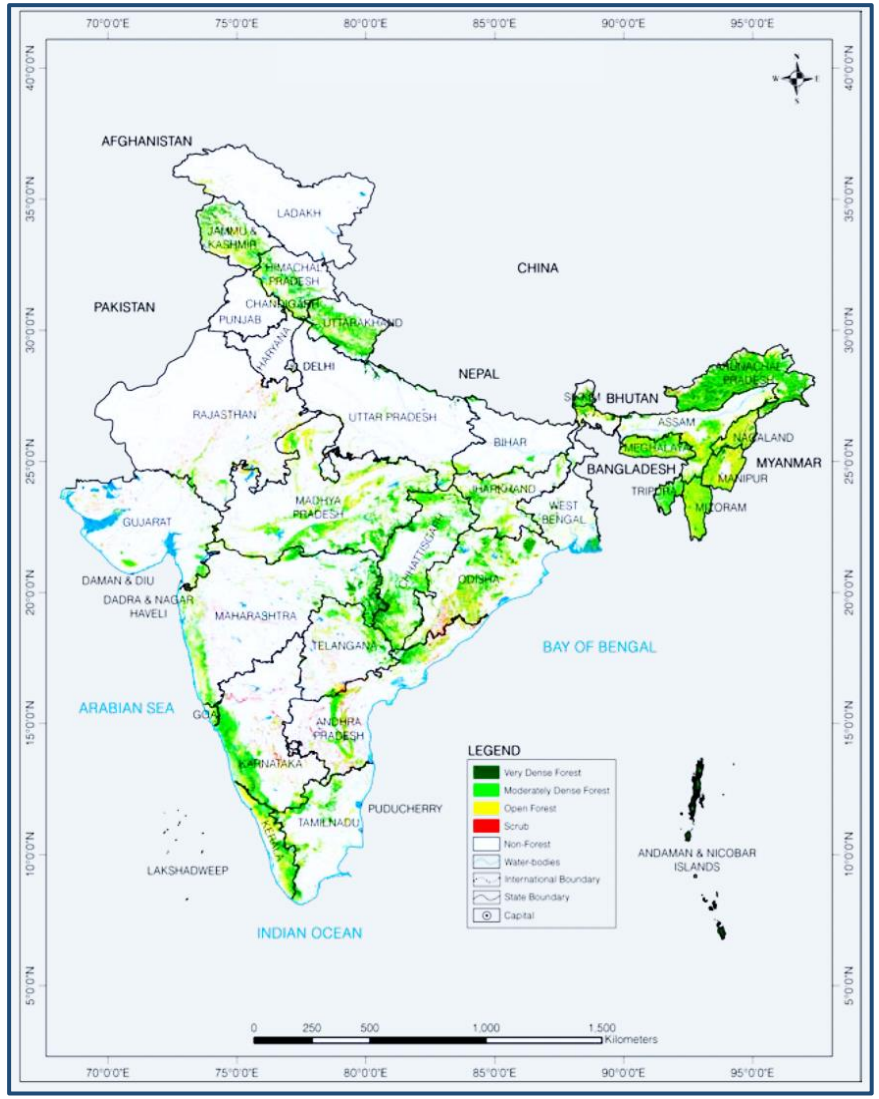
Valuing Forest Ecosystems in National Policy

Experiences and Challenges

United Nations
GLOBAL FOREST GOALS
Ministry of Environment, Forest and Climate Change
Government of India

