

## CHAPTER TWO

### DEVELOPMENT OF ENVIRONMENT STATISTICS IN INDIA

#### 2.1 Introduction

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

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

#### 2.2 Setting up of Environment Statistical Unit in Central Statistical Organisation

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

Statistics. The group also suggested a few variables on which data needed to be collected on priority basis.

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

### **2.3 Compendium of Environment Statistics**

The Central Statistics Office brought out thirteenth issues of the publication entitled “Compendium of Environment Statistics” for the years 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2006, 2007, 2008-09, 2010, 2011 and 2012 presenting available data relating to environment of the country. The present issue is fourteenth in its series covering the data upto 2012. The issues for the years 2004 & 2005 could not be brought out due to unavoidable circumstances. The tenth issue was a combined issue for 2008 and 2009. Although, the present coverage of information in the compendium may not be exhaustive with respect to entire domain of Environment, it does however provide a glimpse of the present scenario of the environmental degradation, its causes and the reasons for concern. It provides the necessary base to bring out the magnitude of the problem. The compendium consists of seven chapters. The first two chapters give a general introduction to environment, its degradation through different sources and their impact on human health and the development of environment statistics in India. The remaining five chapters are on Biodiversity, Atmosphere, Land/soil, Water and Human Settlements. Besides, statistical tables depicting environment data, suitable graphs and charts have also been added to make the publication more user friendly.

### **2.4 National Workshop/Seminars on Environment Statistics**

To disseminate information on the development of environment statistics in India and provide a forum for interaction between users and producers, fourteenth National Workshops/ Seminars on Environment Statistics have been organised so far since 1998.

- First one was organized on different aspects of Environment and its impact on land and soil degradation, health including data gaps in different sectors of environment in Goa during 12-13 January, 1998.
- Second, third and fourth workshop was held during 6-7 April, 2000, at Hyderabad, 8-9 February, 2001 at Thiruvananthapuram and 22-23 April, 2003 at Shillong respectively. In the third workshop, it was decided to organise Seminar on sector specific subject.

- Fifth Seminar on Statistical Accounting of Water Resources was organised during 24-25 June, 2005 at Institute for Social and Economic Change (ISEC) Bangalore.
- Sixth Seminar on Statistical Accounting of Land and Forestry Resources was organised during 29-30 April, 2006 at Indian Institute of Forest Management(IIFM), Bhopal.
- A brainstorming Workshop on Development of National Disaster Statistical System in India was organised by CSO in collaboration with National Institute of Disaster Management (NIDM) on 27<sup>th</sup> April, 2007 at NASC, Complex PUSA, New Delhi.
- A Dissemination Seminar to discuss the finding and other methodological issues in respect of the completed Natural Resource Accounting studies was organised at Shimla during 17-18 December, 2007.
- CSO in collaboration with Institute for Climate Change (ISEC) had organised another two day's National Seminar on 'Climate Change: Data Requirement and Availability' during 16-17 April, 2009 at ISEC, Bangalore.
- The two day Workshop for the DESs held at New Delhi on 21-22 July 2010 discussed 'Disaster Management Statistics'. Another Workshop conducted on 21-22 August 2010 at New Delhi in collaboration with M/o Environment and Forests and WWF to explore the possibilities of environment data flow between CSO and Envis Centres.
- A national seminar on 'Environmental Pollution: Data Availability and Gaps' was conducted at Institute of Development Studies (IDS), Jaipur during 24-25 March, 2011.
- A three day Workshop on 'Disaster Management Statistics' was jointly organised with National Institute of Disaster Management (NIDM) New Delhi during 21-23 September,2011 at National Academy of Statistical Administration (NASA), Greater Noida by inviting participants from DESs, State Disaster Management Commissioners, and the Central Ministries.
- A two day workshop on Climate Change Statistics was organised in February 2012 at Hyderabad.
- In September 2012 a two days workshop on revision of FDES was organised in Hyderabad.

All the workshops were attended by academicians, data users, and data producing agencies. The technical sessions focussed on different aspects of the environment such as environment statistics, population and human health, status of databases on different types of pollution, status of data bases on human settlements and impacts on other aspects of the environment; status of data base on land and soil and degradation; and natural resource accounting. Proceedings of the National Workshops/Seminars are brought out regularly.

