012	0.001	0.011	0.008	0.003	0.011	99
33	Delhi	0.31	0.02	0.29	0.14	0.26	0.4	138
34	Lakshadweep	0.0105	0.007	0.0035	0	0.0026	0.0026	74
35	Puducherry	0.171	0.017	0.154	0.121	0.029	0.15	98
	Grand Total*	431.03	35.03	396.06	221.42	21.89	243.32	61

Note: *State-wise total (i.e Column total) may not match with the Grand Total.

** Sum of Irrigation and Domestic & Industrial Uses may not match with Total.

Source: Ground Water Year Book- India 2011-2012, Central Ground Water Board, Ministry of Water Resources

Stage of Development: Over 100%

Stage of Development: 50-100%

Stage of Development: 0-50%

Annexure-3.12

State-Wise Ground Water Resources Availability, Utilization and Stage of Development

(As on March 2011)

(In BCM)

S. No.	States / Union Territories	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	Andhra Pradesh	35.89	3.32	32.57	13.18	1.33	14.51	45
2	Arunachal Pradesh	4.51	0.45	4.06	0.002	0.001	0.003	0.08
3	Assam	28.52	2.73	25.79	2.86	0.64	3.49	14
4	Bihar	29.34	2.47	26.86	10.25	1.7	11.95	44
5	Chhattisgarh	12.42	0.79	11.63	3.43	0.62	4.05	35
6	Goa	0.24	0.1	0.145	0.01	0.03	0.04	28
7	Gujarat	18.57	0.98	17.59	10.75	1.11	11.86	67
8	Haryana	10.78	0.99	9.79	12.35	0.71	13.06	133
9	Himachal Pradesh	0.56	0.03	0.53	0.25	0.13	0.38	71
10	Jammu & Kashmir	4.25	0.43	3.83	0.2	0.61	0.81	21
11	Jharkhand	6.31	0.55	5.76	1.31	0.55	1.86	32
12	Karnataka	17.03	2.22	14.81	8.59	0.82	9.41	64
13	Kerala	6.69	0.61	6.07	1.3	1.53	2.84	47
14	Madhya Pradesh	35.04	1.75	33.29	17.48	1.35	18.83	57
15	Maharashtra	33.95	1.8	32.15	16.15	1.03	17.18	53
16	Manipur	0.44	0.04	0.4	0.0033	0.0007	0.004	1.02
17	Meghalaya	1.78	0.18	1.6	0.0015	0.0002	0.0017	0.08
18	Mizoram	0.03	0.003	0.027	0	0.001	0.001	3.52
19	Nagaland	0.62	0.062	0.55	0	0.03	0.03	6.13
20	Odisha	17.78	1.09	16.69	3.81	0.92	4.73	28
21	Punjab	22.53	2.21	20.32	34.17	0.71	34.88	172
22	Rajasthan	11.94	1.11	10.83	13.13	1.71	14.84	137
23	Sikkim	-	-	0.044	0.003	0.009	0.011	26
24	Tamil Nadu	21.53	2.15	19.38	13.17	1.76	14.93	77
25	Tripura	2.587	0.229	2.358	0.093	0.069	0.163	7
26	Uttar Pradesh	77.19	5.53	71.66	48.74	4.04	52.78	74
27	Uttarakhand	2.04	0.04	2	1.1	0.03	1.13	57
28	West Bengal	29.25	2.67	26.58	9.72	0.97	10.69	40
29	Andaman & Nicobar Islands	0.308	0.022	0.286	0.001	0.012	0.013	4.44
30	Chandigarh	0.022	0.002	0.019	0	0	0	0
31	Dadra & Nagar Haveli	0.062	0.003	0.059	0.007	0.006	0.013	22
32	Daman & Diu	0.018	0.001	0.017	0.014	0.002	0.016	97
33	Delhi	0.31	0.02	0.29	0.14	0.25	0.39	137
34	Lakshadweep	0.011	0.007	0.0035	0	0.0023	0.0023	67
35	Puducherry	0.189	0.019	0.17	0.124	0.029	0.153	90
	Grand Total*	432.72	34.6	398.16	222.36	22.71	245.06	62

Note: *State-wise total (i.e Column total) may not match with the Grand Total.

** Sum of Irrigation and Domestic & Industrial Uses may not match with Total.

Source: Ground Water Year Book- India 2015-2016, Central Ground Water Board, Ministry of Water Resources

Stage of Development: Over 100%

Stage of Development: 50-100%

Stage of Development: 0-50%

Annexure- 3.12

State-Wise Ground Water Resources Availability, Utilization and Stage of Development

(As on 31st March 2013)

(In BCM)

S. No.	States / Union Territories	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	Andhra Pradesh	20.39	1.91	18.48	7.29	0.81	8.1	44
2	Arunachal Pradesh	4.433	0.443	3.99	0.002	0.007	0.01	0.23
3	Assam	32.11	3.21	28.9	4.06	0.68	4.74	16
4	Bihar	31.31	2.82	28.49	10.36	2.37	12.73	45
5	Chhattisgarh	12.8	0.9	11.9	3.76	0.64	4.4	37
6	Goa	0.24	0.1	0.15	0.02	0.03	0.05	37
7	Gujarat	20.85	1.07	19.79	12.3	1.14	13.44	68
8	Haryana	11.36	1.06	10.3	13.32	0.6	13.92	135
9	Himachal Pradesh	0.56	0.03	0.53	0.16	0.11	0.27	51
10	Jammu & Kashmir	5.25	0.43	4.82	0.2	0.98	1.18	24
11	Jharkhand	6.56	0.57	5.99	0.63	0.72	1.35	23
12	Karnataka	17	2.16	14.83	8.76	0.99	9.76	66
13	Kerala	6.27	0.6	5.66	1.18	1.45	2.63	47
14	Madhya Pradesh	35.98	1.82	34.16	17.95	1.41	19.36	57
15	Maharashtra	33.19	1.71	31.48	15.93	1.14	17.07	54
16	Manipur	0.474	0.047	0.426	0.004	0.001	0.004	1.01
17	Meghalaya	3.31	0.33	2.98	0.008	0.004	0.012	0.4
18	Mizoram	0.03942	0.00394	0.03548	0	0.00104	0.00104	2.9
19	Nagaland	1.94	0.194	1.75	0	0.03	0.03	2
20	Odisha	17.78	1.09	16.69	4.14	0.87	5.02	30
21	Punjab	25.91	2.52	23.39	34.05	0.77	34.81	149
22	Rajasthan	12.51	1.26	11.26	13.79	1.92	15.71	140
23	Sikkim	-	-	-	-	-	-	-
24	Tamil Nadu	20.65	2.07	18.59	12.98	1.38	14.36	77
25	Telangana	14.74	1.35	13.39	7	0.76	7.77	58
26	Tripura	2.471	0.202	2.269	0.093	0.072	0.165	7.3
27	Uttar Pradesh	76.34	4.75	71.58	48.35	4.41	52.76	74
28	Uttarakhand	2	0.03	1.97	0.84	0.15	0.99	50
29	West Bengal	29.33	2.77	26.56	10.84	1	11.84	45
30	Andaman & Nicobar Islands	0.42	0.042	0.378	0.0001	0.0035	0.0037	1
31	Chandigarh	0.022	0.0022	0.0194	0	0	0	0
32	Dadra & Nagar Haveli	0.07	0.007	0.063	0.008	0.013	0.02	32
33	Daman & Diu	0.015	0.001	0.014	0.008	0.002	0.01	70
34	Delhi	0.34	0.03	0.31	0.14	0.25	0.39	127
35	Lakshadweep	0.01055	0.00704	0.0035	0	0.00237	0.00237	68
36	Puducherry	0.193	0.019	0.174	0.124	0.029	0.153	88
	Grand Total*	**446.87**	**35.56**	**411.3**	**228.3**	**24.76**	**253.06**	**62**

Note: *State-wise total (i.e Column total) may not match with the Grand Total.

** Sum of Irrigation and Domestic & Industrial Uses may not match with Total.

Source: Ground Water Year Book- India 2016-17, Central Ground Water Board, Ministry of Water Resource

Stage of Development: Over 100%

Stage of Development: 50-100%

Stage of Development: 0-50%

Annexure- 3.13

State-Wise Area Prioritized for Artificial Recharge

(Area given in sq. km)

S. No.	States / Union Territories	State wise Area Prioritized for Artificial Recharge	Area Delineated for Water Conservation and Harvesting	Area Suitable for Ground Water Development	Geographical Area (Sq. km)
1	Andhra Pradesh*	27530	31854	222676	275045
2	Arunachal Pradesh	12	52462	4500	83743
3	Assam	19495	26033	68868	78438
4	Bihar	662	2240	90548	94163
5	Chhattisgarh	22828	57516	113922	135192
6	Goa	0	685	2856	3702
7	Gujarat	18516	18143	63106	196244
8	Haryana	42086	722	16930	44212
9	Himachal Pradesh	4357	19102	54401	55673
10	Jammu & Kashmir	1281	49821	23842	222236
11	Jharkhand	5083	15903	74167	79716
12	Karnataka	43420	34245	111611	191791
13	Kerala	16635	17232	28604	38852
14	Madhya Pradesh	138823	84710	257846	308252
15	Maharashtra	68907	65389	255612	307713
16	Manipur	0	16441	3964	22327
17	Meghalaya	332	17695	11739	22429
18	Mizoram	0	18225	7	21081
19	Nagaland	0	13635	1165	16579
20	Odisha	4928	63019	109979	155707
21	Punjab	42844	1270	11366	50362
22	Rajasthan	34519	38482	52857	342239
23	Sikkim	0	5340	22	7096
24	Tamil Nadu	46116	23501	75010	130060
25	Tripura	394	6711	10008	10486
26	Uttar Pradesh	121937	4384	208609	240928
27	Uttarakhand	13488	3248	7878	53483
28	West Bengal	29166	7202	80488	88752
29	Chandigarh	115	1	115	114
30	Dadra & Nagar Haveli	0	240	349	491
31	Daman & Diu	0	0	53	111
32	Delhi	1455	0	453	1483
33	Puducherry	10	5	238	490
	Total***	704941	695457	1963791	3287469**

*including Telengana

Note: ** This is an All India Total

*** State-wise total (i.e Column total) may not match with the Total.

Source: Aquifer Systems of India (2012), Central Ground Water Board, Ministry of Water Resources

Annexure- 4.1

Mineral wise State-wise reserves and resources

Mineral/ State	2005				2010				2015			
	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources
Andalusite (000 tonnes)		**0**	**18450**	**18450**	**0**	**0**	**18450**	**18450**	**0**	**0**	**28201**	**28201**
Jharkhand		0	4000	4000	0	0	4000	4000	0	0	4001	4001
Uttar Pradesh		0	14450	14450	0	0	14450	14450	0	0	24200	24200
Antimony Metal (tonne)		**0**	**174**	**174**	**0**	**0**	**174**	**174**	**0**	**0**	**174**	**174**
Himachal Pradesh		0	174	174	0	0	174	174	0	0	174	174
Antimony Ore (tonne)		**0**	**10588**	**10588**	**0**	**0**	**10588**	**10588**	**0**	**0**	**10588**	**10588**
Himachal Pradesh		0	10588	10588	0	0	10588	10588	0	0	10588	10588
Apatite (000 tonnes)	**6126**	**20**	**20719**	**26865**	**2089**	**2**	**22139**	**24229**	**28**	**2**	**24016**	**24045**
Andhra Pradesh	0	20	338	357	36	2	200	238	28	2	200	230
Gujarat	0	0	351	351	0	0	351	351	0	0	351	351
Jharkhand	0	0	7270	7270	0	0	7270	7270	0	0	7270	7270
Meghalaya	0	0	1300	1300	0	0	1300	1300	0	0	1300	1300
Rajasthan	0	0	1068	1068	0	0	1068	1068	0	0	1068	1068
Tamil Nadu	0	0	240	240	0	0	240	240	0	0	240	240
West Bengal	6126	0	10153	16279	2053	0	11710	13762	0	0	13587	13587
Asbestos (000 tonnes)	**2974**	**3067**	**15696**	**21736**	**1700**	**811**	**19656**	**22167**	**20**	**5**	**22923**	**22947**
Andhra Pradesh	3	17	30	50	6	9	42	57	20	5	813	837
Jharkhand	0	0	155	155	0	0	155	155	0	0	155	155
Karnataka	0	0	8282	8282	0	0	8282	8282	0	0	8282	8282
Odisha	10	27	20	57	0	0	57	57	0	0	57	57
Rajasthan	2961	3023	7209	13192	1694	802	11120	13616	0	0	13616	13616
Uttarakhand	0	0	0	0	0	0	0	0	0	0	0	0
Ball Clay (000 tonnes)	**14787**	**17743**	**46761**	**79291**	**12293**	**4485**	**66616**	**83394**	**33526**	**15967**	**85250**	**134743**
Andhra Pradesh	6678	13553	29927	50157	6017	1289	43975	51281	6700	1252	49065	57017
Gujarat	0	250	50	299	0	0	299	299	21	0	796	817
Rajasthan	8109	3941	16785	28834	6275	3196	22341	31813	26805	14715	35389	76910
Barytes (000 tonnes)	**31640**	**2673**	**39891**	**74203**	**29558**	**2026**	**41150**	**72734**	**50449**	**898**	**35324**	**86671**
Andhra Pradesh	31438	2550	35908	69896	29396	1925	37157	68478	48990	422	30035	79447
Haryana	0	0	0	0	0	0	0	0	0	0	0	0
Himachal Pradesh	27	11	101	139	27	13	77	117	0	0	117	117
Jharkhand	0	0	36	36	0	0	36	36	0	0	36	36
Karnataka	0	0	15	15	0	0	15	15	0	0	244	244
Madhya Pradesh	0	4	287	292	0	0	292	292	0	0	292	292
Maharashtra	0	0	123	123	0	0	123	123	0	0	123	123
Rajasthan	175	107	2739	3021	134	89	2769	2992	134	73	2784	2992
Tamil Nadu	0	0	222	222	0	0	222	222	0	0	222	222
Telangana									1325	403	1012	2740
Uttarakhand	0	0	25	25	0	0	25	25	0	0	25	25
West Bengal	0	0	433	433	0	0	433	433	0	0	433	433