Extent of India's Forest Resources

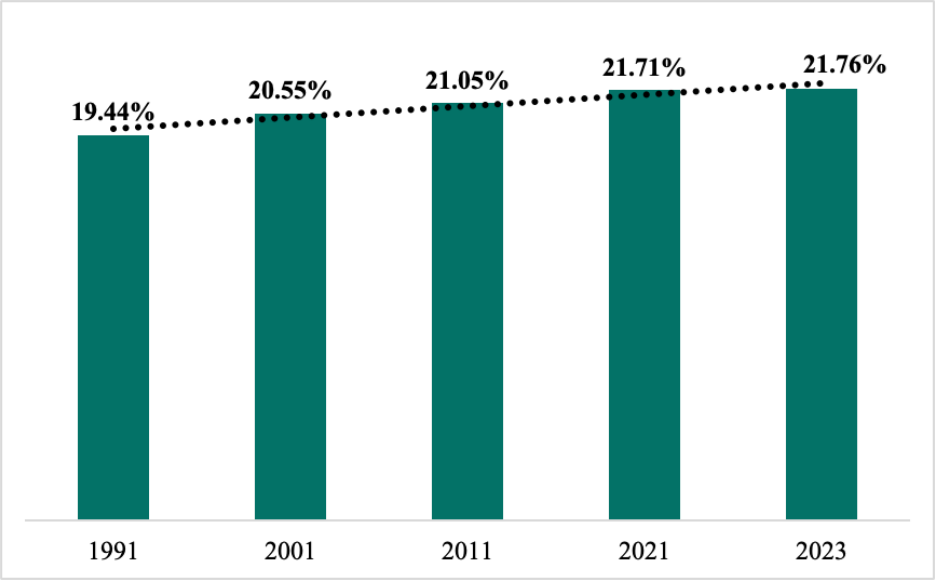
Forest Cover Map of India

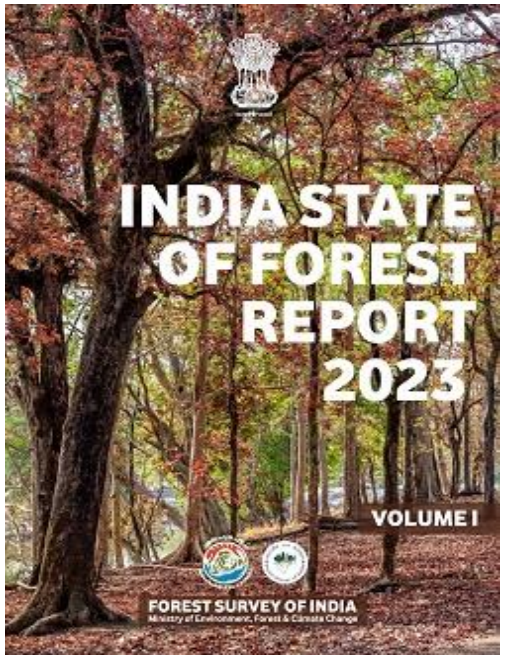


Forest and Tree Statistics

82 Million Hectares	25.17%	10th	3rd	~7286 Mil tonnes
Forest & Tree Cover	Forest and Tree Cover	Largest Forest Area in the World	Highest Net Gain in Forest Area, 2010-2020	Carbon Stock

India's Forest Cover has increased over the last 3 decades





India's Experience with Valuation of Ecosystem Services

Ecosystem Services Evaluation projects over multiple states, landscapes and forest types

2 States

Uttarakhand
Himalayan Topography

Rajasthan
Arid
Topography

16 Tiger Reserves

- **Dry Deciduous Forests** - 6
- **Moist Deciduous Forests** - 5
- **Tropical Evergreen Forests** - 2
- **Tropical Semi-Evergreen Forests** - 1
- **Mangrove Forests** - 1
- **Wet Alluvial Grassland & Moist Deciduous Forest** - 1

India's mechanism for Ecosystem Services Evaluation

Frameworks

- IPBES's Nature's Contribution to People (NCP) Framework
- Millennium Ecosystem Assessment (MA) Framework
- System of Environmental Economic Accounting (SEEA)
- Total Economic Value (TEV) Framework
- Human Values Ecosystem Assets framework

Approaches and Indices

- VALUE+
- Sustainable Environmental Performance Index (SEPI)
- Gross Environmental Product (GEP)
- SEEA Ecosystem Accounts for India

