CASE STUDY

FOREST & ECOSYSTEM VALUATION: A CASE STUDY OF MELGHAT LANDSCAPE

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Abstract: The present study attempts to quantify the value of tangible and intangible benefits of Melghat landscape. For timber and growing stock (GS) quantification market cost approach was adopted and value of GS in Melghat was calculated as Rs. 80221 crore. Carbon sequestration was calculated based on IPCC carbon factor 0.47. The NTFP and grazing benefits were calculated from departmental sale records and domestic consumption. To work out land value the compartments were divided in land zones as per market value and adjoining lands market value was assigned to the forest compartment land. The recreation benefits were quantified based of travel cost method (TCM) and benefit cost approach by analysing consumer's surplus from similar landscape. Water conservation value was worked on the basis of rainfall data and removing losses of runoff and evapo-transpiration through empirical equations. The soil conservation and other values worked out from studies available in similar landscapes. The faunal biodiversity value was based on 'willingness to pay principle'. This report quantifies Total Economic Value of landscape as Rs. 1,70,020 crores, which means Rs. 57.26 lakhs/ha, which is much higher than Net Present Value (NPV) cost Rs.7.5 lakhs per hector prescribed by Ministry of Environment & Forests. The revision in NPV cost on landscape basis giving weightage to floral diversity and faunal peculiarity is very much required for conservation of forests. If feasible, precious forests should not be sacrified so that this generation will bequest better forest to further generations for sustenance.

Keywords: Ecosystem services, Carbon sequestration, Melghat landscape, Forest

INTRODUCTION

Valuing benefits of forest and ecosystem is comparable with valuing love of mother towards her child. Hence it is quite tricky and debatable issue. Forests are under tremendous pressure due to development priorities. The forest lands are undervalued since these are not traded in conventional markets or difficult to value. If these values counted summing up direct as well as indirect values, and considered in decision making it could lead to better conservation outcomes, especially in strengthening the economic case for justifying conservation of forests versus diverting them to non-forest uses. To balance conservation with development needs is a big challenge to scientists, Government body, policy makers and planners. Despite there being several valuation studies, very few have assessed the total (net) economic value of forests landscapes. Forest valuation studies will be helpful to save the precious forest cover. Existing value of forest lands is quantified as NPV (Net present value) which ranges between 5.8 to 9.2 lakhs per ha. for various canopy densities as per Ministry of Forest Environment and Climate Change (MoEFCC) notification under Forest Conservation Act (FCA). If we restructure the rates based on quantification of indirect services, the value will be much more justifiable. Existing proposals under FCA are showing higher profit in alternative land uses like dam/ reservoirs, highways, habitation projects etc. due to less Net Present Value (NPV) rates. If the realistic landscape based assessment is done, there is scope to learn that by saving forests, and we are saving huge capital and reducing chances of loss in future.

A brief review of work done in India and Abroad:

Working Plan of Melghat Forests by Joshi (1974) was a prime reference document for this article. The detailed information on tract, vegetation, history of forest management, proposed silvicultural prescriptions was available as valuable reference. In spite of many following working plans till date, the precision of this working plan is highly praised in the department. The increment tables, growing stock composition, application of forest mensuration techniques makes it highly technical document for reference. Pant (1986) in his text book of 'Forest Economics and Valuation' has explained every basic aspect of forest economics including demand, supply and marketing of forest prouce. Various concepts like net present value, Benefit cost Ratio, Internal Rate of returns, Discounted Cash Flow etc. are elaborated in detail. Project evaluation is also discussed in detail along with new concept of trade in NTFP's.

Verma and Kumar (2006) in their report submitted to Central Statistical Organisation has elaborated valuation of recreational benefits of Pench Tiger Resrve, Madhya Pradesh. The individual travel cost method (ITCM) was used for estimation of consumer's surplus of the visitors and economic

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worth of recreation in the Pench Tiger Reserve. It was illustrated by them that, the ITCM though complicated method gives more precise results. The results were quite helpful to planners and managers, as the ecotourism income was computed much higher in comparison with direct revenue. It has also been impressed by them that such study will enable a shift in direction of eco-tourism.

Gopal et al. (2016) have done economic valuation of Tiger reserves in India, which uses a value plus approach. This study attempted to provide qualitative and quantitative estimates of ecosystem services of Crorbett, Kanha, Periyar, Ranthambore and Sunderban Tiger Reserves. Various 25 ecosystem services have been identified by the IIFM team. The most recent study regarding valueing forest ecosystem services is done by Maseiro *et al.* (2019), which led to preparation of FAO training manual. In the manual, the case study of Bangladesh is described. The concept of ecosystem services is elaborated with current context including time value of money, profitability indicators, market value approaches, benefit transfer etc.

MATERIALS AND METHODS

Site of study was entire Melghat forest landscape spreding over 2969 sq. km., located in Amravati District of Maharashtra at the northern extreme of district. The Melghat lies in the South-western Satpura mountain ranges along the border of Madhya Pradesh. Melghat means 'meeting of the ghats', which describes the area as a large tract of unending hills and ravines scared by jagged cliffs and steep climbs. Based on information available in working plans and forest resource survey (FRS) records the total growing stock in *Melghat* Forests is quantified. The FRS uses systematic line plot sampling technique with random start technique. Considering difference in GS values among different WC, the FRS data has been stratified WC wise, and initial tables worked out for Selection cum Improvement WC, Protection/ Improvement WC, Plantation WC etc. Thereafter the total GS and GS/ha was worked out. The total GS was converted to value based on Market rates of timber as per forest department (FD) record.

