

Chapter 5

Asset Accounting: The Stock of Forests and the Accrual of Goods and Services

5.1 Introduction

National income is not a precise theoretical concept but rather a practical guide to the maximum amount that the country concerned could consume without impoverishment of its environmental and man made capital. Economists including Simon Kuznets emphasise that economic activity and its accounting must serve the needs of mankind. According to him the GNP should be a criterion for the net production of a society, which has a positive value in light of human needs (C. Leipart, 1987). Thus in defining the NNP, besides the changes in the 'human made' capital the changes in the stock of natural capital should also be taken into account. The sustainable income should ideally be placed in the ecological context of finite environmental assets and resources

The contribution of any sector in the economy is measured by its flow of goods and services satisfying human needs. Forestry sector contribution is in terms of the flow of different goods and services it provides. This has been documented in earlier chapters. In the framework of income accounting of forestry sector, only that amount should be accounted that the economic agents could consume with a specified period of time without reducing or affecting the possible consumption in future. This argument is soundly grounded in the welfarist approach of accounting (Hicks 1946, Edwards and Bell 1961). This simply means that accounting process should not only be concerned about the current earnings but changes in asset positions too. If the stock of forest wealth is not taken care of in accounting flow of its goods and services will get affected sooner or later. Stock of forest resources thus must be accounted and positioned along with other accounts so that any declining trend in it can alert the natural resource managers

5.2 Growing Stock and Biomass Volume of Indian Forest

In six major agro-ecological regions of India – Arid, Semi arid, Subhumid, Humid, Coastal and Island Ecosystem, around 64.01 mill.ha. of actual forest has been reported. Around 76.77 mill ha

area is as reported forest. One of the widely accepted classifications of forest types in India by Champion and Seth (1968) provides the details in the following table.

Table 5.1 Area under different forest types in India.
(Million hectares)

Type of Forest	Area
Tropical Wet evergreen	4.5
Tropical Semi evergreen	1.9
Tropical moist deciduous	23.3
Littoral & swamp	0.7
Tropical dry deciduous	29.4
Tropical thorn	5.2
Tropical dry evergreen	0.1
Sub Tropical broad leaved hill	0.3
Sub Tropical pyne	3.7
Sub Tropical dry evergreen	0.2
Montane wet temperate	1.6
Himalayan moist temperate	2.6
Himalayan dry temperate	0.2
Sub alpine & alpine	3.3
Total	77

Source: Forestry statistics of India (2000), ICFRE.

Tropical dry and moist deciduous forests are the most dominant followed by tropical thorn and tropical wet evergreen forest. Forest area indicates land under forest cover but for the flow of tangible goods like various ecological services to occur on sustainable basis, measurement of growing stock of forest is more important. For the first time, the Forest Survey of India (FSI) estimated the growing stock of Indian forest in 1995. FSI's assessment of growing stock is based on vegetation maps, thematic maps and ground forest inventory. By dividing the whole country into 170000 grids, FSI provides inventory data on growing stock and forest composition in terms of 21 species Strata. This exercise also yields three density classifications on the basis of crown density i.e. more than 70%, between 70-40% and between 40-10%. Area of forest having less than 10% crown density are treated as scrub. Table 5.2 provides the details.

Table 5.2 Total Growing Stock and growing stock per unit area of different forest Stratum in India.

Density 1 = canopy cover of more than 70%, Density 2 = canopy cover from 40 to 70% and Density 3 = canopy cover from 10 to 40%. (000' cu m per sq km)

Forest Stratum	Total Growing Stock (000' cu m)			Growing Stock per unit area		
	Density 1	Density 2	Density 3	Density 1	Density 2	Density 3
Fir	8823	103519	40691	57.29	45.76	24.20
Spruce		28972	4094		34.16	7.72
Fir- Spruce		27121	4094		69.4	7.72
Blue Pine	1736	59502	19937	48.22	33.22	13.11
Deodar	1421	23703	2349	78.94	21.23	9.99
Chir -pine	21440	325050	60696	36.4	22.9	13.45
Mixed conifers	20197	304219	54776	40.15	24.82	14.92
Hardwood mixed with conifers		44831	1350		67.16	11.87
Upland hardwood	656	72119	9226	20.5	5.81	2.53
Teak	36394	213240	51310	7.99	6.41	2.79
Sal	17182	311591	107913	11.9	5.65	4.47
Bamboo (tree crop bamboo)	845	11465	8021	6.76	4.04	2.12
Dipterocarpus	651		32	16.69		2.46
Khasipine	281	913	4422	10.8	7.18	3.55
Khair		1618	788		2.09	0.64
Salai		1929	1178		2.09	1.07
Alpine Pastures		506	113		15.81	3.76
Miscellaneous	258734	1815819	519251	13.61	8.99	3.33
Western Ghat evergreen	21221	20574	5607	14.65	13.35	5.65
Western Ghat semi- evergreen	29524	7684	352	14.19	11.46	3.28
Western Ghat Deciduous	11096	6819	442	9.02	6.63	3.04

(Source: Extent, Composition, Density Growing stock and Annual Increment of India's Forests. Forest Survey of India (1995).)

