

Chapter 1

CONTRIBUTION OF THE FORESTRY SECTOR TO GROSS DOMESTIC PRODUCT

CONCEPTUAL FRAMEWORK

1.1 System of National Income Accounts

Nations set up systems of national income accounts with the objective of measuring the different aspects of their economic activity. The macro-economic aggregates that these accounts identify track flows relating to time-periods and stock referring to points of time at the beginning and end of these time periods. The accounts follow a fairly standard set of procedures set up first by the United Nations in 1953 (A System of National Accounts and Supporting Tables) but revised periodically, the latest revision being in 1993. Macro-economic aggregates measured include, among others:

- Gross domestic product at factor cost and at market prices
- Net national disposable personal income
- Net personal disposable income
- Government final consumption expenditure
- Domestic saving and capital formation

Each of the above aggregates measures different dimensions of a nation's economic activity. Over time, some of them have come to be considered as measures of welfare and well being too. Economists are however clear that this can only be done under a certain set of assumptions. Hicks (1940 and 1946) provided the necessary conditions under which income could be regarded as an index of welfare. All income, which did not impoverish future consumption, could be considered welfare improving. For this to be ensued, the stock of capital had to be maintained intact. And a part of the production of any year had to be set apart to do this. In other words, not all the production of the current year adds to current welfare. A part has to be set aside to add to the stock of producers' goods that has been used up in the process of production. And so national income is defined as "Net National Product", net of depreciation or the allowance for wear and tear of man-made capital. It followed that one needed to know what was included in the concept of "capital" to be able to appropriately define it. In other words, the asset boundary became a critical issue.

Systems of national income accounting also develop consolidated accounts for the nation and a set of four/five accounts are set up to examine national income, product and its generation from different viewpoints. These, in India, (see CSO 2000) are:

- Gross domestic product and expenditure account
- National disposable income and its appropriation
- External transactions account
- Capital finance account

In a system of national accounts, sector specific production and income data help to provide aggregate estimates which fit into the double entry system of accounting and result in the following accounting identity:

Aggregate demand = aggregate supply in an economy.

It follows therefore that with respect to flows of production specific to a year from the production side,

Gross Domestic Product = Gross Domestic Production - Intermediate Use

Also, from the expenditure side,

Gross Domestic Product = Private Consumption Expenditure + Public Consumption Expenditure + Gross Investment + Exports- Imports-----(1)

Further, for each sector contributing towards gross domestic production,

Current Production (of goods and services) = Intermediate Use + Final Consumption Use (domestically and in the rest of the world net of any imports) + Use as Investment----(2)

With respect to capital stocks, measured at the beginning and end of the year, usually only human made capital stocks,

Closing Capital Stock = Stock at the beginning + Investments during the year - Capital Depreciation----- (3)

Since stocks, whatever the asset boundary that defines them are additive, the above equation shall hold for each sector, unless the stock in one sector accumulates at the cost of a reduction in stock in another sector, in the same time period.

The second assumption underlying the notion of income, as measure of welfare is that all activity contributing to economic welfare is measured by income as it is expressed in

exchange. A number of economists have expounded at length on how this assumption is limiting and a large part of economic activity lies outside the purview of the market, nevertheless contributing to human well being. This has resulted in an extension of the production boundary to include production for self-consumption, in particular in the context of developing country agriculture. Other extensions, following from conventions have now become standard fare in national income accounting practice.

It follows that what is or is not included within the production and asset boundaries is largely a matter of convention and keeps getting revised from time to time. In estimating the contribution of a particular sector, such as the forestry sector to SNA then, we shall concentrate on equations (2) and (3) above, with a view to alternative production and asset boundaries

1.2 Production and Asset Boundaries in the SNA (1993):

The SNA (1993) forms the basis of national income accounts in India, as in a large number of other countries. The SNA defines production as " an activity in which an enterprise uses inputs to produce outputs". However, the SNA covers all such activities carried out by an institutional unit. An institutional unit further is defined as " an economic entity that is capable in its own right, of owning assets, incurring liabilities and engaging in economic activities and in transactions with other entities". Institutional units are either (i) persons or groups of persons in the form of households or (ii) legal and social entities whose existence is recognized by law or society independent of persons or other entities who may own or control them.

In further defining production, SNA (1993) maintains that, "production encompasses all activities that produce outputs of a kind that can be delivered or provided to other institutional units, including itself. Further, goods produced by any institutional unit, whether or not for self-consumption are invariably considered as production. On the other hand, services are included only if they are produced for other institutional units.

