Worth more standing?

The economics of biodiversity and ecosystem services in tropical forests

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Liquid gold?: Ecosystem services like water are valuable but often not adequately remunerated. *Photo: iStockphoto/MsLightBox*

Tropical forests are unique economic assets. While to some, forests are a place for recreation and spiritual quest, others simply view forests as 'free' service providers. The menu of services they offer include: improving water quality, preventing soil erosion, regulating rainfall, providing communities with food, energy and timber, and serving as a rich storehouse of biodiversity. Further, they lock up 4.8 gigatonnes of carbon per year, making them a viable solution to climate mitigation. But at the rate we chop down or burn our forests, we add up to 20% to global carbon emissions annually – an amount more than the combined emissions from cars, ships and airplanes.

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Halting deforestation can only be addressed if the values of ecosystem services are fully recognized and represented in decision-making. Because many of the goods and services forests give us are considered 'free', they are unaccounted for by conventional economic accounts, such as the universally used System of Standard National Accounts (SNA). Lack of economic measures is also one of the reasons why deforestation effects remain largely hidden from policy-makers, and from the corrective power of public scrutiny. There is little, if any, recognition that forests make important contributions to long-term economic performance and to human-wellbeing.

A recent study, *The Economics and Ecosystems of Biodiversity* (TEEB), reflects the awareness that we need to bring new thinking to the table. In line with 'Beyond GDP' thinking, TEEB recommends a new and much more advanced macroeconomic compass, or a 'dashboard' of indicators which is based on inclusive wealth (or 'extended wealth') and thus involves tracking per-capita physical, natural, human, and social capital on an ongoing basis.

TEEB has studied the value of nature from the point of view of policy makers, local and regional decision makers and businesses. Using a wide range of tools and policy options, we put forward practical and workable policy prescriptions, mechanisms, and market-based instruments. These can then be used to protect nature in a way that seeks win-win solutions – for human welfare and development, as well as for ecological security. Tropical forests, as TEEB found, are one of the drivers to this change in paradigm.

Value of forest services

Forests have both direct and indirect benefits to human beings. Examples of direct benefits with associated market value include timber, fuel wood and non-timber forest products. Indirectly, forests provide essential supporting services, such as the maintenance of soil fertility, pollination or the maintenance of genetic diversity. The average value of these supporting services is estimated at US$900 per ha per annum (TEEB DO 2008).

Using different methods such as direct market pricing, travel costs and contingent valuation, we have obtained 230 values from 19 ecosystem services. The table on the next page presents an overview of the services we derive from tropical forests and their corresponding values.

We're rich!: Values of ecosystem services in tropical forests

Ecosystem service	Value of ecosystem services (US$/ha/year – 2007 values)		No. of studies
	Average	Maximum	
Provisioning services			
Food	75	552	19
Water	143	411	3
Raw materials	431	1 418	26
Genetic resources	483	1 756	4
Medicinal resources	181	562	4
Regulation services			
Influence on air quality	230	449	2
Climate regulation	1 965	3 218	10
Water flow regulation	1 360	5 235	6
Waste treatment/water purification	177	506	6
Erosion prevention	694	1 084	9
Cultural services			
Recreation and tourism opportunities	381	1 171	20
Total	**6 120**	**16 362**	**109**

Source: TEEB Climate Issues Update 2009

Forests are known as the lungs of the planet. But climate regulation, with the highest value of US$1965/ha/ year, is just one major ecosystem service. TEEB results highlight the importance of considering all services when making decisions about forests and other ecosystems. Policies should therefore not focus on a single ecosystem service, but should aim to ensure that other services and their values are considered.

An example of this is the Mayan Forest Road Project along the border of Mexico and Guatemala. Up to an estimated 311 000 hectares of jaguar habitat were found to be at risk of deforestation. But negative rates of return on investment were found when only carbon dioxide emissions (225 million tonnes over 30 years) were accounted for. A fuller evaluation including other ecosystem values would have tilted the conclusions more firmly in the direction of continued conservation rather than road development (TEEB DO 2008).

There are also cases when the local economy suffers heavy blows in the interests of short-term private gains. For instance, although one-time returns from deforestation (US$12 000/ha) may in some cases dwarf the average value of conserving forests (US$6120/ha/year), our study reveals that sustainable forestry is already more economically beneficial than unsustainable logging after two years. In fact, much of the lost ecosystem services are of greater benefit to communities than private gains.

One example is the case of Leuser National Park in Indonesia. A valuation study estimated that conservation and selective use of the forest would provide the highest return for the region over the long term (US$9.1-9.5 billion, using a 4% discount rate). Meanwhile, continued deforestation would cause the degradation of ecosystem services and generate a lower overall economic return for the province (US$7 billion; TEEB D1 2009).

The monetary difference between the deforestation and conservation options amounted to US$2.5 billion over a period of 30 years. Most of this would have to be borne by local communities who would benefit from forest conservation (mainly through water supply, non-timber forest products, flood prevention, tourism and agricultural production). This valuation exercise clearly demonstrated that logging the tropical forest not only worked against overall economic growth and development but also produced a negative impact on hundreds of rural forest dwelling communities compared to the limited private gain by a few logging companies (TEEB D1 2009).

Saying yes to PES

Investments and incentives are crucial in reversing current deforestation trends. According to Eliasch (2008), if we spend around US$17-$33 billion per year to 2030 to halt deforestation, we could generate long-term net benefits of about US$3.7 trillion, in present value terms.

