

Compensating states that maintain forests at the expense of their own development..... Valuation of forests in India



Comptroller and Auditor General of India

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1. Background

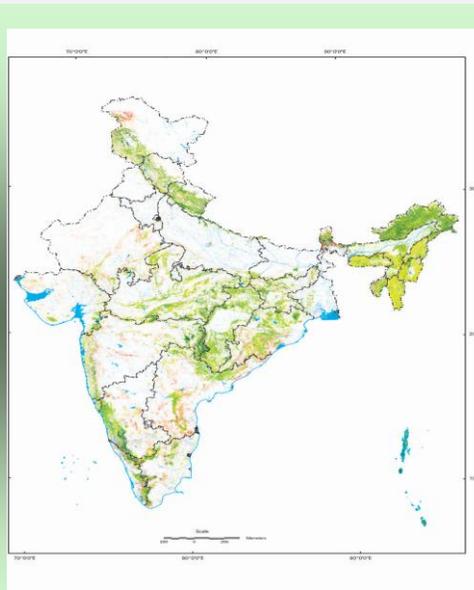
In the prehistoric times, more than 60 *per cent* of the earth was covered with forests. With the development of civilization, large areas have been cleared to make way for development in the form of agricultural farms, mines, towns, infrastructure like roads, dams etc. As a result only 30 *per cent* of the earth is still forested. Forests worldwide continue to be critically important habitats in terms of the biological diversity they contain and the ecological functions they serve. However, the process of development is destroying our forests and the needs of our development have to be balanced with the necessity of protection and preservation of our valuable forest resources.

In this context, some States have raised the issue of compensation for maintenance of forest cover, at levels higher than national average, as their needs for development are being hampered due to preservation and maintenance of large areas under forest cover. This is a legitimate concern which needs to be addressed by the Central Government due to the fact that forests have to be conserved because of the ecological services that they render especially in the context of the threats posed by 'climate change'. Currently there are many methods for valuation of forests which take into account both tangible and the intangible services that forests render. Thus there is an urgent need for a transparent, fair and acceptable approach for valuation of forests which would determine the value of compensation to be given to each State who need to be encouraged to maintain their forest cover despite their need for development. While reasons for slow development of states may be many, the argument that maintenance of large forest cover causes an impediment to development, cannot be dismissed.

Status of forests in India

The total forest cover of India, as per the 2007 assessment, is 690,899 sq. km. which constitutes 21.02 *per cent* of the geographic area of the country. Many states like Mizoram, Nagaland, Arunachal Pradesh, Manipur have high forest cover which is far above the national average while states like Haryana, Punjab, Rajasthan, Uttar Pradesh have forest cover lower than the national average. The states, which have shown a decline in the forest cover are Nagaland, Andhra Pradesh, Arunachal Pradesh, Tripura, Assam and Chhattisgarh. There has been a significant loss of forest cover in the Andaman and Nicobar Islands because of the tsunami, whereas the states of Mizoram, Manipur, Jharkhand, Meghalaya and Orissa have shown a marginal increase in the forest cover.

Distribution of forests in Indian states



Reasons for forest depletion

Population pressure, poverty and weak institutional framework have often been viewed as the predominant underlying causes of forest depletion and degradation in developing countries. Excessive population and livestock pressure and the requirements of forest products for essential development like fuel-wood, fodder, timber, lumber, paper etc., generate pressure on forest resources which in turn triggers deforestation. Over-exploitation of the forest resources, as compared to its incremental and regenerative capacities, escalates the forest depletion and degradation process. India has witnessed a spurt of large projects from big dams and thermal power projects to huge mines and massive industrial complexes which are destroying our forest wealth.

Need to balance development & conservation

The needs of our development have to be balanced with the necessity of protection and preservation of our valuable forest resources. This is possible through sustainable management of forests where the needs of development are taken care of without use of forest resources in a manner in which the resources are not replenished. Sustainable forest management encompasses all the three components of sustainability, viz. ecological, economic and socio-cultural well-being.

There is no doubt that time has come to recognise the conflict between development and conservation of forest resources and adequately compensate states who maintain higher forest cover. Before states can be compensated for maintaining high forest cover, we need to recognise the various parameters which need to be considered before issues regarding compensation can be decided.

