

Economic Valuation of Periyar Tiger Reserve: *Value the Roar's Ecosystem*

Are ecosystems' contributions to our welfare being adequately and accurately reflected in our calculus? It is possible that our failure to depict ecological benefits in monetary terms biases social decisions towards economic activities that are antagonistic to ecological health and production. If so, greater commitment to ecosystem valuation could serve both the interests of conservation and society as a whole. This study makes a fair attempt to value the ecosystem services derived from tiger reserves, the existence of which, is crucial for man's own survival.

Summary

Less than 3500 tigers remain in the wild today with around 50 percent in India and their numbers are declining rapidly. Tigers are apex predators. Their conservation results in the conservation of all trophic levels in an ecosystem. It is high time to centre the cry of our national animal and its importance to the world. Economic valuation of tiger reserves is a novel step in the direction of drawing attention to the wide range of benefits of the ecosystems they provide. Better information on the economic value of tiger reserves will most likely provide an important incentive to allocate sufficient funds for their continued conservation and to stimulate sustainable utilization of the important functions of these areas (de Groot 1994). This study attempts to estimate the value of ecosystem services of Periyar Tiger reserve (PTR) through economic valuation and application of spatial mapping tools like InVEST as monetary valuation conveys the message with precision and simplicity. A representative of the South Western Ghats with high endemism, Periyar Tiger Reserve (PTR) is situated in southern India. It is estimated that the Periyar Tiger Reserve (PTR) provides flow benefits worth ₹17.6 billion (265.46 million US\$) or ₹1.90 lakh (0.003 million US\$) per hectare annually.*

Key Findings

- ✦ For every rupee spent on management costs currently, flow benefits of approximately ₹459 (6.92 US\$) are realized within and outside the Corbett Tiger Reserve.
- ✦ Nearly 10 percent of flow benefits from PTR accrue at the local level, 52percent at the national level and 38percent at the global level.
- ✦ The estimated flow benefits from ecosystem services of Periyar Tiger Reserve are worth ₹ 17,618.3 million (265.736 million US\$) annually.
- ✦ A large proportion of flow benefits (as well as stock) are intangible, and hence often unaccounted for in market transactions.

