



Forest accounting: A theoretical perspective

Parashram Jakappa Patil

Post Doctorate Fellow University of Pune

E-mail: patilparashram9@gmail.com

Abstract

It is necessary to make theoretical analysis of various aspects of forest accounting in order to make further improvement in it. The main objective of the study is to make glance of forest accounting physical and monetary terms. The specific objectives of the study are as follows; 1. To make review of literature of forest accounting in context of past studies and forest accounting concepts. 2. To make glance on various parameters of forest accounting. 3. To make glance on forest accounting concepts. 4. To suggest improvements in forest accounting system. Present study concludes that there is no proper forest accounting system still has not been developed as well as comprehensive forest valuation method is lacking. And absence of forest accounting made impact on biodiversity and economy.

Keywords: Forest Accounting; Forest Valuation; Finance; Biodiversity; Economics.

1. Introduction

Forests provide different basic inputs to the global economic cum ecological system in a multi-dimensional way. It provides timber, fuel wood, pulpwood, fodder, fiber grass and non-wood forest produce & support industrial & commercial activities. They also maintain the ecological balance & life-support systems which is essential for food production, health as well as overall development of human kind. Forest services are invisible have been not accounted because of resources values are neglected. It is leading big biodiversity loss that may cause to risk of disaster. Therefore it is very essential to undertake accounting work for forest area.

2. Statement of the Problem

Forest accounting could be an instrument to tackle some of pertinent issues of environment and economics. The global concern about forest degradation and depletion is related to two main problems i.e. destruction of the carbon sinks affecting the global climate and extinction of species affecting the biodiversity. In this context, it is relevant to study forest accounting. There are some challenging issues in forest accounting system such as No proper accounting for forest resources in the Systems of National Accounts (SNA). (Haripriya et.al, 2007), Lack of availability of fodder and reduction in productivity of livestock population, Lack of awareness about natural resource economics in terms of forest. (Harris et.a., 2002), Lack of proper valuation methodology of forest resources, Lack of investment in forest sector. (CGMA), Lack of awareness about business opportunity in forest sector. (CGMA), Value additions in forest produce-bamboo, jute, wool, etc. (Mkanta et.al. 2002), Agro forestry Interfaces. (Eliasch), Trade Offs in agriculture and environment. (Eliasch), Biodiversity valuation, Nutrition issues in forest product. (Mkanta et.al. 2002) and Measure biodiversity loss and risk of disaster etc.

Forest accounting is complex phenomena involving invisible services of ecosystem and conversation of it in economic terms. Making forest accounting is real challenge there are various dimension

involve in it. Hence researcher made here theoretical analysis of different components of it so that further improvement could be possible.

3. Objectives of the Study

The specific objectives of the study are as follows;

- 1) To examine earlier studies on forest accounting.
- 2) To make glance on various parameters of forest accounting.
- 3) To make glance on forest accounting concepts.
- 4) To suggest improvements in forest accounting system.

4. Research Methodology

The present study is theoretical analysis of various components of forest accounting. Present study is mainly depends of secondary sources of data.

- a) Data Collection

Primary Data: Present study is not based on primary data hence it does not require to collect it.

Secondary Data: Since present study is based on secondary sources of data it collect in various ways as follows;

- i) Published Sources

The researcher collected the data from sources such as Directorate of Economics and Statistics (DES), Forest Department Government of Maharashtra, Administrative Report of Forest Department, Forest Survey of India, National Sample Survey of organization (NSSO), Central Statistical organization (CSO) and also Books, research papers published in the Journals, Articles and different Websites etc.

- ii) Unpublished Sources

It includes unpublished research such as M.Phil dissertation, Ph.D. Thesis and reports.

- b) Topical Scope of Study

Present research work is restricted only to forest accounting.

- c) Analysis of the Study

Present research work made theoretical analysis of various components of forest accounting.

5. Forest Accounting Concepts

Forest accounting is multidisciplinary task; it involves different disciplines such as economics, finance, life sciences, mathematics, statistics, physics, chemistry, agriculture and philosophy etc.

5.1. Forest accounting

It provide framework to capture to value of all economic contribution of forests and how they are linked to economy (Making Waves, 2016).

