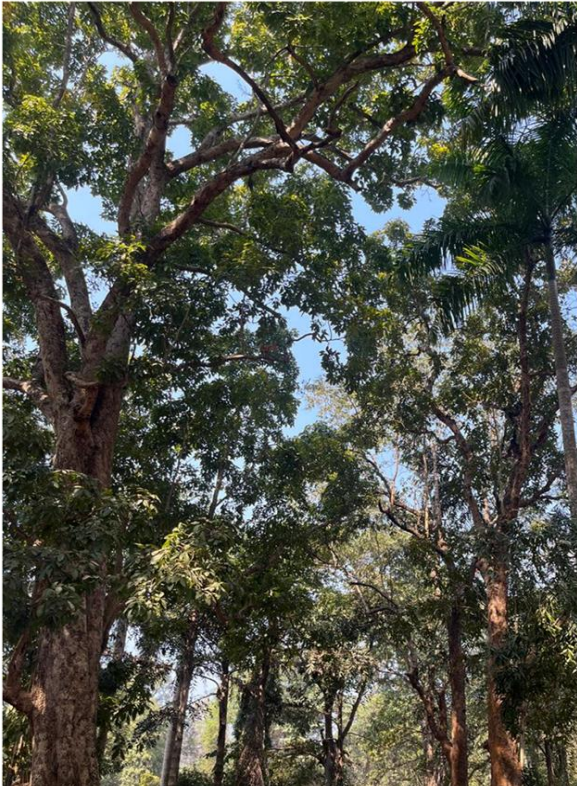


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SUMMARY FOR POLICYMAKERS



**ECOSYSTEM SERVICES OF FOREST
ECOSYSTEM IN CHHATTISGARH AND ITS
POTENTIAL CONTRIBUTION TO STATES
GROSS DOMESTIC PRODUCT GDP**

PREPARED BY- THE ENERGY AND RESOURCES INSTITUTE (TERI) |

SUMMARY FOR POLICYMAKERS

Ecosystem Services of Forest Ecosystem in Chhattisgarh and its potential contribution to States Gross Domestic Product GDP

This Summary for Policymakers (SPM) presents key findings of the study “Ecosystem Services of Forest Ecosystem in Chhattisgarh and its potential contribution to States Gross Domestic Product GDP”, the contribution of The Energy and Resources Institute (TERI) to the Chhattisgarh Forest Department on the monetization of ecosystem services provided by the forests, their contribution to the State’s GDP and the effects of climate change on these services.

Introduction

Forests provide a wide range of ecosystem services; however, it is inherently challenging to place a monetary value on many of these. As a result, the full contribution of forests to the economy is not accounted for, and decisions around allocation of financial resources are based on the values of only those forest services that have a clear price tag. It is important therefore to undertake a comprehensive valuation of the ecosystem services of forests and feed results of such an exercise to planners and policymakers.

Such an exercise is particularly significant for forest-rich states of India like Chhattisgarh, with nearly 41 percent of its geographical area under forest cover. This extensive forest cover makes the state a critical area of biodiversity and a key regulator of ecological balance in India. Over the past decade, Chhattisgarh has not only maintained a substantial forest cover but has also registered an increase of 199 square kilometers between 2013 and 2023, as reported in successive India State of Forest Reports. These forests are also central to the lives and livelihoods of tribal and rural communities, who depend on them for a wide range of forest resources for their livelihood and sustenance.

Approach and methods

This assessment adopts the System of Environmental-Economic Accounting (SEEA) framework, a globally recognized standard by the United Nations for measuring these services in economic terms. It standardizes valuation methods for integration into national accounts like GDP, allowing policymakers to track forest contributions alongside other sectors in a consistent manner. Under SEEA, services are classified into three main categories - provisioning (material outputs like timber and fodder), regulating & supporting (maintenance processes like carbon sequestration and biodiversity conservation), and cultural (non-material benefits like recreation and education), to enable consistent valuation and policy integration. The table below provides a snapshot of valuation methods – as applicable to this study.

Table SPM 1: Valuation method used for ecosystem service valuation

Ecosystem service type	Valuation method	Applicability
Provisioning (Timber, Fuelwood, MFPs)	Market price method	The market price method is best suited for provisioning services that enter established markets, including timber, agricultural produce, fish, and non-timber forest products.
Regulating (Carbon sequestration)	Modelling based method (InVEST)	A modelling-based method such as InVEST is well-suited for estimating regulating services in landscape-level assessments.
Regulating and Supporting (Air purification, Soil conservation, Pollination)	Replacement cost method	This method is suitable when the ecosystem service does not have a direct market price but has a close substitute can be directly valued. The replacement cost method estimates the value of ecosystem services by calculating the costs associated with replacing those services with human-made alternatives
Cultural (Recreation, Ecotourism)	Travel cost method (TCM)	TCM is used to estimate the value of recreational sites based on the costs incurred by visitors to access them.
Biodiversity conservation	Benefit transfer and proxy methods	These are used when direct measurement is challenging and current literature provides estimates that are transferable across contexts.

