

Tropical forests provide the planet with many valuable services. Are beneficiaries prepared to pay for them?

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At your service: tropical forests are unequalled in their provision of biodiversity protection services. *Photo: Iwokrama International Centre for Rain Forest Conservation*

THE many ecosystem services provided by forests—watershed protection, biodiversity conservation and carbon sequestration, for example (*see table*)—are gaining increasing attention from governments and the forest industry, as well as from private citizens. People are becoming aware of the dangers and costs of allowing forest services to be degraded or lost. Forest degradation and conversion can have local impacts, such as floods and landslides, as well as broader impacts, such as global climate change.

This growing awareness is drawing attention to the economic benefits of healthy forest ecosystems, benefits that until recently have often been taken for granted. Indeed, as human demands increase and natural resources become scarcer, those who bear the costs of degradation—such as downstream water utilities, local governments, private insurers and society as a whole—are exploring opportunities to reduce these costs.

For their part, forest owners are beginning to seek compensation for the costs of maintaining healthy forests. The legal tropical timber industry is searching for new ways to increase financial returns from their forests so as to remain viable enterprises. Some environmental groups hope that markets for ecosystem services will provide forestry with sufficient additional income to compete more effectively with alternative land-uses—such as soybean farms in the Brazilian Amazon or oil palm plantations in Malaysia—and to finance the large-scale restoration of degraded forest lands.

At a global scale, several recent reviews (eg Landell-Mills & Porras 2002) indicate that these payments for ecosystem services are nascent and still limited in scope and scale, but that they may have the potential to be scaled up to regional, river-basin or national levels with further development. Most of the activity to date to test such schemes has been in developed countries, where biophysical science tends to be stronger and legal frameworks and institutions exist that permit the development of more sophisticated markets.

A powerful case can be made, however, that the need for ecosystem service payments is strongest in developing countries, including in the tropics. Accordingly, producer countries are starting to investigate their interests and options in these markets. What is in it for tropical developing countries? Can they design and influence markets so that they can benefit fairly? Will these markets be a significant source of new financing—or will this pass as another fad, distracting from more fundamental obligations?

Industrialised-country governments are also beginning to assess their own interests and exposure. Will they be expected to finance the costs of protecting globally significant biodiversity? Will their industry remain competitive if producer country industry rights itself? Will they be expected to finance the costs of building legal and regulatory environments in developing countries to permit fair market trade?

Indigenous communities and other low-income forest people have their own interests and concerns. Will these markets be used as wedges to further alienate them from

their traditional lands? Or could perhaps these markets be a driver for increased tenure security and incomes?

The purpose of this article and the report on which it is based (Scherr et al. 2004) is to help policymakers assess these questions by providing a preliminary assessment of the status of markets for ecosystem services and their potential to contribute to tropical forest conservation. Data on these markets are difficult to attain, either because they are proprietary or because governments or intergovernmental organisations do not collect them. The analysis depends upon the limited available secondary literature and on information and materials provided by colleagues in the Katoomba Group, a network of global innovators in ecosystem service markets. A more substantive analysis will require an organised effort to collect new primary data.

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Types of payment scheme

The many different types of market and payment schemes can be organised into four categories: (1) public payment schemes to private forest owners to maintain or enhance ecosystem services; (2) open trading under a regulatory cap or floor; (3) self-organised private deals; and (4) ecolabelling of forest or farm products, an indirect form of payment for ecosystem services. There are numerous examples of each type of scheme, which can be illustrated for the three main ecosystem services addressed here: watershed protection, biodiversity protection and carbon sequestration.

Watershed protection services—such as flow regulation, water quality, water supply and habitat protection—are well recognised and indeed are a primary motivation for

establishing many national parks and forests. Some 30% of the world's largest cities currently depend on forests for their water. Markets for watershed services are site- and user-specific and currently are limited to situations where the downstream beneficiaries such as hydroelectric power generators, irrigators, municipal water systems and industry are directly and significantly impacted by upstream land-use.

Public payment schemes predominate in scale (though not in number) for watershed protection

services; these payments can make a significant contribution to local incomes and provide sufficient incentives for maintaining forest cover. In Costa Rica, for example, landholders in critical watershed areas are paid between US\$30 and US\$50 per hectare per year, and similar levels of payment are planned in Mexico. In the US, government payments for ecosystem protection range from US\$25–US\$125 per hectare per year. Self-organised private deals appear to be limited—although information is largely proprietary and there has never been a full assessment of these types of transactions. Open trading schemes—such as wetland mitigation banking—are few, and limited primarily to developed countries.