5.2. Environmental accounting

Environmental accounting refers to (1) National Accounting is physical and monetary accounts of environmental assets and the costs of their depletion and degradation and (2) Corporate Accounting is the term usually refers to environmental auditing, but may also include the costing of environmental impacts caused by the corporation. (Sarkar, 2008).

5.3. Natural resource accounting

Natural resource accounts also known as green accounts, are an accounting framework designed to provide information that tracks, important changes in economic use of environmental resources, (Statistic New Zealand, 2002). It is frequently used in the sense of physical accounting and monetary accounting.

a) Physical Accounting

Physical accounting refers to "the natural resource and environmental accounting of stocks and changes in stocks in physical (non-monetary) units". E.g. weight, area or number. Qualitative measures, expressed in terms of quality classes, types of uses or eco-system characteristics, may supplement quantitative measures (Statistic New Zealand, 2002).

b) Monetary Accounting

Monetary accounts refers to "the entries correspond to the physical accounts but contain an additional entry for revaluation, which records the change in asset value due to changes in prices between the beginning and end of the period, (Statistic New Zealand, 2002).

c) Forest Flow Accounts

Forest flow accounts, include supply & use tables for detailed forest products (wood & non wood, marketed & non-marketed) by sector, which are linked to the input - output (I/O) and also include measures of forest eco-system services, environmental degradation associated with forest use, (Statistic New Zealand, 2002).

5.4. Biological assets

It means all living animals and plants in forest area.

5.5. Forest economics

It is cost benefit analysis of forest resources.

5.6. Forest valuations

Determined the monetary value of biological assets of forest.

5.7. Biodiversity

Biodiversity, a contraction of "biological diversity," generally refers to the variety and variability of life on Earth. One of the most widely used definitions defines it in terms of the variability within species, between species and between ecosystems.

5.8. Biodiversity loss

The period since the emergence of humans has displayed an ongoing biodiversity reduction and an accompanying loss of genetic diversity. Named the Holocene extinction, the reduction is caused primarily by human impacts, particularly habitat destruction. It is destroying ecosystems (Encyclopaedia).

5.9. Forest capital

Forest capital refers to elements of forest that produce values directly and indirectly to people such as stock of trees, animals, goods and services etc.

6. Review of Literature

It has been examined earlier studies on forest accounting in order to explore various aspects of it. It supports to understand inter linkages between various factors while making theoretical analysis of forest accounting.

Haripriya, Sukhdev, Shinha and Sanyal (2007) they pointed out that to set out and apply a SEEA based methodology to show the true value of forest resources in India's national as well as state accounts. It is focused on four components of value creation in forest i.e. timber production, carbon storage, fuel wood usage and the harvesting of non-timber forest products. It has been found out that there is need to integrate national resources accounting into the national accounting framework. This is important to generate appropriate signals for sustainable forest management. They conclude that existing measures of national income in India is underestimated the contribution of forest income. The incomes of North-Eastern states in particular are highly underestimated by these traditional (GDP/GSDP) measures. It has shown that if the limitation of the current data on production and prices are addressed, the income through forest will be much more than the today.

Harris and Fraser (2002) they critically examine the natural resource accounting in theory and practices. The prime aim of the study is an extensive review of the theoretical and applied literature on natural resource accounting. They also study the explaining of the economic theory that underpins natural resource accounting, counseling welfare and sustainability of the policy goals. In the study they present various different concept of national income. They found that there is fundamental difference in economic and national accounting methodology. Lastly they conclude that the insufficient attention paid by economist to the revision to the SNA. Furthermore they suggest that there should be use of growth theory model to solve particular technical problem.

Parikh and Ghosh (1995) pointed out that the natural resource accounting for soil to estimate costs of soil degradation for India. They have analysis the soil resource as an empirical estimation of the cost of soil degradation by using the soil quality index for the important states in India. According to the researcher soil productivity is a function of measurable soil properties/assets. They conclude that the loss in soil productivity consequently affect to the soil degradation due to the soil salinization.