Species-wise, Teak commands the highest growing stock i.e. 36.39 mill cu m in density I class while in density 2, Chir-Pine command the maximum i.e. 107 mill cu m . Miscellaneous strata has the highest growing stock in all density class. Another index of growing stock is its availability per unit of that forest strata area. Fir has the highest figure of 57290cum per sq.km in density class 1. In density class 2 Fir spruce strata commands the highest i.e. 6940 cum/sq km.

Fir provides the highest in density 3 class i.e. 2420 cum/sq km. It is noteworthy that with decline in Density class the growing stock per unit of area also declines irrespective of the stratum type. Stratum wise annual increment of growing stock for the entire country provides good insight for its management. While Teak and Sal have the highest annual increment i. e. 8.0 mill cum. and 8.59 mill cu m in species wise category. Miscellaneous strata otherwise show the highest overall annual increment i.e. 55.88 mill cu m. For India as a whole it comes out to be 87.62 mill cu m. Table 5.3 gives the detail.

Table 5.3 Estimated annual increment of growing stock in India according to Forest stratum.

(000' cu m)

Forest Stratum	Annual increment
Fir	1722
Spruce	105
Fir- Spruce	347
Blue Pine	1083
Deodar	366
Chir -pine	1865
Mixed conifers	3850
Hardwood mixed with conifers	783
Upland hardwoods	1862
Teak	8013
Sal	8591
Bamboo(tree crop in bamboo)	909
Dipterocarpus	11
Khasipine	181
Khair	80
Salai	104
Miscellaneous	55876
Western Ghat evergreen	790
Western Ghat semi- evergreen	625
Western Ghat Deciduous	459
Total	87622

(Source: Extent, Composition, Density Growing stock and Annual Increment of India's Forests. Forest Survey of India (1995).

Across different states Arunachal Pradesh (15.24 mill cu m) and Madhya Pradesh (15.24 million cum and 14.12 mill cu m respectively) have the maximum annual increment of growing stock. Table 5.4 gives the details for all states and UTs.

Table 5.4 Estimated Annual increment in different States/UTs.

(Increment 000' cu m)	
States	Annual Increment
Andhra Pradesh	5929
Arunachal Pradesh	15243
Assam	6061
Bihar	1715
Goa, Daman& Diu	231
Gujarat	1459
Haryana	27
Himachal Pradesh	1603
Jammu & Kashmir	6402
Karnataka	5574
Kerala	1983
Madhya Pradesh	14122
Maharastra	5008
Manipur	1889
Meghalaya	2150
Mizoram	1332
Nagaland	1903
Orissa	4432
Punjab	23
Rajasthan	292
Sikkim	767
Tamil Nadu	1394
Tripura	316
Uttar Pradesh	5818
West Bengal	433
Andaman & Nicobar	1494
Dadra& Nagar Haveli	22
Total	87622

(Source: Extent, Composition, Density Growing stock and Annual Increment of India's Forests. Forest Survey of India (1995).)

Density of growing stock i.e. volume per ha. of forest had across the states and UTs of India provide important clue to the stock of forestry resources available. Here J&K has the highest density or growing stock i.e. 224.5 cu m per ha. Followed by Andaman & Nicobar i.e.19.62cu m per ha. For India average stands out as 74.42 cu m per ha. Details have been provided inTable5.5

Table 5.5 Volume per hectare in the Indian States.

(cu m per hectare)

States	Volume per hectares
Andhra Pradesh	61.66
Arunachal Pradesh	112.8
Assam	124.2
Bihar	36.38
Goa, Daman& Diu	101.16
Gujarat	53.07
Haryana	27.92
Himachal Pradesh	203.5
Jammu & Kashmir	224.492
Karnataka	84.23
Kerala	95.67
Madhya Pradesh	51.56
Maharastra	51.43
Manipur	54.1
Meghalaya	66
Mizoram	35.3
Nagaland	66.1
Orissa	52.21
Punjab	7.07
Rajasthan	9.84
Sikkim	125.9
Tamil Nadu	39.31
Tripura	27.9
Uttar Pradesh	99.71
West Bengal	37.68
Andaman & Nicobar	119.62
Dadra& Nagar Haveli	42.2
India's Average	74.42

(Source: Extent, Composition, Density Growing stock and Annual Increment of India's Forests. Forest Survey of India (1995).)