Identification of the Tangible and Intangible Benefits of Forests for a Fairer Estimation of Their Contribution to the Economic Development of the Country

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Abstract:

A study carried out by Dr. Robert Costanza in the year 1997 was claimed to be controversial as it valued the world ecosystem services at US $ 33Trillion per year. His contention was accepted by the world community after a very long time. The current paper discusses both the direct (tangible) and the indirect (intangible) services of the forest ecosystem in detail and also discusses as to why there's a need for the conservation and protection of the Forest ecosystems today. The various ecosystem services are enlisted and the benefits these extend to human life have been highlighted so that these are fairly represented while preparing national income accounts (NIA) of the country and an appropriate budget allocation can be made to the forestry sector for carrying out its sustained growth and development by way of conservation, afforestation and research and development for meeting the purpose of protecting the forest resources of the country.

Key Words: Ecosystem Services, National Capital Accounting (NCA), Total Economic Value (TEV), Forest Resource Accounting (FRA), Millennium Ecosystem Assessment (MEA).

1. INTRODUCTION

A) Forests: The Latin word '*foris*', is where the word forest has originated from. '*Foris*', is synonymous with the English word outside, referring to a fence or a boundary outside a village that includes all uninhabited and uncultivated land. In the current times forest refers to a piece of land that is managed for carrying out forestry irrespective of whether it is covered with shrubs, trees, climbers, etc. or not.

Technically forest has been defined by Sagreiya (1994) as:

a. (In general) An area set aside for the production of timber and other forest produce, or maintained under woody vegetation for certain indirect benefits which it provides, e.g. climatic or protective;
b. (In Ecology) A plant community predominantly of trees and other woody vegetation, usually with a closed canopy; and
c. (In Law) An area of land proclaimed to be a forest under forest law.

B) Forestry: It can be referred to as the practice of and the theoretical knowledge about all the activities that lead to the creation, scientific management, conservation and appropriate utilization of forests such that these provide continued services and goods for generations to come. Forests are assets for any country that have immense value. Mineral resources always pose the threat of getting exhausted over a period of time due to continuous use and exploitation. On the contrary, forests, if ideally dispersed, are of adequate extent, judiciously utilized and are scientifically managed can remain useful for a longer period, extending benefits both directly and indirectly over different generations.

As per FAO", forestry refers to activities related to the management of forests and other wooded land for the production and supply of wood and/or other goods and services.

One third of the Earth's land mass is covered by forests that perform important functions world over. A huge part of the world population depends on forests for their livelihood; this is to the tune of about 1.6 billion people. Not just this forests' also play an important role in mitigating the effects of climate change. Forests not only feed the rivers world over but also supply water to nearly 50% of the big cities of the world. The devastating impact of storms and floods is also regulated due to the presence of forests. Being the most biologically- diverse ecosystems on land forests provide home to more than half of the animals on land, to plants and also to insects. For the forest dependent population these are the source of food, shelter and security. Despite such a huge economic, social and ecological contribution and the health benefits that these provide, the human race has taken over to the path of their ruthless destruction. It becomes evident from the fact that 13 million hectares of forest are destroyed annually worldwide. Ecosystem Valuation Framework

C) Sustainable Forestry: As per FAO," It is the stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biological diversity, productivity, regeneration capacity, vitality and their potential to fulfill, now and in the future, relevant ecological economic and social functions, at local, national and global levels, and that does not cause damage on other ecosystems." In simple words sustainable forestry would imply the use and management of forest resources in the current time period in a way that the needs of the future generations are not interfered with and are

met comfortably. For this the foremost thing is to keep an account of the inventory of forest resources and making plans in a way that the landowners can refer to these and evaluate and implement decisions in order to achieve their goals keeping in mind the conservation and preservation of forests for future.

2. The Various Benefits from Forestry:

An attempt is made in the current paper to enlist the various tangible and intangible benefits of forestry, of which, some find a mention in the National accounts as a contributor to the GDP because of the ease of quantification of the same. These are tapped, recognized and computed while a few others which are either not quantified or are not that obvious a contributor or have a qualitative impact on the life and welfare of the people are missed out/ not included in the estimation of GDP i.e. while referring to the contribution of forestry to the economic development of a country.

Ecosystem Services:

According to the United Nations MEA (Millennium Ecosystem Assessment 2005): "Ecosystem services are the benefits people obtain from ecosystems".