Therefore, there is a need for appropriate valuation of forests to account for the benefits and costs involved in conservation and maintenance of forest cover while considering the scope for compensation. Keeping in mind our need for development which would necessitate some amount of deforestation, few modes of valuation of forests have been suggested below along with mechanisms for compensation for those states who preserve their forests despite their need for development.

2. Why forest need to be valued differently

While the value of any resource can be assessed by its demand behaviour, in case of forests, markets may not exist for all types of products. Further, forest 'services' like regulation of local/global climate, amelioration of weather events, regulation of hydrological cycle, protection of watersheds, their vegetation/water flows/soils, provision of vast store of genetic information etc., provide 'public goods' which have no market place at all. Moreover, forests have the peculiarity of inter-generational use. As a result of this, standard static economic analysis may not serve the purpose of pricing of forest wealth. Also, such resources are subjected to a variety of property rights systems, different from individual or private property rights. In such a scenario alternative methods are required to value forests.

There are externalities associated with forest resources and hence there is a gap between the value and the notional price. The positive externalities are generally in terms of various ecological, biological and aesthetic benefits and very little price is paid for these. Most of the

externalities are not accounted for and this results in gross under-estimation of environmental value of forests. It is mostly the value of timber that gets reflected in the contribution of forests in state domestic product. Such an under-valuation often leads to inadequate allocation of funds for preserving and maintaining forests. It is due to these reasons that there is need to take complete stock of forest resources and assign economic value to all intangibles including goods and services, soil erosion, agricultural productivity, etc.

3. Different methods available for valuation of forests

In this paper, we have examined methods for valuation of the forests and discussed three methods along with their advantages and disadvantages. While none of the methods emerge as clear options, we have tried to suggest variations so that they can be implemented for the limited purpose of determining the compensation payable to the states for maintaining their forest wealth.

Method I: Estimating value of forests as a carbon sink

This method is largely based on the fact that forests serve as carbon sinks and one can put a value to the forest wealth as a result of value of carbon stock stored in forests. This method of valuation is similar to the method of valuation used in carbon emission trading¹ (All references are given as endnotes to this document).

Forests are carbon sinks

Forests serve as carbon sinks, absorbing carbon from the atmosphere and storing it in wood, soil and other organic material. Reducing the world's forested area permanently decreases the Earth's capacity to store future carbon emissions. According to the Inter Governmental Panel on Climate Change, deforestation and forest degradation already contribute more than 18 per cent of all greenhouse gas emissions, an amount larger than both the agriculture and transportation sector. Perhaps more significantly, the world's forests store an estimated 4,500 gigatons of carbon dioxide in their ecosystems, an amount larger than all carbon currently found in the atmosphere. A release of this stored carbon into the atmosphere, even over a long period of time, would have catastrophic effects on the planet.

Carbon Sink method

The United Nations Framework Convention on Climate Change recently agreed to study and consider a new initiative, led by forest-rich developing countries, that calls for economic incentives to help facilitate 'Reductions In Emissions from Deforestation in Developing countries' (REDD)². The REDD concept is, at its core, a proposal to provide financial incentives to help developing countries voluntarily reduce national deforestation rates and associated carbon emissions below a baseline (based either on a historical reference case or future projection). Countries that demonstrate emission reductions may be able to sell those carbon credits on the international carbon market or elsewhere. These emission reductions could simultaneously combat climate change, conserve biodiversity and protect other ecosystem goods and services.

India is also vigorously supporting the REDD initiatives. From 1995 to 2005, the carbon stocks stored in our forests and trees have increased from 6,245 million tonnes (mt) to 6,662 mt, registering an annual increment of 38 mt of carbon (138 mt of CO₂ equivalent).

Forests sequester³ and store more carbon than any other terrestrial ecosystem and are an important natural 'brake' on climate change. When forests are cleared or degraded, their stored carbon is released into the atmosphere as carbon dioxide (CO₂). The largest source of greenhouse gas emissions in most tropical countries is from deforestation and forest degradation. Moreover, clearing tropical forests also destroys globally important carbon sinks that are currently sequestering CO₂ from the atmosphere and are critical to future climate stabilization.

