Policy Brief
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Economic Valuation of Sundarbans 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 reserve 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 Sundarbans Tiger Reserve through economic valuation as monetory valuation conveys the message with precision and simplicity. Sundarbans forms the largest contiguous track of mangrove forest found anywhere in the world and is the only mangrove forest inhabited by tigers. It is estimated that the Sundarbans Tiger Reserve (STR) provides flow benefits worth ₹12.8 billion (193.062 million US$*) or ₹ 0.50 lakh (0.001million US$) per hectare annually.

Key Findings

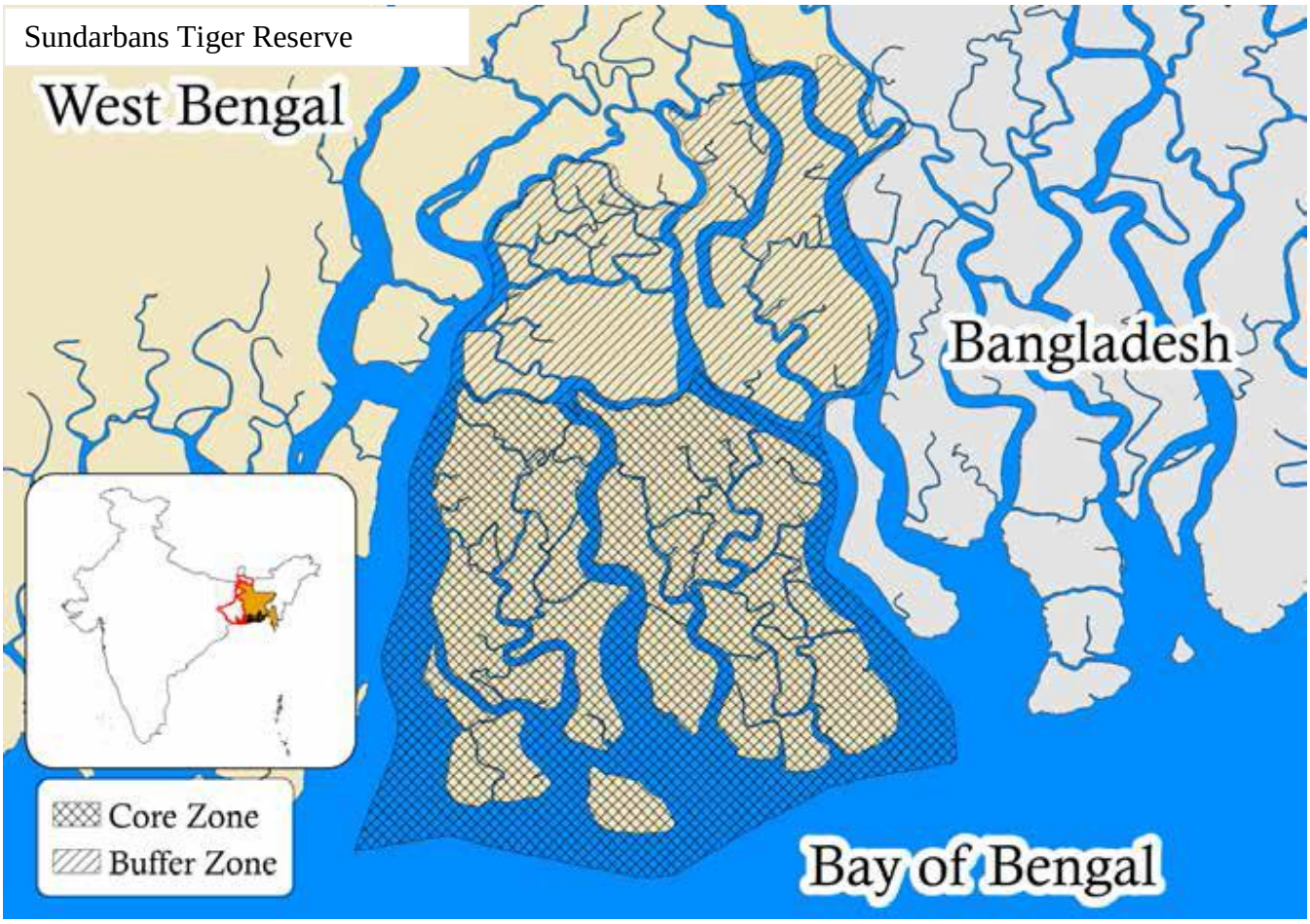
- For every rupee spent on management costs currently, flow benefits of approximately ₹530 (7.99 US$) are realized within and outside the Sundarbans Tiger Reserve.
- Nearly 16 percent of flow benefits from STR accrue at the local level, 39 percent at the national level and 44 percent at the global level.
- The estimated value of the ecosystem services of STR is worth ₹12,800 million (193.062 million US$) 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.