Ecosystem functions that benefit communities, households, economies and lead to the well being of the people are the source of these services. These services comprise of provisioning services, regulating services and cultural services that directly have an impact on people and their lives and also include supporting services which are needed for maintaining the other three categories of ecosystem services. All the conditions and processes that help natural ecosystems and the species in them sustain and fulfill human life are included in ecosystem services. They maintain biodiversity and the production of ecosystem goods, such as forage, seafood, timber, biomass fuels, natural fiber, and many pharmaceuticals, industrial products and their precursors (Daily1977). Ecosystem goods (such as food) and services (such as waste assimilation) represent the benefits human populations derive, directly or indirectly, from ecosystem functions (Costanza *et. al.* 1997:253). Ecosystem service is the generic name given for the earlier used term benefits from ecosystem i.e. Ecosystem Goods and Ecosystem Services.

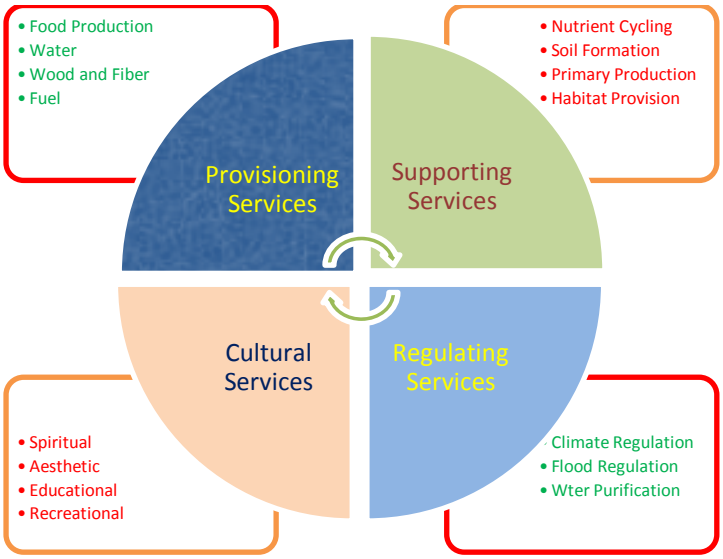
These Goods and Services are explained in detail below:

a) *Provisioning Services*- Provisioning services are the goods and or tangible services that are produced or rendered by an ecosystem directly for the well being of human kind and other living beings. For example, this particular type of services would include food, timber, wood, fuel, natural gas, medicinal benefits, fodder and many more.

b) *Regulating Services*- Regulating Services are the services provided by nature that regulate the natural phenomenon such as climate control, air and water circulation and purification, waste decomposition and disease mitigation etc..

c) *Cultural Services*- Cultural Services provided by a Forest Ecosystem is the indirect benefits that a community at large has access to due to the presence of such an ecosystem. For example, spiritual enrichment, aesthetic values, social customs, knowledge system etc.. An ecosystem has a lot of impact on the living condition of a populace. Cultural services are such a set of services impacting the day to day life of the communities.

d) Supporting Services



Source: Millennium Ecosystem Assessment, 2005.

2.1 **Timber and Non-Timber Forest Products**:

Provisioning Services: (Tangible Benefits)	**Regulating Services (Intangible Benefits)**	**Cultural Services (Intangible Benefits)**	**Supporting Services (Intangible Benefits)**
Timber, Firewood, Pulpwood, Fodder(tree and grass), Bark, Non-edible oils, Cedar oil **Other NTFP's**: Fibers, Resins, Edible fruits, Wild fruits, Other leaves, Bamboo, Raw materials for manufacturing and construction, Food (fish, meat).	_____	_____	_____

2.2 Pollination Services

Provisioning Services (TB)	Regulating Services (IB)	Cultural Services (IB)	Supporting Services (IB)
Agricultural Produce/Food	Pollination	_____	_____

2.3 Carbon Sequestration

Provisioning Services (TB)	Regulating Services (IB)	Cultural Services (IB)	Supporting Services (IB)
_____	Maintenance of Carbon Dioxide balance in the atmosphere, temperature and humidity.	_____	Nutrient Cycling. Hydrological Cycle.

2.4 Water Services

Provisioning Services (TB)	Regulating Services (IB)	Cultural Services (IB)	Supporting Services (IB)
• Water • Agriculture • Domestic • Industry	Soil Conservation. Protection& regulation of water supplies. • Sediment Control. • Shelter from hot and cold winds. • Absorption of dust and noise.	• Aesthetic • Artistic • Spiritual • Scientific	• Nutrient Cycling. • Soil Formation. • Hydrological Cycle.