Annexure- 4.1

Mineral wise State-wise reserves and resources

Mineral/ State	2005				2010				2015			
	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources
Bauxite (000 tonnes)	**538946**	**360441**	**2390433**	**3289820**	**321258**	**271681**	**2886681**	**3479620**	**434043**	**222378**	**3240442**	**3896863**
Andhra Pradesh	199	53	615016	615268	0	0	615267	615267	0	0	615267	615267
Bihar		0	4114	4114	0	0	4114	4114	0	0	4114	4114
Chhattisgarh	30706	58260	59349	148315	21246	53253	96480	170979	12537	2531	158687	173755
Goa	27037	7589	15729	50355	15169	1207	41625	58001	12357	1207	41603	55167
Gujarat	43952	24261	120124	188337	98794	14967	122959	236720	154911	30323	165347	350581
Jammu & Kashmir		0	2025	2025	0	0	2025	2025	0	0	2725	2725
Jharkhand	13408	18250	85888	117546	16023	20153	110148	146324	54471	8268	176321	239060
Karnataka	4576	1153	43774	49503	5399	542	49764	55705	126	4263	41246	45635
Kerala	55	0	14043	14098	0	0	14096	14096	0	0	14096	14096
Madhya Pradesh	13530	3308	117225	134063	17144	2658	126989	146791	11979	11612	149797	173388
Maharashtra	21091	18067	72485	111643	14461	11692	148732	174885	11281	14907	158386	184574
Odisha	380363	227635	1200274	1808272	132314	167209	1510934	1810457	176002	149267	1669305	1994574
Rajasthan		0	528	528	0	0	528	528	0	0	528	528
Tamil Nadu	4029	1865	20951	26845	708	0	24112	24820	379	0	24112	24491
Uttar Pradesh		0	18908	18908	0	0	18908	18908	0	0	18908	18908
Bentonite (000 tonnes)	**0**	**25061**	**505513**	**530573**	**0**	**25061**	**543307**	**568367**	**13926**	**659**	**568303**	**582888**
Gujarat	0	12460	84093	96553	0	12460	121719	134179	9221	0	134724	143945
Jammu & Kashmir	0	0	147	147	0	0	147	147	0	0	147	147
Jharkhand	0	609	202	812	0	609	371	980	0	609	371	980
Rajasthan	0	11991	411526	423517	0	11991	411526	423517	4705	50	423517	428272
Tamil Nadu	0	0	9544	9544	0	0	9544	9544	0	0	9544	9544
Borax (tonne)		**0**	**74204**	**74204**	**0**	**0**	**74204**	**74204**	**0**	**0**	**74204**	**74204**
Jammu & Kashmir		0	74204	74204	0	0	74204	74204	0	0	74204	74204
Calcite (000 tonnes)	**3218**	**3524**	**15832**	**22574**	**1265**	**1399**	**18281**	**20945**	**928**	**2521**	**19555**	**23004**
Andhra Pradesh	6	102	8689	8797	3	1	8795	8799	17	128	8964	9108
Gujarat	0	0	12	12	0	0	12	12	0	0	12	12
Haryana	0	0	351	351	0	0	351	351	0	0	351	351
Karnataka	0	0	67	67	0	0	66	66	0	0	114	114
Madhya Pradesh	227	266	699	1191	0	0	1191	1191	0	5	1067	1073
Rajasthan	2985	3156	5887	12028	1262	1399	7738	10399	912	2388	8919	12219
Tamil Nadu	0	0	117	117	0	0	117	117	0	0	117	117
Uttar Pradesh	0	0	11	11	0	0	11	11	0	0	11	11
Chalk (000 tonnes)					**3266**	**1065**	**585**	**4916**	**4215**	**848**	**1687**	**6750**
Gujarat					3266	1065	585	4916	4215	848	1687	6750
China Clay (000 tonnes)	**101522**	**120600**	**2373539**	**2595661**	**124117**	**53040**	**2528050**	**2705207**	**140456**	**89012**	**2711775**	**2941243**
Andhra Pradesh	4490	7419	61767	73676	2524	2544	69108	74176	2494	2842	57556	62892
Assam		131	3912	4043	0	0	4043	4043	0	0	4043	4043
Bihar		0	1438	1438	0	0	1438	1438	0	0	1438	1438

Annexure- 4.1

Mineral wise State-wise reserves and resources

Mineral/ State	2005				2010				2015			
	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources
Chhattisgarh	914	1764	12088	14766	834	344	13832	15010	107	22	14871	15000
Delhi	19	60	5210	5289	0	0	5289	5289	0	0	5289	5289
Goa		0	16	16	0	0	16	16	0	0	16	16
Gujarat	38581	28609	43958	111148	34290	6472	71425	112187	54111	23157	118021	195289
Haryana		36	12029	12065	0	0	12065	12065	0	0	12065	12065
Jammu & Kashmir		0	28122	28122	0	0	28122	28122	0	0	28124	28124
Jharkhand	22162	8485	159493	190140	8554	9056	181081	198691	427	6412	195405	202244
Karnataka	1805	5882	249369	257056	943	1115	256466	258524	330	472	256834	257636
Kerala	7826	1725	621101	630652	3352	792	659690	663834	7097	925	665360	673382
Madhya Pradesh	943	443	11774	13160	0	0	13160	13160	357	1376	20115	21848
Maharashtra	418	354	6477	7249	0	0	7248	7248	0	0	7248	7248
Manipur		0	2520	2520	0	0	2520	2520	0	0	2520	2520
Meghalaya		0	88875	88875	0	0	88875	88875	0	0	88875	88875
Odisha	557	38816	238789	278162	2376	1526	277025	280927	0	0	286157	286157
Puducherry		0	2940	2940	0	0	2940	2940	0	0	2940	2940
Rajasthan	23050	19242	329418	371710	70012	30100	332405	432517	73434	52003	424874	550311
Tamil Nadu		0	56897	56897	0	0	56897	56897	0	0	56897	56897
Telangana									623	322	15350	16295
Uttar Pradesh		0	25065	25065	0	0	25065	25065	0	0	25065	25065
West Bengal	757	7634	412281	420672	1232	1091	419340	421663	1476	1481	422712	425669
Chromite (000 tonnes)	**30892**	**35236**	**146936**	**213064**	**31652**	**22318**	**149377**	**203347**	**64465**	**37745**	**241805**	**344015**
Andhra Pradesh		0	187	187	0	0	187	187	0	0	0	0
Jharkhand		0	736	736	0	0	736	736	0	0	736	736
Karnataka	470	620	700	1790	333	412	887	1632	315	412	905	1632
Maharashtra	5	0	528	533	53	23	556	632	0	71	538	609
Manipur		0	6581	6581	3	73	6581	6657	0	0	6657	6657
Nagaland					0	0	3200	3200	0	0	3200	3200
Odisha	30417	34616	137922	202955	31263	21810	136948	190021	64150	37262	229301	330713
Tamil Nadu		0	282	282	0	0	282	282	0	0	282	282
Telangana									0	0	186	186
Coal (Million tonnes)	**92959**	**117089**	**37795**	**247843**	**109800**	**130654**	**36359**	**276813**	**131614**	**143242**	**31741**	**306597**
Andhra Pradesh	8263	6079	2584	16926	9257	9730	3029	22016	0	1149	432	1581
Arunachal Pradesh	31	40	19	90	31	40	19	90	31	40	19	90
Assam	279	27	34	340	349	36	3	388	465	47	3	515
Bihar	0	0	160	160	0	0	160	160	0	0	160	160
Chhattisgarh	9373	26191	4411	39975	12441	30230	4011	46682	18237	34390	2285	54912
Jharkhand	35417	30438	6348	72203	39633	30992	6338	76963	41463	33026	6559	81048
Madhya Pradesh	7513	8815	2904	19232	8505	11267	2216	21988	10411	12784	3341	26536

Annexure- 4.1

Mineral wise State-wise reserves and resources

Mineral/ State	2005				2010				2015			
	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources
Maharashtra	4652	2309	1620	8581	5360	2984	1965	10309	5953	3190	2110	11253
Meghalaya	118	41	301	460	89	17	471	577	89	17	471	577
Nagaland	3	1	15	19	9	0	307	316	9	0	307	316
Odisha	15161	30976	14846	60983	21507	32074	12726	66307	30747	36545	8507	75799
Sikkim					0	58	43	101	0	58	43	101
Telangana									9807	8808	2597	21212
Uttar Pradesh	766	296	0	1062	866	196	0	1062	884	178	0	1062
West Bengal	11383	11876	4553	27812	11753	13030	5071	29854	13518	13010	4907	31435
Cobalt (Million tonnes)		**0**	**45**	**45**	**0**	**0**	**45**	**45**	**0**	**0**	**45**	**45**
Jharkhand		0	9	9	0	0	9	9	0	0	9	9
Nagaland		0	5	5	0	0	5	5	0	0	5	5
Odisha		0	31	31	0	0	31	31	0	0	31	31
Copper Metal (000 tonnes)	**1644**	**2740**	**7034**	**11418**	**1605**	**3164**	**7518**	**12287**	**2128**	**607**	**9424**	**12158**
Andhra Pradesh	7	10	106	123	0	0	123	123	0	0	114	114
Arunachal Pradesh									0	0	0	0
Gujarat		95	114	209	0	95	114	209	0	0	210	210
Haryana		0	57	57	0	0	114	114	0	0	114	114
Jharkhand	39	679	1685	2404	163	646	2285	3094	61	21	3194	3275
Karnataka	6	20	200	227	9	22	199	229	4	4	222	230
Madhya Pradesh	1344	1642	1169	4155	1218	1425	1176	3820	1888	148	1382	3419
Maharashtra		17	84	101	0	0	133	133	0	0	138	138
Meghalaya		0	9	9	0	0	9	9	0	0	9	9
Nagaland					0	0	15	15	0	0	15	15
Odisha		0	64	64	0	0	63	63	0	0	63	63
Rajasthan	248	268	3466	3982	215	976	3200	4391	175	434	3867	4476
Sikkim		9	13	21	0	0	21	21	0	0	21	21
Tamil Nadu		0	4	4	0	0	4	4	0	0	4	4
Telangana									0	0	9	9
Uttarakhand		0	60	60	0	0	60	60	0	0	60	60
West Bengal		0	2	2	0	0	2	2	0	0	2	2
Copper Ore (000 tonnes)	**135461**	**231851**	**1024933**	**1394425**	**133388**	**260983**	**1164086**	**1558457**	**162971**	**44795**	**1303730**	**1511496**
Andhra Pradesh	686	771	6791	8248	0	0	8248	8248	0	0	7582	7582
Arunachal Pradesh									0	0	10	10
Gujarat		5800	7260	13060	0	5800	7260	13060	0	0	14120	14120
Haryana		0	17230	17230	0	0	32908	32908	0	0	32908	32908
Jharkhand	4464	71431	150187	226082	16540	70278	201307	288125	5374	1940	288074	295388
Karnataka	963	2595	30846	34404	836	1674	31025	33535	314	557	33793	34664
Madhya Pradesh	101813	125336	177199	404348	90909	107410	178869	377188	141950	12580	128899	283429

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Mineral wise State-wise reserves and resources

Mineral/ State	2005				2010				2015			
	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources
Maharashtra		0	7401	9581	0	0	13210	13210	0	0	14390	14390
Meghalaya		0	880	880	0	0	880	880	0	0	880	880
Nagaland					0	0	2000	2000	0	0	2000	2000
Odisha		0	6051	6051	0	0	6051	6051	0	0	6051	6051
Rajasthan	27535	25407	615515	668457	25103	75813	676255	777171	15333	29718	768276	813327
Sikkim		511	450	961	0	8	950	958	0	0	958	958
Tamil Nadu		0	790	790	0	0	790	790	0	0	790	790
Telangana									0	0	666	666
Uttarakhand		0	4220	4220	0	0	4220	4220	0	0	4220	4220
West Bengal		0	113	113	0	0	113	113	0	0	113	113
Corundum (tonne)	**317**	**288**	**83191**	**83796**	**0**	**598**	**740194**	**740792**	**200**	**0**	**293496**	**293696**
Andhra Pradesh	7	0	51088	51095	0	0	77121	77121	200	0	7	207
Chhattisgarh	310	288	288	886	0	598	288	886	0	0	885	885
Karnataka		0	15890	15890	0	0	646860	646860	0	0	199566	199566
Rajasthan		0	11925	11925	0	0	11925	11925	0	0	11925	11925
Tamil Nadu		0	4000	4000	0	0	4000	4000	0	0	4000	4000
Telangana									0	0	77113	77113
Diamond (000 carats)	**606**	**600**	**3376**	**4582**	**1045**	**0**	**30876**	**31922**	**960**	**0**	**30876**	**31836**
Andhra Pradesh	0	0	1823	1823	0	0	1823	1823	0	0	1823	1823
Chhattisgarh	0	0	1304	1304	0	0	1304	1304	0	0	1304	1304
Madhya Pradesh	606	600	249	1455	1045	0	27749	28795	960	0	27749	28709
Diaspore (tonne)	**1662218**	**1462815**	**2212362**	**5337395**	**1469687**	**1389987**	**3125144**	**5984818**	**3242363**	**4640071**	**2310817**	**10193251**
Jammu & Kashmir		0	1277	1277	0	0	1277	1277	0	0	1277	1277
Madhya Pradesh	798652	1205632	1612541	3616825	719609	737294	2295946	3752849	2380710	3155648	2025365	7561723
Uttar Pradesh	863566	257183	598544	1719293	750078	652693	827921	2230692	861653	1484423	284175	2630251
Diatomite (000 tonnes)	**634**	**0**	**2251**	**2885**	**0**	**0**	**2885**	**2885**	**0**	**0**	**2885**	**2885**
Gujarat		0	811	811	0	0	811	811	0	0	811	811
Rajasthan	634	0	1440	2074	0	0	2074	2074	0	0	2074	2074
Dolomite (000 tonnes)	**407794**	**577361**	**6547953**	**7533108**	**431567**	**306619**	**6992372**	**7730558**	**431749**	**246133**	**7737008**	**8414890**
Andhra Pradesh	78933	44488	1023003	1146424	55507	12790	1114156	1182453	86134	28910	1183677	1298721
Arunachal Pradesh		0	77837	77837	0	0	77837	77837	0	0	77837	77837
Chhattisgarh	52108	92498	702105	846711	41628	19209	785846	846683	34465	59753	823439	917657
Gujarat	28096	26204	470194	524494	20130	11765	493578	525473	34862	36763	472431	544056
Haryana		0	29500	29500	0	0	29489	29489	0	0	27633	27633
Jharkhand	21918	11571	17606	51095	22700	0	18734	41434	4510	6720	13686	24916
Karnataka	84865	59845	488800	633510	86077	42288	533751	662116	28609	12003	585731	626343
Madhya Pradesh	36284	79707	1859788	1975779	26637	55797	2195369	2277803	23765	28792	2258839	2311396
Maharashtra	12907	9533	355633	378073	22741	25312	372771	420824	8301	12114	397578	417993

