



Green National Accounting in India: A Framework-Bio-diversity related findings

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Environmental/Natural Resource Accounting in India

- ▶ Environmental and Natural Resource Accounting in India is in developing stage.
- ▶ The entire process of Environmental and Natural Resource Accounting involves 3 steps:
 - Physical Accounting
 - Monetary Valuation and
 - Integration with Economic Accounting.
- ▶ In order to develop sector-wise uniform methodology for Natural Resource Accounting, the Ministry of Statistics and Programme Implementation commissioned 8 studies on NRA to specialized institutes.

CSO initiated Studies on NRA

Sl.N	Study	Organisation
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1	NRA of Air and Water Pollution in Andhra Pradesh & Himachal Pradesh	Institute of Economic Growth (IEG), Delhi
2	NRA of Land and Forest for Madhya Pradesh & Himachal Pradesh	Indian Institute of Forest Management (IIFM), Bhopal
3	Environmental Accounting of Land and Forest of Meghalaya	North East Hill University (NEHU), Shillong
4	NRA on Solid Waste, Air Pollution, Water Pollution, Forest in Goa	Integrated Research and Action for Development (IRADe), Delhi

CSO initiated Studies on NRA

Sl.No	Study	Organisation
5	Environmental Accounting of Land and Water in Tamil Nadu	Madras School of Economics (MSE), Chennai
6	NRA for Air and Water Sectors in West Bengal	Jadavpur University, Kolkata
7	Accounting for unsustainable mineral extraction in Madhya Pradesh & West Bengal	The Energy and Resources Institute (TERI), Delhi
8	NRA for Land and Forestry (excluding mining) in Karnataka	Centre for Multi-Disciplinary Development Research (CMDR), Dharwad, Karnataka

Synthesis Report

- ▶ A Synthesis Report based on 8 studies has since been prepared under the guidance of a Technical Advisory Committee (TAC) headed by Dr. Kirit Parikh, former Member, Planning Commission to recommend sector wise methodology for environmental accounting.
- ▶ The TAC recommended the preparation of a National Accounting Matrix including Environmental Accounts(NAMEA).
- ▶ There are two forms of NAMEA-Hybrid supply and use tables and hybrid input-output tables.
- ▶ India to start with national input-output tables with extensions on environmental factors.

Expert Group For Green National Accounts

- ▶ Subsequently, in accordance with the direction of Hon'ble Prime Minister, an Expert Group under the Chairmanship of Professor Sir Partha Dasgupta, Emeritus Professor, University of Cambridge, UK was set up in 2011 to develop a framework of green national accounts and prepare a roadmap for India to implement the framework. The Group held three meetings.
- ▶ The Group submitted its Report in March, 2013. An International Workshop was held during 5-6 April, 2013 in New Delhi to discuss the Report. The Workshop was inaugurated and the Report unveiled by Hon'ble Prime Minister.

Contents and Salient Features of the Report

- ▶ Chapter 1 is the Executive Summary of the Report.
- ▶ Chapter 2 and its appendices deal with the conceptual foundations of Green Accounting. 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.

Contents and Salient Features of the Report

- ▶ 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 coin on the basis of which economic evaluation should be conducted is a comprehensive notion of wealth (adjusted for the distribution of wealth in the economy) and not on GDP nor on the adhoc indicators of human well-being such as HDI.

Contents and Salient Features of the Report

- ▶ Here wealth comprises (i) reproducible capital (commonly known as manufactured capital), (ii) human capital (population size and composition, education and health), and (iii) natural capital (ecosystem, land, sub-soil resources, etc.)
- ▶ NDP is GDP minus depreciation which has to include not only wear and tear of buildings and equipment but also loss of human capital and physical depletion and quality degradation of natural capital.

Contents and Salient Features of the Report

- ▶ As per the Report, inter-generational well-being averaged over the generations increases over a brief interval of time if and only if aggregate consumption per capita is less than NDP per capita.

Contents and Salient Features of the Report (2)

- ▶ Chapter 3 gives an outline of the production and expenditure systems currently in place in the existing structure of National Accounts of India and the salient features of UNSEEA.
- ▶ Chapter 4 is a transition chapter which explains how the conceptual framework can be translated in a limited manner into a practical situation through calculation of Net domestic Product which not only takes in to account Consumption of Fixed Capital but also the depletion of natural resources and the cost incurred for preserving natural capital.