Over the next few years, India plans to increase the carbon stocks in India's forest and tree cover at a rate higher than the historical rate of increase⁴. Under this scenario, the total carbon stored in India's forests in 2015 will increase to 7,283 mt. Putting a conservative value of US\$ 5 per tonne of CO₂ locked in our forests, this huge sink of about 24,000 mt of CO₂ is worth US\$ 120 billion, or Rs 6,00,000 crore. Incremental carbon under this scenario will add a value of around US\$ 1.2 billion, or Rs 6,000 crore every year to India's treasury of forest sink, assuming a value of US\$ 7 per tonne.

In this method of valuation, we measure the actual amount of carbon stored in the forests of India. The compensation according to this method would be based on the amount of carbon stocks sequestered in the forests of each state in India.

However, in order to make this method of valuation more fair and acceptable to other states that do not have high forest cover, the compensation could also depend on two other criteria i.e. maintenance of actual forest cover in a particular base year (say for example 2005) and increase in forest cover over the baseline year. Besides serving as an acceptable method for compensating states for maintaining and increasing their forest cover, this method would also encourage states to meet India's targets for REDD.

Based on this method, in the future, the Central Government could also consider a mechanism amongst states like the 'Carbon Emission Trading' to encourage the states to increase their forest cover.

Method 2: Assessing economic value of goods and services provided by forests

Total Economic Value method

In the case of natural and environmental resources a concept of **Total Economic Value (TEV)**⁵ is perhaps the most complete measure to express the full range of value of benefits i.e. both tangible and intangible. Tangible benefits from the forest accrue from timber and non timber forest products. Intangible benefits accrue from the ecological services that forests render like regulation of local & global climate, amelioration of weather events, regulation of the hydrological cycle, protection watersheds and their vegetation, water flows & soils and

Definitions

Direct Use Values refer to the current use of the resources and services provided, directly by natural and environmental resources. Direct use value can be either consumptive or non-consumptive. Forests provide timber, fuel wood, fodder, medicinal plants, fruits, etc., to the people and thereby generate direct consumptive use values. Recreation, education, research etc, are examples of direct non-consumptive use values.

Indirect Use Values generally are referred to the ecological functions that the forests provide. These can be broadly classified into three groups: watershed values flood control (like regulation of

provision of a vast store of genetic information. Another intangible service that forests provide is that of carbon sequestration which helps to counter green house gas emissions. TEV is calculated as per the formula given below.

$$\text{Total Economic Value} = \text{Use Values} + \text{Non-Use Values}$$

$$\text{Use Values} = \text{Direct Use Values} + \text{Indirect Use Values} + \text{Option Values}$$

$$\text{Non-Use Values} = \text{Bequest Value} + \text{Existence Value}$$

Economic value measures provide a common metric of value for the different services provided by the forests viz., timber, biodiversity, carbon sequestration, watershed values, etc. in monetary units, say Rs/hectare.

stream flows, recharging of ground water), **ecosystem services** (like fixing of nitrogen, carbon sequestration, assimilation of waste, carbon sequestration, gene pool) and **evolutionary processes** (like life support, biodiversity preservation).

Option Values are associated with the benefits received by retaining the option of using a resource in the future by protecting or preserving it today.

Bequest Value originates when people are willing to pay to conserve a resource for the use of future generations.

Existence Value is a concept associated with peoples' willingness to pay simply for the pleasure they derive from knowing that a natural area or particular species or characteristic exist, irrespective of any plans they may have to use these resources. People's willingness to pay for the preservation of endangered species is an example of existence value.

For valuation of forests in the states by this method, the total economic value can be arrived at for various forest goods and services. This can then be worked out for the forest cover of each state. The base year for coverage of forests in each state could be taken (say 2005) and value of forest goods and services can be calculated for a fixed period of time and compared with value of forest goods and services in the base year. Those states that show an increase in value of goods and services, i.e. TEV can then be compensated. This type of valuation has been done for the forests of Himachal Pradesh⁶ where it was worked out that the actual forest cover in HP covering an area of 14,346 km² generated economic value to the tune of Rs.7.45 lakh/hectare (based on 2000 prices).

Method 3: Using Green Accounting

Green accounting is a type of accounting that attempts to factor environmental costs into the financial results of operations. It has been argued that Gross Domestic Product among other things ignores the environment and therefore decision makers need a revised model that incorporates 'green national accounting'. The only yardsticks of growth or development that are available today are Gross Domestic Product (GDP) at the National level or Gross State Domestic Product (GSDP) at the State level. These yardsticks are unfortunately not designed to capture the significant gains/losses to human capital and natural capital that happen year after year and affect the depiction of the true or holistic wealth of the nation and its people.