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Mineral wise State-wise reserves and resources

Mineral/ State	2005				2010				2015			
	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources
Odisha	34821	132422	668836	836079	119853	47259	505933	673045	109551	41260	699082	849893
Rajasthan	57862	43471	398970	500303	34309	29851	396010	460170	57910	18573	522607	599090
Sikkim		0	2756	2756	0	0	2756	2756	0	0	2756	2756
Tamil Nadu		0	2145	2145	0	0	2145	2145	0	0	2145	2145
Telangana									42072	651	145298	188021
Uttar Pradesh		17094	69730	86824	0	0	82352	82352	0	0	82352	82352
Uttarakhand		0	203549	203549	1985	1820	204144	207949	1570	594	203888	206052
West Bengal		60528	177501	238029	0	60528	177501	238029	0	0	238029	238029
Dunite (000 tonnes)	**12714**	**115359**	**39855**	**167928**	**14894**	**2243**	**168231**	**185368**	**10848**	**1919**	**175050**	**187817**
Jharkhand	303	6770	3410	10483	373	570	16415	17358	123	262	16857	17242
Karnataka	428	1108	27947	29483	3718	223	28058	31999	3074	207	28549	31830
Nagaland					0	0	4800	4800	0	0	4800	4800
Odisha	4429	3841	2725	10995	3337	0	10995	14332	308	0	11837	12145
Tamil Nadu	7554	103640	5773	116967	7466	1450	107963	116879	7343	1450	113007	121800
Emerald (Kg.)									**0**	**0**	**55869**	**55869**
Jharkhand									0	0	55869	55869
Feldspar (000 tonnes)	**19221**	**18829**	**52732**	**90782**	**24545**	**19958**	**87832**	**132335**	**173383**	**146459**	**313726**	**633567**
Andhra Pradesh	2116	2739	6590	11444	5469	2710	13619	21799	2295	707	11054	14056
Bihar	0	0	4853	4853	0	35	4876	4911	0	0	4911	4911
Haryana	0	0	72	72	0	0	72	72	0	0	72	72
Jharkhand	175	515	968	1657	6	275	1354	1635	69	207	1379	1655
Karnataka	68	206	367	642	120	177	341	637	0	0	626	626
Madhya Pradesh	0	0	24	24	0	0	340	340	0	0	357	357
Maharashtra	1392	134	160	1686	229	91	909	1229	0	0	1229	1229
Meghalaya	0	0	37	37	0	0	37	37	0	0	37	37
Rajasthan	12198	14808	29179	56184	18083	16632	53231	87946	161965	143701	266467	572133
Tamil Nadu	3272	428	5781	9481	613	38	8351	9002	739	31	9173	9942
Telangana									8244	1758	13385	23388
Uttar Pradesh	0	0	200	200	0	0	200	200	0	0	200	200
West Bengal	0	0	4501	4501	26	0	4501	4527	71	54	4837	4962
Fire Clay (000 tonnes)	**26898**	**32403**	**645462**	**704763**	**14375**	**15730**	**683416**	**713521**	**13294**	**13742**	**695792**	**722828**
Andhra Pradesh	1382	2379	18742	22503	548	1028	21638	23214	1252	682	14562	16496
Assam		0	3161	3161	0	0	3161	3161	0	0	3161	3161
Bihar		0	44	44	0	0	44	44	0	0	44	44
Chhattisgarh		62	20916	20978	0	35	20943	20978	315	117	21126	21558
Delhi		0	64	64	0	0	64	64	0	0	64	64
Gujarat	1629	1134	55605	58368	276	161	57859	58296	231	56	59522	59809
Jammu & Kashmir									0	0	4914	4914

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Mineral wise State-wise reserves and resources

Mineral/ State	2005				2010				2015			
	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources
Jharkhand	979	1377	64447	66803	828	775	65017	66620	0	3	66450	66453
Karnataka	119	970	10251	11340	95	409	13734	14238	146	0	11648	11794
Kerala		0	18181	18181	0	0	18181	18181	0	0	18181	18181
Madhya Pradesh	2128	5877	106784	114789	2167	2295	115852	120314	390	7212	119036	126638
Maharashtra	272	392	6849	7513	244	388	6850	7482	0	710	6746	7456
Meghalaya		0	10999	10999	0	0	10999	10999	0	0	10999	10999
Odisha	2933	8376	164176	175485	581	330	169166	170077	133	40	172751	172924
Rajasthan	9013	6386	45789	61188	8543	5659	52221	66423	6561	3932	44163	54656
Tamil Nadu	7702	4364	103796	115862	322	3692	110244	114258	2523	613	113528	116664
Telangana									762	0	10684	11446
Tripura		0	370	370	0	0	370	370	0	0	370	370
Uttar Pradesh		0	3221	3221	0	0	3221	3221	0	0	3221	3221
West Bengal	741	1086	12067	13894	771	958	13852	15581	981	377	14622	15980
Fluorite (000 tonnes)	**8585**	**629**	**10952**	**20166**	**4566**	**146**	**13502**	**18214**	**225**	**64**	**17893**	**18182**
Chhattisgarh	0	0	545	545	0	0	545	545	0	0	545	545
Gujarat	7664	200	6061	13925	4280	0	7725	12005	0	0	12005	12005
Maharashtra	288	64	100	452	262	105	52	419	225	64	100	389
Rajasthan	633	364	4245	5243	24	41	5178	5244	0	0	5243	5243
Fuller's Earth (000 tonnes)	**0**	**58**	**256594**	**256652**	**0**	**58**	**256594**	**256652**	**3941**	**0**	**257438**	**261379**
Andhra Pradesh	0	0	25524	25524	0	0	25524	25524				
Arunachal Pradesh	0	0	20011	20011	0	0	20011	20011	0	0	20011	20011
Assam	0	0	18860	18860	0	0	18860	18860	0	0	18860	18860
Karnataka	0	58	2023	2081	0	58	2023	2081	0	0	2167	2167
Madhya Pradesh	0	0	117	117	0	0	117	117	0	0	117	117
Rajasthan	0	0	190059	190059	0	0	190059	190059	3941	0	190759	194700
Telangana									0	0	25524	25524
Garnet (000 tonnes)	**6720**	**14256**	**36680**	**57656**	**3252**	**16073**	**37638**	**56963**	**9918**	**2866**	**43377**	**56161**
Andhra Pradesh	36	1	14734	14771	2911	715	15439	19065	1184	573	15510	17267
Chhattisgarh	0	0	29	29	0	0	29	29	0	0	29	29
Jharkhand	0	0	1	1	0	0	110	110	0	0	110	110
Kerala	0	46	153	199	0	46	153	199	0	46	153	199
Odisha	0	13793	353	14146	0	3186	348	3534	8460	585	348	9393
Rajasthan	13	29	115	157	6	20	172	198	34	41	210	285
Tamil Nadu	6671	387	21295	28353	334	12107	21387	33828	226	1620	25072	26918
Telangana									15	0	1945	1960
Gold Metal (Placer) (tonne)		**0**	**6**	**6**	**0**	**0**	**6**	**6**	**0**	**0**	**6**	**6**
Kerala		0	6	6	0	0	6	6	0	0	6	6
Gold Metal (Primary) (tonne)	**67**	**18**	**406**	**491**	**71**	**40**	**549**	**660**	**53**	**17**	**585**	**655**

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Mineral wise State-wise reserves and resources

Mineral/ State	2005				2010				2015			
	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources
Andhra Pradesh	2	4	26	32	0	0	36	36	0	8	31	40
Bihar		0	38	38	0	0	38	38	0	0	38	38
Chhattisgarh		0	3	3	0	0	6	6	0	0	6	6
Jharkhand		1	2	3	0	0	13	13	0	0	14	15
Karnataka	64	14	75	153	71	40	227	337	53	8	249	311
Kerala		0	0	0	0	0	0	0	0	0	0	0
Madhya Pradesh		0	8	8	0	0	8	8	0	0	8	8
Maharashtra		0	4	4	0	0	4	4	0	0	4	4
Rajasthan		0	126	126	0	0	217	217	0	0	233	233
Tamil Nadu		0	1	1	0	0	1	1	0	0	1	1
West Bengal		0	124	124	0	0	1	1	0	0	1	1
Gold Ore (Placer) (000 tonnes)	**0**	**0**	**26121**	**26121**	**0**	**0**	**26121**	**26121**	**0**	**0**	**26121**	**26121**
Kerala	0	0	26121	26121	0	0	26121	26121	0	0	26121	26121
Gold Ore (Primary) (000 tonnes)	**15554**	**3700**	**371035**	**390289**	**16046**	**8079**	**469570**	**493695**	**10404**	**6824**	**484611**	**501840**
Andhra Pradesh	655	890	10554	12098	0	0	12275	12275	0	3903	8871	12773
Bihar	0	0	222885	222885	0	0	222885	222885	0	0	222885	222885
Chhattisgarh	0	0	900	900	0	0	4841	4841	0	0	4841	4841
Jharkhand	0	93	254	347	38	0	8113	8151	9	0	10117	10127
Karnataka	14899	2717	48556	66172	16008	8079	84716	108803	10395	2921	90530	103846
Kerala	0	0	558	558	0	0	558	558	0	0	558	558
Madhya Pradesh	0	0	7322	7322	0	0	7788	7788	0	0	7788	7788
Maharashtra	0	0	1517	1517	0	0	1517	1517	0	0	1517	1517
Rajasthan	0	0	65589	65589	0	0	113976	113976	0	0	124604	124604
Tamil Nadu	0	0	67	67	0	0	67	67	0	0	67	67
West Bengal	0	0	12833	12833	0	0	12833	12833	0	0	12833	12833
Granite (Dimension Stone) (000 cu.m	**23010**	**1107014**	**36295978**	**37426002**	**35742**	**227951**	**45966609**	**46230302**	**35742**	**227951**	**46056100**	**46319793**
Andhra Pradesh		0	2405890	2405890	0	0	2405890	2405890	0	0	2360396	2360396
Assam		0	583950	583950	0	0	583950	583950	0	0	583950	583950
Bihar		0	877612	877612	0	0	877612	877612	0	0	877612	877612
Chhattisgarh		0	50057	50057	0	0	50057	50057	0	0	50057	50057
Gujarat		0	421296	421296	0	0	8501947	8501947	0	0	8501947	8501947
Haryana		0	34000	34000	0	0	34000	34000	0	0	34000	34000
Jammu & Kashmir									0	0	84570	84570
Jharkhand		0	8847364	8847364	0	0	8875340	8875340	0	0	8875340	8875340
Karnataka	19212	35600	9252866	9307678	26363	41225	9270306	9337894	26363	41225	9270306	9337894
Kerala	140	0	2669	2809	140	0	2669	2809	140	0	2669	2809
Madhya Pradesh		969224	1024860	1994084	0	160	1993924	1994084	0	160	1993924	1994084
Maharashtra		0	1158847	1158847	0	0	1158847	1158847	0	0	1158847	1158847

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Mineral/ State	2005				2010				2015			
	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources
Meghalaya		0	286467	286467	0	0	286467	286467	0	0	286467	286467
Odisha		80000	1763060	1843060	0	80000	1763060	1843060	0	80000	1767980	1847980
Rajasthan		4500	8520708	8525208	5581	104880	9080204	9190665	5581	104880	9080204	9190665
Tamil Nadu		17690	541745	559435	0	1686	557749	559435	0	1686	557749	559435
Telangana									0	0	45494	45494
Uttar Pradesh		0	494819	494819	0	0	494819	494819	0	0	494819	494819
West Bengal	3658	0	29768	33426	3658	0	29768	33426	3658	0	29769	33427
Graphite (000 tonnes)	**5164**	**5586**	**158025**	**168775**	**3685**	**4347**	**166818**	**174850**	**4230**	**3731**	**186926**	**194887**
Andhra Pradesh	0	1	426	427	0	0	427	427	0	0	701	701
Arunachal Pradesh	0	0	72758	72758	0	0	72758	72758	0	0	72758	72758
Chhattisgarh									6	0	1	7
Gujarat	0	0	3356	3356	0	0	3356	3356	0	0	3356	3356
Jammu & Kashmir	0	0	62741	62741	0	0	62741	62741	0	0	62741	62741
Jharkhand	443	2834	7071	10347	382	718	11810	12911	1519	2655	13387	17560
Karnataka	1	196	71	268	1	22	44	67	0	0	399	399
Kerala	0	26	1424	1450	0	0	1585	1585	0	17	1420	1436
Madhya Pradesh	0	0	1007	1007	0	0	1007	1007	0	0	5737	5737
Maharashtra	0	0	1160	1160	0	0	1160	1160	0	0	1160	1160
Odisha	1553	1554	2316	5423	495	2796	5384	8675	210	249	18509	18968
Rajasthan	48	166	1700	1914	0	0	1914	1914	0	0	1914	1914
Tamil Nadu	3119	810	3985	7914	2807	810	4621	8239	2495	810	4614	7919
Telangana									0	0	219	219
Uttarakhand	0	0	11	11	0	0	11	11	0	0	11	11
Gypsum (000 tonnes)	**40803**	**27855**	**1168218**	**1236877**	**22494**	**16603**	**1247402**	**1286499**	**35141**	**1481**	**1292891**	**1329513**
Andhra Pradesh		0	404	404	0	0	404	404	0	0	404	404
Gujarat	9	33	15138	15180	9	29	15138	15176	4	29	16374	16407
Haryana									0	0	2180	2180
Himachal Pradesh		0	4446	4446	0	0	4446	4446	0	0	4446	4446
Jammu & Kashmir	6044	6875	163916	176835	1664	595	175513	177772	11383	595	180610	192588
Karnataka		0	3784	3784	0	0	3784	3784	0	0	3784	3784
Madhya Pradesh		0	69	69	0	0	69	69	0	0	69	69
Rajasthan	34381	19812	952608	1006801	20821	15915	1018810	1055546	23617	811	1055878	1080306
Tamil Nadu	369	1135	25806	27311	0	64	27191	27255	137	46	27099	27282
Uttarakhand		0	2047	2047	0	0	2047	2047	0	0	2047	2047
Iron Ore (Haematite) (000 tonnes)	**4945328**	**2058840**	**7626220**	**14630388**	**5982042**	**2111505**	**9788551**	**17882098**	**4053033**	**1368719**	**17065215**	**22486967**
Andhra Pradesh	24961	14635	123443	163039	60038	92178	229261	381477	17664	12105	311294	341063
Assam		0	12600	12600	0	0	12600	12600	0	0	12600	12600
Bihar		0	55	55	0	0	55	55	0	0	55	55