Both goods and services fall within the production boundary as defined by SNA, However, the production of services must have been confined to activities that are capable of being carried out by one unit for another.

The production boundary is quite inclusive in the SNA system. It extends to include own-account production of goods and services of owner-occupied dwellings. However, domestic and personal services are included only when produced by paid domestic staff. With regard to own account production of goods, the definition of included goods is quite inclusive. So much so that storage of agricultural goods produced within the household is included as an extension of the production process.

On balance, it seems that the production boundary is a matter of convention, and rightly so. To quote, " When the amount of a good produced within the household is believed to be quantitatively large when compared to the total supply of a good in a country, its production should be recorded. If the amount produced is unimportant, it is not worthwhile to estimate it in practice". (SNA 1993) The inclusion of illegal production within the production boundary of the system is a case in point. Since in some economies, the parallel economy forms a considerable part of their production, it is included within the production boundary, even though it is difficult to obtain information with respect to it.

The earlier SNA 1968 defined the assets boundary to include produced tangible and non-produced tangible and intangible assets. As regards natural resources, the 1968 SNA included in principle natural assets within its assets boundary, though in a much less systematic manner. In practice, only livestock growth was recorded as an addition to a produced asset. Note that agricultural crops and fruits were only recorded when harvested and therefore not recorded as additions to produced assets.

Extensions of the asset boundary were made in SNA 1993. It was maintained, however, that "only those natural assets over which ownership rights have been established and are effectively enforced can qualify as economic assets." They may be owned by individual units, collectively by groups or by governments. Further, natural assets, to be included within the production boundary must be capable of "economic benefits" to their owners. Following from the above two conditions, it is concluded that " the growth of trees, crops or other vegetation which take place under the direct control responsibility and management of institutional units are treated as produced assets in the SNA (1993).

From the above it follows that wherever forest resources are managed by governments, communities or individuals and wherever and whenever they bring economic benefit to their owners, they are to be included in produced assets. There is however a qualification to the above which raises doubts. "... Growth of uncultivated vegetation in forests is not an economic process of production; the resulting assets cannot be produced assets. Nevertheless, when the forests are growing in regions that are inaccessible and no institutional units are able to exercise effective ownership rights over them, they fall outside the asset boundary."

1.3 Lessons for Resource Accounting for the Forestry Sector in India

The above statements are somewhat anomalous but can be interpreted in the following manner to ensure consistency. All forests that result in economic benefits and fall within the purview of ownership and management of an institutional unit (individual, community or government) are to be included within the asset boundary as per SNA 1993. In countries such as India, where all forests are under the ownership of government or of private individuals or communities, these will be within the asset boundary. Inaccessible forest tracts outside the ambit of some human interference or management will be a small and insignificant part of the total.

The assumption underlying the asset boundary demarcation is that inaccessible and unmanaged natural assets do not add to economic activity in the present, the primary issue of concern to the SNA and the system of accounts in general. Note however, that as soon as they add to economic benefits to human beings, they fall within the asset boundary. As an example, as soon as some shepherd communities derive benefits periodically from remote forests and manage them for those benefits, they fall within the asset boundary.

Viewing the above distinction between "inaccessible and unmanaged forests" and "managed forests" from an environmental scientists viewpoint is enlightening. The underlying assumption behind the dichotomy is that inaccessible forests do not contribute to current economic activity. In other words, the externalities, positive and negative, linking natural resources in inaccessible unmanaged areas to accrual of economic benefits downstream are ignored altogether. Scientists point towards these linkages, critical in providing eco-system functions that have otherwise to be provided at some cost. Economists would argue that as long as these services are not scarce, their marginal value is low and hence they need not be counted as providing a service that needs to be costed. The question then is: under what circumstances do these linkages between

upstream inaccessible unmanaged forests and downstream economic activity result in scarce eco-system services? Recent literature in ecological economics tries to answer the question and some answers gravitate around the following possible responses:

- when system resilience is threatened
- when irreversible changes take place in the nature of the system eroding its capability to produce such services
- when human interference or biotic interference exceeds certain acceptable or "sustainable" levels

While the details of the above are issues of in depth theoretical and empirical research, natural resource accounting has to take a position on how to deal with this issue. This is of policy significance for incorporating the recommendations of the SNA 1993 accounts into the Indian national income accounts

From the viewpoint of the forestry sector too, this is important. The total impact of policy changes in the forestry sector since the late eighties find only a partial and distorted place in the statistics on national income and capital. Among these significant policy initiatives are:

- Ban on green felling in several areas, in particular in the so-called "protection forests"
- More permissive import policy for timber
- Encouragement and introduction of new institutional structures such as joint forest management in a large number of states

Further, complementary developments such as increased per unit productivity in agriculture also resulted in a decrease in conversion of forestland for agricultural use.

