

# Economic Valuation of Kanha 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 Kanha Tiger Reserve (KTR) through economic valuation and application of spatial mapping tools like InVEST as monetary valuation conveys the message with precision and simplicity. A typical geophysiological representative of the Central India Highlands, Kanha Tiger Reserve (KTR) situated in Madhya Pradesh is internationally renowned for successful conservation of two endangered wildlife species, viz. the Royal Bengal Tiger and the Central Indian Barasingha. It is estimated that the Kanha Tiger Reserve (KTR) provides flow benefits worth ₹ 16.5 billion (248.869 million US\$\*) or ₹ 0.80 lakh (0.001 million US\$) per hectare annually.*

## Key Findings

- ✦ For every rupee spent on management costs currently, flow benefits of approximately ₹273 (4.12 US\$) are realized within and outside the Corbett Tiger Reserve.
- ✦ Nearly 10 percent of flow benefits from KTR accrue at the local level, 49 percent at the national level and 41 percent at the global level.
- ✦ The estimated flow benefits from ecosystem services of Kanha Tiger Reserve are worth ₹16,451 million (248.13 million US\$) annually.
- ✦ A large proportion of flow benefits (as well as stock) are intangible, and hence often unaccounted for in market transactions.

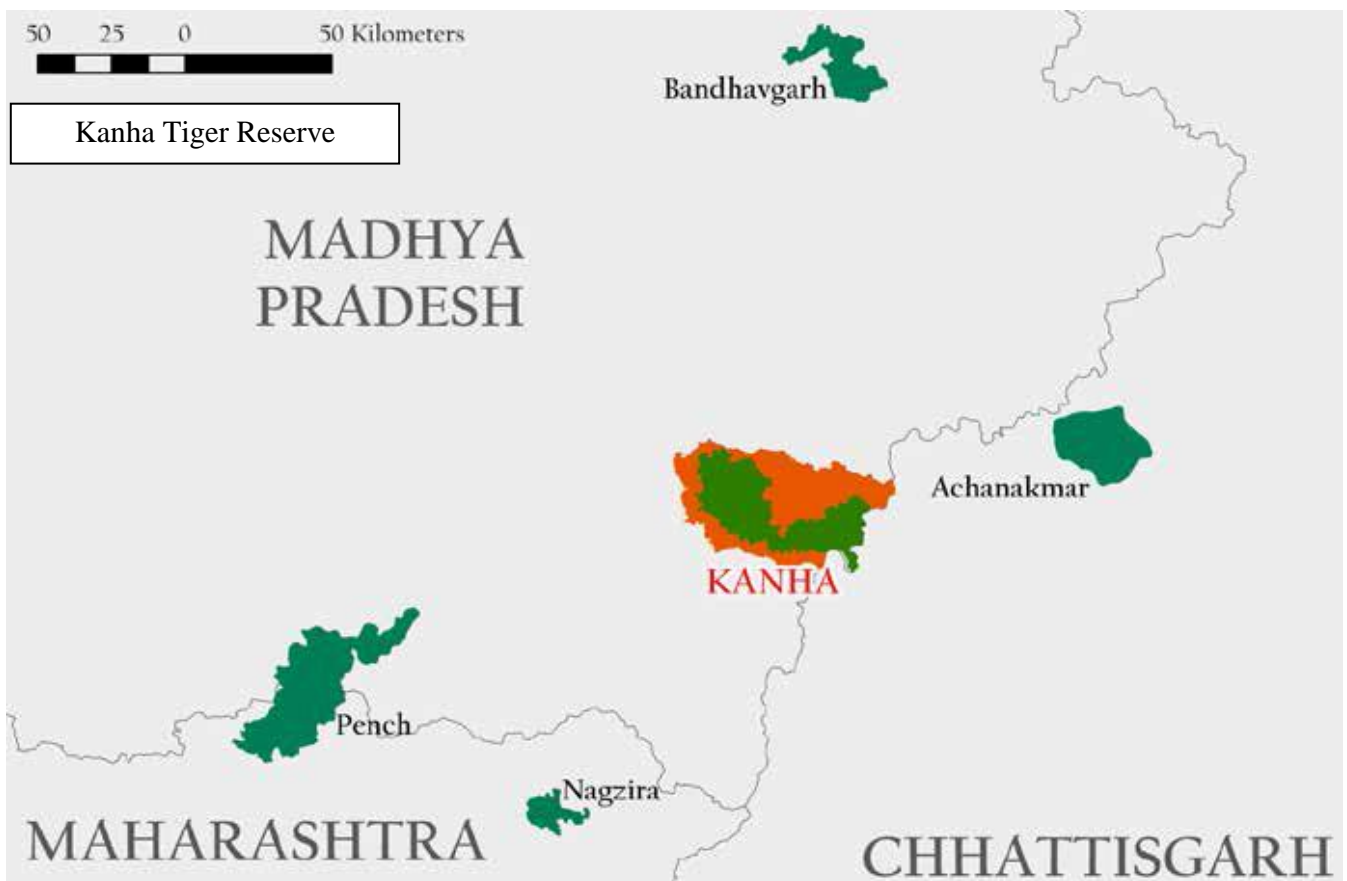
## Key Recommendations

- ✦ 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 KTR with the Achanakmar Tiger Reserves, Chhattisgarh and with Bandhavgarh and Pench Tiger Reserves in Madhya Pradesh is crucial.

## Background

Kanha was among the first nine tiger reserves launched under The Project Tiger in 1973. Spread over districts of Mandla, Balaghat and Dindori, KTR covers an area of 2,051 km<sup>2</sup> (917 km<sup>2</sup> of core zone and 1,134 km<sup>2</sup> of buffer zone). Presently, an aggregate population of 8,000 people and 7,000 cattle units live within 17 villages in the core zone of KTR. There are about 160 forest and revenue villages in the buffer zone of KTR.

Kanha Tiger Reserve has species of tigers, leopards, wild dogs, wild cats, foxes, spotted deer, barking deer, four-horned deer, jackals, etc. Barasingha is the pride of the place as it is the only sub species of swamp deer in India. As per the Forest Survey of India, about 44% of the tiger reserve area (including both core and buffer) is covered with Very Dense Forest, 16% with Moderately Dense Forest, and 6% with Open Forest and the remaining area, i.e. 34 per cent is non-forest. The core zone of KTR enjoys considerable ecological connectivity with other wildlife protected areas in and around the tiger reserve. These include the Achanakmar Tiger Reserve in Chhattisgarh, Bandhavgarh and Pench Tiger Reserves in Madhya Pradesh, and Nagzira and Pench Tiger Reserves in Maharashtra.