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Mineral/ State	2005				2010				2015			
	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources
Chhattisgarh	570227	190285	1970275	2730787	636460	263650	2391714	3291824	1067636	319801	3470687	4858124
Goa	268126	190577	254244	712947	367378	102466	457328	927172	297271	60968	831075	1189314
Jharkhand	2237629	256795	1541323	4035747	1840594	463548	2292478	4596620	365111	74260	4847045	5286416
Karnataka	465677	474752	735792	1676221	602685	274181	1281811	2158677	416684	133563	1916607	2466854
Madhya Pradesh	21093	12824	171021	204938	40534	16280	174632	231446	44203	17860	267900	329963
Maharashtra	9816	4181	251359	265356	6937	6477	269795	283209	11283	5958	276862	294103
Meghalaya		0	225	225	0	0	225	225	0	0	225	225
Odisha	1341025	910752	2508848	4760625	2422247	890754	2617232	5930233	1830569	741649	4986447	7558665
Rajasthan	6774	4039	19035	29848	5169	1971	23420	30560	2103	2555	33745	38403
Telangana									509	0	52673	53182
Uttar Pradesh		0	38000	38000	0	0	38000	38000	0	0	58000	58000
Iron Ore (Magnetite) (000 tonnes)	**14339**	**44165**	**10560977**	**10619481**	**15972**	**5783**	**10622304**	**10644059**	**30351**	**22349**	**10736455**	**10789155**
Andhra Pradesh		0	1463541	1463541	0	0	1463541	1463541	0	0	1392098	1392098
Assam		0	15380	15380	0	0	15380	15380	0	0	15380	15380
Bihar		0	2659	2659	0	0	2659	2659	0	0	2659	2659
Chhattisgarh									8087	3096	42	11225
Goa	10738	39374	164057	214169	12489	3186	206998	222673	4364	626	261345	266335
Jharkhand	14	3376	6879	10269	0	912	9629	10541	0	0	10667	10667
Karnataka		0	7811784	7811784	0	0	7801744	7801744	319	127	7801744	7802190
Kerala		0	83435	83435	0	0	83435	83435	0	0	83435	83435
Maharashtra	513	108		621	559	315	486	1360	359	225	302	886
Meghalaya		0	3380	3380	0	0	3380	3380	0	0	3380	3380
Nagaland		0	5280	5280	0	0	5280	5280	0	0	5280	5280
Odisha		156	54	210	0	54	145	199	74	0	79	153
Rajasthan	3074	1151	522652	526877	2924	1316	522590	526830	17148	18275	581493	616916
Tamil Nadu		0	481876	481876	0	0	507037	507037	0	0	507037	507037
Telangana									0	0	71514	71514
Kyanite (000 tonnes)	**922**	**452**	**101239**	**102613**	**552**	**1023**	**101671**	**103246**	**639**	**49**	**104293**	**104982**
Andhra Pradesh	0	0	80354	80354	0	0	80354	80354	0	0	32004	32004
Jharkhand	629	276	4803	5709	267	927	4837	6031	426	0	7168	7594
Karnataka	128	94	12680	12902	0	0	13035	13035	0	0	13295	13295
Kerala	0	0	229	229	0	0	202	202	0	0	202	202
Maharashtra	151	77	2887	3115	284	97	2944	3324	213	49	2975	3237
Rajasthan	13	5	5	24	0	0	24	24	0	0	24	24
Tamil Nadu	0	0	255	255	0	0	248	248	0	0	248	248
Telangana									0	0	48350	48350
West Bengal	0	0	27	27	0	0	27	27	0	0	27	27
Laterite (000 tonnes)					**13935**	**10778**	**446119**	**470832**	**98598**	**26134**	**581817**	**706549**

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Mineral/ State	2005				2010				2015			
	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources
Andhra Pradesh					4349	9114	12794	26257	13574	2390	32608	48572
Gujarat					9406	164	0	9570	36019	399	9562	45980
Jharkhand					0	0	570	570	0	0	570	570
Kerala					180	1500	16717	18397	0	1156	17670	18826
Madhya Pradesh					0	0	288688	288688	12534	11272	368336	392142
Maharashtra					0	0	4000	4000	0	278	11903	12181
Odisha									0	0	1227	1227
Rajasthan					0	0	123350	123350	0	0	123350	123350
Telangana									36471	10639	16591	63701
Lead Metal (000 tonnes)	**1263**	**1328**	**4617**	**7207**	**398**	**1847**	**9304**	**11549**	**625**	**1858**	**10522**	**13004**
Andhra Pradesh	26	4	170	200	0	0	837	837	0	0	837	837
Bihar		0	24	24	0	0	24	24	0	0	24	24
Gujarat		122	4	126	0	122	4	126	0	0	210	210
Madhya Pradesh		0	26	26	0	0	36	36	0	0	36	36
Meghalaya		0	17	17	0	0	17	17	0	0	17	17
Odisha	34	4	38	77	0	0	77	77	0	0	77	77
Rajasthan	1203	1189	4007	6399	398	1716	7979	10094	625	1858	8982	11464
Sikkim	0	9	0	9	0	9	0	9	0	0	9	9
Tamil Nadu		0	8	8	0	0	8	8	0	0	8	8
Uttarakhand		0	183	183	0	0	183	183	0	0	183	183
West Bengal		0	140	140	0	0	140	140	0	0	140	140
Lead-Zinc Metal (000 tonnes)		**0**	**118**	**118**	**0**	**0**	**118**	**118**	**0**	**0**	**143**	**143**
Gujarat		0	1	1	0	0	1	1	0	0	1	1
Rajasthan		0	118	118	0	0	118	118	0	0	142	142
Lead-Zinc Ore (000 tonnes)	**62860**	**62894**	**396826**	**522580**	**20215**	**88765**	**576614**	**685594**	**31662**	**74454**	**643344**	**749460**
Andhra Pradesh	686	105	5829	6620	0	0	22689	22689	0	0	22689	22689
Bihar		0	11435	11435	0	0	11435	11435	0	0	11435	11435
Gujarat		5800	329	6129	0	5800	329	6129	0	0	7189	7189
Madhya Pradesh		0	6920	6920	0	0	14841	14841	0	0	14841	14841
Maharashtra		0	9272	9272	0	0	9272	9272	0	0	9272	9272
Meghalaya		0	880	880	0	0	880	880	0	0	880	880
Odisha	961	119	670	1750	0	0	1750	1750	0	0	1750	1750
Rajasthan	61213	56370	350925	468508	20215	82465	504852	607532	31662	74454	564222	670338
Sikkim		500	450	950	0	500	450	950	0	0	950	950
Tamil Nadu		0	790	790	0	0	790	790	0	0	790	790
Uttarakhand		0	5620	5620	0	0	5620	5620	0	0	5620	5620
West Bengal		0	3706	3706	0	0	3706	3706	0	0	3706	3706
Lignite (million tonnes)	**4559**	**12747**	**19848**	**37154**	**6146**	**25344**	**8408**	**39897**	**6182**	**26282**	**11650**	**44114**

Annexure- 4.1

Mineral wise State-wise reserves and resources

Mineral/ State	2005				2010				2015			
	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources
Gujarat	1084	259	1319	2663	1244	259	1160	2663	1279	284	1160	2722
Jammu & Kashmir	0	20	7	28	0	20	7	28	0	20	7	28
Kerala	0	0	8	8	0	0	10	10	0	0	10	10
Puducherry					0	406	11	417	0	406	11	417
Rajasthan	643	2292	1048	3984	1167	2136	1501	4804	1169	2671	1887	5727
Tamil Nadu	2831	10175	17465	30472	3735	22522	5719	31976	3735	22900	8574	35209
West Bengal					0	0	1	1	0	1	2	3
Limestone (Million tonnes)	**7492**	**5223**	**162630**	**175345**	**8979**	**5948**	**170009**	**184935**	**9439**	**6897**	**186889**	**203225**
Andhra Pradesh	2066	1315	31798	35179	2483	1565	33388	37436	1003	405	23513	24922
Arunachal Pradesh	0	0	483	483	0	0	483	483	0	0	483	483
Assam	57	160	1088	1305	184	153	1111	1447	26	153	1290	1468
Bihar	4	9	846	859	8	1	847	856	12	0	848	861
Chhattisgarh	669	397	7971	9038	857	41	8062	8959	1025	153	9627	10805
Daman & Diu	0	0	129	129	0	0	129	129	0	0	129	129
Gujarat	585	345	19082	20012	542	268	19201	20011	750	250	20258	21257
Haryana	0	10	62	71	0	0	75	75	0	0	75	75
Himachal Pradesh	276	165	4322	4762	542	436	4472	5449	555	280	5389	6224
Jammu & Kashmir	45	46	1264	1356	257	60	1274	1591	443	111	2088	2643
Jharkhand	250	95	401	746	144	59	431	634	88	29	607	724
Karnataka	746	620	50520	51886	539	559	51102	52200	461	1116	52858	54435
Kerala	137	11	59	207	13	0	184	197	11	0	182	194
Madhya Pradesh	563	232	5126	5921	460	1191	5891	7543	816	1639	6887	9342
Maharashtra	142	135	1460	1737	590	237	1995	2822	424	183	2246	2853
Manipur	0	0	46	46	0	0	46	46	0	0	46	46
Meghalaya	85	72	15897	16054	138	94	17273	17506	136	90	17479	17704
Nagaland	1	0	1037	1038	1	0	1037	1038	0	0	1752	1752
Odisha	261	737	741	1738	281	593	909	1783	256	139	1727	2122
Puducherry	0	0	16	16	0	0	16	16	0	0	16	16
Rajasthan	1122	585	17779	19486	1740	520	19400	21660	2471	1797	20098	24367
Sikkim	0	0	2	2	0	0	2	2	0	0	2	2
Tamil Nadu	479	160	544	1182	199	171	680	1050	334	139	1126	1600
Telangana									626	401	16159	17186
Uttar Pradesh	0	126	380	506	0	0	416	416	0	13	415	428
Uttarakhand	4	3	1533	1540	0	1	1542	1543	0	0	1543	1543
West Bengal	0	0	45	45	0	0	45	45	0	0	45	45
Magnesite (000 tonnes)	**20862**	**55271**	**261749**	**337882**	**20852**	**21099**	**293222**	**335173**	**77867**	**4409**	**311711**	**393987**
Andhra Pradesh		0	80	80	0	0	80	80	0	0	80	80
Himachal Pradesh		0	298	298	0	0	298	298	0	0	298	298

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Mineral wise State-wise reserves and resources

Mineral/ State	2005				2010				2015			
	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources
Jammu & Kashmir		2813	195	3008	2610	740	895	4245	0	0	4145	4145
Karnataka	243	783	2832	3858	332	365	3349	4046	1264	125	4592	5981
Kerala		0	40	40	0	0	40	40	0	0	40	40
Rajasthan	1081	2202	50521	53804	1024	2102	50678	53804	0	0	53804	53804
Tamil Nadu	12055	16374	17088	45517	12462	13442	14608	40512	73499	78	24649	98226
Uttarakhand	7483	33099	190695	231277	4424	4450	223274	232148	3104	4206	224103	231413
Manganese Ore (000 tonnes)	**76843**	**61307**	**240418**	**378568**	**97426**	**44553**	**288004**	**429983**	**62983**	**30494**	**402399**	**495876**
Andhra Pradesh	2457	1392	11734	15583	1719	2437	13443	17599	2235	2723	12687	17645
Goa	28	2832	16197	19057	420	254	12922	13596	0	0	34416	34416
Gujarat		0	2954	2954	0	0	2954	2954	708	0	2180	2888
Jharkhand	687	4361	2429	7477	1250	2206	10254	13710	1840	328	9461	11629
Karnataka	6735	12483	63518	82736	11455	4648	80085	96188	9196	150	101718	111064
Madhya Pradesh	22796	4683	34943	62422	30094	4898	20733	55725	20227	9664	27823	57714
Maharashtra	11544	5637	13173	30354	10000	2318	21835	34153	10867	2842	22910	36619
Odisha	31442	29272	92250	152964	41354	27145	121548	190047	16703	13941	185760	216404
Rajasthan	1154	647	3020	4821	1134	647	4030	5811	1051	647	4030	5728
Telangana									156	199	1214	1569
West Bengal		0	200	200	0	0	200	200	0	0	200	200
Marble (000 tonnes)		**4701**	**1787934**	**1792635**	**103736**	**172759**	**1654968**	**1931463**	**0**	**4551**	**1941341**	**1945892**
Andhra Pradesh					0	0	3	3				
Chhattisgarh		0	83000	83000	0	0	83000	83000	0	0	83000	83000
Gujarat		0	93740	93740	0	0	123571	123571	0	0	123571	123571
Haryana		0	22328	22328	0	0	22328	22328	0	0	22328	22328
Jammu & Kashmir		0	404703	404703	0	0	404703	404703	0	0	414581	414581
Madhya Pradesh									0	4551	0	4551
Maharashtra		324	57723	58047	0	324	57723	58047	0	0	58047	58047
Rajasthan		4377	1118058	1122435	103736	172435	955258	1231429	0	0	1231429	1231429
Sikkim		0	2382	2382	0	0	2382	2382	0	0	2382	2382
Telangana									0	0	3	3
Uttarakhand		0	6000	6000	0	0	6000	6000	0	0	6000	6000
Marl (000 tonnes)					**133236**	**6740**	**11705**	**151681**	**117116**	**6740**	**11705**	**135561**
Gujarat					133236	6740	11705	151681	117116	6740	11705	135561
Mica (tonne)	**1271**	**67299**	**325286**	**393855**	**169841**	**20901**	**341496**	**532237**	**82188**	**32245**	**520869**	**635302**
Andhra Pradesh	0	0	111316	111316	162325	18037	40424	220786	61943	18294	177353	257589
Bihar	0	0	12945	12945	0	74	13000	13074	0	0	13074	13074
Jharkhand	0	0	1665	1665	0	0	1665	1665	0	0	1665	1665
Maharashtra	0	65916	0	65916	0	0	81036	81036	0	0	81036	81036
Odisha					0	0	105280	105280	0	0	105280	105280