Green Accounting method

By this method it is ensured that the national wealth would include not just a measure of manufactured assets and financial assets (physical capital), but also natural capital

About Accrual Accounting

The accrual accounting system is based on accrual concepts, depicting the financial position of an entity more

(oil, other minerals, forests, freshwater resources, cropland, fisheries, etc), human capital (knowledge and skills), and social capital (institutional and legal infrastructure, political maturity, social harmony, etc).

Sustainable growth is then defined as that which increases per-capita national wealth, defined in this 'inclusive' or holistic manner. In the absence of any measure of sustainable growth, it is not surprising that India and its states often unknowingly embark on unsustainable growth initiatives, at a very large future cost to the economy, to society, and to the natural ecosystems within which they survive.

The emphasis in accounting on 'GDP' as the key measure of growth will probably be studied by future generations as a significant design defect in the economic history of mankind. An appropriate alternative, '**Green Accounting**', entails the estimation of prices for all national assets, including natural and human capital assets, and their inclusion in the 'financial statement' of the nation.

'**Green Accounting**' is a methodology for capturing the so-called 'externalities' of 'mainstream' economics (like most material and unaccounted changes in natural capital, human capital, and social capital) by estimating their stock or net asset values, and thus bringing them within a common framework of value accounting for the nation. In practice, '**Green Accounting**' involves an array of quantitative estimations: modeling and valuing the non-marketed services of environmental assets such as forests, present-valuing future liabilities in the form of pollution abatement costs etc. Such estimations warrant the states to move towards '**Accrual Accounting**'.

The benefits are immense, as '**Green Accounting**' would better enable governments to evaluate choices without a bias against future generations, or a bias in favour of man-made assets as against natural assets. It would present in a different & holistic economic light choices such as conserving precious ecosystems rather than surrendering them at throwaway prices to logging interests for a relatively minor economic gain.

completely and in an integrated manner than a cash-based system does. It does so by recording assets, liabilities, revenue and expenditure in an integrated manner. The principal area where an accrued based system scores over a cash-based system is that the former records both cash and non-cash transactions (like the environment), thereby being able to capture a more complete and wholesome picture of operations at most instants of time. Accrual accounting system enables better internal control, better quality information for decision making, a more complete and transparent view of the financial position of the Government. The accrual system of accounting also enables a more effective assessment of the performance and provides the necessary information for linking the input costs to outputs and outcomes that is required by Government.

Implementation of accrual accounting in the Government

Comptroller and Auditor General of India has constituted a Government Accounting Standards Advisory Board (GASAB) to establish and improve standards of governmental accounting and financial reporting and enhance accountability mechanism. The Twelfth Finance Commission in their Report submitted to Government of India have recommended introduction of accrual based system of accounting. The Government has accepted this recommendation in principle and GASAB is in the process of drawing up a detailed road map and operational framework for its implementation.

Right now, models for construction of Green Accounts are available. One approach⁷ takes into account timber, fuel wood, non-timber forest products & carbon, bio-diversity values, soil conservation, water augmentation, & flood prevention, agricultural cropland & pasture land, sub-soil assets, freshwater stocks etc.

Once states prepare green accounts for the forests available in their states, then those that have a healthier Green Accounts could be disbursed more money as compensation.

4. Evaluation of the methods available

The different methods of valuation of forests are still being researched, experimented and refined. While the idea of compensation to states for maintaining forests is a new one, any method of valuation will have to take into account all the advantages and the limitations of each of the suggested approaches. Some of the advantages/limitations of each of the three suggested approaches are discussed below.