These developments imply that a degree of capital formation in the forestry sector has taken place. This is expected to result in a larger flow of goods and services in the future. Some commodities and services expected to accrue are:

- A higher level of extraction of timber (for forests managed for timber) and non-timber forest products
- Accrual of a higher volume of livelihoods from eco-tourism in parks and natural sanctuaries
- Accrual of ecological services such as carbon sequestration, water and nutrient cycle maintenance and ensuring acceptable water quality by maintaining summer season flows in seasonal rivers.

Cost saving and income accrual in the future are expected to take place. Simultaneously however, extraction for current use has decreased so that the contribution of the forestry sector to GDP has decreased to only 1% in the 1996-97 (measured at constant prices of 1980-81). Further, due to the important place which National Income Accounting has come to occupy in decision making with respect to public expenditure and taxation, a sector's contribution to GDP is treated as a proxy for its importance, even though this may not fully reflect the social, economic and environmental reality.

Simultaneously, in the context of the forestry sector, the capital accumulated in the form of natural assets is not a part of the capital creation in the economy. This creates an anomaly for sectors such as the forestry sector. A system of natural resource accounting, which accounts for the increased capital creation in forests needs to be set in place.

Another significant issue for the forestry sector is that a large part of the services provided by it are outside the purview of the market, they are not easy to value in a monetary sense.

While the production boundary of SNA (1993) may include a large number of these services, valuing these goods and services may not be easy. Methodologies are being developed, both in India and in other countries for doing this but these are evolving and will take time. Meanwhile, policy decisions must not be based on a partial view of the role of sectors such as forestry in the national economy. It is with a view to such dilemmas that the United Nations System of Integrated Environmental and Economic Accounting (UNSEE 1993 a and b) has suggested as a first step that satellite accounts for natural resources be set up. Even if not fully integrated with the rest of national accounts, these satellite accounts shall help us to evaluate the contribution made by policies that aim at conservation of natural resources in the interest of future production of goods and services for human well-being

1.4 Integrated versus Satellite(Complementary) Accounts for the Forestry Sector

Integrated accounting for a sector implies that economic activity in that sector is fully accounted for with respect to equations (1), (2) and (3) above (see page 1 above). Its production falls within the production boundary and accrues as intermediate use or final use with the latter being divided into consumption and investment. Also, total investment in all sectors adds up to the addition to capital stock in the economy in the given period. This integration implies that a sector can be viewed from the production, income or expenditure side

and the system of national accounts can be drawn up to view different aspects of a nation's economic activity as indicated in Section 1.1 above.

Integrating natural resources into such a system presents some difficulties. The production and asset boundaries as set up in SNA (1993) are somewhat limiting. Further, natural resources, both exhaustible and renewable, comprise the natural capital of the country and lead to an increase in its productive capacity, something that the asset boundary definition takes into account only partially. In the present study, therefore, we shall attempt at setting up a satellite account for the forestry sector. Satellite accounts are defined as being complementary to but outside the integrated SNA and are better referred to as "complementary" accounts. While they may not fulfill all requirements of double entry based systems of accounting, they record possible additions to or erosions of the productive base of an economy. They throw light on economy-environment relationships and provide guidelines for policy which ensures a sustained production of goods and services in the medium run. A schematic description of satellite accounts attempted by other studies (See Kadekodi 2001 and Murty 2001), which we term as "complementary accounts" is reproduced below:

Figure 1: Core and Complementary Satellite Systems and their Inter -Linkages

CORE SYSTEM

COMPLEMENTARY: FORESTS

System of National Accounts (SNA)	Selection of Forestry Related Sectors from SNA And their contribution to GDP: alternative methodology
Description of Economic Sectors	Extension of Production

Capital Account: National Capital and Additions or Depletions from it Depreciation Estimates to give NDP	Extending the Asset boundary Forest Stock as Natural Capital
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The complementary account for the Forestry sector shall attempt to:

- Use a theoretical structure to determine adjustments to be made to GDP and NDP
- Set up methodologies for determining contribution of forest derived goods and services to GDP
- Account for asset creation in the forestry sector consequent on an extension of the asset boundary as suggested.