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Mineral wise State-wise reserves and resources

Mineral/ State	2005				2010				2015			
	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources
Rajasthan	1271	1383	199359	202013	7516	2790	100090	110395	20245	13952	141876	176073
Telangana									0	0	585	585
Molybdenum Contained MoS2 (tonne)		**1050**	**11590**	**12640**	**0**	**0**	**12640**	**12640**	**0**	**0**	**12668**	**12668**
Karnataka		0	1719	1719	0	0	1719	1719	0	0	1719	1719
Madhya Pradesh		0	5020	5020	0	0	5020	5020	0	0	5020	5020
Tamil Nadu		1050	4851	5901	0	0	5901	5901	0	0	5930	5930
Molybdenum Ore (000 tonnes)	**0**	**1500**	**17787**	**19287**	**0**	**0**	**19287**	**19287**	**0**	**0**	**19372**	**19372**
Karnataka	0	0	1321	1321	0	0	1321	1321	0	0	1321	1321
Madhya Pradesh	0	0	8000	8000	0	0	8000	8000	0	0	8000	8000
Tamil Nadu	0	1500	8466	9966	0	0	9966	9966	0	0	10051	10051
Nickel Ore (Million tonnes)		**0**	**189**	**189**	**0**	**0**	**188**	**188**	**0**	**0**	**189**	**189**
Jharkhand		0	9	9	0	0	9	9	0	0	9	9
Karnataka		0	0	0	0	0	0	0	0	0	0	0
Nagaland		0	5	5	0	0	5	5	0	0	5	5
Odisha		0	174	174	0	0	174	174	0	0	175	175
Ochre (000 tonnes)	**25747**	**22120**	**45573**	**93441**	**39863**	**15079**	**89319**	**144261**	**21960**	**14974**	**130859**	**167793**
Andhra Pradesh	3211	5102	2646	10959	1693	975	8215	10883	5285	65	6868	12218
Chhattisgarh									0	0	0	0
Gujarat	14	98	2946	3059	12	98	2946	3056	38	76	3053	3167
Jharkhand	221	12	9	242	64	4	147	215	0	0	0	0
Karnataka	488	326	953	1766	0	0	1786	1786	0	0	1786	1786
Madhya Pradesh	390	2394	7379	10163	486	169	9788	10443	1605	2090	15153	18848
Maharashtra	40	155	298	493	22	16	455	493	22	16	455	493
Rajasthan	21383	14033	31272	66688	37586	13816	65912	117314	15009	12728	103473	131210
Uttar Pradesh	0	0	70	70	0	0	70	70	0	0	70	70
Perlite (000 tonnes)	**188**	**316**	**1385**	**1889**	**140**	**288**	**1978**	**2406**	**0**	**0**	**2406**	**2406**
Gujarat	188	316	1385	1889	140	288	1978	2406	0	0	2406	2406
Platinum Group of Metals (tonne)		**0**	**14**	**14**	**0**	**0**	**16**	**16**	**0**	**0**	**16**	**16**
Karnataka					0	0	2	2	0	0	2	2
Odisha		0	14	14	0	0	14	14	0	0	14	14
Uttar Pradesh									0	0	0	0
Potash (Million tonnes)		**0**	**21815**	**21815**	**0**	**0**	**21815**	**21815**	**0**	**0**	**22508**	**22508**
Madhya Pradesh		0	1206	1206	0	0	1206	1206	0	0	1206	1206
Rajasthan		0	20419	20419	0	0	20419	20419	0	0	20419	20419
Uttar Pradesh		0	190	190	0	0	190	190	0	0	883	883
Pyrite (000 tonnes)	**27129**	**29597**	**1617675**	**1674401**	**0**	**0**	**1674401**	**1674401**	**0**	**0**	**1674401**	**1674401**
Andhra Pradesh		0	880	880	0	0	880	880	0	0	880	880
Bihar	13462	6680	1554419	1574561	0	0	1574561	1574561	0	0	1574561	1574561
Himachal Pradesh		0	2560	2560	0	0	2560	2560	0	0	2560	2560

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Mineral wise State-wise reserves and resources

Mineral/ State	2005				2010				2015			
	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources
Karnataka		0	3000	3000	0	0	3000	3000	0	0	3000	3000
Rajasthan	13667	22917	54292	90876	0	0	90876	90876	0	0	90876	90876
Tamil Nadu		0	24	24	0	0	24	24	0	0	24	24
West Bengal		0	2500	2500	0	0	2500	2500	0	0	2500	2500
Pyrophyllite (000 tonnes)	**9585**	**9905**	**14205**	**33695**	**12146**	**11129**	**32807**	**56083**	**16575**	**8357**	**34683**	**59616**
Andhra Pradesh	11	10	16	37	245	213	892	1350	39	9	1600	1648
Jharkhand					1	0	0	1	1	0	0	1
Madhya Pradesh	3539	6757	5314	15611	6780	7862	16928	31570	9786	4150	14623	28559
Maharashtra	236	268	210	714	703	281	3144	4127	0	705	5233	5938
Odisha	4530	1923	5829	12281	3329	1527	7436	12292	2782	1095	9812	13689
Rajasthan	132	106	558	795	140	187	782	1109	369	394	1296	2060
Uttar Pradesh	1136	842	2279	4257	949	1059	3625	5633	3598	2004	2119	7721
Quartzite (000 tonnes)	**26419**	**72126**	**1046414**	**1144959**	**59004**	**27595**	**1164650**	**1251249**	**47759**	**35714**	**1575324**	**1658797**
Andhra Pradesh	3300	10683	4588	18571	2114	2537	18931	23582	16001	1389	46905	64295
Arunachal Pradesh		0	5270	5270	0	0	5270	5270	0	0	5270	5270
Bihar	16	18198	252992	271206	0	32	276302	276334	0	12542	265282	277824
Chhattisgarh	3402	8263	14688	26353	1404	1267	23913	26584	605	3091	24870	28566
Haryana	15702	16200	590078	621980	0	0	621980	621980	0	0	884188	884188
Himachal Pradesh	95	39	48	182	25	16	16	57	25	16	16	57
Jammu & Kashmir	0	1112	0	1112	1500	58	0	1558	1500	58	16600	18158
Jharkhand	409	416	39405	40230	1079	174	39340	40593	181	0	40527	40708
Karnataka	43	680	393	1116	390	1011	1920	3321	231	0	7353	7584
Madhya Pradesh		0	832	832	0	0	832	832	0	0	832	832
Maharashtra	4	71	17	92	48700	19480	22536	90716	9026	0	81671	90697
Odisha	3263	15235	39473	57971	3629	2934	53837	60400	20050	18532	101971	140553
Punjab		0	81912	81912	0	0	81912	81912	0	0	81912	81912
Rajasthan	185	104	724	1013	163	86	742	991	140	86	742	968
Sikkim		1125	15994	17119	0	0	17119	17119	0	0	17119	17119
West Bengal									0	0	66	66
Quartz-Silica Sand (000 tonnes)	**271614**	**499895**	**2466704**	**3238213**	**272971**	**156249**	**3069809**	**3499029**	**433013**	**214509**	**3260298**	**3907820**
Andhra Pradesh	43626	40829	69461	153916	33590	39092	136349	209031	94483	17116	125090	236689
Assam		0	1790	1790	0	0	1790	1790	0	0	1790	1790
Bihar		0	23378	23378	0	2121	24652	26773	0	0	25755	25755
Chhattisgarh	424	304	739	1467	141	46	8924	9111	501	1279	9856	11636
Goa		0	20004	20004	0	0	20004	20004	0	0	20004	20004
Gujarat	26367	25075	45311	96753	16042	19940	64789	100771	27892	20877	83656	132425
Haryana	196	267703	1543231	1811130	0	8363	1802868	1811231	0	0	1653650	1653650
Himachal Pradesh		0	2928	2928	1	7	3027	3035	1	7	3027	3035

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Mineral/ State	2005				2010				2015			
	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources
Jammu & Kashmir		0	3110	3110	0	0	3110	3110	0	0	3110	3110
Jharkhand	7213	7202	140352	154767	563	8675	147283	156521	0	1070	150122	151192
Karnataka	15276	17046	48211	80533	8677	6184	75987	90848	7975	2224	84794	94993
Kerala	864	1514	125759	128137	0	38	128096	128134	221	169	128092	128482
Madhya Pradesh	106	46	2634	2786	144	25	2692	2861	129	1811	5261	7201
Maharashtra	32650	32974	82581	148205	12356	12969	151663	176988	15188	10077	154461	179726
Meghalaya		0	7083	7083	0	0	7083	7083	0	0	7083	7083
Odisha	907	1492	67362	69761	438	929	72573	73940	567	834	72824	74225
Punjab		0	3927	3927	0	0	3927	3927	0	0	3927	3927
Rajasthan	103741	77404	78890	260035	132135	38229	162104	332468	239131	109762	391438	740331
Tamil Nadu	33910	6487	130601	170998	60063	102	168432	228597	25086	4692	171718	201496
Telangana									18541	8283	53250	80074
Tripura		0	490	490	0	0	490	490	0	0	490	490
Uttar Pradesh	6095	20896	63659	90650	8042	18507	79337	105886	445	34969	105314	140728
West Bengal	239	923	5203	6365	779	1022	4629	6430	2853	1339	5586	9778
Rare Earth Elements (tonne)									**0**	**0**	**25493**	**25493**
Odisha									0	0	25493	25493
Rock Phosphate (000 tonnes)	**33090**	**19633**	**252585**	**305309**	**20697**	**14081**	**261506**	**296284**	**43833**	**1975**	**266871**	**312679**
Gujarat	0	0	315	315	0	0	315	315	0	0	315	315
Jharkhand	0	0	107370	107370	0	0	107370	107370	0	0	107370	107370
Madhya Pradesh	7606	11550	31277	50434	6590	11550	31277	49418	5999	1498	50554	58051
Meghalaya	0	0	1311	1311	0	0	1311	1311	0	0	1311	1311
Rajasthan	22421	2797	70709	95927	14107	2531	71281	87919	37834	477	57370	95680
Uttar Pradesh	0	3551	22222	25773	0	0	25773	25773	0	0	25773	25773
Uttarakhand	3064	1734	19381	24178	0	0	24178	24178	0	0	24178	24178

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Mineral/ State	2005				2010				2015			
	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources
Rock Salt (000 tonnes)	**8470**	**5060**	**0**	**13530**	**10036**	**5990**	**0**	**16026**	**0**	**0**	**16025**	**16025**
Himachal Pradesh	8470	5060	0	13530	10036	5990	0	16026	0	0	16025	16025
Ruby (Kg.)	**143**	**1782**	**3346**	**5271**	**143**	**93**	**5113**	**5349**	**0**	**0**	**5349**	**5349**
Odisha	143	1782	3346	5271	143	93	5113	5349	0	0	5349	5349
Sapphire (Kg.)		**0**	**450**	**450**	**0**	**0**	**450**	**450**	**0**	**0**	**450**	**450**
Jammu & Kashmir		0	450	450	0	0	450	450	0	0	450	450
Shale (000 tonnes)					**14992**	**339**	**580**	**15911**	**15027**	**445**	**3781**	**19253**
Andhra Pradesh					14992	339	580	15911	1120	434	1994	3548
Madhya Pradesh									55	11	1787	1853
Telangana									13852	0	0	13852
Sillimanite (000 tonnes)	**457**	**10967**	**62916**	**74340**	**1693**	**2392**	**62902**	**66987**	**323**	**6179**	**63702**	**70204**
Andhra Pradesh	0	0	8777	8777	518	170	8957	9645	2	0	8789	8791
Assam	0	0	4605	4605	0	0	4605	4605	0	0	4605	4605
Jharkhand	0	0	83	83	0	0	83	83	0	0	83	83
Karnataka	0	0	983	983	0	0	983	983	0	0	983	983
Kerala	0	2621	6628	9249	698	0	6452	7150	0	0	7145	7145
Madhya Pradesh	0	0	102	102	0	0	102	102	0	0	102	102
Maharashtra	151	16	21	187	145	58	3	206	181	22	16	219
Meghalaya	0	0	56	56	0	0	56	56	0	0	56	56
Odisha	0	7768	11501	19269	0	1602	11501	13103	0	6157	11501	17657
Rajasthan	0	0	0	1	0	0	1	1	0	0	1	1
Tamil Nadu	306	562	17059	17927	332	562	17059	17952	140	0	17320	17461
Uttar Pradesh	0	0	11450	11450	0	0	11450	11450	0	0	11450	11450
West Bengal	0	0	1653	1653	0	0	1653	1653	0	0	1653	1653
Silver Metal (tonne)	**2283**	**3775**	**4154**	**10213**	**1592**	**6448**	**19589**	**27628**	**4310**	**2862**	**22810**	**29982**
Andhra Pradesh	5	1	1	7	0	0	128	128	0	0	128	128
Jharkhand		0	5	5	0	0	5	5	0	0	5	5
Karnataka	3	0	3	6	3	0	3	6	3	0	3	6
Madhya Pradesh					0	0	160	160	0	0	160	160
Maharashtra		0	0	0	0	0	0	0	0	0	0	0
Meghalaya		0	20	20	0	0	20	20	0	0	20	20
Odisha	27	3	34	65	0	0	65	65	0	0	65	65
Rajasthan	2248	3755	3868	9871	1589	6432	18985	27006	4307	2862	22191	29359
Sikkim		15	41	57	0	15	41	57	0	0	57	57
Tamil Nadu		0	43	43	0	0	43	43	0	0	43	43
Uttarakhand		0	139	139	0	0	139	139	0	0	139	139
Silver Ore (000 tonnes)	**55752**	**60161**	**128721**	**244633**	**46109**	**141449**	**279426**	**466985**	**69277**	**81167**	**361511**	**511955**
Andhra Pradesh	686	105	90	881	0	0	16950	16950	0	0	16950	16950
Jharkhand	0	0	23840	23840	0	0	23840	23840	0	0	23840	23840