Approaches	Advantages	Limitations	Comments
Carbon Sink method	<ol style="list-style-type: none"> 1. Easy to calculate stored carbon in forests based on satellite data. 2. Ground work for the valuation has already been done by MoEF in conjunction with REDD initiative. 3. As the parameter for valuation is just one, there is less possibility of dispute between states. 	<ol style="list-style-type: none"> 1. States with high forest cover in the base year may not be able to easily show 'additionality' and hence may be at a disadvantage. 2. States that already have high forest cover spend huge amounts of money on maintenance. This aspect would not be taken into account by this method. 	In order to overcome the limitations, the compensation package under this method could contain three criteria i.e. (i) amount of actual carbon stored in the forests by each state in a specific year of valuation, (ii) maintenance of already existing forest cover (in a specific year) and (iii) increase in forest cover over the base year. An appropriate weightage for these factors could be worked out (like 50:25:25 or 40:30:30 etc.) after considering the pattern of increase of forest cover over a period of time both in India as well as in other countries.
Total Economic Value method	<ol style="list-style-type: none"> 1. For calculation of Non-Use Values, sophisticated probability models are now available for calculating some of the uncertainties in the valuation process. 2. Active research is taking place in this area and the method is becoming more and more refined and acceptable. 	<ol style="list-style-type: none"> 1. Calculation of Non-Use Values could be subjective and the uncertainty in the valuation process could bring in a high degree of error in the calculations. 2. The calculation of these values are highly site specific and cannot be extrapolated from one region to another or one state to another and hence the process would be very time intensive. 	This method would continue to have its share of subjectivity especially in calculation of non use values. Though a large amount of research is being done in this area, in the current scenario, the acceptability for deciding compensation to states based on this valuation method seems unlikely.
Green Accounting	<ol style="list-style-type: none"> 1. It is a true measure of sustainable growth as it not only measures 	<ol style="list-style-type: none"> 1. Accrual concept of accounting in the government sector is still in a very nascent 	This method would be the truest measure of sustainable growth and forest values. Though

method	manufactured assets and financial assets but also natural capital like biodiversity, minerals, forests, freshwater resources, cropland, fisheries, etc.	stage. 2. Green Accounting involves an array of quantitative estimations valuing the non-marketed services of environmental assets such as forests, valuing future liabilities in the form of pollution abatement costs, etc., all of which are highly subjective	currently it would be difficult to implement this, there is a need for the Government to move towards ' Green Accounting ' in the long run. For implementing this, the Government also needs to implement ' Accrual Accounting ' as suggested by the Twelfth Finance Commission and the Comptroller and Auditor General of India.
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5. Funding & mechanism for transfer of actual compensation to states

Once an approach for valuation of forests has been chosen and forests in each state valued accordingly, any of the mechanism listed below could be used for the process of transfer of compensation to the states.

- a. Setting up of a '**Forest Commission**' which would value the forests based on any of the suggested approaches and decide to award different rates of compensation to the states. Since a lot of money is being deposited in central CAMPA⁸, the pool of money lying in CAMPA could be used to award compensation to different states. The total fund available in ad hoc CAMPA is Rs.1366 crore as of January 2010. The government could consider setting up a Forest Commission (say every 5 years) which would work out the valuation of forests based on any of the 3 methods listed above and accordingly decide the compensation to be paid to the states.
- b. Another source of funds could be the financing available for REDD which could be used to support increase in activities relating to forest conservation and awarding compensation to states who do manage to increase the area of the state under forest cover. The REDD financing mechanism is under negotiation, to take effect after 2012. The mechanism will draw on various public and private financing sources to respond to the diverse needs of different developing countries. Two main types of financing needs which will arise are (i) upfront capacity building⁹ and (ii) ongoing emissions reductions¹⁰. India needs to intensify its efforts in areas of forest governance like land tenure clarification and improved law enforcement, land zoning etc, so that it will be eligible to get funding under REDD. Once India gets funds under REDD, the government may use the carbon sink method described above to distribute the fund amongst the states.

In the meantime, The Forest Carbon Partnership Facility (FCPF) became operational in June 2008. FCPF is a global partnership focused on reducing emissions from deforestation and forest degradation, forest carbon stock conservation, sustainable management of forests and enhancement of forest carbon stocks (which is also known as the REDD+ initiative). India needs to become a member of FCPF so that it has access to funds for REDD+ activities. Once funds are available to it under FCPF, the government can allocate it each state, according to valuation of forests as carbon sinks.

- c. As a part of the Finance Commissions' transfers to the states, one of the criteria could be the valuation of forests based on preservation and increase in forest cover. The criteria for horizontal sharing recommended by the 13th Finance Commission for arriving at the share of each state in tax devolution were:
1. 25 per cent to population,
 2. 50 per cent to per capita income distance,
 3. 10 per cent to area,
 4. 7.5 per cent to tax effort, and
 5. 7.5 per cent for fiscal discipline.