The many different **biodiversity protection services**—such as habitat and species' conservation, genetic and chemical information, and ecosystem functions such as pollination—are increasingly recognised as critical to many economic sectors, such as commercial fisheries. Market mechanisms include land markets for high-biodiversity-value habitat, payments for private, non-consumptive uses such as ecotourism, tradable rights and credits within a regulatory cap on habitat conversion, and ecolabelled products such as shade-grown coffee, herbal medicines and other botanicals from natural forests. The trade in these product markets is booming, with medicinals derived from compounds originally found in forests worth tens of billions of US dollars a year alone; however, these benefits are rarely captured by forest peoples. Although the bioprospecting market is still evolving, it has not yet generated significant direct investment or payments to local people and other forest owners. A recent global survey found 72 cases of biodiversity markets in 33 countries, of which 63 were in 28 tropical countries. Over 70% of these markets were international. In the US alone, experts estimate that over US\$2 billion have been invested in easements for habitat conservation over the past several years.

Of all the forest ecosystem services, **carbon sequestration** has drawn arguably the greatest attention and enthusiasm in recent years. There is now scientific consensus that human activities have contributed to global warming and that forests play major roles in both overall global carbon emissions and the provision of sequestration and storage services. Market segments in which tropical forests can play a role include reforestation and afforestation within the Clean Development Mechanism (CDM) of the Kyoto Protocol (the global cap-and-trade scheme), a range of land-use options that are attractive to investors through non-Kyoto trading, and voluntary payments by emitters to achieve carbon neutrality. Given restrictions on forest carbon offsets and estimating a value of US\$10 per ton of carbon, the CDM is expected to raise at most US\$300 million per year for afforestation and reforestation in the first commitment period (2008–2012). Estimates of the dollar value of forest carbon trading vary widely and ultimately depend on the size of the market, which in turn depends on

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Major functions performed by forest ecosystems

- Purification of air and water
- Regulation of water flow
- Detoxification and decomposition of wastes
- Generation and renewal of soil and soil fertility
- Pollination of crops and natural vegetation
- Control of agricultural pests
- Dispersal of seeds and translocation of nutrients
- Maintenance of biodiversity
- Partial climatic stabilisation
- Moderation of temperature extremes
- Windbreaks
- Support for diverse human cultures
- Aesthetic beauty and landscape enrichment

Source: Daily 1997

the final rules adopted under Kyoto, European trading rules and alternative schemes implemented by the us.

Key findings

Market characteristics

The total value of direct ecosystem service payments in tropical countries is presently modest, but has grown dramatically over the past decade and is significant, particularly to low-income producers: tropical ecosystem services are not yet commodities; rather, they behave as niche markets for products of special value to a narrow range of buyers.

Markets for forest ecosystem services are expected to grow in both developed and developing countries over the next 20 years: the potential for increased demand, and increased payment, for watershed services is immense. Water demand is projected to double, if not triple, over the next 50 years, and much of this growth will be in developing countries. Downstream users are learning that investments in watershed protection can be far more economical than investments in new treatment facilities. Growth in the carbon market could potentially be large but will depend on still unpredictable rules of international climate-change mitigation. Markets for ecolabelled products for export and for urban consumers in middle-income countries are likely to be the fastest-growing component of biodiversity markets.

Governments play a critical role as the principal direct buyers of many ecosystem services, and catalysts for many private-sector direct payment schemes: since many ecosystem services are public goods (*see box*), government intervention is usually required to make a market. This may entail directly paying for a service, establishing property rights, or establishing regulations that set caps and govern trading schemes. Since these markets are characterised by high transaction costs to link buyers and sellers and a lack of specialised market institutions, government intervention is usually required to assist in addressing these two major constraints to market development. Private buyers dominate indirect payments via certification schemes.

Ecosystem service payments will in most cases cover only a modest—but potentially catalytic—share of the costs of good forest management: prices for ecosystem services are generally not sufficient to justify forest conservation in areas where there are moderate to high opportunity costs for the land. However, evidence suggests that these payments can have a catalytic effect on forest establishment and management. Even modest payments, reliably paid over a number of years, can provide the increment to net income that makes forestry enterprises viable, justifying the restoration of degraded lands and enhancing the livelihoods of poor people.