Annexure- 4.1

Mineral wise State-wise reserves and resources

Mineral/ State	2005				2010				2015			
	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources
Karnataka	7208	69	314	7592	8681	0	384	9065	10620	1730	384	12734
Madhya Pradesh					0	0	3216	3216	0	0	3216	3216
Maharashtra	0	0	235	235	0	0	235	235	0	0	235	235
Meghalaya	0	0	880	880	0	0	880	880	0	0	880	880
Odisha	961	119	670	1750	0	0	1750	1750	0	0	1750	1750
Rajasthan	46897	59368	98062	204326	37428	140950	227542	405920	58657	79437	309127	447221
Sikkim	0	500	450	950	0	500	450	950	0	0	950	950
Tamil Nadu	0	0	790	790	0	0	790	790	0	0	790	790
Uttarakhand	0	0	3390	3390	0	0	3390	3390	0	0	3390	3390
Slate (000 tonnes)					**0**	**0**	**2369**	**2369**	**19619**	**667**	**2586**	**22872**
Andhra Pradesh					0	0	2369	2369	109	667	2586	3362
Haryana									19510	0	0	19510
Sulphur (Native) (000 tonnes)		**0**	**210**	**210**	**0**	**0**	**210**	**210**	**0**	**0**	**210**	**210**
Jammu & Kashmir		0	210	210	0	0	210	210	0	0	210	210
Talc-Steatite-Soapstone (000 tonnes)	**65013**	**50516**	**196809**	**312338**	**54614**	**35413**	**178996**	**269024**	**72172**	**34319**	**209432**	**315923**
Andhra Pradesh	3134	2213	3771	9118	1031	4104	6109	11244	1875	1483	7137	10495
Bihar	62	2	1	65	0	149	3	152	0	0	149	149
Chhattisgarh	22	8	78	108	22	8	78	108	22	8	78	108
Gujarat	8	9	29	46	0	6	31	37	0	4	33	37
Jharkhand	4	27	311	342	0	0	338	338	336	83	319	738
Karnataka	97	82	1742	1921	35	182	1851	2068	46	235	1800	2081
Kerala		0	14390	14390	0	0	14390	14390	0	0	14390	14390
Madhya Pradesh	4	467	8563	9034	0	0	9119	9119	185	99	9952	10236
Maharashtra		0	16827	16827	0	0	16827	16827	0	0	16827	16827
Odisha	137	224	343	704	123	290	406	820	0	10	817	827
Rajasthan	22631	21114	113445	157190	28719	17475	85969	132163	52812	25178	100975	178965
Sikkim	0	60	0	60	0	0	60	60	0	0	60	60
Tamil Nadu	194	1828	705	2727	0	333	2328	2661	0	0	3110	3110
Telangana									0	0	20	20
Uttarakhand	38720	24482	36604	99806	24684	12866	41487	79037	16896	7219	53765	77880
Tin Metal (tonne)	**108**	**26**	**101103**	**101237**	**926**	**207**	**101142**	**102275**	**45**	**110**	**102259**	**102413**
Chhattisgarh	73	26	14349	14449	926	207	14354	15487	45	110	15471	15625
Haryana	0	0	86221	86221	0	0	86221	86221	0	0	86221	86221
Odisha	35	0	533	568	0	0	568	568	0	0	568	568
Tin Ore (000 tonnes)	**201**	**49**	**86303**	**86552**	**4**	**3**	**83719**	**83726**	**2**	**2**	**83721**	**83725**
Chhattisgarh	188	49	32390	32627	4	3	29794	29801	2	2	29795	29800
Haryana	0	0	53910	53910	0	0	53910	53910	0	0	53910	53910
Odisha	13	0	3	15	0	0	15	15	0	0	15	15
Titanium Minerals (000 tonnes)	**13621**	**11528**	**363240**	**388388**	**15271**	**6759**	**371966**	**393996**	**13552**	**868**	**399205**	**413626**

Annexure- 4.1

Mineral wise State-wise reserves and resources

Mineral/ State	2005				2010				2015			
	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources
Andhra Pradesh	0	0	76703	76703	0	0	76703	76703	0	0	76734	76734
Jharkhand	0	0	4385	4385	0	0	4385	4385	0	0	4385	4385
Karnataka	0	0	13862	13862	0	0	13862	13862	0	0	13862	13862
Kerala	11963	0	107010	118972	13796	0	114916	128713	0	0	128713	128713
Maharashtra	424	869	3196	4488	294	117	4015	4426	0	0	4426	4426
Meghalaya	0	0	3345	3345	0	0	3345	3345	0	0	3345	3345
Odisha	0	8292	39230	47522	0	4274	39230	43504	12851	868	51759	65479
Tamil Nadu	1235	2367	113230	116832	1181	2367	113230	116779	701	0	113702	114403
West Bengal	0	0	2279	2279	0	0	2279	2279	0	0	2279	2279
Tungsten Contained WO3 (tonne)		**0**	**142094**	**142094**	**0**	**0**	**142094**	**142094**	**0**	**0**	**142094**	**142094**
Andhra Pradesh		0	20263	20263	0	0	20263	20263	0	0	20263	20263
Haryana		0	3568	3568	0	0	3568	3568	0	0	3568	3568
Karnataka		0	6235	6235	0	0	6235	6235	0	0	6235	6235
Maharashtra		0	16035	16035	0	0	16035	16035	0	0	16035	16035
Rajasthan		0	93708	93708	0	0	93708	93708	0	0	93708	93708
Tamil Nadu		0	50	50	0	0	50	50	0	0	50	50
Uttarakhand		0	705	705	0	0	705	705	0	0	705	705
West Bengal		0	1531	1531	0	0	1531	1531	0	0	1531	1531
Tungsten Ore (000 tonnes)	**0**	**0**	**87387**	**87387**	**0**	**0**	**87387**	**87387**	**0**	**0**	**87387**	**87387**
Andhra Pradesh	0	0	14802	14802	0	0	14802	14802	0	0	14802	14802
Haryana	0	0	2230	2230	0	0	2230	2230	0	0	2230	2230
Karnataka	0	0	36678	36678	0	0	36678	36678	0	0	36678	36678
Maharashtra	0	0	8077	8077	0	0	8077	8077	0	0	8077	8077
Rajasthan	0	0	23928	23928	0	0	23928	23928	0	0	23928	23928
Tamil Nadu	0	0	250	250	0	0	250	250	0	0	250	250
Uttarakhand	0	0	658	658	0	0	658	658	0	0	658	658
West Bengal	0	0	764	764	0	0	764	764	0	0	764	764
Vanadium Metal (tonne)	**1914**	**8856**	**54620**	**65390**	**1145**	**458**	**63284**	**64887**	**0**	**0**	**64594**	**64594**
Karnataka		6300	43198	49498	0	0	49498	49498	0	0	49498	49498
Maharashtra	1914	421	0	2335	1145	458	229	1832	0	0	1539	1539
Odisha		2135	11423	13558	0	0	13558	13558	0	0	13558	13558
Vanadium Ore (000 tonnes)	**491**	**5828**	**18529**	**24848**	**294**	**117**	**24308**	**24719**	**0**	**0**	**24634**	**24634**
Karnataka	0	4500	14884	19384	0	0	19384	19384	0	0	19384	19384
Maharashtra	491	108	0	599	294	117	59	470	0	0	385	385
Odisha	0	1220	3645	4865	0	0	4865	4865	0	0	4865	4865
Vermiculite (tonne)	**1556664**	**206966**	**674631**	**2438261**	**1628475**	**75532**	**803003**	**2507010**	**1582906**	**49979**	**719582**	**2352467**
Andhra Pradesh	1508	8806	100170	110484	102058	75532	176586	354176	60892	49979	161195	272066
Gujarat		0	1960	1960	0	0	1960	1960	0	0	1960	1960

Annexure- 4.1

Mineral wise State-wise reserves and resources

Mineral/ State	2005				2010				2015			
	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources	Proved Reserves	Probable Reserves	Remaining Resources	Total Resources
Jharkhand		0	30048	30048	0	0	30048	30048	0	0	30048	30048
Karnataka		27680	68220	95900	0	0	201770	201770	0	0	133740	133740
Madhya Pradesh		166052	106960	273012	0	0	329	329	0	0	329	329
Rajasthan	20623	4428	18656	43707	0	0	43693	43693	0	0	43693	43693
Tamil Nadu	1534533	0	343051	1877584	1526417	0	343051	1869468	1522014	0	343051	1865065
West Bengal		0	5566	5566	0	0	5566	5566	0	0	5566	5566
Wollastonite (000 tonnes)	**7424**	**1109**	**11708**	**20242**	**2290**	**197**	**14083**	**16570**	**1953**	**288**	**14228**	**16469**
Gujarat	0	0	1990	1990	0	0	1990	1990	0	0	1990	1990
Rajasthan	7424	1109	9715	18248	2290	197	12089	14576	1953	288	12234	14476
Tamil Nadu	0	0	4	4	0	0	4	4	0	0	4	4
Zinc Metal (000 tonnes)	**5503**	**5590**	**13167**	**24260**	**1938**	**10515**	**24212**	**36665**	**2872**	**7128**	**26363**	**36363**
Andhra Pradesh		0	63	63	0	0	63	63	0	0	63	63
Bihar		0	39	39	0	0	39	39	0	0	39	39
Gujarat		263	1	265	0	263	1	265	0	0	344	344
Madhya Pradesh		0	339	339	0	0	454	454	0	0	454	454
Maharashtra		0	590	590	0	0	590	590	0	0	590	590
Meghalaya		0	14	14	0	0	14	14	0	0	14	14
Rajasthan	5503	5310	11670	22483	1938	10235	22600	34774	2872	7128	24393	34393
Sikkim	0	16	4	20	0	16	4	20	0	0	20	20
Tamil Nadu		0	37	37	0	0	37	37	0	0	37	37
Uttarakhand		0	267	267	0	0	267	267	0	0	267	267
West Bengal		0	143	143	0	0	143	143	0	0	143	143
Zircon (tonne)	**2484687**	**1221225**	**569748**	**4275660**	**1025942**	**321528**	**1786483**	**3133953**	**1012205**	**146085**	**2264913**	**3423203**
Kerala	2438147	0	569748	3007895	972624	0	1786483	2759107	972624	0	1786483	2759107
Odisha		1045782		1045782	0	146085	0	146085	0	146085	342791	488876
Tamil Nadu	46540	175443	0	221983	53318	175443	0	228761	39581	0	135639	175220

Source: 1. Coal & lignite: Provisional Coal Statistics, 2005-06;
2. Coal Directory of India 2007-08, 2009-10, 2015-16; and
3. Minerals: National Mineral Inventory at a Glance at 2005, 2010, and 2015.

REFERENCES

INTRODUCTION

- Lange, Glenn-Marie, Quentin Wodon, and Kevin Carey, eds. 2018. The Changing Wealth of Nations 2018: Building a Sustainable Future. Washington, DC: World Bank

LAND- THE BASE, THE FOUNDATION

- Agricultural Census 2010-11
- Land Cover Classification System- Classification Concepts-Software Version 3

FOREST – THE PROTECTOR AND PROVIDER

- Centre for International Forestry Research (CIFOR)- 2016
- India State of Forest Report (ISFR), Forest Survey of India (FSI)
- Mitchell, A.W., Secoy, K., Mardas, N., Trivedi, M., Howard, R. and Parker, C. (2008). Forests NOW in the Fight Against Climate Change. Forest Foresight Report 1.v4 Global Canopy Programme, Oxford. pp.23;
  https://theredddesk.org/sites/default/files/resources/pdf/2009/Forests_Now_version_4.pdf;
  https://theredddesk.org/what-redd
- https://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf_files/Chp3/Chp3_1_Introduction.pdf

WATER-THE NECTAR OF LIFE

- Agriculture Census 2010-11, Department of Agriculture, Cooperation & Farmers Welfare, Ministry of Agriculture & Farmers Welfare
- Annual Report 2016-17, Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture & Farmers Welfare
- Basin Planning Directorate, CWC, XI Plan Document; Report of the Standing Sub-Committee on "Assessment of Availability & requirement of Water for Diverse uses-2000"

- Dynamic Ground Water Resources of India (As on 31st March, 2009), Central Ground Water Board, Ministry of Water Resources
- Dynamic Ground Water Resources of India (As on 31st March, 2011), Central Ground Water Board, Ministry of Water Resources
- Dynamic Ground Water Resources of India (As on 31st March, 2013), Central Ground Water Board, Ministry of Water Resources
- Dynamic Ground Water Resources of India (As on March, 2004), Central Ground Water Board, Ministry of Water Resources
- Economic Survey 2017-18, Volume I
- Government of India, 2009 (NCIWRD Report, 1999)
- Ground Water Year Book- India 2009-10, Central Ground Water Board, Ministry of Water Resources
- Ground Water Year Book- India 2016-17, Central Ground Water Board, Ministry of Water Resources
- NG Hegde (2012), 'Water Scarcity and security in India', http://www.indiawaterportal.org/articles/water-scarcity-and-security-india
- Rainfall Statistics of India (2016), Indian Meteorological Department (IMD), Ministry of Science & Technology
- River Basin Atlas of India, 2012, http://www.india-wris.nrsc.gov.in/wrpinfo/index.php?title=WRIS_Publications
- Selected Best Practices in Water Management (August 2017), NITI Aayog, TERI University
- The System of Environmental-Economic Accounting: Central Framework (SEEA-CF),2012, United Nations Statistics Division
- Water and Related Statistics, CWC, 2015

MINERALS-THE BUILDING BLOCKS

- Annual Report 2017-18, Ministry of Mines
- Coal Directory of India 2007-08, 2009-10, 2015-16
- National Mineral Inventory at a Glance at 2005, 2010 and 2015

- Petroleum and Natural Gas: Indian Petroleum and Natural Gas Statistics, 2010-11 and Petroleum and Natural Gas Statistics, 2016-17
- Provisional Coal Statistics, 2005-06

GLOSSARY

Glossary

A

Above-Ground Biomass (AGB)

Component of carbon pool consisting of all living vegetation above the soil, inclusive of stems, stumps, branches, bark, seeds and foliage.