Blignaut and Hassan (2001) have studied natural resource accounting of mineral resources i.e. gold and coal in South Africa. They examine the change in value of mineral resource mainly gold and coal and how to manage the support sustainable development. For the study they used natural resource accounting indicators and measurable of sustainable development in mineral resource sector. They found that the there is very small percentage of total mineral resource rent in South Africa. After the study they conclude that the lower rent of mineral resource help to capture the market of world and increase in economic situation.

Haripriya (2000) she worked on integrating forest resource into the system of nation's accounts in Maharashtra. It has analyzed the SEEA framework stumpage value methods for timber, market prices for timber and non-timber forest products and study for bio-prospecting for biodiversity in Maharashtra. She find out the value

added by forest was 3.5% of the net state domestic product and value of depletion was 19.8% at the estimated value added. She concludes that Maharashtra state domestic product is 99.3% of the estimated net state domestic product.

Mkanta and Chintembo (2002) had made an attempt to study the two view i.e. valuation of non-marketed forest resources and proposing means for generation of modified national accounting. The study area was selected according to enumeration area (EAs) as listed for the 1998 population census. The fuel cured tobacco growing areas were purposely selected for this study found that 63% of the respondent was regular grower of tobacco. The study also found that there is impact of income, size, time to reach collection area and the total area owned for farming is effect on collection of forest resources. After the study they suggest that there is strong need of revising the method used for production of tobacco. The study concludes that there is need of regular delivery of data from government department which will help to natural resource accounting and regular updates.

Ramos and Margaret (2002) have analyzed physical and monetary accounting of forest area in Zimbabwe. This paper is mainly focused on theoretical concept of forest resource. They study on the values of ecological services such as carbon sequestration and water abstraction for natural forest was made. They found that the carbon sequestration may not have immediate productive effects in the rural areas but in long run it impacts negatively on productivity, these losses will have general equilibrium effects on mainly agriculture. The study emphasize that using conventional SNA measures of welfare it will misleading and effect on sending the wrong signals to policy makers. Lately they conclude that the central government agencies make better planning of natural resource and the impact of improving the stock of national economy.

Jordan, Hayes, Yoskowitz, Smith, Summers, Russell and Benson (2010) have studied the accounting for natural resources and sustainability of linking ecosystem services to human well beings. They used two parameters of the study i.e. individual metric and composites of multiple metrics. They also work on structured approach to the environmental accountability for that purpose they study policy frames of environmental accountability, goals specific environmental outcomes and measure the unit of environmental accounting. They found that for achieving and maintaining the sustainable environment requires more than accounting actions including legislation, regulation, mitigation, resource management, education and social responses to environment challenges are the dynamic factors for results. Lately they conclude that human well-being and sustainable eco-system are entirely interdependent.

The Eliasch Review on Climate Change Financing Global Forests in which it has been emphasized on sustainable development that could be achieved by integrated effort worldwide. Climate change is serious challenge faced by world which need to be tackled to reduce down its bad impact. The loss of global forest is also cause of concern for global community therefore there is need to stop deforestation immediately. Developing countries could play crucial role in maintaining forest for which international community must support to such countries. It will help to stabilize greenhouse gas atmospheric level, forest emissions, biodiversity, ecological cycles etc. It has been examined that the global carbon trading scheme is best placed to ensure that emissions from forest are reduced effectively. Also stressed on capacity building and filling the funding gap and inclusion of forest sector within comprehensive global cap and trade scheme. It also focusing on identifying practical framework for minimizing forest emissions while maintaining livelihood to forest communities and preserving ecosystem services. There is need to established strong research and development base for tackling the challenges in forest sector. The trade-off between agriculture and forest raises serious challenges which need to be tackled by concrete policies at manifold level. For making sustainable production need to involve different factors such as private sector, public sector and civil society.

CGMA report on Rethinking the Value Chain explain natural capital include forest, river, minerals, oceans, air and land which providing significant ecosystem services to whole society. In fact on which entire value chain is depends on natural capital. It is base of all other capital including financial on which economy, society and wellbeing is depend. Natural resources are used at alarming rate that bring risks of price volatility and shortage of raw material. Natural resources does make impact on business hence it has to be handled carefully. There is close relationship between business and natural resources. Despite this natural capital consideration are still not included in corporate accounting. Here it also mentioned that role of financial professional role in natural resources capital is very important.