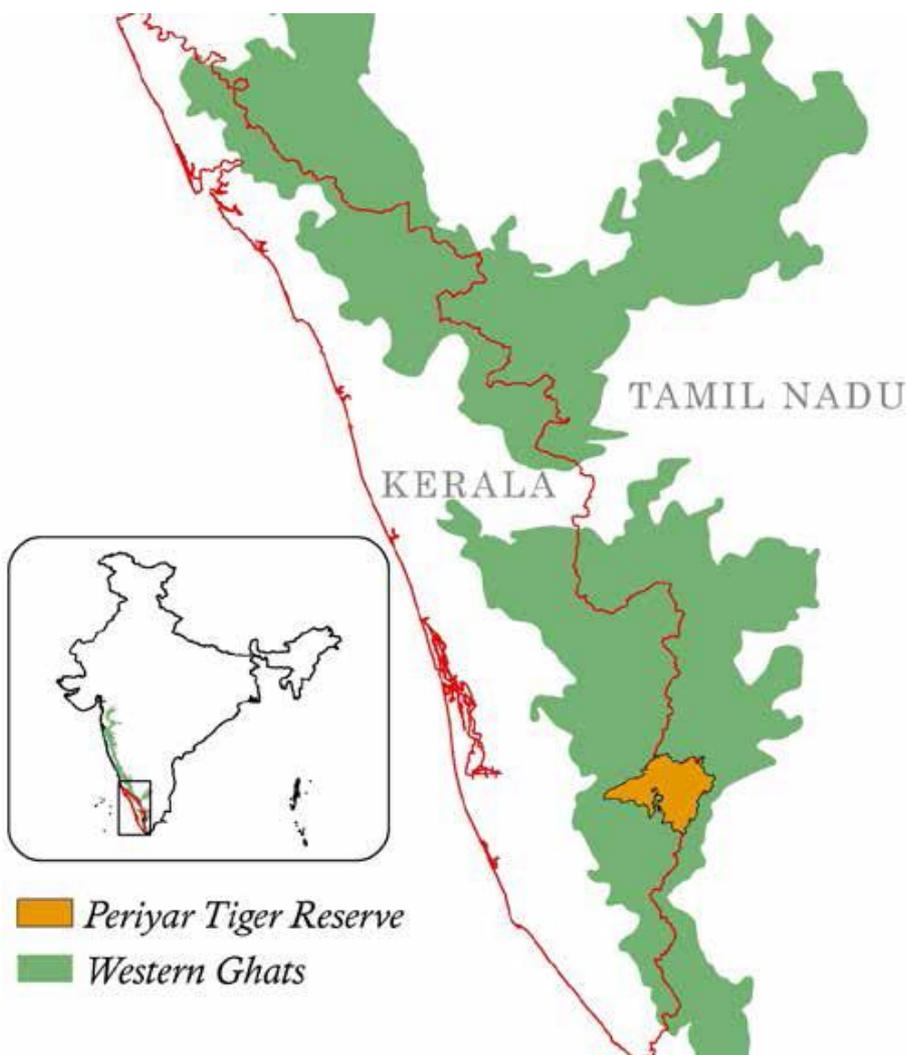
Key Recommendations

- ✦ Adequate investment in tiger reserves is essential to ensure the flow of ecosystem services in future, and is economically rational.
- ✦ Intensive research is required to arrive at a value closer to the actual worth of ecosystem services prevailing in the tiger reserve and accordingly activities should be prioritized and valued like ecotourism.
- ✦ Need to integrate management of tiger reserves into the broader landscapes and enhancement of ecological connectivity among the tiger reserves and their wide environment as corridor connectivity of PTR is crucial.



Background

Located in the Idukki district of Kerala, PTR extends over an area of 925 km² (881 km² of core zone and 44 km² of buffer zone). Periyar, the longest river of Kerala and River Pamba, also known as Dakshina Ganga, is the third longest river of Kerala, both, originates inside PTR. There is no human inhabitation inside the core area of PTR. There are 5 tribal and non-tribal settlements covering an area of 729 hectares in the buffer region of PTR. Twenty-five of the 94 species endemic to this range are reported to be in found in PTR. The fauna of the reserve is represented by 66 species of mammals, 100,107, 323 species of birds, 48 species of reptiles, 29 species of amphibians, 45 species of fishes including three new records and 180 species of butterflies. PTR contains only 10% of the total forest area in Kerala but contains about 41 percent (1,985 species) of flowering plants found in the state. PTR is a world-acclaimed example of participation of the local community in management of the protected area.



Key Results

Ecosystem Services from PTR

Besides conserving the wild, tiger reserves also provide a range of associated economic, social, cultural and spiritual benefits, which are termed as ecosystem services.

The study focuses on quantitative and qualitative estimates for as many as 25 ecosystem services from Periyar Tiger Reserve which were identified from the Millennium Ecosystem Assessment Framework. The monetary estimates for the 20 services are specified in Fig 1, whereas some important values that these tiger reserves provide are difficult to capture through economic analysis like sacred values of particular places to faith groups, etc have been qualitatively assessed.

Value + Approach

The study uses a VALUE+ approach wherein the 'VALUE' represents all benefits for which monetary economic valuation is possible and conducted, while the '+' represents all those benefits for which economic valuation is currently not possible either on account of lack of accepted methodologies, knowledge and/or understanding. The economic values derived in the study are thus conservative. It is important to note that the monetary value derived for the tiger reserve is not the exchange value. It is a conservative estimate.

Application of InVEST- Spatial Mapping Tool

The results of the InVEST exercise are envisaged to assist in identification of ecosystem service hotspots within tiger reserves and thus better equip tiger reserve managers in conservation and management of such areas.

Investment Multiplier

Based on the flow benefits of ₹ 17618.3 million per year, for every rupee spent on management costs in PTR, flow benefits of ₹ 459 are realized within and outside the tiger reserve.

Valuation Framework

The study has used a multiplicity of frameworks including Total Economic Value; Millennium Ecosystem Assessment; Stock and Flow; and Tangible and Intangible Benefits to communicate the diverse values embedded and emanating from tiger reserves.

