

## CHAPTER 6

### CONTRIBUTION OF THE FORESTRY SECTOR TO GDP

#### 6.1 The Nature of Forest Cover, Forest Stock and Accrual of Benefits and Costs

The present study estimates the contribution of the forestry sector to GDP on the assumption that a large number of stakeholders i.e. the forest department, the holders of rights to timber, fuel-wood, the international community and so on, derive benefits from production activity that is derived from or associated with land under forest cover of different kinds. It needs to be emphasized that we are examining the value added by the forestry sector, from the production side. This focus is the outcome of looking at GDP as a measure of the economic activity in a particular time period. As stated in earlier chapters, the list of goods and services that we consider is by no means exhaustive, It is determined by considerations of the significance of particular kinds of flows accruing from forests in the economic activity of the country. It includes, in addition to industrial wood and fuel-wood, an array of non timber forest products and two instances of services accruing from forests: eco-tourism and carbon sequestration.

A few points of interest need to be noted. Forests in India are marked by differences in terms of density, growing stock and biomass volumes that they represent. In addition, age and growth rates differ across species and in different regions. This implies that they constitute a capital stock with many dimensions. This has many implications. From the viewpoint of the annual flow of goods and services it implies that one has to understand this link between nature of forest cover and the accrual of benefits from it. Plantations of different ages may be critical in determining the carbon sequestration value of forests. Diversity of species, associated with mature forests results in wildlife protection and accrual of non-timber benefits and tourism. Managed plantations determine timber outputs. We shall take this non-specificity of forest production accrual into account while determining total benefits from the forestry sector.

We have earlier referred to the joint cost nature of the process, which leads us to view costs as a single composite whole and not separate them into costs corresponding to each component of

the benefit flow. All capital and revenue expenditure relating to forestry sector is treated as a cost of providing these services and products. Further, cost incurred by private co-owners or co-stakeholders is also included in costs wherever it is relevant in the interests of completeness.

## **6.2 Estimates and Conclusions**

In the context of the system of national income accounting, we propose to set up satellite forest accounts to present a once in five years picture of the significance of the significance of the sector in economic production activity in the country. To be consistent with this objective, we use existing and augmented data sets to provide estimates based on simple econometric techniques. Estimated values from these models, which need to be kept simple enough in view of data limitations are the treated as guidelines to help us arrive at the contribution of the forestry sector with respect to the goods and services under consideration. Models used vary from case to case, with simple trend values being obtained some times, and are described in each chapter. We present below the results, first with respect to the flow of benefits.

It is to be noted that this measure of the flow of benefits is at market prices and appropriate changes shall need to be made to find the producers' prices estimates. Table 6.1 gives details of our estimates based on the above-mentioned methodology.

The value of goods and services provided by the forestry sector is estimated at Rs. 25,984.53 crores. Net of repairs, maintenance and other operational costs, the gross domestic product from the forestry sector comes to Rs. 23003.43 crores. Of the gross value, some 54.21% is output of fuel-wood, 9.27% is industrial wood, 15.91% is NTFP and eco-tourism and carbon sequestration contribute 13.85 and 6.76% respectively.

This increase in domestic product from forestry is 93.87% of the CSO reported product of Rs. 11, 865 crores for 1996-97. Further, the percentage contribution of fuel wood decreases from 87.46% to 54.21%, of industrial wood from 13.29% to 9.27%: that of minor forest products increases from 10.36 to 15.91% with the two new items that contribute the remainder. As a percentage of GDP at market prices, the forestry sector now contributes 2.37% (1996-97 GDP at 1993-94 prices) instead of 1.2 as earlier for the same year of reference.

All this has policy implications in terms of allocations to the forestry sector that are obvious. Let us consider the two new services added in this study first. Eco-tourism arising out of the natural parks and sanctuaries comprises 14.036% of the total value of production in the forestry sector. At Rs.7443 per hectare, it is significant in its own right too. This points to the need to strengthen this sector as a source of livelihoods arising out of conservation.

Carbon sequestration flows annually provide 5.91% of the gross value of production in the forestry sector. This value depends critically on the assumptions with respect to the international price for carbon sequestered. With more careful implementation of the Kyoto protocol and rising demand for adopting least cost methods for carbon sequestration, this demand is bound to rise. More work needs to be done on this aspect to examine factors impacting on international price and their effect on the supply of carbon sequestration services by forests at an international and national level.

Fuel- wood and non-timber forest products emerge as important contributors to production in the forestry sector. This is a continuation of the earlier trend. However, the livelihood, welfare and sustainability assumptions of this need further examination in particular in the context of increasing urbanization.

**Table 6.1** Gross Value of Production and Value Added from forestry sector

	Forest area Corresponding In mil hectares	Lower Estimates	Higher Estimate	Value Reported	Sources/ Assumptions
Industrial Wood	-----	Rs. 2441.75 Crores (12.3)	Rs. 2441.75 Crores (5.10)	Rs. 2441.75 Crores (9.27) [13.29]	From CSO with Adjustments
Fuel-wood	-----	Rs. 14272.96 Crores (71.92)	Rs. 14272.96 Crores (29.83)	Rs. 14272.96 Crores (54.21) [87.46]	From CSO with trend value