Ecosystem service valuation

The table below presents estimates of the annual Economic Values (EV) of key ecosystem services of the forests of Chhattisgarh, based on application of the methods mentioned above.

Table SPM 2: Total Economic Value (TEV) of ecosystem services

S.No.	Description	Annual EV (in Rs crore)
1	Timber*	318
2	Fuelwood*	1,857
3	Small Timber*	641
4	Bamboo*	20
5	Fodder*	6,197
6	MFP*	9,561
	Provisioning	18,594
8	Carbon Sequestration*	13,394
9	Water Availability and Purification*	20,825
10	Air Purification	269

11	Soil Conservation	693
12	Pollination	13,727
	Regulating	48,908
13	Biodiversity Conservation	41,111
14	Nutrient Cycle	15,211
	Supporting	56,321
15	Recreation*	13,645
16	Education, & Science	3,916
	Cultural	17,560
	TEV	1,41,383

**Denotes the services accounted as use values*

In terms of the spread of values across categories of services, supporting and regulating services clearly dominate. Significantly, these account for about three-fourth of the Total Economic Value, indicating the critical role played by forests in maintaining vital ecosystem functions.

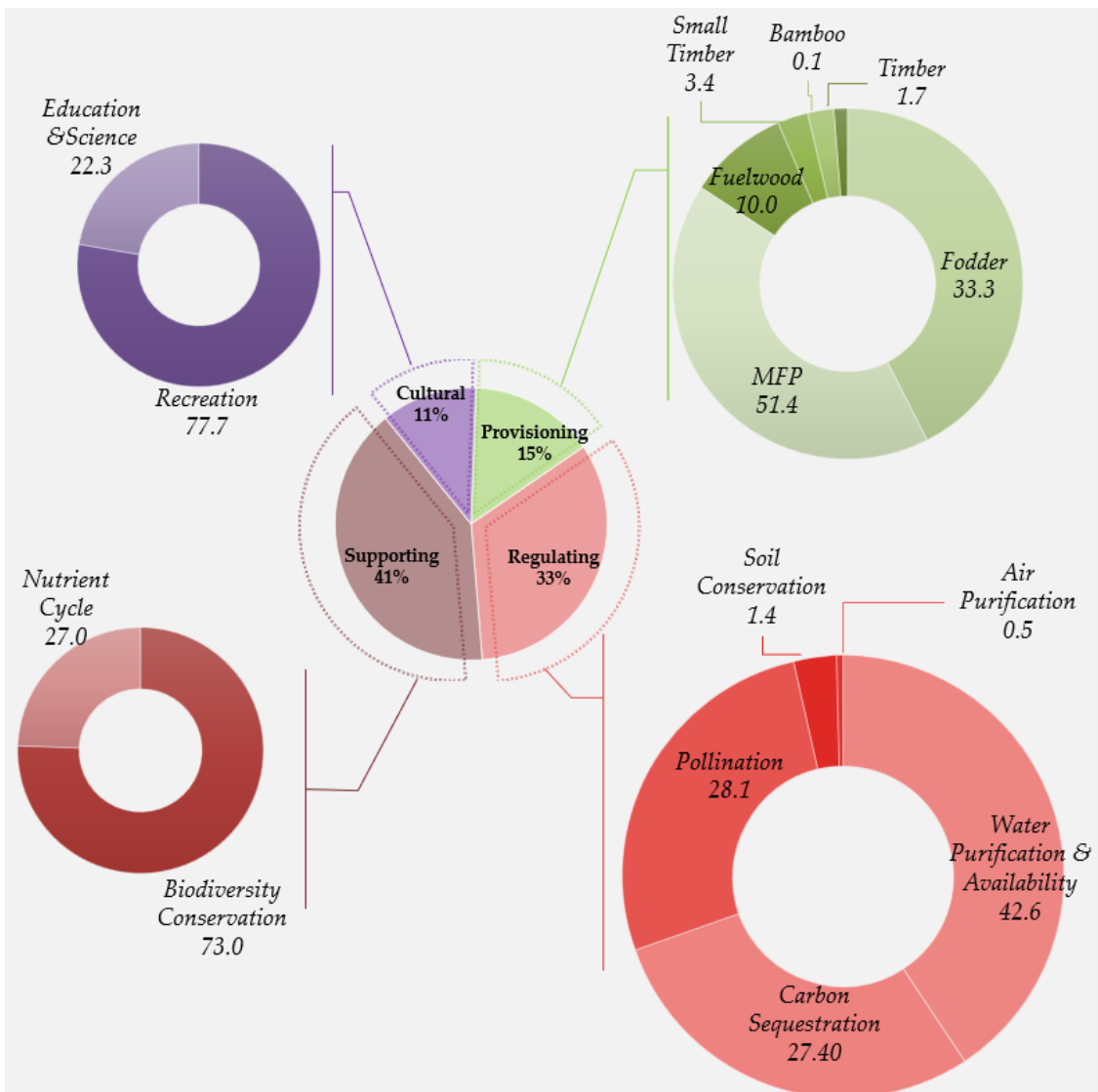


Figure SPM 1: Percentage contribution of services towards TEV

These benefits split into use values totalling Rs. 0.66 lakh crore (47% of TEV), covering direct and indirect benefits (e.g., provisioning services, water availability/ purification, biodiversity conservation) and non-use values (nutrient cycle, soil conservation, pollination, education) at Rs. 0.75 lakh crore (53% of TEV). Among provisioning services, the values of fodder and MFP dominate while among regulating services, water availability/ purification, carbon sequestration and pollination rank among the dominant services.

Contribution to the state's economy