## 2.5 Training on Environment Statistics

Environment statistics being a multi- disciplinary emerging subject, the Statisticians working both at the Centre as well as State Governments are required to be fully familiar with the relevant terminologies, and concepts and definitions. To fulfil this need, the CSO organized an International Training Programme on Environment Statistics during 27 Jan-6 Feb, 1998 with financial support from Asian Development Bank. Twenty-two participants

from South and South East Asia, including nine from India, participated in this programme. Till date, ten such training programmes were organized in collaboration with different organizations working in the area of Environment at different parts of the India.

## 2.6 Natural Resource Accounting

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

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

As a result, concept of Integrated Environmental and Economic Accounting (IEEA) has emerged on the initiative of the United Nations. The main objectives of integrated environmental accounting are segregation and elaboration of all environmental and economic accounts, linkages of physical resource accounts with monetary environmental accounts and balance sheets, assessments of environmental costs, benefits and accounting for the maintenance of the tangible wealth. It is, thus, a complete accounting procedure for environmental assets. The IEEA later revised and termed by the City Group formed by UNSD namely, London Group as “System for Environmental and Economic Accounting”(SEEA) taking into consideration the contributions of the environment to the economy and the impacts of the economy the environment.

The United Nations, the European Commission, the International Monetary Fund, the Organisation for Economic Co-operation and Development and the World Bank undertook jointly the task of revision of the United Nations handbook of National Accounting Integrated Environmental and Economic Accounting (commonly referred to as SEEA-2003). Much of the work was done by the London Group on Environmental and Natural Resources Accounting, through a review process that started in 1998. SEEA 2003 provides a common framework for economic and environmental accounting, permitting a consistent analysis of contribution of environment to the economy and of the impact of the economy on the environment. It is intended to meet the needs of policy makers by providing indicators and descriptive statistics to monitor the interaction between the economy and the environment as well as serving as a tool for strategic planning and policy analysis to identify more sustainable development paths.

However, data on environmental components and the goods and services rendered by them, and their valuation in economic terms required for Environmental Accounting are lacking in various areas like Land, Water, Air, Energy, Agriculture, Forest, Mining, Industry etc. At present, in the fast changing environmental and economic scenario, data pertaining to various natural resources are highly desirable for proper policy formulation for sustainable development.

## **2.7 Natural Resource Accounting in India System of Environmental Economic Accounting (SEEA) and Implementation of Natural Resource Accounting (NRA)/SEEA in India.**

The SEEA 2003, revision of SEEA 1993, represented a considerable step forward in terms of breadth of material and harmonization of concepts, definitions, and methods in environmental and economic accounting. Although SEEA 2003 was never formally adopted as an international statistical standard, it, however, provided a well accepted and robust framework for the compilation of environmental and economic accounts. Another revision process of SEEA 2003 was started in 2007 with the aim of adopting SEEA as an international statistical standard. This latest version comprise three parts, the main one being SEEA Central Framework.

The System of Environmental–Economic Accounting (SEEA) Central Framework is a multi-purpose, conceptual framework that describes the interactions between the economy and the environment, the stocks and changes in stocks of environmental assets. This is a system that has been developed under the aegis of the UN Statistical Commission to explicitly account for the environment at the macro level. The current version of the SEEA builds on previous 1993 and 2003 revisions. The 43rd Session of the UN Statistical Commission formally accepted the SEEA Central framework as an international statistical standard in 2012. The SEEA allows us to examine various issues at the macro level such as resource efficiency and productivity indicators, decomposition analysis, analysis of net wealth and depletion, sustainable production and consumption, structural input-output analysis and general equilibrium modeling, consumption based input-output analysis and footprint techniques, analysis using geospatially referenced data etc.

The SEEA Central Framework provides a structure to compare and contrast source data and allows the development of aggregates, indicators and trends across a broad spectrum of environmental and economic issues. Particular examples include the assessment of trends in the use and availability of natural resources, the extent of emissions and discharges to the environment resulting from economic activity, and the amount of economic activity undertaken for environmental purposes.

The SEEA Central Framework represents a melding of many disciplines and brings together, in a single measurement system, information on water, minerals, energy, timber, fish, soil, land and ecosystems, pollution and waste, production, consumption and accumulation. It is designed to be applicable across all countries, regardless of their level of economic and statistical development, their economic structure, or the composition of their environment.