Timber Value= GS x Market value

Carbon sequestration was GS dependent function and was calculated based on IPCC carbon factor 0.47. The NTFP and grazing benefits were calculated from departmental sale records, but found data deficit. The domestic consumption in the line of IIFM studies was incorporated in NTFP values.

Forest land values are taken as market values of adjoining lands by making value zones like Zone I for urban and hill station area, Zone II for Major Village settlement area and Zone III for remote area.

The recreation benefits are worked out by using Travel Cost Method (TCM) and Benefit Transfer Approach (BTA) as per recommended methodology in FAO manual for forest valuation by Maseiro et al. (2019). The Water Conservation value is worked out by formula as below.

Water Conserved= Rainfall –(Evapotrainspiration + Run Off)

Soil conservation values being similar for all hilly landscape shall be taken from secondary references. Other values like NTFP, Grazing Biodiversity, Nutrient and Air Quality are taken from Similar Landscape studies. TEV (Total Economic Value) worked Out to compare proposed loss of sanctuary area and anticipated gains of dam.

The faunal biodiversity value was based on 'willingness to pay principle'. The Mysore and Borivali zoos run animal adoption scheme for which sponsorship is received from enthusiasts. The willingness to pay for conserving faunal diversity was quantified and gene pool values from similar landscapes.

RESULTS AND DISCUSSION

Quantification of tangible benefits: The GS was quantified which is based on Forest Resource Surveys (FRS) data divided in Working Circle (WC) wise. The total GS reported in Melghat landscape was 227 lakh CuM. By applying value of market price from departmental sale records the value of GS in Melghat was concluded as Rs. 80,221 crores. The value of NTFP benefits, though data deficit worked out to be Rs. 3.92 crores. The value of internal consumption worked out as per IIFM methodology was Rs. 2.99 crores. Value together comes as Rs. 691 croes, which still remains under-valued due to Panchayat Extension to Scheduled areas Act (PESA) constraints.

Forest land value worked out through zonation value was Rs. 66874 crores. At the beginning of thesis, Eco-tourism was classified as direct benefit due to available revenue data from various sources. But with progress of research the indirect quantification through Travel Cost Method (TCM) approach found higher, hence now it comes under both direct and indirect benefits category.

Quantification of non-tangible benefits: The carbon sequestration is variable dependent on GS value. By applying carbon factor 0.47 and wood density 0.6 factor the carbon sequestration worked out in tones was 78,91,261 tones.

After analyzing tourist trend over the years in Melghat, it was reported that number of tourists is increasing over the years. The direct revenue as per departments record was Rs.1.23 crores through various sources like tourists and vehicle entry fee, camera/video charges, safari, accommodation etc. But value of TCM with benefit transfer was found 30.94 which was higher than direct method. The recreation value has scope to improve through management interventions.

Average value of rainfall in Chikhaldara and Dharani blocks was 1140.44 mm. The reduction factor of 38.7% for runoff and evapo-transpiration losses the water conserved was 2075575750 CuM. Value was water conserved was worked out by applying potable water municipal rates, and the value of water conserved was finally Rs.7534 crore. After adding value of soil conservation the soil water conservation value comes 7954 crore rupees. Other values like biodiversity, nutrient, air purification was worked out from similar studies and value from other services was arrived at Rs.911 crores, which is least quantified due to less availability of resource material. This value has considerable scope for improvement, and some engineer's institute shall take initiative for study.

Summary quantification of total economic value (TEV): By summing up tangible and intangible benefits quantified as per methodology, the TEV of entire Melghat landscape was worked out and given in Table 1.

Table 1. Summary of TEV of Melghat Landscape

Valuation Component	**Value in crore Rs.**	**Remarks**
Timber/ GS	87148	Market Price of departmental auctions
NWFP & Grazing	691	As above
Land	67734	Market Price + Hedonic Pricing
Recreation	13.65	TCM/ BTA
Carbon sequestration	9291	IPCC guidelines
Water/Soil Cons	7954	Alternative cost
Other	911	Biodiversity, Air Quality etc
TEV	170020	For entire landscape Per ha cost much higher as compared to NPV cost (MoEFCC) 7.5 l/ha
	i.e. 57.26 lakhs/ha	

CONCLUSIONS AND SUGGESTIONS FOR FURTHER RESEARCH

In the view of the findings, the following conclusions have been drawn with few suggestions for future work.

TEV of Melghat landscape is Rs.1,70,020 crore, which means 57.26 lakhs per hactor. The growing stock is major contributor in value followed by forest land and carbon sequestration.

Certain services like eco-tourism, soil-water conservation, NTFP's and other values are counted for one year. Considering working plan period of 10 years, if the benefits are re-quantified the value of landscape will reach to more than 92 lakhs per hector These higher values justifies that we are loosing precious forests for petty development activities. Forest landscape as better land use as compared to other development projects.

The prevailing value of NPV by MoEFCC is 7.5 lakhs/hector is considerably less as compared to valuation done in this study. Hence the NPV rates of central government needs to be revised. This will ensure more funds for forest developmental works.

The recreation benefits in Melghat landscape can be improved by improving sighting through management interventions, as sighting is major component of tourist inflow as well as good weightage in travel cost method.

Research on soil conservation, biodiversity value and other values like nutrient cycling, temperature regulation, waste assimilation needs to be done in intensified manner.

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