Abstraction

Amount (of water) that is removed (from any source), either permanently or temporarily, in a given period of time.

Afforestation

Planting of new forests on lands that historically have not contained forests.

Agricultural Land

Land primarily used for farming and for production of food, fibres and other commercial and horticultural crops.

Annual Replenishable Ground Water Resources

Quantity of ground water recharged during monsoon and non-monsoon seasons.

Aquifer

A geologic formation, group of formations, or part of a formation that contains sufficient saturated permeable material to yield significant quantities of water to wells and springs.

Artificial reservoirs

Man-made reservoirs used for storage, regulation and control of water resources.

B

Barren and Unculturable Land

Land which cannot be brought under cultivation except at an exorbitant cost, are classified as unculturable whether such land is in isolated blocks or within cultivated holdings. Includes all barren and unculturable land like mountains, deserts, etc.

Below-Ground Biomass (BGB)

Component of carbon pool consisting of the biomass contained within live roots.

Biodiversity

Variability among living organisms from all sources including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part, including diversity within species, between species and of ecosystems. It is a measure of ecosystem health.

Biomass

Refers to the density of organic matter expressed as oven-dry tonnes per unit area.

Bore holes

Deep round hole made by a special tool or machine, especially one that is made in the ground when searching for oil or water.

Brackish water

Water with salinity content between that of freshwater and marine water.

Built-up land

Area of human habitation developed due to non-agricultural use and that has a cover of buildings, transport and communication, utilities in association with water, vegetation and vacant lands.

C

Canopy

The cover of branches and foliage formed by the crowns of trees.

Canopy Cover

Percentage of the ground covered by a vertical projection of the outermost perimeter of the natural spread of the foliage of plants.

Canopy Density

Percent area of land covered by the canopy of trees. It is expressed as a decimal coefficient, taking closed canopy as unity.

Carbon Pool

Components of an ecosystem that can either accumulate or release carbon.

Carbon Sequestration

The removal and storage of carbon from the atmosphere in carbon sinks (such as oceans, forest or soils) through physical or biological processes, such as photosynthesis.

Catchment

Area having a common outlet for its surface run-off.

Climate

Climate in a narrow sense is usually defined as the "average weather," or more rigorously, as the statistical description in terms of the mean and variability of relevant quantities over a period of time ranging from months to thousands of years. The classical period is 3 decades, as defined by the World Meteorological Organization (WMO). These quantities are most often surface variables such as temperature, precipitation and wind.

Climate Change

Climate change refers to any significant change in the measures of climate lasting for an extended period of time. In other words, climate change includes major changes in temperature, precipitation, or wind patterns, among others, that occur over several decades or longer.

Coastal Wetland

Include estuaries, lagoons, creek, backwater, bay, tidal flat /mudflat, sand /beach, rocky coast, mangrove, salt marsh /marsh vegetation and other hydrophytic vegetation and saltpans.

Concentration

Amount of a chemical in a particular volume or weight of air, water, soil or other medium.

Crops

Plants or agricultural produce grown for food or other economic purposes, such as for textiles or livestock fodder

Cropland

These are the areas with standing crop as on the date of satellite overpass.

Crown Area

It is the area of horizontal projection of a tree crown on the ground.

Culturable Waste Land

Lands available for cultivation, which are either not taken up for cultivation or taken up for cultivation once but not cultivated during the current year and the last five years or more in succession for one reason or other. Such lands may be either fallow or covered with shrubs and jungles, which are not put to any use. They may lie in isolated blocks or within cultivated holdings. Land once cultivated but not cultivated for five years in succession are included in this category at the end of the five years.

Current Fallows

Represents cropped area, which is kept fallow during the current year.

Current Shifting Cultivation

This describes the growing of crops for a few years on selected and clear plots, alternating with a lengthy period of vegetative fallow when the soil is rested. The land is cultivated for less than 33 percent of the time.

D

Dams

Artificial barrier which impounds or diverts water. A dam is generally considered hydrologically significant if it is either (i) One and one quarter feet (0.4 meters) or more in height from the natural bed of the stream and has a storage of at least 15 acre-feet; or (ii) has an impounding capacity of 50 acre-feet or more and is at least six feet (2 meters) above the natural bed of the stream.

Dead Organic Matter (DOM)

Component of carbon pool that contains all non-living woody biomass and can be divided into wood (fallen trees, roots and stumps with diameter over 10cm) and litter (greater than 2mm and less than 10cm diameter) components.

Deciduous

These are the forest types that are predominantly composed of species, which shed their leaves once a year, especially during summer. It also includes tree clad area with tree cover lying outside the notified forest boundary areas that are herbaceous with a woody appearance.

Deforestation

Practices or processes that result in the conversion of forested lands for non–forest uses. The term specifically excludes areas where the trees have been removed as a result of harvesting or logging and where the forest is expected to regenerate naturally or with the aid of silvicultural measures.

Depletion

In physical terms, it is the decrease in the quantity of the stock of a natural resource over an accounting period that is due to the extraction of the natural resource by economic units occurring at a level greater than that of regeneration.

Derelict water

Water which is abundant or unused. Such water may be useful in aquaculture practices after treatment and settlement. Usually the stagnant waters of fresh water ponds and lakes which are in habituated with weeds come under this category.

Desertification

Land degradation in arid, semi–arid and dry sub–humid areas resulting from various factors, including climatic variations and human activities.

Discharge

Quantity of water flowing across a section of a channel in a unit time is called the discharge. Common units are cubic feet per second (cfs), second-day feet (sdf), and cubic meter per second (cumecs). Two types of discharges are often measured and recorded: (i) instantaneous discharge - the discharge at a particular instant of time; and (ii) mean discharge- the arithmetic mean of individual discharges during a period of time.

Drainage Area

Area around a river, rainfall on which flows into the river. Also known as watershed, catchment area and drainage basin.

E

Ecosystem

A dynamic complex of plant, animal and microorganism communities and their non–living environment interacting as a functional unit.

Ecosystem services

Benefits supplied by the functions of ecosystems and received by humanity.

Energy production

Capture, extraction or manufacture of fuels or other energy products in forms which are ready for general consumption.

Evapotranspiration

Combined process of evaporation from the Earth's surface and transpiration from vegetation.

Evergreen/Semi-Evergreen

This category comprises of tall trees, which predominantly remain green throughout the year. It includes both coniferous and tropical broadleaved evergreen species. Semi- evergreen is a forest type that includes a combination of evergreen and deciduous species with the former dominating the canopy cover.

Extraction

Extractions are reductions in stock due to the physical removal or harvest of an environmental asset through a process of production.

F

Fallow (Cover)

Lands which are taken up for cultivation but are temporarily allowed to rest, un-cropped for one or more season, but not less than one year.

Fallow Land other than Current Fallow

Includes all lands, which were taken up for cultivation but are temporarily out of cultivation for a period of not less than one year and not more than five years.

Feasibility Mineral Resource (UNFC classification code: 211)

Part of measured mineral resource, which after feasibility study has been found to be economically not mineable. Possibly economically viable subject to changes in technological, economic, environmental and/or other relevant conditions.

Flood irrigation

One of the oldest methods of irrigating fields also known as surface or furrow irrigation, where farmers flow water down small trenches running through their crops.

Flood plain

Flat area adjacent to rivers that is periodically flooded.

Forest

Includes all actually forested area on the lands so classed or administered as forests under any legal enactment dealing with forests, whether state-owned or private. It does not include land that is predominantly under agricultural or urban land use.

Forest Area

Area recorded as a forest in the Government records. It is also referred to as 'recorded forest area'.

Forest Cover

Forest Cover refers to all lands more than one hectare in area, with a tree canopy density of more than 10 percent irrespective of ownership and legal status. Such lands may not necessarily be a recorded forest area. It also includes orchards, bamboo and palm.

Forest Inventory

The measurement of certain parameters of forests to assess the growing stand and stock and other characteristics of forests.

Forest Plantation

These are the areas of tree species of forestry importance, raised and managed especially in notified forest areas. The species mainly constitute teak, sal, eucalyptus, casuarinas, bamboo etc.

Freshwater

Naturally occurring water having a low concentration of salt.

G

Geological formation

Formed rock types/ sedimentary layers under the surface of the earth.

Glacier

A multi–year surplus accumulation of snowfall in excess of snowmelt on land and resulting in a mass of ice at least 0.1 km^2 in area that shows some evidence of movement in response to gravity. A glacier may terminate on land or in water.

Grass / grazing land

These are the areas of natural grass along with other vegetation, predominantly grass-like plants and non-grass-like herbs. It includes natural/semi-natural grass/ grazing lands and manmade grasslands.

Green Wash

The extent of wooded areas generally shown in light green colour on the Survey of India(SOI) toposheets.

Groundwater

Water that collects in porous layers of underground formations known as aquifers, that supplies wells and springs. The upper surface of the zone of saturation, where all openings in rocks and soil are filled, forms the water table.

Groundwater recharge

The amount of water added from outside – either naturally or through artificial recharge - to the zone of saturation of an aquifer during a given period of time.

Growing Stock

The sum (by number or volume) of all the trees growing/living in the forest or a specified part of it.

Gullied / Ravinous Land

Gullies are formed as a result of localized surface run-off affecting the unconsolidated material resulting in the formation of perceptible channels causing undulating terrain. They are mostly associated with stream courses, sloping grounds with good rainfall regions and foothill regions. These are the first stage of excessive land dissection followed by their networking which leads to the development of ravinous land. Ravines are basically extensive systems of gullies developed along river courses.

H

Hydropower generation

Water used in generating electricity at plants where the turbine generators are driven by falling water.

I

Indicated Mineral Resource (UNFC classification code: 332)

Mineral resources where the tonnage, densities, shape, physical characteristic, grade and mineral content can be estimated with reasonable level of confidence based on exploration, sampling and testing information, location of borehole, pits etc. too widely spaced.

Inferred Mineral Resource (UNFC classification code: 333)

Mineral resources where the tonnage, grade and mineral content have been inferred from geological evidence and the tonnage can be estimated with low level of confidence.

Industrial minerals

Geological materials which are mined for their commercial value, which are not fuel (fuel minerals or mineral fuels) and are not sources of metals (metallic minerals) but are used in the industries based on their physical and/or chemical properties.

Inland Wetland

These are the areas that include ox-bow lakes, cut-off meanders, playas, marsh, etc. which are seasonal as well as permanent in nature. It also includes manmade wetlands like waterlogged areas (seasonal and perennial).

Irrigation

Process of purposely providing land with water other than rain water by artificial means.

Irrigation Potential Created (IPC)

The Irrigation potential created by a project at a given time is the aggregate gross area that can be irrigated annually by the quantity of water that could be made available by all the connected and completed works up to the end of the water courses or the last point in the water delivery system.

Irrigation Potential Utilized (IPU)

The Irrigation potential utilized is the total gross area actually irrigated by a project/scheme during the agricultural year under consideration.

Irrigation water

Water artificially applied to land for agricultural purposes.

L

Lakes

Larger bodies of standing water occupying distinct basins. These wetlands occur in natural depressions and are normally fed by streams/rivers.

Land cover

Land cover refers to the observed physical and biological cover of the Earth's surface and includes natural vegetation and abiotic (non-living) surfaces.

Land put to non-agricultural uses

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

Land under Miscellaneous Tree Crops

Includes all cultivable land which is not included in 'Net area sown' but is put to some agricultural uses. Lands under Casuarina trees, thatching grasses, bamboo bushes and other groves for fuel, etc. which are not included under 'Orchards' are classified under this category.

Land-use

Land use reflects both (a) the activities undertaken and (b) the institutional arrangements put in place for a given area for the purposes of economic production, or the maintenance and restoration of environmental functions

Lithology

Lithology is the general characteristics of sediments, rocks, and rock types present in a stratigraphic division of earth, used by geologists to characterize rocks based on their physical appearance.

Litter

Woody material of trees having diameter < 5cm which is not decomposed.

M

Major Irrigation Scheme

A scheme having Culturable Command Area (CCA) more than 10,000 hectares is classified as major irrigation scheme.

Managed expansion / regression

Managed expansion / regression represent an increase /decrease in the area of a land cover type due to human activity. Generally, the managed expansion /regression of one land cover type will also lead to the recording of a matching entry for managed regression /expansion of another land cover type. A matching entry is not recorded if there is a managed expansion in the total area of land within scope of the account (e.g., in the case of land reclamation).

Medium Irrigation Scheme

A scheme having Culturable Command Area (CCA) more than 2,000 hectares and up to 10,000 hectares individually is classified as medium irrigation scheme.