In addition to the SEEA Central Framework, two related parts are being developed: SEEA Experimental Ecosystem Accounts, and SEEA Extensions and Applications. The SEEA Experimental Ecosystem Accounts (which is under preparation) describes both the measurement of ecosystems in physical terms, and the valuation of ecosystems in so far as it is consistent with market valuation principles, noting that only those issues for which broad consensus has emerged will be included. In accounting terms, many of the structures for ecosystem accounting will be drawn from the structures in the SEEA Central Framework and, in this regard, the accounting conventions of the SEEA Central Framework will be applied consistently. SEEA Extensions and Applications will present various monitoring and analytical approaches that could be adopted, and will describe ways in which SEEA data can be used to inform policy analysis which will be useful for official statisticians, researchers and policy makers. This part of SEEA will not be a statistical standard.

The SEEA Central Framework adopts slightly different terminology in relation to environmental assets compared to the SNA. In the SNA, the term “Natural Resources” is used to cover natural biological resources (e.g. timber and aquatic resources), mineral and energy resources, water resources and land, whereas in the SEEA Central Framework, land is separated from natural resources recognizing its distinct role in the provision of space. Further, in the SNA, land and soil resources are considered as a single asset type whereas in the SEEA Central Framework, these are recognized as separate assets highlighting the role of land in the provision of space. Soil resources are included as part of natural resources.

The valuation of environmental assets is a complex measurement task. The SEEA Central Framework adopts the same market price valuation principles as the SNA. However, since observable market prices are usually not available for environmental assets, the same need to be treated differently.

Both the SEEA Central Framework and the SNA recognize the change in the value of natural resources that can be attributed to depletion. In the SNA, the value of depletion is shown in the other changes in the volume of assets account alongside flows such as catastrophic losses and uncompensated seizures. Thus, it is not recognized as a cost against the income earned by enterprises extracting natural resources. In the SEEA Central Framework, the value of depletion is considered to be a cost against income and hence, in the sequence of economic accounts, depletion adjusted balancing items and aggregates are defined which deduct depletion from the measures of value added, income and savings. The depletion deduction is made in addition to the deduction of CFC for the cost of using fixed assets which is already deducted from measures of value added, income and saving in the SNA. Depending on the arrangements underpinning the ownership of specific natural resource, this differing treatment of depletion in SEEA Central Framework may require additional entries in the sequence of economic accounts at an institutional sector level.

## **2.8 Towards Implementation of Natural Resource Accounting (NRA)/SEEA in India**

As per the recommendations of a Technical Working Group on NRA constituted by CSO, a pilot project on NRA in the State of Goa was initiated during 1999-2000 which was

undertaken by The Energy and Resources Institute (TERI), Delhi. The findings of the study generated a lot of discussion among the academics as well as the National Statistical Commission. In order to develop sector-specific but uniform methodologies for resource accounting, the Ministry of Statistics and Programme Implementation (MOSPI) commissioned a set of studies on land, forests, air, water, and sub-soil resources in eight Indian states.

#### **State-level studies on Natural Resource Accounting commissioned by the CSO**

<b>Name of study/Organization</b>	<b>Areas</b>
Institute of Economic Growth, New Delhi	NRA of Air and Water Pollution in Andhra Pradesh & Himachal Pradesh
Indian Institute of Forest Management (IIFM), Bhopal	NRA of Land and Forestry for Madhya Pradesh & Himachal Pradesh
North East Hill University (NEHU), Shillong	Environmental Accounting of Land and Forestry of Meghalaya
Integrated Research and Action for Development (IREDe), Delhi	NRA in Goa
Madras School of Economics (MSE), Chennai	Environmental Accounting of Land and Water in Tamil Nadu
Jadavpur University, Kolkata	NRA for Air and Water Sectors in West Bengal
The Energy and Resources Institute (TERI), Delhi	Accounting for unsustainable mineral extraction in Madhya Pradesh & West Bengal
Centre for Multi-Disciplinary Development Research (CMDR), Dharwad, Karnataka	NRA for Land and Forestry (excluding mining) in Karnataka

SEEA prescribes two valuation methods viz., maintenance cost method and non-market valuation by stated and revealed preference methods. In fact, the projects undertaken by CSO provided case studies using both these methods. The non-market valuation methods used were hedonic prices method, household health production function method, travel cost method etc. Also some of these studies attempted to make estimates of maintenance cost at the sector and regional levels. The sectors covered were thermal power generation, urban transport, industrial management, forests and land and exhaustible resource of coal.

The efforts are on to build up a sector-wise framework for NRA through a Technical Advisory Committee under CSO headed by Dr. Kirit Parikh, Former Member, Planning Commission involving the Centre for Economic and Social Studies (CESS), Hyderabad.