2.5Biodiversity

Provisioning Services (TB)	Regulating Services (IB)	Cultural Services (IB)	Supporting Services (IB)
• Aromatic and medicinal plants. • Edible fruits and wild fruits. • Habitat (indigenous people and wildlife)	• Maintenance of Genetic pool (Biodiversity).	Symbolic, Sacred Grooves, Ritualistic Values.	_____

2.6 Landscape Beauty

Provisioning Services	Regulating Services	Cultural Services	Supporting Services
Recreation ————	Maintenance of visual quality of the environment.	Aesthetic, Artistic Spiritual, Historic Scientific, Educational, Inspirational, Sacred grooves.	————

3. Measuring Ecosystem Services :

Ecosystem services influence welfare of human population. Many attempts have been made till date to systematically link the functioning of ecosystems with human well being. The central elements in this 'link' are the intertwined notions of natural capital 'stocks' and the ecosystem services that flow like interest or dividends from those stocks. Ecosystem stocks contribute to human welfare and therefore their depletion is a point of concern. When this concern arises the first and foremost thing that is needed is their measurement. Some kind of a measurement shortcut will have to be employed for the even harder-to-define ecological services. Proxies may be relied upon for measuring the difficult to quantify service outputs. But these should be used with full understanding and awareness of the fact that they are in fact proxies for the true value of the actual service. Besides there is a need for the **3M's** as we may say: **Measure, Manage and Monitor**. This would include measurement of the current stock of natural capital, its use and management in the most efficient manner and a monitoring mechanism that would ensure its sustained growth and development.

According to the MEA natural capital is "an economic metaphor for the limited stocks of physical and biological resources found on earth". There have been concerns and debate over the continuing depletion and degradation of natural capital and over the capacity of the economic system to substitute for these losses with manmade capital, and the conditions for sustainable development, defined as non declining welfare over generations. Even though the degree of substitutability between natural capital and manmade capital is an empirical question, it is generally seen that there is limited substitutability between the two and that there's a dire need to preserve a critical amount of natural capital.

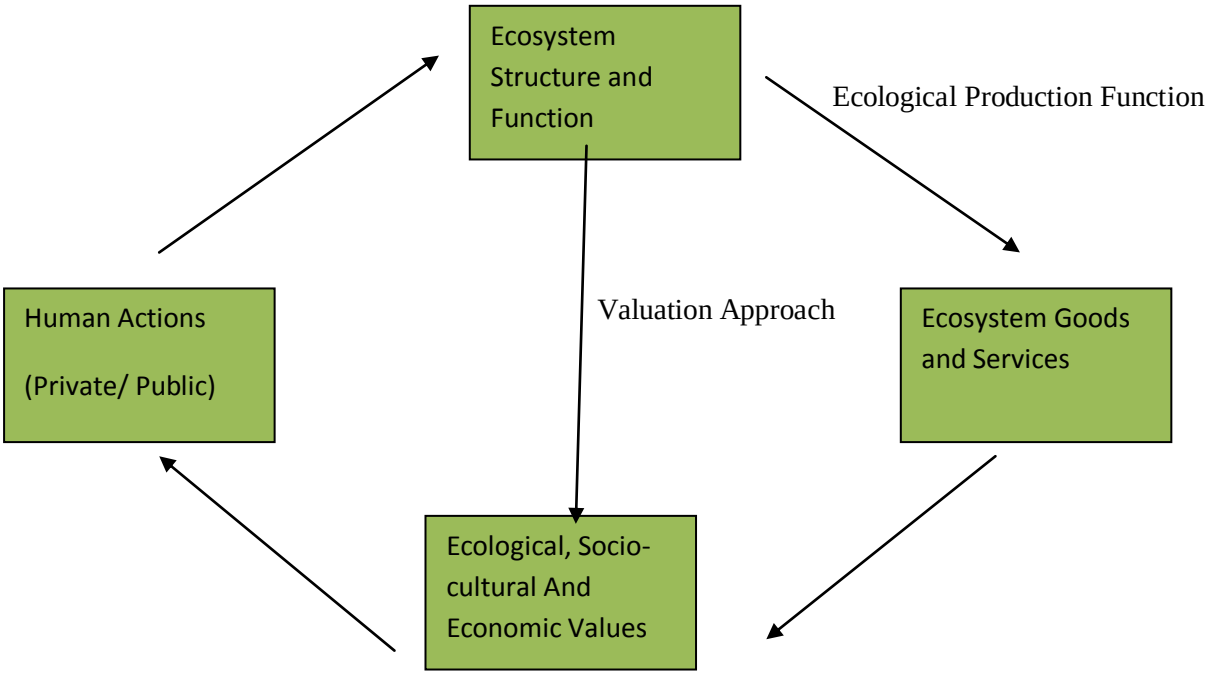
For the preservation of this natural capital it is a must to fairly represent it in the process of national income accounting either in part or fully through proxy variables or any other method/ measure. This would provide a better and clearer picture of the contribution of forestry to National Income and economic development of the country and will pave way for its conservation, protection and sustained development.