Shunsuke Managi et.al. (2006) in their research paper entitled Productivity and Environment in India, in which he explain that due to rapid industrialization India has facing various environment problems and environmental productivity over a period of time has been decreased. This paper measure productivity change for environmental outputs in India. They also make glance on environmental policy of India, existing environmental management is not sufficient to bring about sustainable development in India. There is need to make certain concrete steps to tackle environmental threat in long run.

Partha Dasgupta (2009), research paper entitled The Place of Nature in Economic Development, in this paper he mentioned about various issues of ecological economics. He explain socio-ecological process in context of poverty. The externalities that the use of ecological capital gives rise are not confined to market failure, they are expressions of institutional failure in its widest sense. Need to devise market friendly solutions to environmental problems. Ecological services payment could be given owners. There is relationship between poverty, natural resources base and population growth. He has been make micro level analysis of natural resources in socio-economic perspective.

7. Forest Accounting Parameters

There are certain parameters use for the analyzing of forest resources accounting which are given below.

- i) Actual / Economic Accounts:
 - Physical Account
 - Monetary Account
 - Flow Account
- ii) Financial Performance (Income and Expenditure):
- iii) Ecological Classifications:
 - 1) Legal Classification of Forests
 - 2) Forest Types Wise
 - 3) Species Wise
 - 4) Animal/Fauna Wise
 - 5) Forest Product Wise.
- iv) (IV) Valuation Methods:
 - 1) Historical Cost Method
 - 2) Market Price Method
 - 3) Net Present Value Method
 - 4) Discounted Cash Flow Method
 - 5) Scholastic Discounted Cash Flow Method
 - 6) Real Option Pricing Methods
 - 7) Sensitivity Analysis
- v) Forest Economics:
 - 1) Forest Resources
 - 2) Goods and Services
 - 3) Employment
 - 4) Business

These parameters would help to make forest accounting to great extent in comprehensive manner. Apart from such parameters there are other parameters which need to be take care such non-financial parameters. It really challenging to make forest accounting since there is not scientific forest accounting system have not been developed. Forest accounting is interdisciplinary field involving various discipline such as economics, finance, sociology, life sciences,

mathematics, statistics, and physiology. Therefore this subject brings various challenges for researchers and policy makers at various stages.

8. Findings of the Study

The following are the finding have been given based on analysis of earlier studies.

- 1) Existing measures of national income in India is under estimated the contribution of forest income.
- 2) The incomes of North-Eastern states in particular are highly underestimated by these traditional (GDP/GSDP) measures.
- 3) Insufficient attention paid by economist to the revision to the SNA.
- 4) There is impact of income, size, time to reach collection area and the total area owned for farming is effect on collection of forest resources.
- 5) Trade-off between agriculture and forest raises serious challenges.
- 6) Conventional SNA measures of welfare it will misleading and effect on sending the wrong signals to policy makers.
- 7) Human wellbeing and sustainable eco-system are entirely interdependent.
- 8) There is close relationship between business and natural resources.
- 9) There is relationship between poverty, natural resources base and population growth.

9. Conclusion

Forest accounting is helpful for maintenance of forest resources in forest in a proper way. It is important to the management of forest area and understanding the availability of natural assets and income earned from this asset. Forest accounting is having large significant in society such as (1) To reduce loss of biodiversity.(2) To mitigate inflated economic production figures.(3) To enable value chain and supply chain accounting starting with net forest produce.(4) To enable Gross National Happiness -GNH calculation that is dependent on forest living and environmental standards.(5) To enable balanced economic growth keeping future economic concerns.(6) To enable balance in regional economic diversity.(7) To safeguard biodiversity (both plant and animal).(8) To assess tradeoff between agriculture and environment preservation exercises(9) To assess nature of food safety networks based on area specific nutrition availability and bring economic measures for balanced nutrition in regions.(10) To cause rational international economic and diplomacy dialogues based on hard data.(11) To measure economic sustainability.