Tools

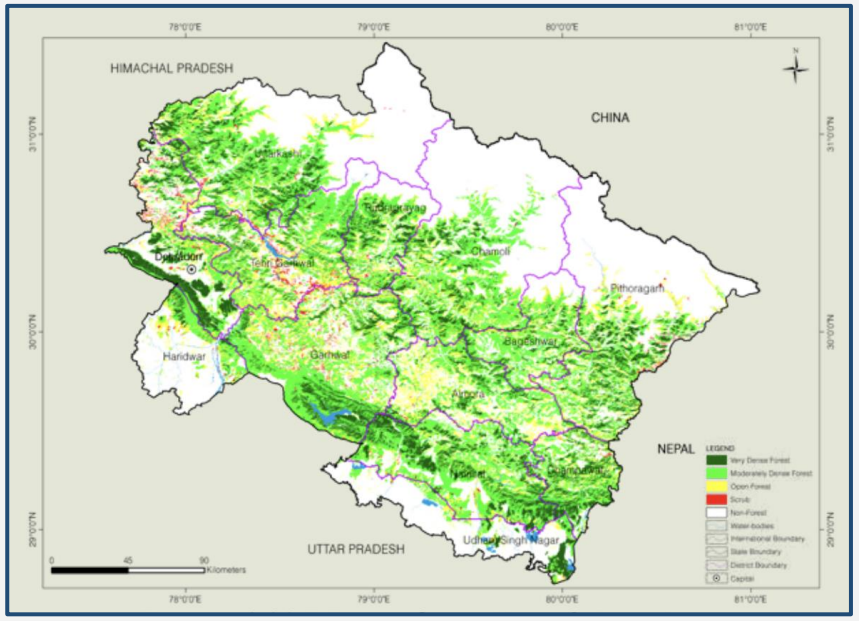
InVEST
Integrated Valuation of Ecosystem Services and Tradeoffs

ARIES
ARtificial Intelligence for Environment & Sustainability

Models

- Carbon Storage and Sequestration
- Reservoir Hydropower Production
- Sediment Retention
- Sediment Delivery Ratio

Ecosystem Services Valuation & Green Accounting in Uttarakhand State (Jun 2019)



Total Area	**5.35 mha**
Forest Cover	**2.43 mha**
Percentage of Total Area	**45%**
Annual Stock Valuation	**$170.3B** [INR 14,13676 Cr]
Carbon Storage	**327.95 M tonnes**
Water Yield	**10.46 B m³**

Valuations leveraging Millenium Ecosystem Assessment Framework

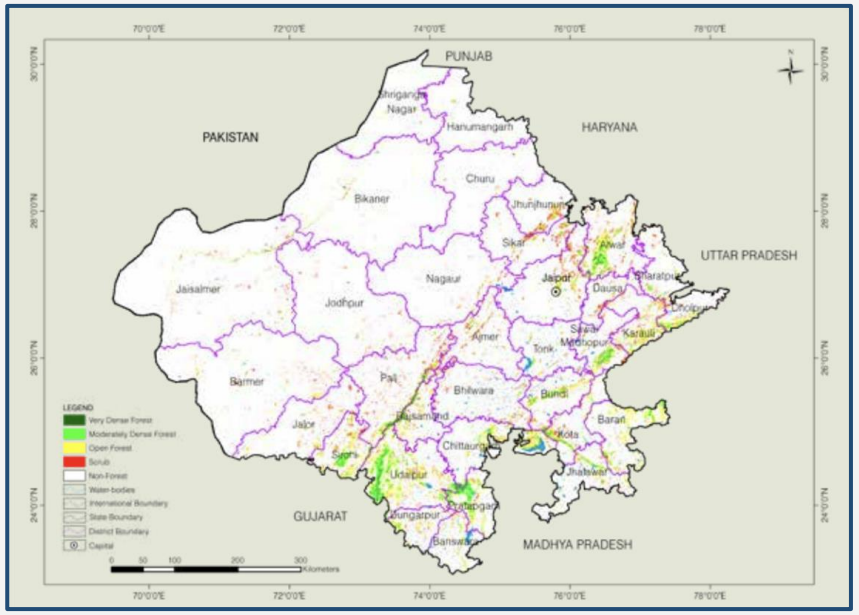
Type	Service	Est. Annual Value
Provisioning	Fuelwood, Fodder, Timber, NTFPs, Employment Generation	$156.82M
Regulating	Carbon Sequestration, Water Purification, Flood Control, Pollination, Water Provisioning, Gene-Pool Protection, Sediment Regulation / Retention, Biological Control, Gas Regulation, Waste Assimilation	$973.14M
Cultural	Recreation, Tourism	$0.12M
Supporting	Habitat for Species, Nutrient Cycling, Nutrient Retention	$15.82M
Total Annual Flow Valuation		**$1,146 M**