## Key Results

### Ecosystem Services from KTR

Besides conserving 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 Kanha Tiger Reserve which were identified from the Millennium Ecosystem Assessment Framework. The monetary estimates for the 15 services are specified in fig1, 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.

S.No.	Ecosystem Service	Value (₹in Millions/ year)
1	Fuel Wood	109.00
2	Grazing	546.00
3	Timber Includes Standing Stock	1,73,124.36
4	NWFP	70.05
5	Gene-Pool Protection	12410.00
6	Carbon Storage	20500.00
7	Carbon Sequestration	219.41
8	Water Provisioning	557.86
9	Sediment Regulation	16.29
10	Nutrient Cycling	60.59
11	Biological Control	89.96
12	Pollination	245.34
13	Habitat/ Refugia	318.94
14	Recreation	383.70
15	Gas Regulation	98.14
16	Waste Assimilation	981.36

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

### 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

*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 Kanha 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.*

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.

#### InVEST Outputs

- 192 thousand tons of carbons are stored in KTR.
- The net water yield is about 1804 million KL per annum.
- Negligible sediment export as the silt flow is less in the rivers originating from the reserve.

### Investment Multiplier

Based on the flow benefits of ₹16451 million per year, for every rupee spent on management costs in KTR, flow benefits of ₹ 273 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.

Total Economic Value (TEV) Framework	
Type of Value	Value (₹ in million/ year)
Direct Use Value	1,069
Indirect Use Value	2,971
Option Value	12,410

Millennium Ecosystem Assessment (MEA) Framework	
Type of Value	Value (₹ in million / year)
Provisioning Services	13,479
Regulating Services	2,587
Cultural Services	383

Stock and Flow Benefits Framework	
Type of Value	Value (₹ in million/ year)
Flow Benefits	16,450
Stock	1,93,280

Tangible and Intangible Benefits Framework	
Type of Value	Value (₹ in million/ year)
Tangible Benefits	999
Intangible Benefits	15,451

## 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:** Madhu Verma, 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 J. S. Chouhan (Kanha Field Director) and his team for their cooperation in provisioning of necessary data and logistic support at Kanha 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](mailto:cesm@iifm.ac.in) or [mverma@iifm.ac.in](mailto:mverma@iifm.ac.in)

\*1 US\$ = ₹ 66.3