1.5 A Theoretical Structure for Forest-Economy Interactions

The principle ways in which forests interact with economies and which need to be provided for in the complementary account are:

1. Forests as a source of timber, renewable in the main but potentially depletable. It is usually harvested by government corporations or private loggers and used as an input in wood-based industries
2. Forests as a source of tangible non-timber forest products collected and consumed by households (e.g. fuel wood, resin, fruit, leaves, game, etc) but not always bought and sold in markets
3. Forests as a source of less tangible forest amenities consumed directly either in the present or future (bio-diversity related benefits)
4. Forests as a source of environmental services that benefit other productive sectors (e.g. watershed protection for downstream agriculture, forest based recreation and tourism)
5. Forests as a disposal site for air pollutants that may be damaging to forest health (acid disposition)
6. Forests as a sink and a source of carbon dioxide which potentially damages other sectors through global climate change (carbon sequestration)

7. Through deforestation, forests as a source of land for other sectors, in particular agriculture and urban construction
8. Forest management as an activity of the governmental and private sectors involving the use of variable inputs (labour and materials) and human capital

Using the above comprehensive list of forest-economy interactions and defining forest related production in the context of output in the rest of the economy, Vincent (1999) defines the adjustments required to be made in NDP, conventional GDP and in the level of GDP.

While, the details of the theory are not reproduced here, we give below the kinds of adjustments, he suggests are to be included:

Adjusted NDP = Conventional GDP + Non-market Values to be added to GDP- Depreciation of human-made capital + Net accumulation of Natural Capital.

Further, changes in the value added by industry and agriculture are to be made to allow for the contribution of the forestry sector to them. This is in the form of the contribution of forests to pollution disposal and carbon sequestration services, should they accrue to these sectors. Some carbon sequestration services would flow to the rest of the world as well.

1.6 The Present Study

The present study is undertaken with the objective of assessing the contribution of the forestry sector to the GDP of India. In Chapter 2, we shall examine other country experience to ascertain whether and to what extent they have attempted to set up either satellite or integrated systems of accounts with respect to this sector. It shall also review critically present practice with respect to the forestry sector in national income accounting. Chapter 3 shall first examine the nature of the production process in the forestry sector. Subsequently, it looks at the production of goods and services in the forestry sector, examines present methodology with respect to them and suggests methods of extending the scope of production accounted for in the GDP. In doing so, data from different sources is taken into account and estimates arrived at for some components where data and methodology make it feasible. It needs to be mentioned here that the estimates made bring together evidence from a large number of recent studies on the

forestry sector in the present and extended framework of SNA. We suggest extensions in methodology with estimates for eco-tourism, non-timber forest products and carbon sequestration. In each case significant contributions are made to economic activity in the present.

Chapter 4 deals with cost aspects of forest based economic activity. This aspect is particularly weak in the present system of accounting. Following on the theoretical treatment of forest-based production as being of a joint nature, all costs are viewed in a composite manner in this chapter. These consist of different components: i.e. costs incurred by different units within government (states, center, planned allocations, non plan allocations,), costs incurred by private agents (contractors for timber harvesting, tourists for access to national parks and individuals for collection of fuel-wood or non-timber forest products). We also follow up on the second postulate that the detailed forestry sector accounts be set up once in five years and account for costs and benefits of these flows on the basis of average expected costs to provide guidelines for policy. Hence, average and trend values in these cost series are arrived at to provide sign posts and to arrive at estimates of value added in the forestry sector.

Chapter 5 examines the capital counterpart of the accounts. It seeks to determine what part of the production activity has contributed to or taken away from asset formation in the forestry sector. The special character of forest assets comes out sharply when we understand that capital stocks in the forestry sector can be viewed in at least three different ways: as "growing stock" which is typically, the stock of woody biomass, as volumes of total biomass and as stocks of future "ecological security" or "knowledge" (in the form of stocks of biodiversity, watershed functions and storehouse of information). How does one value these alternative aspects of the capital stock? Both conceptual and data problems exist here and we only provide some pointers to how they can be kept in mind by policy-makers and taken into account by national income accounts within the constraints of the data availability in India.

Finally, Chapter 6 provides alternative estimates of the contribution of forestry sector to GDP in India, compares with existing estimates and suggests areas for further extension of the present work.