Contents and Salient Features of the Report (3)

- ▶ Chapter 5 gives some illustrations of Physical Asset Accounts for selected assets such as land and soil, forests Agricultural and pasture lands , and minerals based on the existing data.
- ▶ Chapter 6 gives a brief of the various steps taken by the Government of India towards implementing natural resources/ environmental accounting followed by the recommendations of the Expert Group.

Bio-diversity related findings

- ▶ Ecosystems provide innumerable services
 - * Food, fibres, fuel and fresh water

- ▶ Ecosystems provide hidden services
 - * Control floods, mitigate droughts, filter pollutants, assimilate waste, pollinate crops, operate the hydrological cycle, and maintain the gaseous composition of the atmosphere.

As these services are not visible, it is easy to overlook them.

Bio-diversity related findings

- ▶ Ecosystems offer joint products
 - * Wetlands recycle nutrients and produce purified water.
 - * Mangrove forests protect coastal land from storms and are spawning grounds for fish.
- ▶ Natural capital is a mesh of environmental resources.
- ▶ Ecosystems have been traditionally associated with more or less “natural” systems that is with a limited degree of human influence.

Bio-diversity related findings

- ▶ Different degrees of human influence can, however, be observed.
- ▶ Example:
 - * In a natural forest or a landscape ,ecosystem processes dominate the dynamics of the ecosystem and there are likely to be fewer impacts from human management of the ecosystem or from human disturbances.
 - * In a greenhouse or in intensive aquaculture ponds, ecosystem processes have become dominated by human management and ecosystem close to human settlement may be significantly affected by human disturbances such as pollution.

Bio-diversity related findings

- ▶ Assessment of ecosystems should consider their ecology and location.
- ▶ Key characteristics of the ecology
 - i. Its structure (eg. the food web within the ecosystem)
 - ii. Its composition including biotic (flora and fauna) and abiotic (soil, water) components.
 - iii. Its processes (eg. photosynthesis or the recycling of nutrients)
 - iv. Its functions (eg. resilience).

Bio-diversity related findings

- ▶ Key characteristics of its location are
 - i. Its extent
 - ii. Its configuration (i.e. the way in which the various components are arranged and organized within the ecosystem)
 - iii. The landscape forms (eg. mountain regions, coastal areas) within which the ecosystem is located.
- ▶ An important broad characteristic of ecosystems related to its ecology and location is its biodiversity. There are, therefore, important connections between ecosystems and biodiversity.

Bio-diversity related findings

- ▶ Ecosystems can be identified at different spatial scales.
- ▶ In addition, ecosystems are interconnected commonly being nested and overlapping and they are subject to processes that operate over varying time scales
- ▶ General measurement issues in the compilation
 - i. The integration of information across different spatial scales.
 - ii. Benefit transfer and the scaling of data.
 - iii. Gross and net recording.
 - iv. The length of the accounting period.

Bio-diversity related findings

- ▶ Ecosystem services are supplied in many ways and vary from ecosystem to ecosystem.

- ▶ Ecosystem services may be grouped into four types
 - i. Provisioning services (such as the provision of timber from forests)
 - ii. Regulatory services (such as when forests act as a sink for carbon)
 - iii. Supporting services (such as in the formation of soils)
 - iv. Cultural services (such as in the enjoyment provided to visitors to a national park)

Bio-diversity related findings

- ▶ The relationship between ecosystem services and biodiversity is complex.

*Biodiversity is a core characteristic of ecosystems and is a fundamental aspect of ecosystem processes that support the generation of all ecosystem services

*In the SEEA, biodiversity is considered a characteristic of ecosystems and hence is best accounted for as part of the assessment of ecosystem assets

Bio-diversity related findings

- ▶ In accounting, one has to understand the relationship between bio-diversity, ecosystems and the ecosystem services they provide, quantification of the impact of human activity on bio-diversity and ecosystem services and motivations of accounting.

Bio-diversity related findings

▶ Other measurement issues

1. Defining Volumes: Ecosystem services are defined as the contribution to benefits and hence should be measured only when SNA or non-SNA benefits can be identified. If there are no users there can be no ecosystem service flows. Consistent with this treatment, the volume of any ecosystem service will rise as the number of users increases.

2. Storage of ecosystems services

3. Disservices: From a societal perspective there may often be outcomes from ecosystems processes that are seen as negatives (e.g. pests and diseases).