Strategic issues

Policymakers concerned with tropical forests are beginning to assess their strategic competitive positions in the markets

for ecosystem services. They are keen to understand if and when they should seek to compete in global markets, and what kinds of market approaches make sense in their own domestic contexts. Policymakers face a set of key issues when trying to adequately assess and develop these options:

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- **property rights and national legal frameworks are necessary for ecosystem service markets to develop, yet these are poorly developed in most producer countries:** recognising property rights and reforming legal frameworks are often politically contentious and costly, yet are fundamental to establishing payment schemes of any type. Unfortunately, many forest areas in tropical countries are characterised by overlapping and conflicting claims to land and historic tensions over the rights of indigenous and other local communities. In most places it will be necessary to negotiate political support from key stakeholders in order to establish new markets;
- **these markets are not likely to contribute substantially to poverty alleviation unless proactive efforts are made to recognise rights and shape**

The problem of public goods

Most ecosystem services are considered 'externalities' or 'public goods'—positive benefits resulting from good forest management that can be enjoyed by all. Under present property rights and institutions, those forest managers responsible for providing benefits cannot exclude the beneficiaries from enjoying the service ('non-excludable') and the beneficiaries are not in competition with one another ('non-rival'). This undermines the formation of markets, since beneficiaries have no incentive to pay suppliers. Thus, in most of the world, forest ecosystem services are not traded in markets and have no 'price'. The failure of forest owners and producers to capture financial benefits from the provision of ecosystem services leads to the over-exploitation of forest resources and the under-supply of ecosystem services.

Thus, forest will be cleared where the opportunity costs of forest land for agricultural enterprises, infrastructure and human settlements are higher than the use or income value of forest products. In some cases, deforestation occurs because of perverse policy and institutional incentives, such as credit, agricultural and logging subsidies, or land tenure rules (Nasi et al. 2001). But even in the absence of perverse public policies,

forest ecosystem services would still be under-supplied by the market, in most cases due to their nature as public goods. Forest owners and producers ignore the value of ecosystem services in making decisions about land-use and management because they receive little or no direct financial benefit from them.

Economists and others have argued that mechanisms are needed by which forest and other resource owners are rewarded for their roles as stewards in providing ecosystem services. Anticipation of such income flows would enhance the value of forest assets and thus encourage their conservation. Compared to previous approaches to forest conservation, market-based mechanisms promise increased efficiency and effectiveness, at least in some situations. Experience with market-based instruments in other sectors has shown that such mechanisms, if carefully designed and implemented, can achieve environmental goals at significantly less cost than conventional 'command-and-control' approaches, while creating positive incentives for continual innovation and improvement. Where the benefits and costs of conservation vary spatially, market-based instruments seek out and concentrate on higher-benefit cases (Pagiola et al. 2002).

markets to provide equal access to low-income producers of tropical forest ecosystem services: rules governing any new market tend to be set by those more powerful sectors of society who have the capital and capacity to invest in designing the rules. To some extent, this is already taking place in the global carbon market. The implications of new markets, regulations and ecolabelling standards for low-income producers need to be identified and addressed; and

- **new market institutions are needed to reduce transaction costs and financial risks:** a major challenge of ecosystem service market development is to ensure that critical institutions are established to reduce transaction costs and to provide intermediation between buyers, sellers, investors, certifiers and other key groups in the value chain. If there is not appropriate action to address this at both national and international levels, many market opportunities will simply fail to materialise, especially in poorer countries and for poorer forest producers.

Knowledge gaps

Information about ecosystem service markets is scarce, the capacity to assess and develop markets is limited, and progress is hampered by a lack of understanding and political support from key stakeholders. To realise the potential of ecosystem service markets in tropical countries, leading organisations promoting forest stewardship will need to fill these knowledge gaps. In particular, policymakers and program leaders require:

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- objective technical assistance to identify the opportunities and risks of using different market instruments and to design them to be effective, efficient and equitable;
- opportunities to exchange experiences, perspectives and lessons with peers in other countries and regions about the most appropriate legal and regulatory frameworks;
- practical data on the costs of production, transactions, establishment and management for different market mechanisms; and
- capacity-building to develop sophisticated national expertise in analysing, designing and implementing ecosystem service markets in the public, private and civil sectors.

Ecosystem service markets offer a potentially powerful new set of incentives for tropical forest conservation and restoration, and new income opportunities for forest producers. However, it remains unclear which producers, consumers and types of forest resources will be the real beneficiaries of such market development. It is also

unclear as to the conditions under which the creation of ecosystem service markets will be the most effective policy instrument for achieving forest policy goals. Most markets are still incipient and their further development will require concerted government action. The decisions that will be taken over the next few years will shape market effectiveness, efficiency and equity for decades to come.

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This article is based on a report commissioned by ITTO and published in July 2004 as ITTO Technical Series No 21. The full report can be requested from the ITTO Information Officer (ahadome@itto.or.jp; see postal address on page 2) or downloaded from the ITTO website (<http://www.itto.or.jp/live/PageDisplayHandler?pageId=203>).