S.No.	Ecosystem Service	Value (₹ in Millions/Year)
1	Employment Generation - Through management and Community-based Ecotourism	35.84
2	Agriculture	18.55
3	Fishing	2.95
4	Fuel Wood	7.03
5	Grazing	3.06
6	Timber Includes Standing Stock	2,99741.00
7	NWFP	1.98
8	Gene-Pool Protection	7,860.00
9	Carbon Storage	16,760.00
10	Carbon Sequestration	181.18
11	Water Provisioning	4050.00
12	Water Purification	482.7
13	Sediment Regulation	14.21
14	Nutrient Cycling	38.00
15	Biological Control	130.00
16	Pollination	167.79
17	Habitat/ Refugia	3560.00
18	Recreation	425.15
19	Gas Regulation	61.15
20	Waste Assimilation	593.55

Fig 1: Quantitative Assessment of Ecosystem Services of Periyar Tiger Reserve

InVEST is a suite of software models used to spatially map and value the goods and services from nature that sustain and fulfil human life. InVEST is a data-hungry tool. Further, 3 of the 17 models in the InVEST 3.0 package were applied at Periyar Tiger Reserve. These include the Carbon Storage and Sequestration: Climate Regulation Model, the Water Yield: Reservoir Hydropower Production Model and the Sediment Retention: Avoided Dredging and Water Purification Model.

InVEST Outputs

- ✚ 172 thousand tons of carbons are stored in PTR.
- ✚ The total water yield from PTR as well as its fringe areas amounts to 4366 million KL per annum. This water is stored in the Periyar dam and is used for electricity generation, irrigation (at least 6 districts are completely dependent on this water), drinking water, etc.
- ✚ The potential for the highest soil loss is from the areas lying outside the park boundary, which are under agriculture, urban Development and various other land uses.



Total Economic Value(TEV) Framework	
Type of Value	Value (₹ in millions)
Direct Use Value	58
Indirect Use Value	9,699
Option Value	7,860

Millenium Ecosystem Assessment (MEA) Framework	
Type of Value	Value (₹ in millions)
Provisioning Services	7,918
Regulating Services	9,274
Cultural Services	425

Stock and Flow Benefits Framework	
Type of Value	Value (₹ in millions)
Flow Benefits	17,620
Stock	3,16,500

Tangible and Intangible Benefits Framework	
Type of Value	Value (₹ in millions)
Tangible Benefits	56
Intangible Benefits	17,561

Save the Roar- Call for Action

In an economic age economic measures like GDP, profits and income are indicators of the progress of nations or individuals. Valuation becomes an imperative step to the ecosystem services movement in conservation science and advocacy. The study was a fair attempt to monetize the value of ecosystem services of the tiger reserves. This value can be further used for prioritization of activities and investments at the local, national and global level for the welfare of society as a whole.

This Policy Brief is an output of the research study titled “**Economic Valuation of Tiger Reserves in India: A Value+ Approach**” conducted by the Centre for Ecological Services Management (CESM), IIFM, Bhopal and supported by the National Tiger Conservation Authority (NTCA), MoEFCC, India.

CESM is a centre of excellence established in 2007 at the Indian Institute of Forest Management with a mission to conduct action and policy research for ecosystem services management.

Study Mentors: Rajesh Gopal, Giridhar Kinhal, S. P. Yadav and Sanjay Kumar
Lead Authors: MadhuVerma, Dhaval Negandhi, Chandan Khanna, Advait Edgaonkar, and Ashish David
Contributing Lead Authors: Gopal Kadekodi, Robert Costanza and Rohit Singh
Study Advisors: Anmol Kumar, E. Somanathan, Himmat Negi, Ida Kubiszewski, N. S. Bisht, P. K. Sen, Qamar Qureshi, Rajesh Kumar, Rucha Ghate, Swapan Mehra and Y. V. Jhala

***Acknowledgements:** The study would not have been possible without the support from Field Directors of selected tiger reserves. We are thus grateful to Amit Mallick (Periyar Field Director) and his team for their cooperation in provisioning of necessary data and logistic support at Periyar Tiger Reserve. Ms. Ritika Agarwal deserves special mention for her sincere efforts in organizing this policy brief.*

Download the complete report from <http://goo.gl/ZuQdMC>

For further information contact: cesm@iifm.ac.in or mverma@iifm.ac.in

*1 US\$ = ₹ 66.3