Outcomes

Valuation for 21 Ecosystem Services - District-wise valuation was carried out

Introduced **Sustainable Environmental Performance Index** (SEPI) to assess environmental health across sectors & track progress on SDGs

Ecosystem Services Valuation & Green Accounting in Rajasthan State (Nov 2019)



Total Area	**34.22 mha**
Forest Cover	**1.65 mha**
Percentage of Total Area	**4.8%**
Annual Stock Valuation	**$1,153B** [INR 95,73,597 Cr]
Carbon Storage	**96.74 M tonnes**
Water Yield	**109.86 B m³**

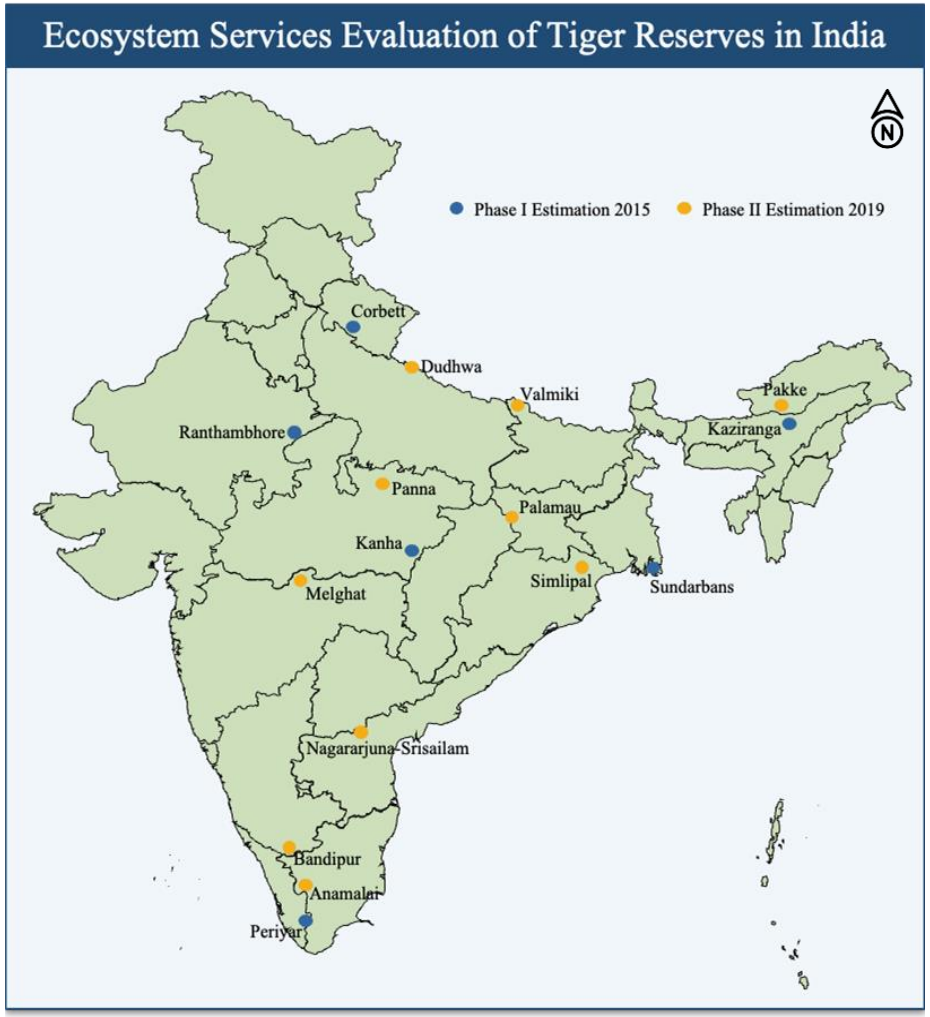
Valuations leveraging Millenium Ecosystem Assessment Framework