The contribution of the forestry sector to the state's economy is captured through the lens of Gross Value Added (GVA) which calculates the state's income through the 'supply side' at base prices (excluding taxes and subsidies). GVA is ideally suited for sectoral analysis (that is, comparison of sectoral contributions to the economy). As this study attempts to position the value of the forestry sector's contribution to the economy within the context of other sectors such as agriculture, mining and manufacturing (that are fully monetised), the GVA approach has been used here.

This approach reveals a transformative shift when comparing forestry's contribution to Chhattisgarh's economy with and without the adjustment for ecosystem services, fundamentally reshaping perceptions of the sector's importance. In the baseline scenario, official GVA data shows forestry and logging contributing a modest Rs. 18,462 crore (3.5% of total GVA) within a state economy of Rs. 5,33,255 crores, which reflects only recorded timber revenues and ignores the vast unmonetized forest benefits. However, incorporating use values of ecosystem services elevates forestry to Rs. 66,458 crore (11.4% of total GVA), expanding the overall economy to Rs. 5,81,252 crores. This dramatic leap repositions forestry as the third-largest sector, surpassing mining and manufacturing.

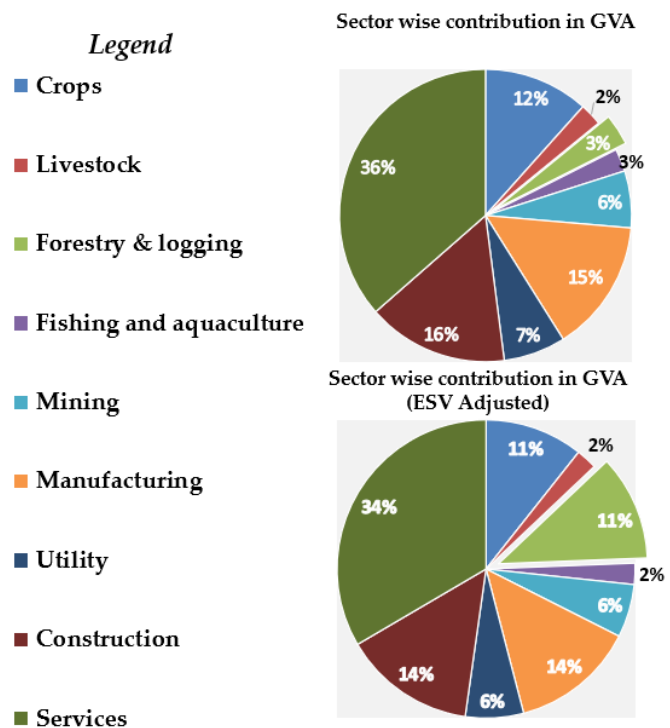


Figure SPM 2: Contribution of Forestry in GVA with and without ESV adjustment

It may be noted that using the GDP approach will slightly elevate the size of the total economy when adjustments are made for taxes (net of subsidies). However, if the adjustments are made consistently across sectors, the percentage contribution to the economy either in GVA or GDP terms will remain identical (11.4%) and therefore will not alter the overall narrative.

This shows that correctly reflecting just the use values of forests (within the spectrum of ecosystem services) creates a new policy perspective. We may note here that this would still represent a conservative estimate of the contribution of the forestry sector to the economy – and if the non-use

values are also incorporated within accounting systems, the potential importance of this sector will further go up.