Even the investment in degraded areas is economically compelling. Restoration of degraded areas helps regain productive potential as examples have shown: Eucalyptus plantation re-vegetation in Australia costs about US$1200/ha but yields benefits in increased land productivity worth US$33 000/ha (Dorrough and Moxham 2005). Also, planting mangroves along the coastline in Vietnam cost US$1.1 million but saved US$7.3 million annually in dyke maintenance (Tallis *et al.* 2008).

Likewise, corporations are increasingly seeing value in biodiversity preservation and recognizing the interconnectivity with long-term business durability. For instance, insurance firms and shipping companies have financed the reforestation of the Panama Canal region to restore freshwater flow to its locks and thus prevent the rise of shipping premiums caused by the risk of Canal closures.

There is also a high level of interest in tools that help capture the public goods value of natural ecosystems by implementing payments for ecosystem services (PES, see chart next page). PES seeks to ensure that the people who benefit from a particular ecosystem service compensate those who provide the service, giving the latter group an incentive to continue doing so.

Costa Rica remains a poster child for PES, where it is virtually a country-wide strategy for forest and biodiversity conservation as well as sustainable development. Set up in 1997, the national program remunerates landholders for providing carbon sequestration and hydrological (watershed protection) services as well as for preserving biodiversity and landscape beauty. From 1997-2004, Costa Rica invested some US$200 million, protecting over 460 000 hectares of forests and forest plantations and providing additional income to over 8000 forest owners. By 2005, the program covered 10% of national forest areas. US$64/ha/year was paid for forest conservation in 2006 and US$816/ha over ten years for forest plantations (TEEB D1 2009).

The program is based on partnerships at national and international level, contributing to long-term financial sustainability. National fossil fuel tax (US$10 million/year) is

the primary source of revenue, along with grants from the World Bank, Global Environment Facility and the German aid agency (Kreditanstalt für Wiederaufbau (KFW)). Funds are also provided through individual voluntary agreements with water users (US$0.5 million/year) which will increase with the gradual introduction of a new water tariff and potential new opportunities from carbon finance (TEEB D1 2009).

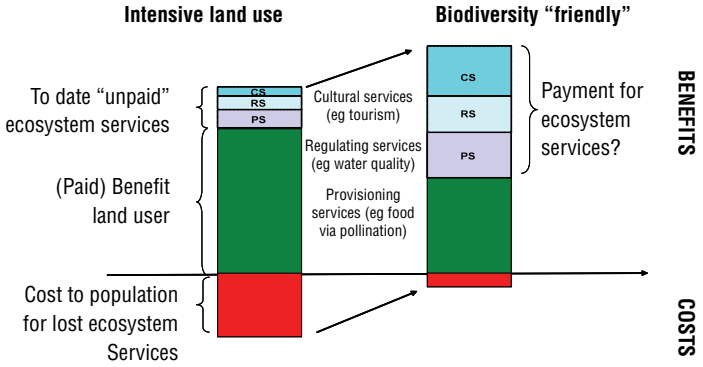
Costa Rica's program was successful overall in slowing deforestation, adding monetary value to forests and biodiversity and enhancing understanding of the economic and social contribution of natural ecosystems. However, recent assessments suggest that many areas covered through the program would have been conserved even without payments, for three main reasons: deforestation pressures were already much reduced by the time the program was introduced; the use of uniform payments (fixed prices); and limited spatial targeting of payments in the early stages of implementation. The program is being adjusted in response to these lessons (TEEB D1 2009).

Recommended actions

In the 'Cost of Policy Inaction' study during the first phase of TEEB, we estimated a value of US$3.4 trillion for the total benefit flows from tropical forests (Braat and ten Brink cited in TEEB D0 2008). Providing investments and incentives are necessary steps in ending forest degradation, but it should not stop there. Strict regulations and fiscal measures need to be put in place, making the economic cost of forest degradation visible to and felt by those incurring these costs. The TEEB reports aim to develop guidance for decision makers at international, regional and local levels in order to foster sustainable development and better conservation of ecosystems and biodiversity. This guidance includes a detailed consideration of subsidies and incentives, environmental liability, national income accounting, cost-benefit analysis, and methods for implementing instruments such as PES.

The guiding principles and operating framework for forest carbon, compatible with a wider framework of incentives for forest ecosystem services, will have significant influence on the development of other environmental markets – for freshwater enhancement, soil conservation, biodiversity conservation, etc. These also have to include a range of ecological, socio-economic and biodiversity criteria that more fully reflect the true economic value and development role of forests.

A higher bar: PES to encourage biodiversity friendly land use (higher ecosystem service provision)



Source: Bassi S. and ten Brink P., IEEP, adapted from S. Bassi *et al., Agriculture and Environment: Payments for Environmental Services (PES)*, presentation at the conference *Common Agriculture Policy and its Impacts* in Malta, 7-9 November 2008

Ultimately, such criteria could form the basis of entirely new classes of forest ecosystem services (e.g. freshwater quality) that can be 'sold' alongside or separately from carbon credits, generating yet more revenue for forest conservation and sustainable rural livelihoods.

Protecting forests from deforestation, conserving them against degradation and going even further by restoring them generates substantial co-benefits in the form of public goods and services which need to be treated explicitly rather than being treated as externalities in decision making.

References

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