Background

Lying at the southern-most extremity of the lower Gangetic delta bordering the Bay of Bengal, STR can be described as a maze of estuaries, river channels and creeks encompassing more than 100 islands. STR extends over an area of 2,585 km^2 (1700 km^2 of core zone and 885 km^2 of buffer zone). STR is bounded by fringe villages along the northern boundary, the Bay of Bengal on the south, and Bangladesh on the east separated by Raimangal, Kalindi and Harinbhanga rivers. About 78 species of mangroves have been recorded in the area making it the richest mangrove forest in the world. STR supports a wealth of animal species including the single largest population of tiger and a number of other threatened aquatic mammals such as the Irrawaddy and Ganges river dolphins. It is also called the kingfishers' paradise as out of 12 species found in India, 8 are found here. In the mangrove forest of Indian Sundarbans, a total of 69 floral species belonging to 29 families and 50 genera have been recorded, out of which 34 species are of true mangrove type. Sundarbans shelters rich microbial community, a total of 64 phytoplankton species have been recognized in the Indian Sundarbans. There is no human inhabitation inside the core as well as buffer area of STR.



Key Results

Ecosystem Services from STR

Besides conserving the wild, tiger reserves also provide a range of associated economic, social, cultural and spiritual benefits, which are also termed as ecosystem services. The study focuses on quantitative and qualitative estimates for as many as 25 ecosystem services from Sundarbans Tiger Reserve which were identified from the Millennium Ecosystem Assessment Framework. The monetary estimates for the 14 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.

S.No.	Ecosystem Service	Value (₹ in Millions/ Year)
1	Employment Generation - Through management and Community-based Ecotourism	36.22
2	Fishing	1,600.00
3	Standing Stock	6,28,700.00
4	NWFP	5.50
5	Gene–Pool Protection	2870.00
6	Carbon Storage	24100.00
7	Carbon Sequestration	462.08
8	Biological Control	101.51
9	Moderation of Extreme Events	274.83
10	Pollination	276.84
11	Nursery Function	5170.00
11	Habitat/ Refugia	359.89
12	Recreation	37.00
13	Gas Regulation	110.74
14	Waste Assimilation	1,500.00

Fig 1: Quantitative Assessment of Ecosystem Services of Sundarbans 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.

Investment Multiplier

Based on the flow benefits of ₹12.8 billion per year, for every rupee spent on management costs in STR, flow benefits of ₹530 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 millions)
Direct Use Value	1,641
Indirect Use Value	8,293
Option Value	2,870

Millenium Ecosystem Assessment (MEA) Framework	
Type of Value	Value (₹ in millions)
Provisioning Services	4,512
Regulating Services	8,256
Cultural Services	37

Stock and Flow Benefits Framework	
Type of Value	Value (₹ in millions)
Flow Benefits	12,800
Stock	6,55,770

Tangible and Intangible Benefits Framework	
Type of Value	Value (₹ in millions)
Tangible Benefits	1,642
Intangible Benefits	11,163

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 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.

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*1 US$ = ₹ 66.3