The CSO also constituted a Technical Advisory Committee in the year 2010 under the Chairmanship of Dr. Kirit Parikh, Former Member, Planning Commission to bring out a Synthesis Report combining the findings of all the 8 studies commissioned by CSO with the help of Centre for Economic and Social Studies (CESS), Hyderabad. A synthesis report based

on those studies was developed by Technical Advisory Committee. The report recommended the preparation of a National Accounting Matrix that would include environmental accounts.

Subsequently, an 'Expert Group on Green National Accounting' was constituted in August, 2011 under the Chairmanship of Prof. Partha Dasgupta, Professor Emeritus, Cambridge University, UK with a mandate to (a) to develop a frame work for 'Green National Accounts' for India keeping in view of the previous work done on the subject, including the findings of the studies award to CESS, Hyderabad, (b) to identify the data requirements for the implementation of the recommended framework, and (c) to develop a road map for the implementation of the framework.

This Expert Group on Green National Accounting for India, held three meetings in August 2011, April 2012 and December 2012. Based on the suggestions emerged from the meeting, the Expert Group had prepared a report comprising **Conceptual Framework, Valuation Principles, System of National Accounts (SNA) in India and System of Environmental Economic Accounting (SEEA), and Implementing the Green Accounting Framework.**

The Report deals with the conceptual foundations of Green National Accounts. The conceptual framework lays out the conditions for sustainability under the assumption that information is not a serious constraint for evaluating and aggregating the diverse elements that compose an economy. It provides an outline for what would ideally be needed for a comprehensive set of national accounts.

The Report's central conclusion is that, adjusting for the population, the economic evaluation should be based on a comprehensive notion of wealth (adjusted for the distribution of wealth in the economy) and not on GDP and nor on the adhoc indicators of human well-being such as Human Development Index (HDI). Wealth means the social value of an economy's stock of capital assets, comprising (1) **Reproducible Capital** (commonly known as "manufactured capital": roads, ports, cables, building machinery, equipment and so forth), (2) **Human Capital** (population size and composition, education, health), and (3) **Natural Capital** (ecosystem, land, sub-soil resources and so on). In particular, changes in the circumstances of an economy should be judged on the basis of their effect on the economy's wealth per capita, adjusted for the distribution of wealth. In other words, wealth per capita tracks intergenerational well-being averaged across the generations, the former increases over a period of time if and only if the latter increase over that same period of time.

The report says that Green GDP is a misnomer in the sense that (i) Net Domestic Product (NDP) which is GDP – Depreciation of capital assets where depreciation should not only include wear and tear of buildings and equipment but also loss of human capital and physical depletion and quality degradation of natural capital and (ii) aggregate net investment per capita does not simply mean aggregate net investment divided by population but its social value of the change in per capita stocks of assets. The full report of the Expert Group is available in the Ministry of Statistics and Programme Implementation website. (<https://www.mospi.gov.in>)



An International Workshop was organized during 5-6 April 2013 in Delhi to discuss the report. Hon'ble Prime Minister inaugurated workshop and unveiled the report of the Expert Group.

Environmental Economic Accounting was discussed with State Directorates of Economic and Statistics in 21<sup>st</sup> Conference of the Central and State Statistical Organisations (COCSSO) which was held during January 23-24, 2014 at Panaji, Goa. During the conference, the following issues were discussed.

1. Availability of data at States/UTs level for preparation of asset accounts for land and forests.
2. Preparation of State-wise Assets Accounts so that National Level Asset Accounts can be generated based on consolidation of state-wise accounts.

## **2.9 Climate Change Statistics**

As per the recommendations of 16<sup>th</sup> COCSSO, an Expert Committee on Climate Change Statistics was constituted by the CSO in 2009 to identify the indicators that are affecting climate change, adaptation and mitigation and examine the availability of data with a view to develop database on Climate Change Statistics. The Expert Committee constituted on Climate change data base has submitted their report during June 2010. The Ministry of Environment & Forest and others were consulted with recommendation of the report. Also a Workshop to discuss the framework for climate change statistics was held in Hyderabad on 3-4 February, 2012. Based on various inputs, the framework was finalized and data were collected as per the framework. The draft report on Climate Change Statistics was discussed in the National Workshop on 24-25<sup>th</sup> October 2013. The first report on 'Climate Change Statistics-India' was published by Central Statistics Office (CSO) on 29<sup>th</sup> November 2013.

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