Forests and climate change

Chhattisgarh has achieved the highest national forest cover gain (684 square kilometre from 2021–2023) though growing stock has plummeted from 74.42 m³/ha (FSI, 1997) to 55.69 m³/ha (FSI, 2019). As per the ICFRE report the Mean Annual Increment (MAI) of growing stock of India's forest is 1 m³/ha/year, whereas the average growing stock of Chhattisgarh is 0.75 m³/ha/year. This signals that although the growing stock of Chhattisgarh's forest has increased over the years, but it has not been increasing at the expected rate, which is 1 m³/ha/year at the national level and 2.1 m³/ha/year at the global level (ICFRE, 2018). Thus, more investment is required to enhance the growing stock of Chhattisgarh's forests and help improve the quality of forests.

Furthermore, the decline in growing stock directly undermines Chhattisgarh's carbon sequestration capacity, a critical regulating ecosystem service valued at Rs. 13,394 crores annually estimated by integrating state-level assessments of carbon stocks, InVEST modelling and Social Cost of Carbon (TERI, 2025; FSI, 2023; MoSPI, 2022).

Policy Implications

It is evident that forests provide a wide range of ecosystem services which when fully valued would significantly increase the sector's contribution to the state's income. Moreover, many of the benefits of forests transcend state boundaries; for instance, the carbon sequestration functions of forests constitute a global service though the state must bear the costs associated with forest management and conservation.

There is therefore a case for states with rich forest cover to be reasonably compensated for the ecosystem services their forests provide – through appropriate Environmental Fiscal Transfer (EFT) mechanisms. In India, successive Finance Commissions have accepted the principles underlying these mechanisms. The 12th Finance Commission introduced forestry grants using geographical area (7.5% weight), followed by forest cover inclusion in the 13th and 14th Commissions (7.5% weight), and enhancement to "forest and ecology" in the 15th Commission (10% weight) (15th Finance Commission Report). However, these funds remain untied, often redirected by states to other priorities rather than forestry, despite Chhattisgarh achieving the highest national forest cover gain of 684 km² (2021-23) (ISFR 2023).

The 15th Finance Commission provides Chhattisgarh Rs. 2,077 crore annually (2021-26), with approximately 10% (Rs. 208 crore/year) supporting forestry (15th Finance Commission Report Vol. II). Across the state's 59,816 km² Recorded Forest Area, this equals Rs. 34,729 per hectare annually. By contrast, the use values of ecosystem services of forests amount to Rs. 1,11,104 per hectare annually, implying that Finance Commission allocations account for less than a fifth of the contribution of forests to the economy even if only the use values are considered.

Besides, these funds remain untied, often redirected by states to other priorities rather than forestry, despite Chhattisgarh achieving the highest national forest cover gain of 684 km² (2021-23) (ISFR 2023). Results from this study can therefore help build a case of enhancing allocations to the forest sector of the state. Notably, Chhattisgarh's forests demonstrate significant growth potential

that targeted investments could unlock. The state leads nationally in forest cover expansion, yet growing stock stands at 55.69 m³/ha against a potential of 74.42 m³/ha observed in earlier assessments. This 22 m³/ha opportunity, aligned with ICFRE's 1 m³/ha/year increment standard, could yield 171 MtCO₂e additional carbon storage annually across RFA (40.3 tCO₂e/ha using IPCC factors) (ISFR 2023).

Funding should extend beyond forest protection to address root causes of degradation, particularly supporting forest-fringe communities. Approximately 12.77 million forest-dependent people generate Rs. 20,000-50,000 annually from minor forest produce, yet face constraints in health, sanitation, and education (Household survey, TERI, 2025). Forest development must be viewed as an integrated policy objective, combining sustainable forest management with livelihood enhancement, including improved access to health, sanitation, and education services for forest-dependent communities. This integrated strategy aligns with national objectives under the Green India Mission, translating ecosystem values into tangible socio-economic gains. Ecosystem service valuation provides the essential evidence base for securing these resources. Demonstrating forests' substantial economic contributions makes a compelling case for prioritizing the sector in state planning.

Conclusion

This study demonstrates that Chhattisgarh's forests constitute vital economic assets generating Rs. 1.41 lakh crore per year in ecosystem services and elevating forestry to an 11.4% contribution to the economy, while confronting degradation pressures that demand urgent action. Current funding is based on a relatively narrow estimate of a part of the use value of forests and constrains the realisation of the state's remarkable growth potential, including 171 MtCO₂e additional carbon storage capacity. Enhanced budgetary allocations to the forestry sector, for example through scaling up Finance Commission allocations will help unlock this potential while delivering climate resilience, community prosperity, and establish Chhattisgarh as a thought leader in green economy initiatives. Ecosystem service valuation provides the evidence base to transform forests from undervalued land banks into a crucial pillar of sustainable development.

Sustainable forest management must prioritize the upliftment of forest-fringe communities through employment generation and improved health, sanitation, and education; however, current budgetary allocations to the forestry sector are inadequate. The economic value of forests highlighted in this study highlights the need for increased budgetary support to strengthen forest conservation while enhancing livelihoods of forest-dependent communities.