A new 6th criterion (percentage to be decided) for horizontal transfer to the states based on valuation of forest cover can be introduced. The percentage share for rest of the criteria can be adjusted accordingly.

6. Conclusion

There has been an increasing awareness in recent years that protection of the environment, especially maintenance of our forest cover, is necessary for sustaining balanced economic and social progress of the country. Over the last few decades, India has evolved legislations, policies and programmes for environmental protection and conservation of natural resources. Many states have responded well by protecting the environment and maintaining their forest cover despite pressures and needs of development. These efforts need to be encouraged. The Planning Commission is currently evolving a methodology for rewarding good environment performance by the states. In this backdrop, this paper, which talks about valuation of forests and award of compensation to states, will aid the Government in evolving transparent criteria to reward states.

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ENDNOTES

¹ Carbon emissions trading are a form of emissions trading that specifically targets carbon dioxide (calculated in tonnes of carbon dioxide equivalent). This form of permit trading is a common method countries utilize in order to meet their obligations specified by the Kyoto Protocol; namely the reduction of carbon emissions in an attempt to reduce (mitigate) future climate change.

² The UN-REDD Programme is the United Nations Collaborative initiative on Reducing Emissions from Deforestation and forest Degradation (REDD) in developing countries. The Programme was launched in September 2008 to assist developing countries prepare and implement national REDD+ strategies, and builds on the convening power and expertise of the Food and Agriculture Organization of the United Nations (FAO), the United Nations Development Programme (UNDP) and the United Nations Environment Programme (UNEP). The UN-REDD Programme's Policy Board has approved a total of US\$42.6 million for eight of the Programme's nine initial pilot countries. These funds help to support the development and implementation of national REDD+ strategies.

³ Carbon sequestration is the natural removal of carbon from the atmosphere by the soil and plants.

⁴ Based on '*India's Forest and Tree Cover: Contribution as a Carbon Sink*'- a paper by Ministry of Environment and Forests in collaboration with Indian Council of Forestry Research and Education, Forest Survey of India and National Institute of Remote Sensing.

⁵ Work in this area has been quoted from the following publications:

- The Value of Forest Ecosystems published by the Secretariat of the Convention on Biological Diversity;
- Valuing Forests-- A Review of Methods and Applications in Developing Countries by Joshua T. Bishop (editor), Environmental Economics Programme, International Institute for Environment and Development (IIED); and
- Towards an Economic Approach to Sustainable Forest Development—by Archana S Mathur and Arvinder S Sachdeva, Perspective Planning Division, Planning Commission, Government of India.

⁶ Economic Valuation of Forests of Himachal Pradesh by Madhu Verma, Associate Professor, Forest Resource Economics & Management, Indian Institute of Forest Management, Bhopal, India.

⁷ The Green Indian States Trust, an Indian NGO promotes sustainable development in India and one of its projects was to research and publish State-level 'Green Accounts' to encourage India's policy-makers and opinion-makers to overcome their almost exclusive dependence on the archaic and limited economic compass of 'GDP Growth' to measure and manage India's progress.

⁸ Compensatory Afforestation Fund Management and Planning Authority.

⁹ Upfront capacity-building (readiness) costs: Countries need to fulfill minimum readiness requirements, such as emissions reduction accounting infrastructure (monitoring, reporting and verification), clarification of land tenure and institutional capacities for law enforcement. Amount and type of costs will vary significantly among countries.

¹⁰ Ongoing emission reduction costs: These refer to two cost categories: forest protection costs and opportunity costs.

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- Forest protection costs refer to the costs of implementing policies and measures—both inside and outside the forest sector—that are needed to reduce forest emissions, including recurrent monitoring costs. Examples include tenure reform, forest law enforcement, taxation of forestland, restrictions on road building and agricultural zoning. Costs vary, and some measures, such as removing subsidies, may bring in revenue rather than incur costs.
 - Opportunity costs refer to the costs of lost profit opportunities from not deforesting or from adopting more sustainable forms of forest use. These costs vary across space and time: where markets are accessible, opportunity costs tend to be higher than in remote areas; where agricultural intensification increases in response to expanding forest protection (e.g. REDD activities), the opportunity costs also rise.