However forest accounting is facing some challenges such as contribution of forest is does not include in system of national accounts, underestimation of its income, and identification of biological assets and its valuation, lack of research on developing proper forest accounting system, availability of sufficient data, and lack of experts etc.

There is need to make concrete steps in order to improve forest accounting system such as including forest accounting in system of national accounts, developing strong research base for improving forest accounting system, better planning for utilization of forest resources, inclusion of forest sector within comprehensive global cap and trade scheme and increase the role of financial professional role in forest resources valuation etc.

There is nexus between forest accounting and biodiversity and sustainable development. Mankind cannot afford forest in danger otherwise society will be in danger. It must be recognized invisible forest ecosystem services and determined its economic value.

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References

- [1] Directorate of Economics and Statistics (DES), Planning Department, Govt. of Maharashtra, India.
- [2] CGMA (2014) Rethinking the Value Chain, World Congress of Accountant 2014, London.
- [3] Eliasch Review on Climate Change Financing Global Forests, Earthscan Dunstan House 14a St Cross St London EC1N 8XA UK.
- [4] Global Forest Resource Assessment -2010: Food and Agriculture Organization of the United Nation (2011), FAO Forestry Paper 163. pp. 12-13.
- [5] Harries Michael and Fraser Iain (2002) - "Natural Resource Accounting in Theory and Practice: A Critical Assessment", The Australian Journal of Agricultural and Resource Economics, Vol - 46, Issue - 2, pp 139-192.
- [6] Haripriya G. S. (2003) - "Integrating Forest Resource into the System of National Accounts in Maharashtra, India", Natural Resource Accounting and Economic Development: Theory and Practices, pp 180-193.
- [7] Jordan Stephen J., Hayes Sharon E., Yoskowitz David, Smith Lisa M., Summers J. Kevin, Russell Mare and Benson H. William (Jan. 2010) - "Accounting for Natural Resources and Environmental Sustainability: Linking Ecosystem Services to Human Well-Being", Environmental Science & Technology, Vol. xxx, No. xx. <https://doi.org/10.1021/es902597u>.
- [8] India state of Forest Report -2011: Forest Survey of India (FSI)-2011, Ministry of Environment and Forests, Govt. of India (2011). pp. 4-5.
- [9] Mabugu Ramos and Chitiga Margaret (Sept. 2002) - "Accounting for Forest Resources in Zimbabwe", CEEPA - Discussion Paper Series, No - 7, pp 1-53.
- [10] Mkanta William N. and Chimtembo Mathew M. B. (Sept. 2002) - "Towards Natural Resource Accounting in Tanzania: A Study on the Contribution of Natural Forests to National Income", Centre for Environmental Economics and Policy in Africa (CEEPA) Discussion Paper Series, No - 2, pp 1-53.
- [11] Parikh Kirit and Ghosh Vpal (1995) - "Natural Resource Accounting form Soils: Towards an Empirical Estimation of Cost of Soil Degradation for India", Indira Gandhi Institute of Development Research (IGIDR), Bombay, pp 22.
- [12] Partha Dasgupta (2009), The Place of Nature in Economic Development, University of Cambridge and University of Manchester London, UK.
- [13] Shunsuke Managi Pradyot Ranjan Jena (2006) in their research paper entitled Productivity and Environment in India, Economics Bulletin, Vol. 17, No. 1 pp. 1-14.
- [14] Statistic New Zealand (2002) - "Natural Resource Accounts for New Zealand: Overview Document", Christchurch. www.stats.govt.nz (07/01/2015 at 1.45 pm.)
- [15] State of Forest Report -2013: Ministry of Environment and Forests, Govt. of India (2014).
- [16] Statistical Outline, Current Salient Forest Statistics-2013, Maharashtra Forest Department, Govt. of Maharashtra. Sarkar, S. (2008) - "Developing Green Accounting System", Serial Publication, New Delhi, India. pp. 13-15.
- [17] Trivedi P. R. (2010) - "Natural Resource Conservation", A.P.H. Publishing Corporation, New Delhi - 110002, pp 1-30.
- [18] www.mahades.maharashtra.gov.in 12/01/2015, 10:30 am.
- [19] www.mahaforest.nic.in 14/01/2015, 12:45 pm.