Type	Service	Est. Annual Value
Provisioning	Employment Generation, Fuelwood + Timber, Bamboo, NTFP	$64.54M
Regulating	Genepool Protection, Carbon Sequestration, Water Provisioning, Water Purification, Sediment Regulation, Biological Control, Pollination, Gas Regulation	$325.67M
Cultural	Recreation & Tourism	$0.29M
Supporting	Habitat for Species, Nutrient Cycling	$10.97M
Total Annual Flow Valuation		**$401M**

Outcomes	
Valuation for 17 Ecosystem Services	**Capacity Building for Forest Personnel**

Ecosystem Services Valuation of 16 Tiger Reserves in India (2015 - 2019)

Tiger reserves are vital ecosystems that support biodiversity and provide essential ecological, economic, social, and cultural benefits



Phase I — Annual Flow Benefits **$100 - $210 Million**

Per Hectare Annual Value **$658 - $2,235**

Phase II — Annual Flow Benefits **$60 - $190 Million**

Per Hectare Annual Value **$600 - $1,679**

Phase	Name of the Tiger Reserve	Annual Flow Benefits	Per Hectare Annual Value
I	Corbett	$170 M	$1,341
	Kanha	$190 M	$941
	Kaziranga	$120 M	$1,117
	Periyar	$210 M	$2,235
	Ranthambore	$100 M	$658
	Sundarbans	$100 M	$658
II	Anamalai	$150 M	$1,505
	Bandipur	$170 M	$1,679
	Dudhwa	$120 M	$1,235
	Melghat	$110 M	$1,094
	Nagarjunasagar	$190 M	$1,095
	Pakke	$60 M	$600
	Palamau	$80 M	$788
	Panna	$100 M	$1,047
	Similipal	$130 M	$1,341
	Valmiki	$90 M	$894

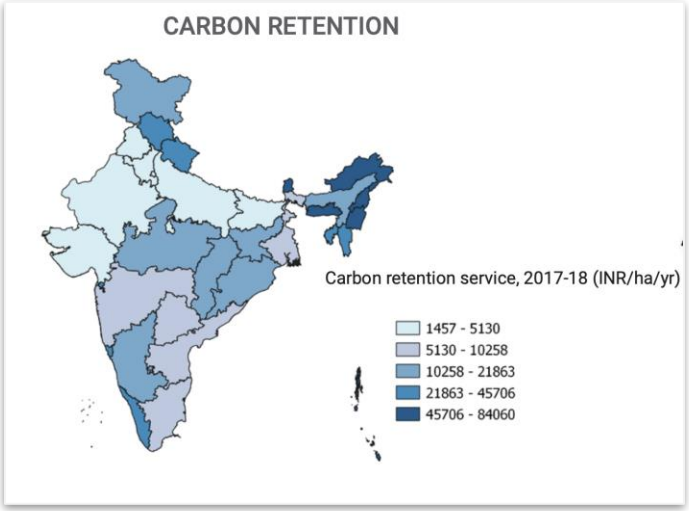
The SEEA Ecosystem Accounts; Pilot Project undertaken