Economic Valuation Methodologies:

i) **Total Economic Value**- Total Economic Value is given by the sum of a number of components.
Mathematical representation:
TEV = Direct Use Value (DV) + Indirect Use Value (IV) + Option Value (OV) + Existence Value (EV)
{DV: Revenues from Timber and non-timber forest products.
IV: Ecological functions performed by forests.

OV/ Quasi Option Value: Expected value of the information on the benefits of an asset, conditional on its preservation enabling an increase in the stock of knowledge relevant to the total utilization of the asset.
EV: Value of Environmental Assets irrespective of current or optional uses.}

Ecosystem Valuation Framework



Source: Adopted from NRC 2005

ii) **Benefits Transfer Method**: It is used to estimate economic values for ecosystem services by transferring available information from studies already completed in another location and/ or context.

iii) **Replacement Cost Approach**: RC Approach is based on either:
a) The costs of avoiding damages due to lost services,
b) The cost of replacing ecosystem services, or
c) The cost of providing substitute services.
It assumes that the cost of avoiding damages or replacing ecosystems or their services provides useful estimates of the value of these ecosystems or services. For example while valuing water purification services: cost of filtering and chemically treating water are studied.

iv) **Hedonic Pricing**: This method is used to estimate economic values for ecosystem or environmental services that directly affect market prices. It is most commonly applied to variations in housing prices that reflect the value of local environmental attributes.

v) **Production Function Approach**: This approach recognizes that ecosystem services are important inputs to traditional economic production processes and also contribute directly to human welfare without ever passing through the market economy. For example forests provide water supply and flood protection services that can be measured/ valued in proportion to their marginal contribution to welfare function etc.

vi) **Travel Cost Method**: It is a technique that attempts to deduce value from observed behavior in a surrogate market. It uses information on visitors' total expenditure to visit a site to derive their demand curve for the sites' services.

Symbolically, ∂ Total Travel Cost = ∂ Admission Fees.

4. Role of Forest Accounts in State Policy:

Accounting for environmental services is important to public policy because those services contribute significantly to human welfare and are not captured in existing welfare accounts. We come at ecosystem services accounting from an economic perspective. The forest accounts can help inform policy on how the economic contribution of forests to the state economy can be maximized. Forest accounts linked with tourism accounts, for example, can help inform government policy on nature-based tourism, and ecosystem accounts for watersheds can help design payment for ecosystem services schemes. Because existing state accounts do not fully capture the economic contribution of forests, total benefits from sustainable forestry are underestimated, and other sectors are not fully aware of their dependence on healthy forests. These factors are likely to bias decisions away from sustainable management of forests and prevent policymakers from fully leveraging forest resources to realize their contribution to economic growth.

5. Conclusion:

Human beings have got enough from nature. Their very survival is based on natural resources. Beginning from food, to water to air, natural resources are essential for the survival of man. The major disappointment is that these resources are not always optimally used. It varies between gross overuse to misuse mainly because these resources have no price or a very nominal one attached to them. Efficient use of natural and environmental resources requires knowledge of the value of these resources in various uses (Prato, 1998).

The only way through which the country can assess the sustainability of various priority sectors is through Natural Capital Accounting (NCA). Using a framework similar to the current System of National Accounts, a detailed statistical report can be made that would help in monitoring the interactions between the state of forest resources and the state of the economy and also help in filling the current information gap in our National Income Accounting procedures. NCA includes asset accounts to monitor changes in the stock of natural resources and flow accounts to monitor the use of natural resources, impacts of economic activity on the environment, etc. The current work is an attempt in the same direction and it is hoped that soon the process of National Income Accounts would incorporate the appropriate estimation of natural capital stock and measures to prevent its depletion so as to ensure sufficient budgetary allocation for the sustained growth and development of the forestry sector that will be followed by its increased contribution to the overall economic development of the Country.

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