Non-timber Forest Product	25.00	Rs. 2068.32 Crores (10.42)	Rs. 16884.1 Crores (35.29)	Rs. 4188.85 Crores (15.91) [10.36]	Own Estimates; Chapter 3 and assumption that NTFPs accrue from forest based CPR (Chopra 2001)
Eco-Tourism	4.9	Rs. 331.24 Crores (1.67)	Rs. 11417 Crores (23.86)	Rs. 3647.256 Crores (13.85) [0]	Own Estimates: Chapter 3
Carbon Sequestration	10.85	Rs. 732.08 Crores (3.69)	Rs. 2825.88 Crores (5.91)	Rs. 1778.98 Crores (6.76) [0]	Own Estimates: See Chapter 3
TOTAL VALUE (at market/ international prices)		Rs. 19846.35 Crores	Rs. 47841.69 Crores	Rs. 26329.8 Crores	
TOTAL COST 2404.83 (government costs) + 921.54 (Private costs)		Rs. 3326.37 Crores	Rs. 3326.37 Crores	Rs. 3326.37 Crores	Own Estimates: See Chapter 4

Contribution to GDP at market prices		Rs. 16519.98 Crores	Rs. 44515.32 Crores	Rs. 23003.43 Crores.	
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The figures given in the first brackets are the percentage contribution of each product in the Gross value of output of forestry. Similarly the values in square brackets give the percentage contributions of some of these products as per CSO's method of accounting.

**Table6.2: Range of Gross values of different contribution of forest : -**

Products	Lower value	Higher Value	Value taken in this report	Remarks
NTFP	Rs. 827.33 Per hec.	Rs. 6753.64 Per hec.	Rs.1675.54 Per hec.	Area identified is 25 million hectares.
Eco-Tourism	Rs.676 Per hec.	Rs.23300 Per hec.	Rs.7443.38 Per hec.	Area identified is 4.9 million hectares out of the 15 million hectares of PA, which are actually managed.
Carbon sequestration	Rs. 674.73 Per hec.	Rs. 2604.45 Per hec.	Rs. 1639.61 Per hec.	Area identified is 10.85 million hectares. (Area under plantation with age more than 10 years).
Fire wood	Rs.14272.96 crores	Rs.14272.96 crores	Rs.14272.96 crores	Total Value of output in Rs. Crores
Industrial Wood	Rs.2441.750 crores	Rs.2441.750 crores	Rs.2441.750 crores	Total Value of output in Rs. Crores

Remarks	The low value is obtained from different studies and it is based on the availability of NTFP (which in turn depends upon the forest stratum in that area). Similarly for Ecotourism the per hectare values differ markedly across states owing to the health of forest in them. The range of values for carbon sequestration depends upon the prices and the decay rates.
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**Table 6.3: Range of contribution of Forests as a percentage of GDP\* in 1996-97 at 1993-94 prices.**

Range	Lower	Value reported	Higher
Value (in Rs Crores)	16519.98	23003.43	44515.32
Percentage of GDP	1.7	2.37	4.58

\* in 1996-97 India's GDP was Rs.970083 Crores at 1993-94 prices.

### 6.3 Limitations and Scope for further Work

This study has examined the methodology used by the CSO in estimating contribution of the forestry sector to the GDP and has estimated the value of production in the forestry sector on the basis of an alternative methodology. For two components on the output side, i.e. non-timber forest products and eco-tourism, findings from a range of studies conducted in different parts of the country at micro levels have been amalgamated using econometric techniques to yield values of output. A completely new methodology has been used to estimate the annual flows of carbon sequestration benefits. These are then valued at international prices in view of the emerging international markets for carbon trading.

On the cost side, the concept of joint production has been used to yield estimates of total cost incurred by different stakeholders. However, all cost data was not readily accessible and estimates of private costs, in particular timber extraction costs and fuel wood and non-timber collection costs could be improved upon.

The question of the sustainability of timber and fuel-wood flows has also not been discussed at length. It seemed that timber extraction at the national level was within sustainable limits but this fact can well coexist with ecological degradation in sensitive patches of forest which are

critical to human well-being and the accrual of important eco-system services. Sustainability of extraction studies needs to be done to ensure that this does not happen.

Further, it is important to keep in mind that GDP is only a measure of domestic production and should not be interpreted in a welfare context. For this production to be a welfare measure, or “genuine income”, the stock of capital embedded in forests needs to be kept constant. With this in view, we looked at aspects of the stock of capital in Chapter 5. At least three dimensions of this capital stock turn out to be significant:

- Constancy of the forest stock with respect to canopy cover of different kinds
- Constancy of the capital stock inherent in forests from the viewpoint of growing woody –stock
- Constancy of the forest cover with respect to the biomass (both above and below ground)

The three dimensions may not and in fact are not constant under the same set of conditions and this may impact estimates of depreciation of the capital stock and hence of the contribution of the sector to NDP. We have provided estimates of different dimensions of the capital stock that exist in Chapter 5 with a view to bringing these issues into the ambit of attention and interest.

Further, in order to put a welfare interpretation on the contribution of the forestry sector, we need to do more complete stock accounting and estimate values of depreciation. This shall ensure that the flow of services and goods is maintained in the future. The multiple products produced by the forestry sector then lead to the question: depreciation with respect to what kind of capital stock do we need to estimate. Three components of the stock of natural capital embedded in forests have been pointed out. Is it possible to conserve all three components simultaneously? Further, how will conserving one component impact the vector of flow of goods and services? For example, adding single species plantations adds to the production of industrial wood and to the availability of carbon sequestration services. How does it impact the non-timber forest product accrual or the services of eco-tourism, both of which accrue more from multi-species forests. In other words, questions of the substitution and complementarities between flows of different kinds of goods and services remain.