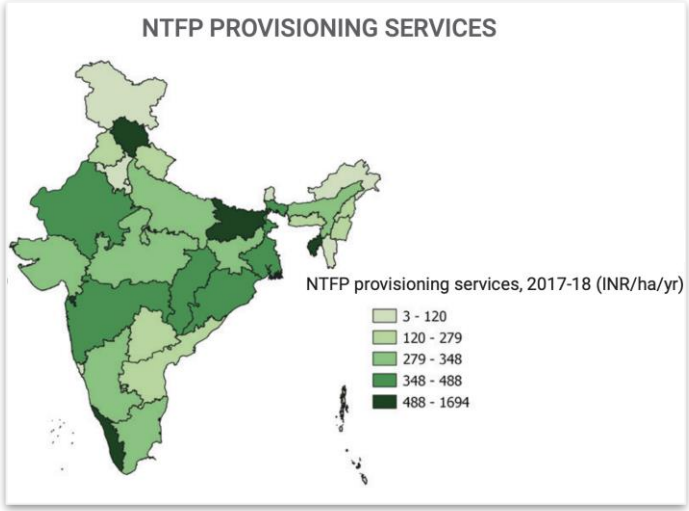
3

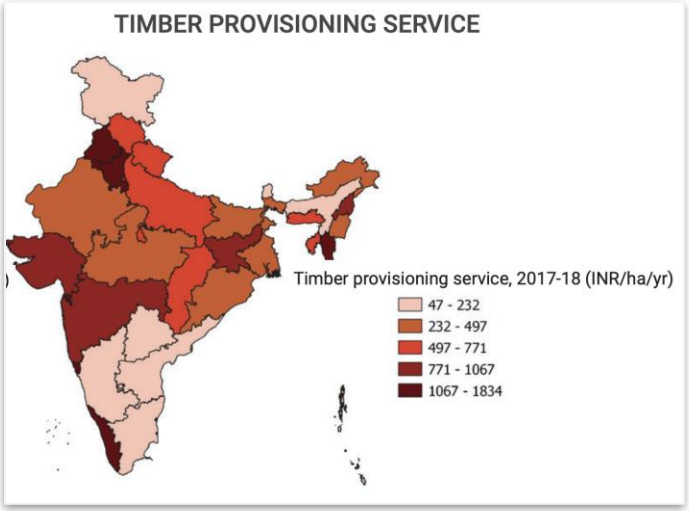
AIMS

- Improve measurement of ecosystem services
- Mainstream biodiversity and ecosystems into policy planning and implementation
- Contribute to the development of internationally agreed methodologies

Leveraged the SEEA EA framework to compile ecosystem accounts and created a thematic account on the country's biodiversity.







Ministry of Environment, Forest and Climate Change
Government of India

Government of India
Ministry of Statistics and Programme Implementation

Government of India
National Remote Sensing Centre
Indian Space Research Organisation
ISO 9001:2015

Challenges in Ecosystem Services Evaluation

Complexity of Ecosystem Functions

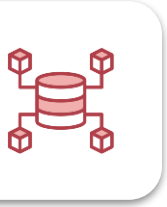
Ecosystems are dynamic and highly interconnected. Interplay between various services makes it challenging to evaluate their cumulative benefits accurately.

Valuation Methodologies

No single method for valuing ecosystem services; different studies use different approaches, leading to inconsistent results

Valuation of Non-Market Services

Many ecosystem services, such as air quality regulation and biodiversity, do not have direct market prices, making their valuation highly subjective and complex.



Data Availability and Quality

Ecosystem services data is often scarce or incomplete, especially for intangible benefits like cultural services. Inconsistent data collection methods and lack of long-term data complicate accurate valuation.

Trade-offs Between Services

Ecosystems often provide multiple services, and prioritizing or balancing competing services (e.g., agriculture vs. conservation) is a difficult task that requires complex decision-making frameworks.

Way Forward for Ecosystem Services Evaluation

Informed Policy Decisions

Incorporate ecosystem service valuations into policy and decision-making processes to ensure more informed, sustainable, and inclusive environmental governance.

Enhance Investments

Mobilize greater financial resources to strengthen forest conservation efforts and promote sustainable forest management practices, ensuring long-term ecosystem service benefits.

Thank You