4. Flows of ecosystem services between countries

Bio-diversity related findings

- ▶ Determining the functional value of biodiversity is delicate matter.
- ▶ The implicit assumption made is that the diverse species have co-evolved under selection pressure.
- ▶ Ecologists don't mean a simple head count of objects constituting the diversity.
- ▶ Example: The diversity of species increased when the Nile perch was introduced into lake Victoria, but not for long, the lake, as a fishery, was devastated.

Bio-diversity related findings

- ▶ Biodiversity, appropriately defined, would seem to be a key to ecosystem productivity. The term ‘productivity’ means the production of biomass, termed “primary productivity”. It has been found in experiments in field stations that species-rich plots yield greater biomass than species-poor ones, which would indicate that the total productivity of a population of species is greater than the sum of the productivities of the individual species grown in isolation. This reflects a form of synergy, making ecosystems resilient to changes in the circumstances they experience.

Bio-diversity related findings

- ▶ Valuation of biodiversity is difficult

$$P_i(t) = R_i(t) + E_i(t)$$

where $P_i(t)$ is the shadow price of asset i at time t

$R_i(t)$ is the market price of asset i at time t

$E_i(t)$ is the social value of the externalities generated by the deployment of an additional unit of i at t

The term $E_i(t)$ in the equation possesses an intriguing feature. In order to estimate it, one has to know the shadow prices of possibly many other assets, in other words, shadow prices are interdependent.

- ▶ Biodiversity is not included in the compilation of National Accounts presently only limited data are available and also there is no regularity in the data availability.

Recommendations of The Report

- Transition from the existing SNA to a Comprehensive Set of National Accounts can only occur in a step by step manner.
- Bearing this in mind the possible steps are suggested .
- The subsequent slides show these steps in terms of short, medium and long term plans.

Recommendations of The Report (2)

- Prepare Physical Supply use tables (PSUTs) and Asset Accounts for : (i) land, (ii) forest and timber, and (iii) minerals.
- Develop a medium-term plan (extending to a period of, say, 5 years) that would include
 - i. the preparation of Monetary Supply Use Tables (MSUT) for land, forest and timber, and minerals
 - ii. the development of PSUTs and Asset Accounts for soil, water, carbon, and energy; and
 - iii. planning and collecting data for the purposes of valuing changes in water, carbon, and energy sectors

Recommendations of The Report (3)

- ▶ Develop a medium-term plan for estimating NDP. In addition to adjusting for depletion of reproducible and the types of natural capital identified such as land, forest and timber, minerals, the move would require subtracting defensive expenditure on the environment from GDP and identifying better ways to account for human capital as investment.

Recommendations of The Report (4)

- ▶ Initiate exploratory research in two areas; (i) the development of a more complete set of national accounts, including a balance sheet for the nation; and (ii) the identification of principles for valuing and periodically collecting and compiling data on environmental assets and flows. This would culminate in a valuation-and-data manual that can be used for making adjustments to the SNA.

Recommendations of The Report (5)

- ▶ Develop a long-term Plan (extending, say, to a period of ten years for (i) institutionalising mechanisms for periodic collection of data and for organising periodic studies and surveys for environmental accounts; (ii) collecting and compiling data for valuation and preparation of MSUTs for aquatic resources, air, and bio-diversity.
- ▶ The Planning Commission could fruitfully put in place a mechanism for estimating shadow prices and their natural ranges.

A Word of Caution

- ▶ The strategy adopted for the Report has been to begin by providing an outline of an ideal system of accounts (an “ideal SNA”, so to speak) and from there to show step by step how very far the current system is from the ideal and how far it can be expected to remain from it. The Report presents a feasible transition path with the word of caution that even if figures for physical stocks were available, the deep problem of estimating shadow prices would remain.

A Word of Caution (2)

- ▶ The issue is not merely the uncertainty about the role environmental resources play in production and consumption possibilities but also of differences among people in their ethical values.
- ▶ Wealth Estimates should be presented as bands , not exact figures.
- ▶ That people may never agree on the wealth of nations is however no reason for abandoning Wealth as the object of interest in policy and sustainability analyses.

Refer to the website <http://mospi.nic.in> for the 8 CSO studies on NRA, and the report titled "Green National Accounts in India - A Framework".

THANK YOU