Measured Mineral Resource (UNFC classification code: 331)

That part of mineral resource for which tonnage, densities, shape, physical characteristics, grade and mineral content can be estimated with a high level of confidence i.e. based on detailed exploration.

Mineral

The term 'Mineral' means a class of substances occurring in nature, formed as a result of geological processes, which is of definite chemical composition and usually, a characteristic crystal structure, but sometimes also includes rocks formed by these substances.

Mineral resources

A 'Mineral Resource' is a concentration or occurrence of material of intrinsic economic interest in or on the earth's crust in such form, quality and quantity that there are reasonable prospects for eventual economic extraction.

Mining

Mining is the extraction of valuable minerals or other geological materials from the earth, usually from an ore, lode, vein, seam, reef or placer deposit. These deposits form a mineralized package that is of economic interest to the miner.

Minor Irrigation Scheme

A scheme having Culturable Command Area (CCA) up to 2,000 hectares individually is classified as minor irrigation scheme.

Minor minerals

Minor minerals mean building stones, gravel, ordinary clay, ordinary sand other than sand used for prescribed purposes, and any other mineral which the Central. Government may, by notification in the Official Gazette, declare to be a minor mineral.

Moderately Dense Forest

All lands with forest cover having a canopy density between 40 to 70 percent.

Monitoring well

A well constructed or used for the purposes of water level or water quality data collection.

N

Natural expansion / regression

Natural expansion / regression is an increase /decrease in area resulting from natural processes including seeding, sprouting, suckering, layering or erosion by sea. As in the case of managed expansion /regression, generally, the natural expansion of one land cover type will also lead to the recording of a matching entry for natural regression of the another land cover type. A matching entry is not recorded if there is a natural expansion /regression in the total area of land (e.g., in the case where land is created through volcanic activity or landslide or eroded by sea).

Net Annual Ground Water Availability

The Net annual ground water availability is the available resource after deducting the natural discharges from the Annual Replenishable Ground Water Resource.

Net area irrigated

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

Net area Sown

Represents the total area sown with crops and orchards. Area sown more than once in the same year is counted only once.

Non-renewable resources

A non-renewable resource (also called a finite resource) is a resource that does not renew itself at a sufficient rate for sustainable economic extraction in meaningful human time-frames.

Normal year

The year during which the precipitation or stream flow approximates the average for a long period of record.

O

Observation well

A well constructed in a specific location for the purpose of observing (measuring) changes in water level. An existing well perhaps drilled for a different purpose may also be used to observe water level changes. Observation wells are typically used for short duration data collection such as before, during and after an aquifer test. Wells that are used to collect data on a long term basis are usually referred to as monitoring wells.

Open Forest

Lands with forest cover having a canopy density between 10 to 40 percent.

Ore

Ores are concentrations of minerals in rock that are high enough to be economically extracted for use.

Other wooded land

Land not classified as "Forest", spanning more than 0.5 hectares; with trees higher than 5 metres and a canopy cover of 5–10 per cent, or trees able to reach these thresholds in situ; or with a combined cover of shrubs, bushes and trees above 10 per cent. It does not include land that is predominantly under agricultural or urban land use.

P

Permanent Pastures and other Grazing Lands

Includes all grazing lands whether they are permanent pastures and meadows or not. Village common grazing land is included under this head.

Physiographic Zone

A physiographic zone constitutes geographical areas that exhibit broad similarities in factors responsible for the growth of tree vegetation. Physiographic zones are used as strata for assessing tree cover in the country.

Piezo meter

A piezometer is a purpose-built observation well that facilitates measurement of liquid pressure above a geodetic datum of the selected aquifer.

Plantations

These are the areas under agricultural tree crops planted adopting agricultural management techniques. It includes agricultural plantation (like tea, coffee, rubber etc.) horticultural plantation (like coconut, areca nut, citrus fruits, orchards, fruits, ornamental shrubs and trees, vegetable gardens etc.) and agro-horticultural plantation.

Precipitation

The total volume of atmospheric wet precipitation, such as rain, snow and hail, on a territory in a given period of time.

Prefeasibility Mineral Resource (UNFC classification code: 221 and 222)

That part of an indicated and in some circumstances measured mineral resource that has been shown by prefeasibility study to be not economically mineable. Possibly economically viable subject to changes in technological, economic, environmental and/or other relevant condition.

Protected Forest (PF)

An area notified under the provisions of the Indian Forest Act or other State Forest Acts, having limited degree of protection. In protected forest all activities are permitted unless prohibited.

Proved Mineral Reserves (UNFC classification code: 111)

Economically mineable part of measured mineral Resource.

Probable Mineral Reserves UNFC classification code: 121 & 122)

Economically mineable part of indicated or in some cases a measured mineral resource.

R

Rann

An extensive salt marsh of western India between the Gulf of Kutch and the Indus River delta.

Reappraisals

Reappraisals can be upward or downward and can reflect changes due to the use of updated information that permits a reassessment of the size of the area of different land covers, for example, from new satellite imagery or interpretation of satellite imagery. The use of updated information may require the revision of previous estimates to ensure a continuity of time series.

Recharge

The downward movement (percolation) of rain, snowmelt or surface water through the soil, weathered material and rock layers to replenish the ground water/aquifer stores. Concentrated zones of ground water recharge may occur through stream beds.

Recorded Forest Area (RFA)

Same as 'forest area', i.e., geographic areas recorded as forests in Government records.

Reforestation

Planting of forests on lands that have previously contained forests but that have been converted to some other use.

Remaining resources

Mineral resources that have not yet been declared as economically viable, but are potentially valuable and for which reasonable prospects exist for eventual economic extraction.

Renewable resources

Renewable resources that are replaced by natural processes and forces persistent in the natural environment.

Reserved Forests (RF)

An area so constituted under the provisions of the Indian Forest Act or other State Forest Acts, having full degree of protection. In reserved forests all activities are prohibited unless permitted.

Reserves

Estimates of deposits, that are valuable and legally, economically and technically feasible. Economically mineable parts of measured and/or indicated mineral resources are placed under 'reserve' category.

Reservoir/Barrage

A pond or lake built for the storage of water, usually by the construction of a dam across a river or by dykes constructed for irrigation/water facilities.

Reconnaissance Mineral Resource (UNFC classification code: 334)

Estimates of Mineral Resources based on regional geological studies and mapping, airborne and indirect methods, preliminary field inspections as well as geological inference and extrapolation

River /Stream / Canals

Rivers /streams are natural course of water flowing on the land surface along a definite channel /slope regularly or intermittently towards a sea in most cases or in to a lake or an inland basin in desert areas or a marsh or another river. Canals are artificial water course constructed for irrigation, navigation or to drain out excess water from agricultural lands.

River Basin

River Basin is the basic hydrological unit for water resources planning and management. It includes the drainage area of a river and its tributaries.

Rivers/ Streams

Bodies of water flowing continuously or periodically in a channel.

Runoff

Water which is not absorbed by the soil and flows to lower ground, eventually draining into a stream, river, or other body of water. It is that part of precipitation that flows toward the streams on the surface of the ground or within the ground. Runoff is composed of base flow and surface runoff.

Rural

These are the lands used for human settlement where the majority of population is involved in the primary activity of agriculture. These are the built-up areas, smaller in size, mainly associated with agriculture and allied sectors and non-commercial activities. They can be seen in clusters non-contiguous or scattered.

S

Saline

Salinity is the presence of soluble salts in soils or waters. Salinity in water is usually defined by the total dissolved solids content (TDS, mg/L or g/ L) or the chloride content (Cl, mg/L) although the chloride ion comprises only a fraction of the total dissolved salts in water.

Salt-Affected Land

Generally characterized as land that has excess salt in the soils with patchy growth of grasses.

Sandy Area

These can occur in coastal, Riverine or inland areas. Desertic sands are characterized by accumulation of sand developed in situ or transported by Aeolian processes. Coastal sands are the

sands that are accumulated as a strip along the sea-coast. Riverine sands are those that are seen as accumulations in the flood plain as sheets which are the resultant phenomena of river flooding.

Scrub

Degraded forest lands having canopy density less than 10 percent.

Slim hole

Slim holes are usually drilled to recover core, take water samples, measure thermal and fluid flow properties. Once the reservoir has been adequately defined and slim holes happen to be in an optimal location and depth, they can be used for observation and monitoring of the geothermal reservoir during production.

Snow and glaciers

These are the areas under snow cover confined to the Himalayan region.

Soil Erosion

Soil erosion is the displacement of the upper layer of soil, caused by the dynamic activity of erosive agents, that is, water, ice (glaciers), snow, air (wind), plants, animals, and humans.

Soil organic matter (SOM)

The SOM carbon pool is divided into mineral and organic soil carbon and contains biomass less than 2 mm diameter.

Stage of development

Stage of ground water development is denoted by the percentage of utilization with respect to recharge and can be computed as:

Stage of development = (Existing Gross Draft for All Uses)/ (Net Annual Ground Water Availability) * 100

Strategic minerals

Strategic minerals (also known as Critical Minerals) are a broad-based category that constitutes various minerals and elements; the majority of which are minor metals. Geography and availability of domestic supply often defines which minerals are deemed "critical" for any particular region or country.

Sub-soil resources

Underground deposits of various minerals that provide raw materials and energy sources for humans. When considered as resources for human use, these sub-soil elements differ fundamentally from ecosystems in that they are non-renewable. Their use thus results in permanent depletion.

Surface water

Comprises all water that flows over or is stored on the ground's surface, regardless of its salinity levels. Surface water includes water in artificial reservoirs, lakes, rivers and streams, snow, ice and glaciers.

T

Tanks/Ponds

An artificial pond, pool or lake formed by building a mud wall across the valley of a small stream to retain the monsoon or to store water, including those constructed for industrial purposes.

Timber resources

Defined by the volume of trees, living and dead, which can still be used for timber or fuel.

Tree

A large woody perennial plant having a single well defined stem (bole or trunk) and a more or less definite crown. It also includes bamboos, palms, fruit trees, etc. and excludes non-perennial non-woody species like banana and tall shrubs or climbers. For the purpose of assessing growing stock and tree cover, only those trees having diameter at breast height (dbh) of 10cm or more are measured.

Tree Cover

It comprises of tree patches outside the recorded forest area exclusive of forest cover and less than the minimum mappable area (1 ha) and up to 0.1 ha. Such small patches comprising of block, linear and scattered trees are not delineated as forest cover during interpretation of satellite data. The areas of scattered trees are computed by notional numbers.

Trees Outside Forests (TOF)

Trees growing outside recorded forest areas.

U

Ultimate Irrigation Potential (UIP)

The ultimate irrigation potential is the gross area that can be irrigated from a project in design year for the projected cropping pattern and assumed water allowance on its full development. The Ultimate Irrigation Potential of ground water may however, be taken as the total area that can be

irrigated by utilizing the Annually Rechargeable Ground Water Resource Available for Irrigation considering the gross irrigation requirement of crops grown in an unit area.

Unclassed Forests

An area recorded as forest but not included in reserved or protected forest category. Ownership status of such forests varies from state to state.

United Nations Framework Classification (UNFC) classification

The UNFC consists of a three dimensional system with the following three axes: Geological Assessment, Feasibility Assessment and Economic viability. The process of geological assessment is generally conducted in stages of increasing details. The typical successive stages of geological investigation i.e. reconnaissance, prospecting, general exploration and detailed exploration, generate resource data with a clearly defined degrees of geological assurance. These four stages are therefore used as geological assessment categories in the classification. Feasibility assessment studies form an essential part of the process of assessing a mining project. The typical successive stages of feasibility assessment i.e. geological study as initial stage followed by prefeasibility study and feasibility study/mining report are well defined. The degree of economic viability (economic or sub-economic) is assessed in the course of prefeasibility and feasibility studies. A prefeasibility study provides a preliminary assessment 3 in decreasing order, similarly the three categories of feasibility study have also codes 1, 2 and with a lower level of accuracy than that of a feasibility study, by which economic viability is assessed in detail.

It is a three-digit code based system, the economic viability axis representing the first digit, the feasibility axis the second digit and the geologic axis the third digit. The three categories of economic viability have codes 1,2 and 3 while the four stages of geological assessment are represented by 4 codes i.e. 1 (detailed exploration), 2 (general exploration), 3 (prospecting) and 4 (reconnaissance). Thus the highest category of resources under UNFC system will have the code (111) and lowest category the code (334).

Urban

Urban areas are non-linear built up areas covered by impervious structures adjacent to or connected by streets. This cover is related to centers of population. This class usually occurs in combination with, vegetated areas that are connected to buildings that show a regular pattern, such as vegetated areas, gardens etc. and industrial and/or other areas. It includes residential areas, mixed built-up, recreational places, public/ semi-public utilities, communications, public utilizes/facility, commercial areas, reclaimed areas, vegetated areas, transportation, industrial areas and their dumps, and ash/cooling ponds.

V

Very Dense Forest

Lands with forest cover having a canopy density of 70 percent and above.

W

Wastelands

Described as degraded lands which can be brought under vegetative cover with reasonable effort and which is currently underutilized and land which is deteriorating for lack of appropriate water and soil management or on account of natural causes.

Water body

A mass of water distinct from other masses of water. This category comprises areas with surface water in the form of ponds, lakes, tanks and reservoirs.

Water resources

Consist of freshwater and brackish water, regardless of their quality, in inland water bodies, including surface water, groundwater and soil water.

Watershed

The geographic area through which water flows across the land and drains into a common body of water, whether a stream, river, lake, or ocean.

Weather

Atmospheric condition at any given time or place. It is measured in terms of such things as wind, temperature, humidity, atmospheric pressure, cloudiness and precipitation. In most places, weather can change from hour–to– hour, day–to–day and season–to–season. Climate in a narrow sense is usually defined as the "average weather".

Weathering

Breakdown of rocks through contact with atmospheric conditions such as heat, water, ice and pressure.

Wetland

Areas of land that are either temporarily or permanently covered by water. These are neither truly aquatic nor terrestrial; it is possible that wetlands can be both at the same time depending on seasonal variability. These could be natural or man-made and found both in the inland and coastal areas.

150 YEARS OF CELEBRATING THE MAHATMA

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